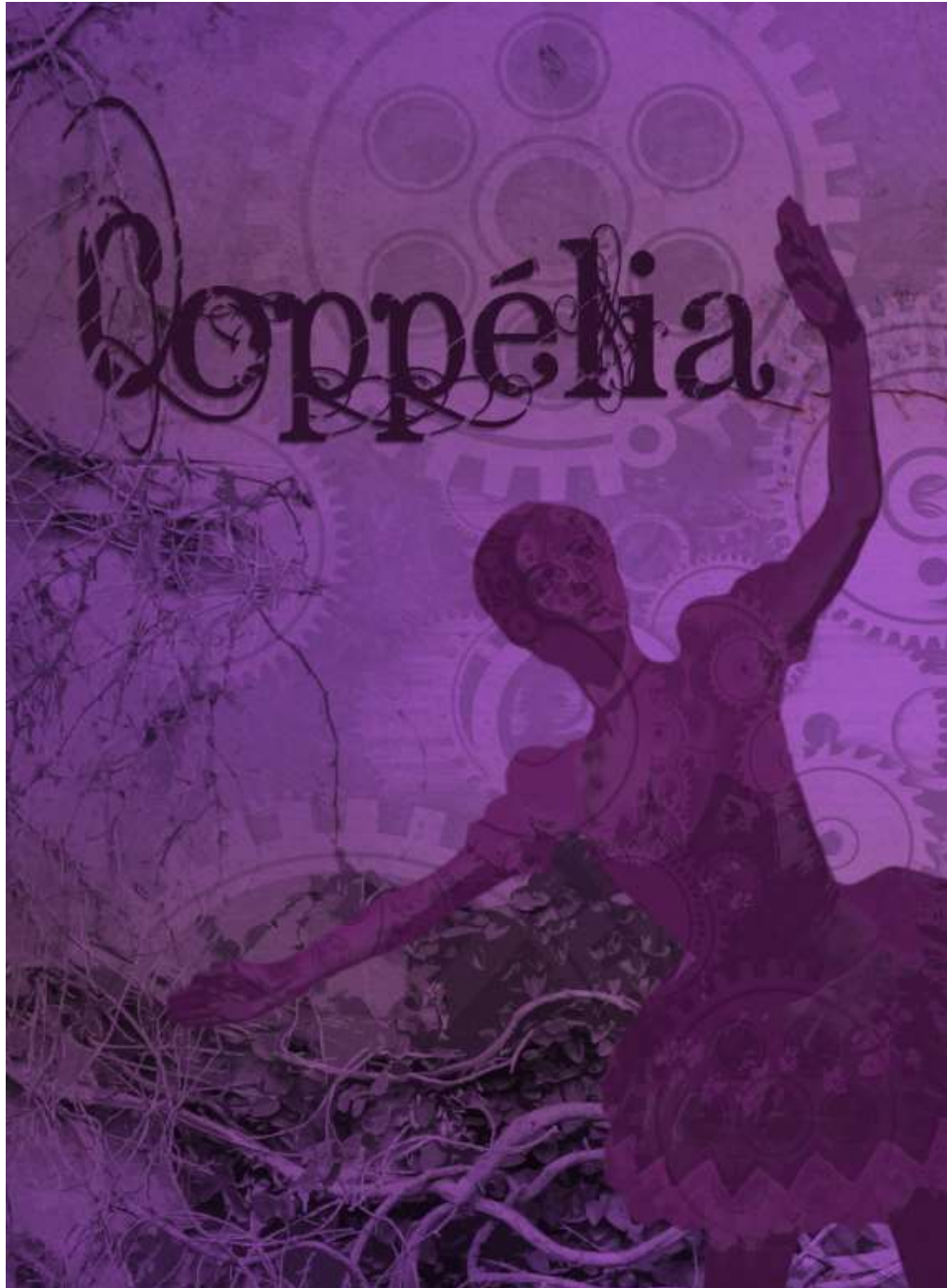


The Jefferson Performing Arts Society

Presents



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Teacher's Notes

- Music by Léo Delibes
- Libretto by Charles-Louis-Étienne Nuitter
- Originally Choreographed by Arthur Saint-Léon

Coppélia is a comic ballet based upon two stories by E. T. A. Hoffmann: *Der Sandmann* (The Sandman) and *Die Puppe* (The Doll). Dr. Coppélius is an inventor who has made a life-size dancing doll. It is so lifelike that Franz, a village youth, becomes infatuated with it and sets aside his true heart's desire, Swanhilda. She shows him his folly by dressing as the doll, pretending to make it come to life and ultimately saving him from an untimely end at the hands of the inventor.

Coppélia was a trail blazer. Coppélia was the first ballet to incorporate traditional dances and music, including national dances like the Czárdás (Hungarian) and the Mazurka (Polish.) Coppélia was the first (and only) ballet to be danced by Guiseppina Bozzacchi, the 16 year old ballerina who originated the lead role of Swanhilda. In fact, Coppélia was the first time Guiseppina Bozzacchi ever danced ballet on stage.

Coppélia was the first ballet to use automata, marionettes or automatized dolls. The Industrial Revolution in France paved the way for the trend of automata as parlor entertainment for adults, starting in the mid-19th century. Until then, larger automata were hand-built to impress royalty while most aristocrats could only afford smaller hand-crafted automata trinkets. The rise of the middle class meant more Europeans were wealthy enough to purchase automata devices to entertain guests at their homes, and advances in manufacturing meant parts for these clockwork robots could be produced and assembled like never before—particularly around Paris, which had the perfect mix of material resources, technology, and skilled craftsman to make these moving works of art. Thus, 1860 to 1910 is known as “The Golden Age of Automata.”

The **Background** section of this Companion contains information on both the history of Coppélia and the history of automata, marionettes or automatized dolls. This history

includes an overview of the earliest beginnings of automata, or self-operating machines from ancient Greece and China.

The lesson in this Study Companion delve into connections found between ballet, English languages arts and mathematics. In **Coppélia: Re-Writing the Ending** students will become familiar with the characters, settings and events of Coppélia and have an opportunity to create a new ending for this ballet.

In **Comparing the Characters in Coppélia and the Paper Bag Princess** students will become familiar with the characters of Coppélia and the modern-day fairytale The Paper Bag Princess, have opportunities to express their opinions about the characters of Coppélia and explore how the characters of these two stories are similar and different.

Whether still or in motion, ballet dancers are artistic wonders of the mathematical. Extended arms, heads, torsos, legs and feet become elegant lines and perfectly shaped angles. These lines and angles are also wonderful opportunities to learn about geometric measurement, triangles, angles, medians, perpendicular bisectors, angle bisectors and altitudes. The precision of elegant lines and perfectly shaped angles in ballet technique can be measured using a protractor.

Calculating angles is important not only for the placement of feet and arms, this skill is found in city planning and the mechanics and movement of planes, trains, automobiles, ships and rockets, including plotting and planning the trajectory of a rocket's path of ascent, orbit, reentry and landing. Precise measure of angles is used for the layout of streets, the planning of parking lots, train stations, gas stations, airports, parks, building lots and what will reside on them. The necessity of this skill is found in the drawing of blue prints and the design of a house office or business, the design of sidewalks, including the ramps that will be used by those traveling by wheel chair, and the placement of parking spots, parking meters, street lights and traffic lights on a city street. The planning and making of anything motorized—things that navigate through traffic, roll on tracks, fly or glide across water, all rely on the ability to measure accurately and calculate angles. In addition to configuring pattern and tempo, dancers have the distinction of being the embodiment of angles and measurement, calculations inherent in the art form.

Coppélia: Ballet Trailblazers, Arabesques, Jetés, Angles and Altitudes will investigate facts about Guiseppina Bozzacchi, the first dancer to ever portray Coppélia, Misty Copeland, American Ballet Theatre's first ever African American woman principal dancer, vocabulary for basic ballet positions (types of arabesques) and a movement (jeté) and explore discover the connections between these ballet techniques and geometric measurement.

The Choreography of Coppélia and Geometric Measurement can be used by itself or as a follow up to the math concepts explored in **Coppélia: Ballet**

Trailblazers, Arabesques, Jetés, Angles and Altitudes. Ballet dancers are precision, grace and beauty in motion. Their movements are also wonderful opportunities to learn about geometric measurement, angles, degrees, rotation and angles around a point in particular. The precision of ballet positions and movements can be measured using a protractor. Piqué tour or pique turn is a common ballet turn that is found within the choreography of Coppélia. The positions of the dancer's arms, legs and torso create angles, angles that can be measured. In this lesson, students will learn vocabulary for basic ballet positions (croisé devant, quatrième devant, effacé devant, à la seconde, croisé derrière, écarté, épaulé and quatrième derrière) and movements (relevé and piqué tour) and discover the connections between these positions and movements and geometric measurement.



Louisiana Educational Content Standards and Benchmarks

The arts facilitate interconnection. They provide tangible, concrete opportunities for students and teachers to explore academic concepts. Academic concepts are strengthened when learning integrates academic subjects like English language arts with arts. A system of Grade Level Expectations and Standards and Benchmarks is replacing the Common Core standards used since 2010 to measure student achievement. Here is some background information on Louisiana Common Core:

LOUISIANA STATE STANDARDS

In March, 2016 The Louisiana Board of Elementary and Secondary Education (BESE) approved the Louisiana State Student Standards in English language arts and mathematics. This action by BESE replaces the Common Core State Standards with unique state standards developed through a collaborative statewide process. Please visit these sites for more information:

<http://bese.louisiana.gov/documents-resources/newsroom/2016/03/04/bese-approves-louisiana-student-standards-adopts-2016-17-education-funding-formula>

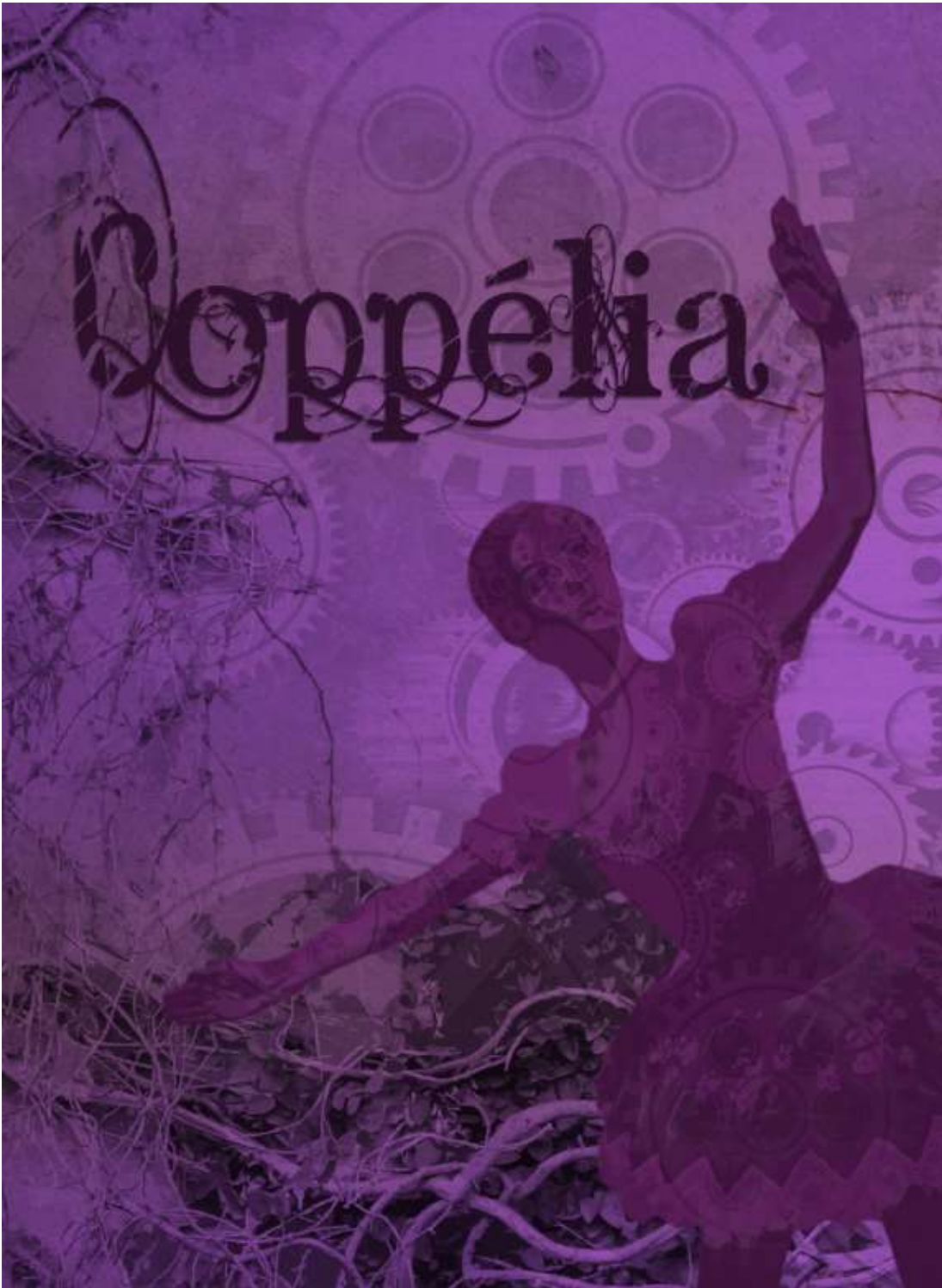
<http://www.louisianabelieves.com/academics/louisiana-student-standards-review>

All Louisiana State Standards were retrieved from:

<http://www.louisianabelieves.com/docs/default-source/teacher-toolbox-resources/k-12-ela-standards.pdf?sfvrsn=12>

http://www.louisianabelieves.com/docs/default-source/teacher-toolbox-resources/louisiana-student-standards-for-k-12-math.pdf?sfvrsn=86bb8a1f_60

Background





Background, Arthur Saint-Léon & Petipa

Coppélia is one of the most frequently performed and well-loved comic ballets. It was first choreographed at the end of the Romantic era and is considered to be a precursor to the “Classical era” (think Petipa) which then followed.

As George Balanchine put it, “Just as *Giselle* is ballet’s great tragedy, so *Coppélia* is its great comedy.” The ballet is an obvious deviation from Romantic ballets, which featured ethereal figures like sylphs and wilis, long tulle dresses for costumes (later known as Romantic tutus), and tragic endings. In contrast, *Coppélia* featured human characters (that is, apart from Dr. Coppélius’s dolls), and ended with the central characters, Swanilda and Franz, in blissful matrimony.

Following the success of *La Source* (1866), the collaborative effort between librettist Charles Nutter and choreographer Arthur Saint-Léon, the Paris Opera director Émile Perrin asked them to reprise the partnership, appointing Léo Delibes to compose the music. Nutter worked on the libretto for *Coppélia*, adapting E.T.A. Hoffmann’s dark tale of *Der Sandmann* (1815) to focus on the more lighthearted aspects of the story.

In early productions of *Coppélia*, women *en travesti* (or in disguise) would play the role of Franz, a tradition that continued at the Paris Opera until the 50s. For this reason, music had not been written for a male variation and there was no Act III *pas de deux*, which would only be incorporated once the score was rearranged for Marius Petipa’s production in 1884. Incidentally, Petipa’s production would mark the start of a trend towards a conclusive *Grand Pas de Deux* (adagio, male and female variations plus a *coda*), as seen in most classical ballets that followed.



Singapore Dance Theatre's production of Coppélia - Photo: © SDT

Coppélia was also the first ballet to feature national dances: the Czárdás (Hungarian) and the Mazurka (Polish) from Act I. Both Saint-Léon and Delibes were folklore aficionados, and the trend at the time of expressing nationalism through the arts are reasons for their mutual agreement to include these. *Coppélia* premiered in Paris on May 25, 1870, starring Giuseppina Bozacchi as Swanilda, Eugenie Fiocre as Franz and Francois-Edouard Dauty as Dr. Coppélius. Its initial success was interrupted by the outbreak of war, but it subsequently was presented more than 500 times, becoming the most performed ballet at the Paris Opera.

Just three months after the premiere of *Coppélia*, Saint-Léon died of a heart attack. The Paris Opera was left without its leading choreographer, and the shift of ballet supremacy to Russia was then wholly apparent, with the defection of dancers and other creative talents. In 1884, Marius Petipa restaged *Coppélia* in St. Petersburg, and ten years later, Enrico Cecchetti and Lev Ivanov would also revise it.

Other Notable Versions:

Ninette de Valois (The Royal Ballet)

Coppélia was first staged for the Royal Ballet in 1933 by Nicholas Sergeyev after the Ivanov/Cecchetti revision of the ballet. On that occasion, Dame Ninette performed the role of Swanilda. The Royal Ballet now performs a staging by de Valois from 1954, based on the Russian versions of *Coppélia*, with designs by Osbert Lancaster.

Patrice Bart (Paris Opera Ballet)

In 1996, Bart, a former *Étoile* (principal dancer) who worked very closely with Rudolf Nureyev (during his latter years with the Paris Opera Ballet), was commissioned to create a new *Coppélia* for the company. This production is inspired by the Hoffmann tale and attempts to give the characters psychological depth. Most significantly, Bart reintroduced the character of Professor Spalanzani: a mechanic in service of Dr Coppélius, and his sinister alter ego. He also used additional music from

Delibes' operas *Le roi l'a dit* and *Lakmé*, and chose to conclude his version with a love duet for Swanilda and Franz, instead of a *Grand Pas de Deux*.

George Balanchine/Alexandra Danilova (New York City Ballet)

The Balanchine/Danilova *Coppélia* is the most widely performed version in the United States. Alexandra Danilova had been a celebrated Swanilda herself, and both had performed the ballet in St. Petersburg and on tour with the Ballet Russes. Their 1974 production retains the Nutter plotline in the first two acts, but reimagines Act III as an extravagant pageant of balletic celebration.

Marius Petipa/Enrico Cecchetti/Sergei Vikharev (the Bolshoi Ballet)

In 2009 Sergei Vikharev reconstructed *Coppélia* for the Bolshoi using old Mariinsky records of the 1894 Petipa/Cecchetti version, based on the Stepanov notation system. This version features a large ensemble of 24 dancers in the "Dance of the Hours" (Act III) and exquisitely refurbished designs. This version was staged in London in 2010 as part of the Bolshoi's summer tour.



Maria Alexandrova as Swanilda and Ruslan Skvortsov as Franz - Photo: © Damir Yusupov / Bolshoi Theatre

Story

Act I

Dr. Coppélius is an eccentric toymaker. He has built a life-sized doll, Coppélia, and daydreams of her coming to life. Franz, a young villager betrothed to Swanilda, is unaware that Coppélia, who sits at Dr. Coppélius' window, is only a doll and finds himself attracted to her beauty.

In the village square, celebrations are underway as the burgomaster presents a new bell to mark the following day's harvest festival, when Franz and Swanilda will tie the knot. The couple bicker and quarrel, but Swanilda shakes an ear of corn to test Franz's faithfulness, and the couple make up by the evening. Following a run-in with some mischievous youths on his way out, Dr. Coppélius drops

the key to his house. Swanilda and her girlfriends pick it up and decide to venture in to meet Coppélia.



David Morse as Coppélius and Elisha Willis as Swanilda - Photo: © Roy Smiljanic / BRB

Act II

Entering Dr. Coppélius's house, Swanilda and her friends find out that Coppélia is nothing but one of the mysterious toymaker's creations. Dr. Coppélius soon returns and drives out all the intruders, but Swanilda remains trapped. She sees Franz climb in through the window, hoping to meet Coppélia too. But he is intercepted by Dr. Coppélius and is made to drink till he passes out.

Dr Coppélius takes the opportunity to cast a spell, seeking to give life to Coppélia by transferring Franz's life force to the doll. He is overjoyed when she comes to life, not knowing that Swanilda – who has been following all his actions – has taken her place. Franz regains his consciousness, and soon all is revealed. Swanilda forgives Franz and they run out, leaving the dismayed Dr. Coppélius alone with his toys.



Maria Alexandrova as Swanilda and Gennadi Yanin as Coppelius - Photo: © DamirYusupov / Bolshoi Theatre

Act III

The villagers gather to celebrate the harvest, as well as the wedding of Swanilda and Franz. Dr. Coppélius is upset and bitter, and threatens to take revenge for the intrusion to his home, but he is pacified by the burgomaster who gives him a purse of gold. The festivities continue into the night, with the “Dance of the Hours” and the wedding *Pas de Deux*.

Videos

- The Royal Ballet with [Leanne Benjamin as Swanilda and Carlos Acosta as Franz](#)
- Artists of the Bolshoi Ballet dance the [Act I Mazurka](#)
- Natalia Osipova and Vyacheslav Lopatin in the [Act III Grand Pas de Deux](#)
- Natalia Osipova performs [Swanilda’s Act III variation](#)
- Vyacheslav Lopatin performs [Franz’s Act III variation](#)
- Irina Shapchits and Mikhail Zavialov in [the Mariinsky’s Coppélia](#)
- Pacific Northwest Ballet’s Mara Vinson rehearses [the Balanchine/Danilova Coppélia](#)
- San Francisco Ballet’s production [of the Balanchine/Danilova Coppélia](#)
- Dorothée Gilbert as Swanilda in [Paris Opera Ballet’s Coppélia](#)



BRB's Jade Heusen and Maureya Lebowitz in the Dance of the Hours - Photo: © Roy Smiljanic / BRB

Music

Léo Delibes, then aged 30, was assigned to work on the score for *Coppélia*, together with Nutter and Saint-Léon. This was his first full-length ballet and is considered to be a great leap forward in the development of ballet music. Each of the characters is identified by a *leitmotif*: Coppélia's enigmatic tones and Dr. Coppélius' sinister undercurrent of vibrating strings, with the music clearly indicating the bustling village square in contrast to Dr. Coppélius' dark house.

Delibes was a folklore aficionado and was familiar with Eastern European dance music. He was said to be influenced by the Polish composer Stanislaw Moniuszko, whose use of melody and rhythm was largely based on national folkloric music. This led Delibes to include a Polish Mazurka in Act I, now one of the ballet's most iconic passages. In addition, Delibes included Czárdás (Hungarian), and short Spanish and Scottish vignettes for Swanilda in Act II.

A quintessential Spotify / iPod playlist should include:

- Act I (I) Prélude et Mazurka
- Act I (II) Valse Lente (Andante)
- Act I (IV) Mazurka
- Act I (VII) Czárdás
- Act II (XIV) Scène
- Act II (XV) Scène
- Act II (XVI) Bolero

- Act II (XVII) Gigue
- Act III (XXIII) Valse des Heures
- Act III (XXX) Danse de Fête
- Act III (XXXI) Galop Final



Natalia Osipova and Viacheslav Lopatin in Act III of Coppélia - Photo: © Damir Yusupov / Bolshoi Theatre

Mini Biography

Choreography: Arthur

Saint-Léon

Libretto: Charles

Nuitter

Music: Léo

Delibes

Original Cast: Giuseppina Bozacchi as Swanilda, Eugenie Fiocre as Franz and Francois-Edouard Dauty as Dr. Coppélius

Premiere: 25 May 1870, Paris Opera Ballet.

Sources and Further Information

1. Ballet Met [Notes for Coppélia](#) by Gerard Charles. August, 2001
2. Ballet Met [Notes on Arthur Saint-Léon](#), February 2001
3. [Recreating Lost Instants in a Reconstructed Ballet](#) – Bolshoi Ballet Review by Alistair Macaulay. New York Times, 30 May 2012
4. [Automaton for the People](#) – Royal Ballet Review by Luke Jennings. The Observer, 22 October 2006
5. DVD insert for the [Paris Opera Ballet Coppélia](#). Opus Arte, 2011.

6. Wikipedia Entry for [Coppélia](#)
7. Wikipedia Entry for [Léo Delibes](#)

About the Author:

Germaine Cheng is a freelance dance artist and writer, who graduated from [Rambert School of Ballet and Contemporary Dance](#) in London. Prior to that, she trained at the Crestar School of Dance and Singapore Ballet Academy, and has performed with the Singapore Dance Theatre and the Washington Ballet. She was mentored by leading UK dance critics at “Resolution! Review” and was a regular contributor to [londondance.com](#) and English National Ballet’s [Dance is the Word blog](#).

Follow on Twitter [@GermaineCheng](#)

RETRIEVED FROM: <http://www.theballetbag.com/2013/03/16/coppelia/>



George Balanchine

1904 – 1983



“I don’t have a past. I have a continuous present. The past is part of the present, just as the future is. We exist in time.”

22 January 1904

Georgi Melitonovich Balanchivadze, son of a composer, is born in St. Petersburg, Russia.

1913

Balanchivadze enrolls in the Imperial Theater Ballet School in St. Petersburg.

1915

Balanchivadze performs on stage for the first time, playing a cupid in Marius Petipa’s *The Sleeping Beauty* at the Mariinsky Theater, an experience he later credits with inspiring him to pursue a career in ballet.

1920

Balanchivadze creates his first choreography for student ballet concerts. He begins three years of piano and music theory at the Petrograd Conservatory of Music.

1921

Balanchivadze becomes a dancer at the State Theater of Opera and Ballet (formerly known as the Mariinsky Theater).

1922

Balanchivadze choreographs for the School’s graduation performances, dances at the State Theater, and organizes the Young Ballet, a small experimental company.

1924

Balanchivadze joins a touring troupe, Principal Dancers of the Soviet State Ballet. While performing in Germany, the troupe decides not to return to the Soviet Union. After an engagement in London, he travels to Paris to audition for Serge Diaghilev's Ballets Russes. Diaghilev hires him and changes Balanchivadze's name to George Balanchine.

1925 – 1927

Balanchine choreographs ballets for the Opera de Monte-Carlo and the Ballets Russes including *L'enfant et les Sortilèges*, a reworking of Léonide Massine's *Le Chant du Rossignol*, *Barabau*, *La Pastorale*, *Jack in the Box*, *The Triumph of Neptune*, and *La Chatte*.

1928

Apollon Musagète (later named *Apollo*) with music by Igor Stravinsky

1929

Prodigal Son with music by Sergei Prokofiev
Diaghilev dies in Venice. The Ballets Russes disbands.

1930 – 1933

Balanchine choreographs for companies in Paris, London, Copenhagen, and Monte Carlo, including the Ballets Russes de Monte-Carlo and Les Ballets 1933.

1933

Lincoln Kirstein meets Balanchine in London and invites him to the United States to establish an American ballet school and company.
Balanchine arrives in New York on October 17.

1934

Kirstein and Balanchine, with the financial support of Edward M. M. Warburg, establish the School of American Ballet, which opens on January 2. Balanchine choreographs *Serenade*, with music by Tschaikovsky, his first ballet created in America, which premieres at the Warburg estate.

1935

Balanchine and Kirstein establish the American Ballet, a professional company, with dancers from the School of American Ballet.

Balanchine is hired as ballet master of the Metropolitan Opera, and the American Ballet becomes its resident ballet company.

1936

Balanchine begins choreographing for Broadway productions, including *Ziegfeld Follies: 1936 Edition* and *On Your Toes*. Some of his dancers also appear with Ballet Caravan, a small touring company founded by Kirstein.

1937

Balanchine stages his first Stravinsky Festival, presented by the American Ballet at the Metropolitan Opera House and continues his work on Broadway musicals.

1938

Balanchine leaves the Metropolitan Opera and takes some of his dancers to Hollywood, where he choreographs *The Goldwyn Follies*.

1939

Balanchine becomes a United States citizen. He directs the dances for the Hollywood film of *On Your Toes*.

1941

Balanchine and Kirstein establish the American Ballet Caravan. The Company embarks upon a five-month goodwill tour of South America, which disbands at the tour's end. Balanchine choreographs *Ballet Imperial* (later renamed *Tschaikovsky Piano Concerto No. 2*) and *Concerto Barocco*.

1944 – 1946

Balanchine is hired as resident choreographer of the Ballet Russe de Monte Carlo, for which he creates *Danses Concertantes*, *Raymonda*, and *Night Shadow* (later called *La Sonnambula*).

1946

Balanchine and Kirstein establish Ballet Society. Balanchine choreographs *The Four Temperaments* to a commissioned score by Paul Hindemith in 1940 for the company's first performance.

1947

Balanchine works for six months as ballet master of the Paris Opera Ballet, for which he choreographs *Le Palais de Cristal* (renamed *Symphony in C* in 1948 for its American premiere). He choreographs *Theme and Variations* for Ballet Theatre.

1948

Balanchine choreographs *Orpheus* to a commissioned score by Stravinsky. Following the success of the ballet, Morton Baum, of the New York City Center of Music and Drama, invites Balanchine's troupe to join the organization as its resident ballet company, renamed the New York City Ballet. The first performance took place on October 11.



George Balanchine rehearsing Peter Martins in *Orpheus*. Choreography © The George Balanchine Trust. Photo © Carolyn George.

“Dance is a continuation. You cannot predict the signs of its evolution.”

1949

Firebird

1951

La Valse

Swan Lake

1952

Scotch Symphony

1954

The Nutcracker (Balanchine’s first full-length work for New York City Ballet)

Western Symphony

Ivesiana

1956

Allegro Brillante

1957

Square Dance

Agon

1958

Stars and Stripes

1960

Tschaikovsky Pas de Deux

Liebeslieder Walzer

1962

A Midsummer Night’s Dream

The New York City Ballet tours the Soviet Union. It is Balanchine’s first visit to his native country since he emigrated 38 years earlier.

1964

New York City Ballet moves into its new home, The New York State Theater at Lincoln Center for the Performing Arts, which was designed by Philip Johnson in consultation with Balanchine and Kirstein.

1965

Don Quixote, in which Balanchine plays the title role.

1967

Jewels

1972

Balanchine stages his second Stravinsky Festival, for which he choreographs eight new ballets, including *Stravinsky Violin Concerto*, *Duo Concertant*, *Symphony in Three Movements*, and *Divertimento* from *Le Baiser de la Fée*.

1974

Variations pour une Porte et un Soupir
Coppélia

1975

Balanchine stages a three-week festival honoring Ravel, for which he choreographs *Tzigane*, *Le Tombeau de Couperin*, and *Sonatine*.

1976

Chaconne
Union Jack

1977

Vienna Waltzes

1978

Ballo della Regina
Kammermusic No. 2

1980

Ballade
Robert Schumann's "Davidsbündlertänze"
Walpurgisnacht Ballet

1981

Balanchine stages a Tchaikovsky Festival at the New York City Ballet, for which he choreographs a new version of *Mozartiana*, which he originally created for Les Ballets 1933.

1982

Balanchine directs the Stravinsky Centennial Celebration, during which 25 ballets set to Stravinsky's music are performed by the New York City Ballet.

1983

George Balanchine dies in New York City on April 30.

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Coppélia

Based on the book by Charles Nuitter, after E.T.A. Hoffmann's "Der Sandmann," *Coppélia* is considered one of the triumphant comic ballets of the 19th century. It marked the passing of ballet supremacy from France to Russia. Originally choreographed by Arthur St. Léon in Paris in 1870, it was restaged by Marius Petipa in St. Petersburg in 1884 and revised, again, by Lev Ivanov and Enrico Cecchetti in 1894. None of St. Léon's choreography remains in today's production, although Acts I and II retain his ideas and the story of mischievous young lovers. Balanchine provided entirely new choreography for Act III.

Léo Delibes (1836-1891) was born in St. Germain du Val and died in Paris. He learned music as a child from his mother and uncle. Renowned as a composer for dance, he had a gift for illustrating action, creating atmosphere, and inspiring movement. Although he spent many years as a church organist, he was drawn more to the theater, and he composed many light operas. The decisive advance in his career came in 1870, with his full-length ballet *Coppélia*, which includes melodic national dances, descriptive passages introducing the main characters, and musical effects that have captured audiences for more than 100 years.

Repertory notes provided courtesy of and adapted from [New York City Ballet Online Repertory Index](#). Additional sources: Choreography by George Balanchine: A Catalogue of Works, An [Eakins Press Foundation](#) Book, published by Viking (1984); and Repertory in Review: 40 Years of the New York City Ballet by Nancy Reynolds (1970; The Dial Press).

Photo credit: Photo © Paul Kolnik



Choreography: George Balanchine and Alexandra Danilova, after Marius Petipa (1884) © The George Balanchine Trust

Music: *Coppélia*, ou La Fille aux Yeux d'émail

Composer: Delibes, Léo

Premiere: 1974

Average Length: 96 minutes

No. Dancers: 64

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Elizabeth Catlett, (American, 1915–2012)

Title:

Fiesta, 1988

RETRIEVED FROM: <http://www.artnet.com/artists/elizabeth-catlett/fiesta-By1Jkw-rIMWMtnRQNowFtg2>

Discover More About the Coppelia Ballet

A Classic, Comical Ballet



Caiaimage/Martin Barraud / Getty Images

by [Treva Bedinghaus](#)

Updated August 13, 2017

Coppelia is a charming, funny and comical [ballet](#) for all ages. The classic ballet is full of humor and ballet mime. It is often performed by small ballet companies because it doesn't require a large cast of world-class dancers, making it an ideal choice for a small production.

Plot Summary of Coppelia Ballet

The ballet is about a girl named Coppelia who sits on her balcony all day reading and never speaking to anyone. A boy named Franz falls deeply in love with her and wants to marry her, even though he is already engaged to another woman. His fiancée, Swanhilda, sees Franz throwing kisses at Coppelia. Swanhilda soon learns that Coppelia is actually a doll that belongs to Doctor Coppélius, the mad scientist. She decides to impersonate the doll, in order to win the love of Franz. Chaos ensues, but all is soon forgiven. Swanhilda and Franz make up and get married. The marriage is celebrated with several festive dances.

Origins of Coppelia

Coppelia is a classical ballet based on a story by E.T.A. Hoffmann entitled "Der Sandmann" ("The Sandman"), which was published in 1815. The ballet premiered in 1870. Doctor Coppélius has many similarities to Uncle Drosselmeyer in The Nutcracker. The Coppelia story evolved from traveling shows of the late 18th and early 19th centuries starring mechanical automatons.

Famous Dancers of Coppelia

Many well-known ballet dancers have danced roles in Coppelia. [Gillian Murphy](#) impressed audiences when she performed in American Ballet Theater's version of the classical ballet. Other famous dancers performing the classical story ballet include [Isadora Duncan](#), Gelsey Kirkland, and Mikhail Baryshnikov.

Interesting Facts About Coppelia

Coppelia introduced automatons, dolls, and marionettes to ballet. The ballet consists of two acts and three scenes. The original choreographer was by Arthur Saint-Leon, who died three months after the first performance. The ballet was choreographed again by George Balanchine for his first wife, Alexandra Danilova, with much success.

In some Russian versions of the ballet, the second act is played on a more happier note; in that version, Swanilda does not fool Dr. Coppélius by dressing up as Coppelia and instead tells him the truth after being caught. He then teaches her how to act in a mechanical, like a doll, way in an effort to help her with her situation with Franz.

In the Spanish production that was performed with the Orchestra of the Gran Teatro del Liceo of Barcelona, Walter Slezak played Dr. Coppélius and Claudia Corday was the doll who came to life.

RETRIEVED FROM: <https://www.thoughtco.com/what-is-the-coppelia-ballet-1007225>

YOUTH *Ballet* ACADEMY

THE FAIRY DOLL

The Fairy Doll, or Die Puppenfee, was premiered at the Vienna Court Opera on the 4th October 1888, a ballet which owes its inspiration to E.T.A Hoffman's 1815 story the Sandman in which a mechanical doll comes to life.



Original designs from the 1888 production

Synopsis

The Curtain rises on a toy shop where the proprietor is mending a doll's head, various customers and trades people arrive. An English family, a Scottish family a child with a broken doll, they are shown Ma-Ma- Pa-Pa dolls, Chinese and Spanish dolls as well as Tyroleans, harlequins, drumming bunny dolls and Finally the Fairy Doll.

The English family are enraptured by the Fairy Doll and place an order to buy her and arrange for her to be delivered. They leave and the shop closes for the night.



Anna Pavlova backstage as the Fairy Doll

As midnight strikes the shop magically comes alive and all the dolls with pulcinellas playing tiny cymbals dance the Fairy Doll waltz followed by a triumphal march with massed battalions of drumming bunny dolls and all join in a sparkling gallop gathering around the Fairy Doll. Disturbed by the noise the shopkeeper now rushes in but finds everything in order, he stands puzzled as the ballet ends with a tableau of dolls around their fairy queen.

Anna Pavlova danced her version of the Fairy Doll on her worldwide tours in the 1920's adding music from Drigo's 'Harlequinade' and the famous 'Serenade pas de trios'; Diaghilev in competition commissioned Leonide Massine to create 'La Boutique Fantasque' to an arranged score of Rossini pieces.

Richard Slaughter recreated the Pavlova version for Ballet Creations of London's 'A Portrait of Pavlova' in 1989 and staged the entire Fairy Doll Ballet for the Bournemouth Ballet Club in 1992.

RETRIEVD FROM: <http://www.youthballetacademy.uk/repertoire/the-fairy-doll/>

COPPÉLIA

CAST OF CHARACTERS

Dr Coppelius is a lonely old alchemist who lives in a two-storey house on the edge of the village square. He is regarded by the villagers as a sorcerer, someone who conducts strange experiments in his laboratory. They fear him and ridicule him.

Coppélia is his "daughter", a mechanical doll who is so lifelike she is able to fool the villagers into believing she is alive. Doctor Coppelius is so enamoured of this doll that he tries to use magic to bring her to life.

Swanilda is one of the most beautiful girls of the village, Swanilda loves life and her fiancé, Franz. She and her friends are to be married at a mass wedding during the Harvest Festival on the following day.

Franz is engaged to marry Swanilda, he causes her a great deal of dismay when he notices the beautiful "new girl" in the village, Coppélia, throwing kisses at him. Not realising that she is only a mechanical doll, he is determined to discover whether she really loves him or not by breaking into Dr Coppelius' house, where he finds himself in great danger.

The Official Party

The Seigneur and his Lady

The Town Councillor and his Wife

The School Teacher

The Priest

Villagers, Dolls, Attendants

RETRIEVED FROM: <https://australianballet.com.au/education-resources/coppelia-the-story>



A Synopsis of the Ballet, Coppélia - Act 1

The Truth About Love and the Beauty of Coppélia

By [Aaron Green](#)

Updated February 13, 2017

Act I

The story begins during a town festival in celebration of a new town bell that is due to arrive in the coming days. Anyone who wants to be married on that day will be awarded with a special gift of money. Swanilda is engaged to Franz and plans to marry during the festival. Swanilda asks Franz if he loves her and he answers yes, but she senses a lack of sincerity in his reply. She becomes unhappy with her fiancé because it seems he is more interested in getting another girl's attention.

The girl is Coppélia who sits on the toy-maker Dr. Coppélius's balcony reading all day long, paying no heed and showing no care for anyone trying to be social with her. Franz is mesmerized by her beauty and is determined to get her attention. Swanilda is deeply hurt by his distractions and feels he does not love her despite his answers.

Because she doesn't trust his words, Swanilda decides to turn to an old wives' tale for guidance. She holds up an ear of wheat to her ear; if it rattles when she shakes it, then she will know that he loves her. She shakes the wheat furiously, but no rattle can be heard. Confused and upset, she has Franz do the same thing. He tells her it does rattle. She does not believe him and runs away heartbroken.

When Dr. Coppélius leaves his house, he is heckled by a group of small boys. After running them off he finally goes on his way not knowing that he dropped his keys in the process of chasing the boys away. Swanilda finds his keys and is determined to find out more of Coppélia. She and her friends decide to go inside Dr. Coppélius's house. Meanwhile, Franz develops his own plan to meet Coppélia. He climbs up a ladder to Coppélia's balcony.

Act II

Swanilda and her friends find themselves in a large room filled with people, but these people aren't moving. The girls discover that these are not people, but life-size

mechanical dolls. They quickly wind them up and watch them move. In her searching, Swanilda finds Coppélia behind a curtain and discovers that she, too, is a doll.

When Dr. Coppelius returns home, he finds the girls in his house. He becomes angry not only for getting into his house, but for also messing up his workroom, and kicks the girls out. Dr. Coppelius begins cleaning up the mess and notices Franz coming into the window. Instead of shooing him away, he invites him in. Dr. Coppelius wants to bring Coppelia to life and in order to do that, he needs a human sacrifice. His magic spell will take Franz's life and transfer it to Coppélia. Dr. Coppelius gives Franz some wine laced with sleeping powder and Franz begins to fall asleep. Dr. Coppelius then readies his magic spell.

When Dr. Coppelius kicked the girls out, Swanilda stayed and hid behind a curtain. Swanilda dresses up in Coppelia's clothes and pretends to come to life. She wakes up Franz and quickly escapes by winding up all of the mechanical dolls. Dr. Coppelius becomes saddened to find a lifeless Coppélia behind the curtain.

Act III

Swanilda and Franz are about to say their vows when the angry Dr. Coppelius shows up. Feeling bad for causing such a mess, Swanilda offers Dr. Coppelius her dowry in return for his forgiveness. Swanilda's father tells Swanilda to keep her dowry. He pays Dr. Coppelius instead because it was a special day. Swanilda kept her dowry and Dr. Coppelius was awarded his own bag of money. Swanilda and Franz get married and the entire town celebrates by dancing.

RETRIEVED FROM: <https://www.thoughtco.com/coppelia-act-1-synopsis-723765>

The Guardian

Books

Living Dolls: A Magical History Of The Quest For Mechanical Life by Gaby Wood

The 18th-century mechanician, Jacques de Vaucanson, made 'robots' that were capable of playing musical instruments as melodiously as human beings - but it was his incontinent duck that has fascinated down the ages

Gaby Wood

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The 18th century was the golden age of the philosophical toy, and its reigning genius was Jacques de Vaucanson. His magnificent creations were admired by audiences all over Europe; they were praised by kings and applauded by scientists. Voltaire labelled him a "new Prometheus". Like the Greek Titan, he had the power, it seemed, to create life, to fashion men out of new materials.

Vaucanson's earliest mechanical influences came from the church. He was the youngest of 10 children (born in Grenoble in 1709), and his Catholic mother would take him with her every time she went to confession. While his mother was with the priest, Jacques stared at the clock in the adjoining room. Soon he had carefully calculated and memorised its mechanism, and was able to build a perfect copy of it at home.

His father, a master glovemaker, died when Jacques was seven, and the boy was sent away to be schooled at a monastery, where he arrived clutching a metal box. He didn't get on with the other boys, and couldn't concentrate on his lessons. Eventually, the father superior was forced to open the box. He found wheels and cogs and tools, next to the unfinished hull of a model boat. When confronted,

Vaucanson refused to do any studying until he could make his boat cross the school pond. He was locked in a room for two days as punishment, but he spent the time making drawings so exceptional that the maths teacher, who was later to be lauded by the Royal Academy of Sciences, decided to help him.

Of course, a story exists about the youthful genius of all famous men. What is curious here is that all of Vaucanson's early efforts as a mechanic were connected in some way to religion. The clock was seen at confession; the maths teacher was a monk. He went on to be taught by Jesuits, and, on leaving school, became a novice in the religious order of the Minimes in Lyon. This was the only way, he thought, that he would be able to pursue his scientific study, given the limited finances of his widowed mother. Indeed, Vaucanson was given his own workshop in Lyon, and a grant from a nobleman to construct a set of machines; but his talents were only encouraged up to a certain point. In 1727, to celebrate the visit of one of the heads of the Minimes, he decided to make some androids, which would serve dinner and clear the tables. The visitor appeared to be pleased with the automata, but declared afterwards that he thought Vaucanson's tendencies "profane", and ordered that his workshop be destroyed.

From this point on, Vaucanson realised he was involved in a risky business. He went home to Grenoble, and, offering the excuse of an "unmentionable illness", pleaded with the bishop to be withdrawn from the order. As soon as he was free, he ran away to Paris. Little is known about Vaucanson's activities around the time he left for Paris. It is thought that he attended classes in anatomy and medicine at the Jardins du Roi. He had soon produced enough work to go on an exhibition tour of Brittany. In Tours he met one of his main financial backers, and returned to Paris with enough money to dress in floral garments and carry a sword - in short, to gain a gentlemanly entry into high society. Just as he was preparing to construct the automaton he had been sponsored to make, however, Vaucanson fell seriously ill. He was bedridden for four months. In his delirium, he dreamed up an android that could play the flute, in the shape of a famous marble statue by the royal sculptor Antoine Coysevox, then on display in the Tuileries Gardens. He rose from his bed and drew designs for every part, handing them out as he went along to various craftsmen and clockmakers. As soon as the pieces were joined together, the automaton could be heard to play the flute, as perfectly as any human being. It was as if the marble statue had come to life.

The Automaton Flute Player was first exhibited on February 11, 1738. The price of entry was three livres, a week's wages for a manual labourer. Vaucanson demonstrated the object himself, to groups of 10 to 15 people at a time. The show was a huge success. The figure was made of wood, and painted white to look like Coysevox's marble. It was life-size - five and a half feet tall - and was supported by a large pedestal. The flute, as Vaucanson had learned from his musical acquaintances, was considered one of the hardest instruments to play in tune -

notes are produced not just by fingers and breath but by varying amounts of air blown into the flute, and different shapings of the lips. He had set himself an apparently impossible task, and emerged with a machine that could play 12 different melodies. The virtue of this flute player, and the reason it seemed an ideal Enlightenment device, was that Vaucanson had arrived at those sounds by mimicking the very means by which a man would make them. There was a mechanism to correspond to every muscle.

Nine bellows were attached to three separate pipes that led into the chest of the figure. Each set of three bellows was attached to a different weight to give out varying degrees of air, and then all pipes joined into a single one, equivalent to a trachea, continuing up through the throat, and widening to form the cavity of the mouth. The lips, which bore upon the hole of the flute, could open and close and move backwards or forwards. Inside the mouth was a moveable metal tongue, which governed the air-flow and created pauses.

This automaton breathed .

Vaucanson had designed seven levers corresponding to the fingers; but although the actions were all correct, the sound was not quite right. He discovered that wooden fingers could not play a metal flute the way a man or woman could: the machine was just not soft enough. So he looked around for a material that would accurately simulate the effect, and found it - the glovemaker's son covered his android's fingers in skin. As a later commentator put it, "What a shame the mechanician stopped so soon, when he could have gone ahead and given his machine a soul."

In 1739, when attendance at the exhibition was flagging, Vaucanson introduced two other machines. One was a pipe-and-drum figure, which played the pipe at a speed faster than any living person could achieve. The other was a mechanical duck. What was remarkable about this duck was that it ate food out of the exhibitor's hand, swallowed it, digested it, and excreted it, all before an audience. It became Vaucanson's most famous creation; without the shitting duck, Voltaire commented wryly, there would be nothing to remind us of the glory of France. It was made of gold-plated copper, but it was the same size as a living duck. It could drink, muddle the water with its beak, quack, rise and settle back on its legs and, spectators were amazed to see, it swallowed food with a quick, realistic gulping action in its flexible neck.

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Vaucanson gave details of the duck's insides: not only was the grain, once swallowed, conducted via tubes to the animal's stomach, but Vaucanson had also had to install a "chemical laboratory" to decompose it. It passed from there into the "bowels, then to the anus, where there is a sphincter which permits it to emerge". The duck was beyond a machine, it was a highly skilled joke. Had the duck been an artificial defecating man, there would no doubt have been a more complicated, less rapturous response.

Vaucanson, it must be said, was a man much preoccupied by the state of his body. He was plagued by an illness that had prevented him from eating. He suffered from a fistula of the anus. The mechanic's particular mention of the bowels, anus and sphincter of the duck - parts audiences may have preferred to imagine for themselves - might be seen as a reflection of his own personal preoccupations.

By 1741 Vaucanson had had enough of his automata. He wanted them to be shown in England, where there was a substantial audience for mechanical exhibitions, but he did not want to take them there himself. He had never seen himself as a mere entertainer, and in any case by then he had been given another, rather grand job. So he packed off his three machines with three Lyonnais businessmen, who paid over the odds for the privilege. They disappeared from their inventor's view, and embarked on a new stage of their mechanical lives.

As soon as he had sold his automata, Vaucanson put all his energies into his new job. Louis XV had been a great admirer of the duck, and in 1741 he appointed Vaucanson inspector of silk manufacture. Until then, there had been specific problems in the making of silk: the mills and wheels were mediocre, the weaving process was faulty. Vaucanson made several lengthy trips to Lyon, the silk-making capital and home of his former monastery. By introducing new regulations and designing new looms, he revolutionised the industrial process in France. Although not strictly automata, these machines were in a sense prostheses - extensions of men - or substitutes for men. The silk workers of Lyon rebelled against Vaucanson's automatic loom by pelting him with stones in the street; they insisted that no machine could replace them. In retaliation, Vaucanson spitefully built a loom manned by a donkey, in order to prove, as he said, that "a horse, an ox or an ass can make cloth more beautiful and much more perfect than the most able silk workers".

In 1744, makers of silk fabric and stockings - labourers and journeymen, overseers, dye workers, carpenters, crochet workers, shopkeepers - and manufacturers of gold and silver cloth revolted. The King responded first by issuing fines, and then by prohibiting the workers, on pain of prison, from gathering in "cabarets, taverns, cafes and places of public games" in groups of more than four. A crochet worker by the name of Gaspard Jacquet was condemned to appear before the Palace and the Hôtel de Ville, holding a blazing torch, naked except for his shirt, with a sign around his neck that read "seditious crochet worker". Other strikers suffered the same fate; still more were imprisoned. Almost a year later, the king issued an amnesty; but the damage had been done. Vaucanson had tried to replace men with machines; men had died as a result, and he had been forced to escape violence under cover of night, disguised as a Minime monk. Vaucanson's biographers, André Doyon and Lucien Liaigre, blame the silk workers for stalling the march of progress, for France's industrial revolution lagging behind England's.

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Meanwhile Vaucanson's three automata passed from one owner to another. The flute player left few traces, but the duck appears to have risen now and then, like a clockwork phoenix. A man named Dumoulin, a perfumier and glovemaker like Vaucanson's father, travelled with the machines through Europe and then pawned them in Nuremberg.

The automata were next seen, packed up in boxes in an attic, by the German writer Christoph Friedrich Nicolai, who published an account of his travels in 1783. The duck was intact, but Dumoulin had carefully positioned its internal chains in reverse, so that they would break if the duck was set in motion. The result of Nicolai's report was that the machines were rescued by an extraordinary man who had heard about them as a boy, declaring them to be "the greatest masterpieces of mechanics that humankind has ever created". The man was Gottfried Christoph Beireis, doctor to the Duke of Brunswick, collector of curiosities and reputed master of alchemy.

In 1805, Johann Goethe went to visit Beireis, lured by the legend of "the old wonder-worker". "The Vaucansonian automatons were utterly paralysed," Goethe reported. "In an old garden-house sat the flute player in very unimposing clothes, but his playing days were past... A duck without feathers stood like a skeleton, still devoured the oats briskly enough, but had lost its powers of digestion."

After Beireis' death, the automata disappeared once again; only the duck has been heard of since. It was found 20 years later, in the attic of another pawnbroker, by Georges Dietz, a theatrical impresario and exhibitor of automata. Dietz passed it on for repair to a Swiss clockmaker, who spent three and a half years working on the duck. Dietz took the duck to Paris in 1844 for the Exposition Universelle at the Palais Royal, where a wing fell out of order.

Also on show at the exposition were the automata of a celebrated magician, Jean-Eugène Robert-Houdin (the conjuror from whom Houdini took his name). Robert-Houdin had made an automaton that could write and sketch, and Dietz asked him to repair the duck's broken wing. The magician, delighted to have his hands on the famous creature, wrote about the occasion in his memoir. "To my great surprise," he reported gleefully of Vaucanson, "I found that the illustrious master had not been above resorting to a piece of artifice I would happily have incorporated in a conjuring trick." Robert-Houdin discovered that the digestion had been faked, and the emitted substance was a premixed preparation of dyed green breadcrumbs, "pumped out and collected with great care on to a silver platter".

Subsequent traces of the duck are scarce. In 1882, someone wrote a letter to a German newspaper claiming they had seen the duck in a private museum in Krakow during the summer of 1879. But within days the museum had burnt down. Amid the ashes, the writer of the letter reported, he and his wife found a pair of misshapen metal wheels, "the pitiful remains of our glorious bird".

More recently, however, some mysterious photographs have come to light in the archives of the Conservatoire National des Arts et Métiers in Paris (situated on a street now called rue Vaucanson). They show a crude, featherless bird, made of spring-like windings of wire and perched on a huge wooden frame that contains a mechanism resembling a watermill. They are extraordinary views, reminiscent of the sorry skeleton Goethe described.

The provenance of the photos is still in question. The present director of the museum does not believe the bird in the pictures is the original duck; Doyon and Liaigre believe it is. Either way, these photographs, the last fragments of possible evidence, tell their own story: Vaucanson's artificial being broke free from its creator and developed an afterlife of its own; stripped back and rebuilt, seen through and newly admired - whether in truth or in legend - it survives

• This is an edited extract from *Living Dolls: A Magical History Of The Quest For Mechanical Life*, by Gaby Wood, to be published by Faber on March 4.

RETRIEVED FROM: <https://www.theguardian.com/books/2002/feb/16/extract.gabywood>

[Ancient Androids: Even Before Electricity, Robots Freaked People Out](#)

By [Lisa Hix](#) — July 30th, 2018



The term “robot” was coined in the 1920s, so it’s tempting to think of the robot as a relatively recent phenomenon, less than 100 years old. After all, how could we bring metal men to life before we could harness electricity and program computers? But the truth is, robots are thousands of years old.

The first records of automata, or self-operating machines that give the illusion of being alive, go back to ancient Greece and China. While it’s true none of these ancient androids could pass the [Turing Test](#), neither could early 20th-century robots—it’s only

in the last 60 years that scientists began to develop “[artificial brains](#).” But during the European Renaissance, machinists built life-size, doll-like automata that could write, draw, or play music, producing the startling illusion of humanity. By the late 19th century, these magical machines had reached their golden age, with a wide variety of automata available in high-end Parisian department stores, sold as parlor amusements for the upper middle class.

One of the largest publicly held collections of automata, including 150 such Victorian proto-robots, lives at the [Morris Museum](#) in Morristown, New Jersey, as part of the [Murtoth D. Guinness Collection](#), which also features 750 mechanical musical instruments, from [music boxes](#) and [reproducing pianos](#) to large [orchestrions](#) and band organs.



Top: Swiss mechanic Henri Maillardet, an apprentice of Pierre Jaquet-Droz, built this boy robot, the Draughtsman-Writer, circa 1800. His automaton could write four poems and draw four sketches. Above: A drawing by Maillardet's automaton. (Via the [Franklin Institute of Philadelphia](#))

“Murtoth Guinness was one of the elders of the [Guinness brewing](#) family based in Dublin, Ireland,” says Jere Ryder, an automata expert and the conservator of the Guinness Collection. “Guinness traveled extensively throughout the world with his parents, and they had homes around the globe. But just after [World War II](#), he decided

he loved New York City best—with its opera, ballet, Broadway shows, and antiques—so he established a permanent residence there. That’s when he rediscovered mechanical music and automata and started to collect them with a passion.” Guinness died at age 89 in January 2002, and a year later, his collection was awarded to the Morris Museum.

Ryder’s connection to Murtoth Guinness goes way back. His parents, Hughes and Frances Ryder, were collectors and members of the [Musical Box Society International](#). In the late 1950s, Guinness, then in his 40s, had learned of their [music-box](#) collection. When Jere and his brother, Stephen, first met the Guinness heir, they were toddlers. “Guinness—who never drove himself anywhere—had to call a taxi to bring him all the way out to New Jersey from New York City,” Ryder says, remembering that first meeting. “He came knocking on our door in the evening. I was about 2 years old, and my brother, Steve, was just a year older. That was the night Guinness first met my father and my mother, and they struck up a lifelong friendship. He and my dad both had a passion for collecting these things. Of course, our family was not in the same league, collecting-wise. Mr. Guinness had the wherewithal to take it to a whole different level.” Given his early exposure, it’s no wonder Ryder would go on to apprentice with automata makers in Switzerland, [repair and sell automata](#) for a living, and [write extensively](#) on the subject with his brother.



Pierrot writes his love, Columbine, under the light of an oil lamp in this 1875 scene by Parisian automata manufacturer Vichy. At the time, artisans building automata would have been working under oil or gas lamps. (Via the [Murtoogh D. Guinness Collection](#) at the [Morris Museum](#))

In May, the Morris Museum hosted its second-ever [AutomataCon](#), which brought together 300 makers, collectors, and fans of all things automata. The convention corresponded with an annual exhibition of modern-day kinetic art, and the Morris Museum is currently [accepting entries](#) for next year's juried steam-themed show, "A Cache of Kinetic Art: Simply Steampunk"—the deadline is September 20, 2018. Of course, a rotating exhibition of half-a-dozen pieces from the Guinness Collection are on display at the museum year-round, and live demonstrations of selected machines take place at 2 p.m., Tuesdays through Sundays.

"In keeping with Murtoogh Guinness' wishes, we provide [regular demonstrations](#) of selected instruments and automata," says Michele Marinelli, the curator of the collection. "These are moving pieces. They need to be seen and heard."

The demonstrations always draw a crowd of gawkers. “When people today first see these things operate or hear them play, they’re just mesmerized,” Ryder says. “If people are in the next room and you turn one on, it’s like a magnet. They ask, ‘When were these made?’ We tell them, ‘Before [electric lights](#).’”

“These were the state-of-the-art entertainment devices of their day,” Ryder continues. “Back then, people didn’t have iPods, or even [radios](#). The [phonograph](#) hadn’t been invented. Think of that. Now, place yourself in that period and imagine you’re watching or hearing this technology. At the Morris Museum, we try to remove people from the cacophony of today’s electronics to help them imagine the impact of these machines.”

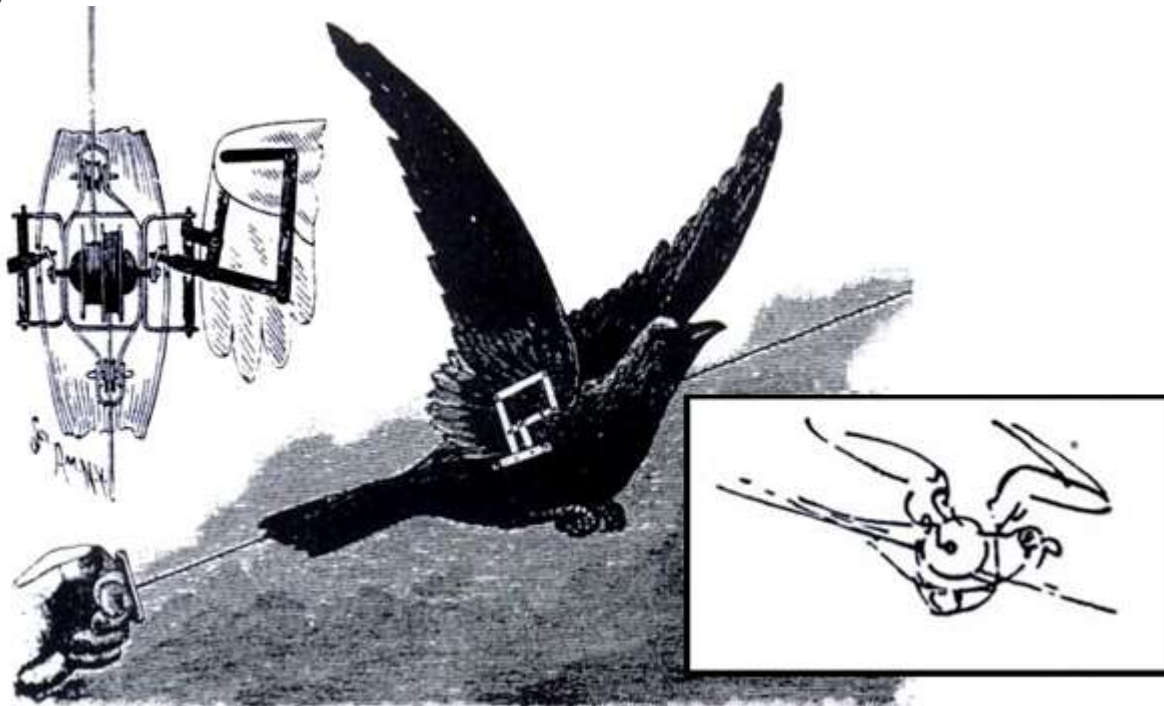


Jacquemarts, or “jacks-of-the-clock,” also known as bellstrikers, were among the earliest clockwork automata. This jacquemart is on St. Peter’s Collegiate Church in Leuven, Belgium. (Via WikiCommons)

Automata—those magical simulations of living beings—have long enchanted the people who see them up close. Ancient humans first captured their own likenesses with paintings, sculptures, and [dolls](#). Then, they made dolls that could move and, eventually, [puppets](#).

“Man’s fascination with replicating human or living creatures’ characteristics is an ancient thing,” Ryder says. “Back in the earliest times, the makers of carved dolls started to use [articulated limbs](#), with joints at the shoulders, knees, and hips in order to pose the dolls, before they had a way to mechanize the figures. It’s all an outgrowth of this human desire to see life replicated in a realistic manner.”

If you’ve ever watched the original “Clash of the Titans” and assumed [Bubo the metallic owl](#) was a preposterous 1981 Cold War anachronism, you might be surprised to learn that metal or wooden fowl were the stuff of legend for ancient Greeks, as much as Medusa and Perseus were. Around the globe, stories from mythology, religious scripture, and apocryphal historical texts describe wondrous moving statues, [incredible androids with leather organs](#), and mobile metallic animals—particularly in temples and royal courts—but it’s hard to sort fact from fiction.

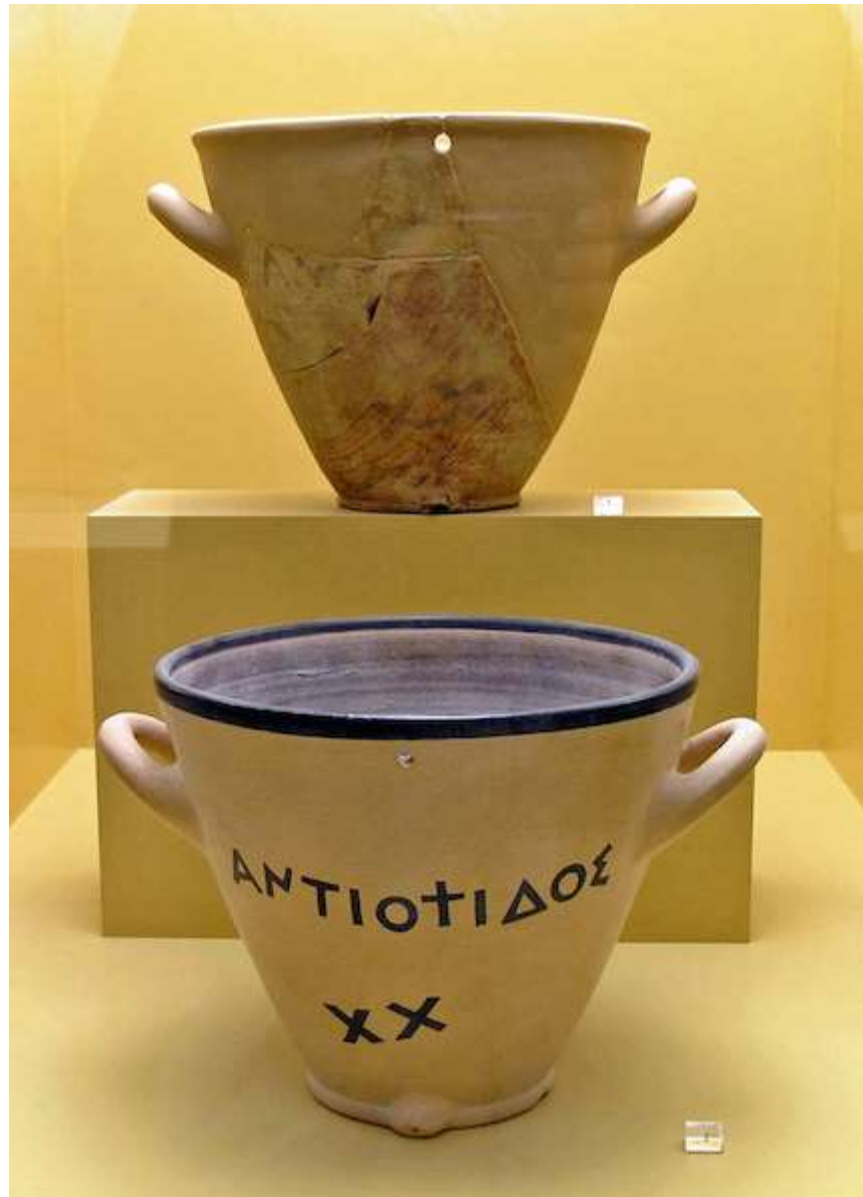


In the early 16th century, Leonardo da Vinci sketched a mechanical dove (inset), a concept made into a mechanical toy in the 19th century (main image).
(From [Leonardo’s Lost Robots](#))

For example, the Greek engineer Daedalus was said to have built human statues that walked by the magical power of “[quicksilver](#)” around 520 BCE, but it’s more likely the statues appeared to move through the power of his clever engineering. In “[The Seventh Olympian](#),” 5th-century BCE Greek poet Pindar described the island of Rhodes as “The animated figures stand / Adorning every public street / And seem to breathe in stone, or / move their marble feet.”

Nor were automata a uniquely Western preoccupation. Around 500 BCE, King Shu in China is said to have made a flying wood-and-bamboo magpie (like [Lu Ban's](#) bird a hundred years later, it was probably similar to a [kite](#)) and a wooden horse driven by springs, long before spring technology was perfected.

The Greek mathematician Archytas of Tarentum is credited with creating [a wooden dove](#) around 350 BCE that could flap its wings and fly 200 meters. It's likely the device was connected to a cable and powered by a pulley and counterweight, but some have speculated it was animated by an internal system of compressed air or an early steam engine.



A display of two outflow water clocks, or clepsydrae, from the Ancient Agora Museum in Athens. The top is an original from the late 5th century BC. The bottom is a reconstruction of a clay original. (Via WikiCommons)

Besides the obvious connection to dolls and puppetry, automata were long connected to [clock](#)-making. In ancient times, that meant water-driven mechanisms, similar to fountains. The earliest timepiece, the [clepsydra](#) or water clock—developed as early as 1700s BCE and found in Babylonia, Egypt, and China—used the flow of water in or out of a bowl to measure time.

According to Mark E. Rosheim in his book, *Robot Evolution*, Greek inventor [Ctesibius](#), also spelled Ktesibios, is thought of as the founder of modern-day automata. Around 280 BCE, and he started building water clocks that had moving figures, like an owl, and whose waterworks forced air into pipes to blow whistles. Essentially, he built the first [cuckoo clock](#). Ctesibius also amused people with a hydraulic device that caused a fake blackbird to sing, as well as mechanical figures that appeared to move and drink. The Morris Museum's Jere Ryder explains that because none of these ancient devices survived, it's hard to know how they worked. "The speaking heads or the talking animals might not have had articulated limbs," he explains. "They were more like sculptures, which might have had water-driven pneumatic instruments to create guttural sounds of an animal. This could be accomplished by opening a sluice gate or tap so water could turn a wheel, which then turned cams on a cog that worked a bellows. Or perhaps a person, hidden out of sight, would talk through a tube. You'd be walking by this bronze or stone statue, and all of a sudden, realistic sounds would be emanating from it. The experience would have been magical, almost wizard-like. That's why automata were sometimes regarded as witchcraft."



A 2007 mechanical model based on the ancient Greek Antikythera machine. (Photo by Mogi Vicentini, WikiCommons)

According to historian Joseph Needham in his epic study of ancient Chinese engineering, *Science and Civilisation in China*, in the 3rd century BCE, Chinese engineers and mathematicians like Chang Hêng, who worked for the royal court, were focused on how to animate full-scale puppet shows. Han emperor Chhin Shih Huang Ti, as known as [Qin Shi Huang](#), was said to have had a device that featured a band of a dozen 3-foot-tall bronze men that played real music, but it still required two unseen puppeteers to operate, one blowing into a tube for the sound and another pulling a rope for the movement.

Back in Greece, Ctesibius' student, [Philo \(or Philon\) of Byzantium](#), was a pioneer who advanced from pneumatics to steam-driven automata and other devices around 220 BCE, writing a book called *Mechanike syntaxis*. Only part of Philo's work has survived. Unfortunately, the true depth of Greek and Roman engineering and the extent to which they employed steam power are unknown, as many records were destroyed in the centuries of wars after the fall of the Roman Empire.

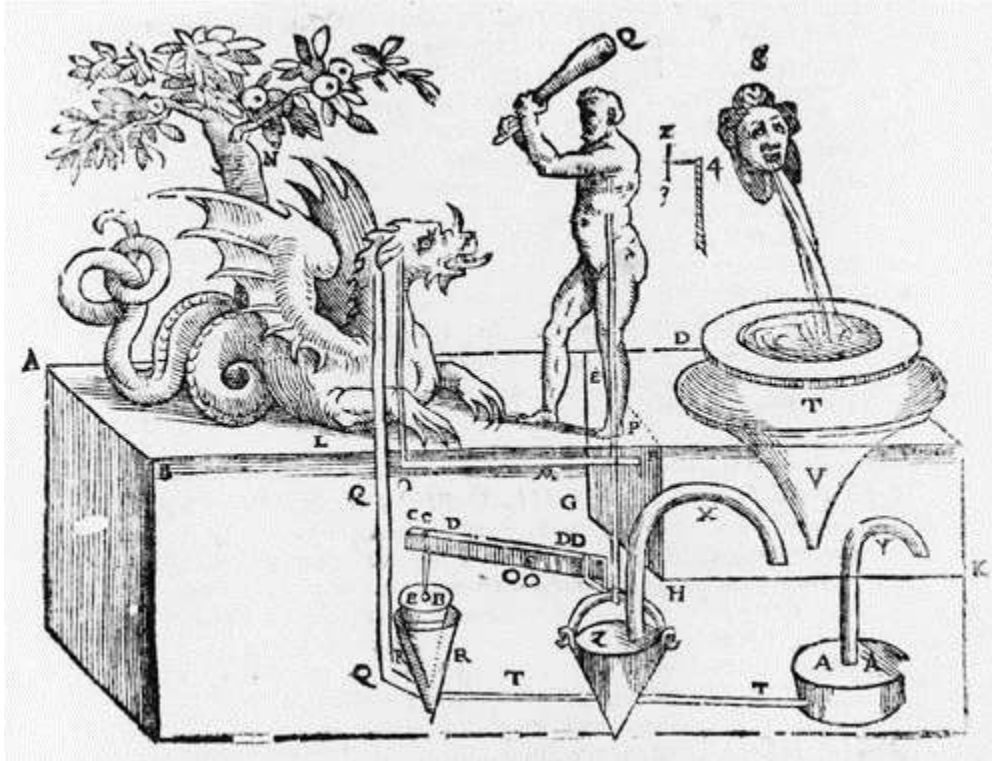
The first real evidence of the ancient Greeks' mechanical abilities was the discovery of the [Antikythera mechanism](#), dated between 205 and 60 BCE. This clock mechanism, which used 30 bronze gears and cams, is thought of as the first computer and may have been employed to operate automata.



This sketch, based on Hero of Alexandria's writings describing water- and weight-driven bird automata, appeared in Sigvard Strandh's 1989 book, *The History of the Machine*.

The earliest full-length book of Greek robots that's survived is [On Automatic Theaters, on Pneumatics, and on Mechanics](#), written circa 85 CE, by the inventor [Hero \(or Heron\) of Alexandria](#). In his treatise, Hero describes mechanical singing birds, robot servants that pour wine, and full-scale automated puppet theaters that employed everything from weights and pulleys to water pipes, siphons, and steam-driven wheels. Mostly, the automata executed simple, repetitive motions. Because Romans kept human slaves and servants to do hard labor and menial tasks, apparently no one thought to give robots actual work.

Since Hero's writings left out certain details and didn't include drawings, depictions of his machines still require a lot of guesswork, explains Rosheim in *Robot Evolution*. For example, the Hero automaton known as "Hercules and the Beast" has been drawn showing the legendary hunk shooting a snake with a bow and arrow and, alternately, depicting Hercules pounding a dragon with a club. What we do know is the action depended on water draining into hidden vessels that served as counterweights.

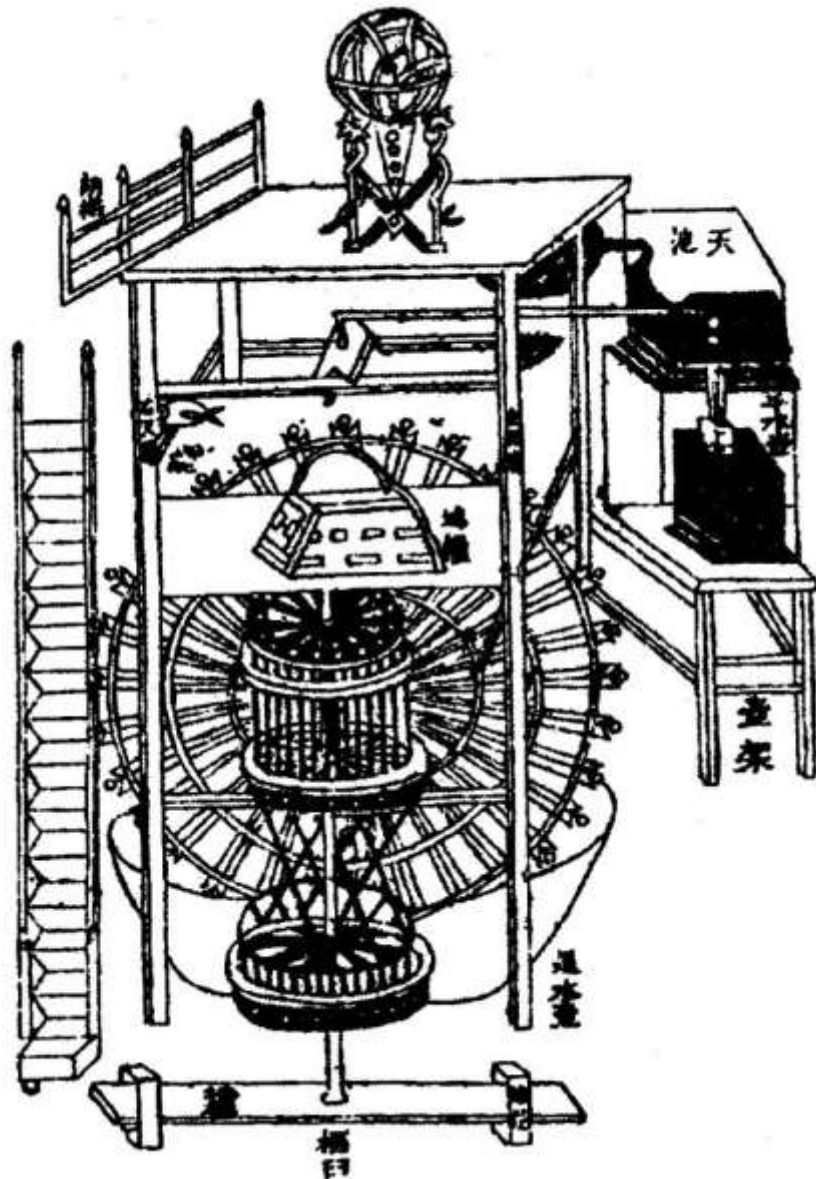


This interpretation of Hero's "Hercules and the Beast" was drawn in 1598 as an illustration for a translation of *On Automatic Theaters*. (Via [Robot Evolution](#))

But progress on building robots in the Western World halted as the Roman Empire began to crumble around 117 CE. In the meantime, circa 3rd-7th century CE, according to Needham, the Chinese continued to develop elaborate puppet theaters with myriad figures of musicians, singers, acrobats, animals, and even government officials at work, which would move and make music. They were likely operated by water-driven wheels, and possibly underwater chains, ropes, or paddle wheels.

In the 600s, Chinese engineer Huang Kun, serving under Sui Yang Ti, described an outdoor mechanical puppet theater in the palace courtyards and gardens with 72 finely dressed figures that drifted on barges floating down a channel. To impress his guests, the emperor's automata would stop to serve them wine. In *Science and Civilization in China*, Needham quotes Huang's manual: "At each bend, where one of the emperor's guests was seated, he was served with wine in the following way. The 'Wine Boat' stopped automatically when it reached the seat of a guest, and the cup-bearer stretched out its arm with the full cup. When the guest had drunk, the figure received it back and

held it for the second one to fill again with wine. Then immediately the boat proceeded, only to repeat the same at the next stop. All these were performed by machinery set in the water.”



Medieval Chinese engineer Su Song designed this escapement for his famous astronomical clock tower that included [jacquemart-type figures](#) to announce the hours. (Via WikiCommons)

The *Tu-Yang Tsa Pien* (*Miscellaneous Records from Tu-Yang*) has [this intriguing story of automata](#) in 9th century China: “A guardsman, Han Chih-Ho, who was Japanese by origin ... made a wooden cat which could catch rats and birds. This was carried to the emperor, who amused himself by watching it. Later, Han made a framework which was operated by pedals and called the ‘Dragon Exhibition.’ This was several feet in height

and beautifully ornamented. At rest there was nothing to be seen, but when it was set in motion, a [dragon](#) appeared as large as life with claws, beard, and fangs complete. This was presented to the emperor, and sure enough, the dragon rushed about as if it was flying through clouds and rain; but now the emperor was not amused and fearfully ordered the thing to be taken away.”

Naturally, Han feared for his life. “Han Chih-Ho threw himself upon his knees and apologized for alarming his imperial master, offering to present some smaller examples of his skill. The emperor laughed and inquired about his lesser techniques. So Han took a wooden box several inches square from his pocket, and turned out from it several hundred ‘tiger-flies,’ red in color, which he said was because they had been fed on [cinnabar](#). Then he separated them into five columns to perform a dance. When the music started they all skipped and turned in time with it, making small sounds like the buzzing of flies. When the music stopped they withdrew one after the other into their box as if they had rank. ... The emperor, greatly impressed, bestowed silver and [silks](#) on him, but as soon as he had left the palace he gave them all away to other people. A year later he disappeared and no one could ever find him again.”

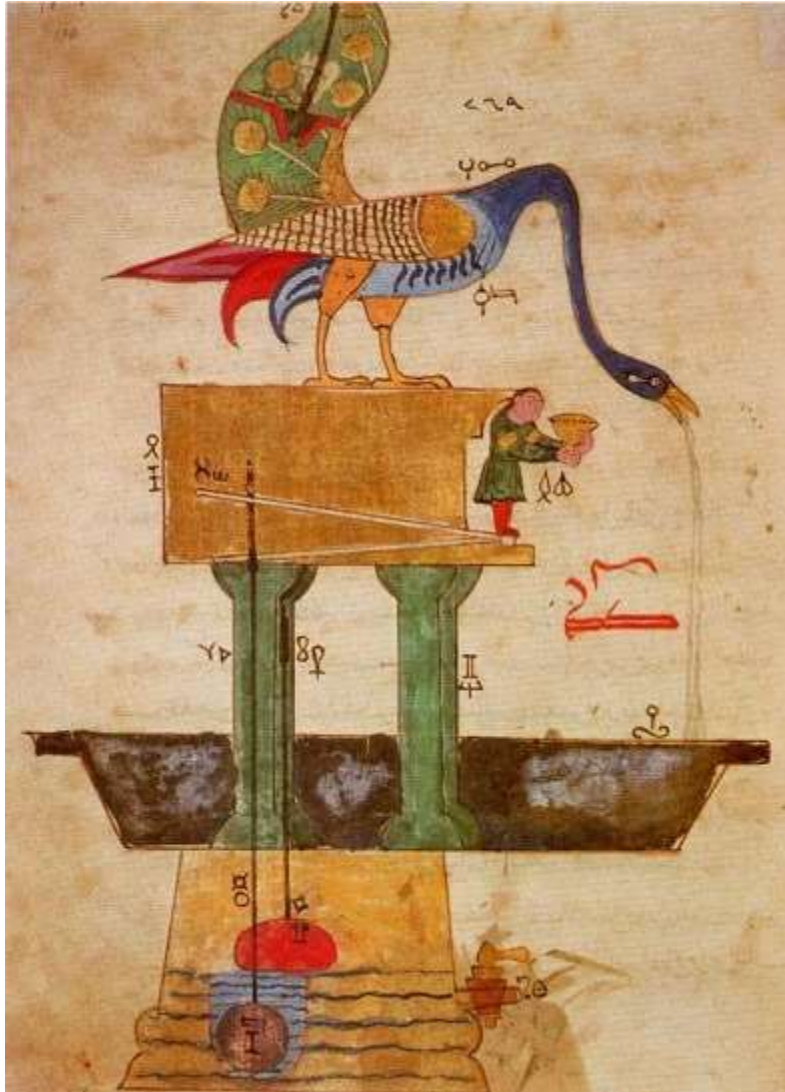


In the 12th century, Isma’il Ibn al-Razzaz al-Jazari designed this water-driven miniature “robot band” that sat in a boat on a lake and played music for royal guests.

Around the same time, circa 800s-830s, the Khalif of Baghdad, Abdullah al-Manum, recruited three brothers known as [Banū Mūsā](#) to hunt down the Greek texts on mechanical engineering, including Hero's *On Automatic Theaters, on Pneumatics, and on Mechanics*. The brothers wrote *The Book of Ingenious Devices*, which included both their own inventions, like an automatic flute player, and the ancient concepts they'd collected. The 9th century was something of a [golden era of Muslim invention](#), with alchemists and engineers building impressive automata for Muslim rulers, including snakes, scorpions, and humans, as well as [trees with metal birds](#) that sang and flapped their wings. Around the same time, the Byzantine Emperor Constantine VII in Constantinople was said to have a similar tree as well as an imposing rising "[throne of Solomon](#)" guarded by two roaring-lion automata.

By the 11th century, India had automata, too. According to *History of Indian Theatre* by Manohar Laxman Varadpande, a book on architecture, *Samarangana Sutradhara*, written by Parmar King Bhoja of Malava, describes miniature wooden automata called "das yantra" that decorated palaces and could dance, play musical instruments, or offer guests betel leaves. Other yantra were put in the service of mythological plays and acted out everything from war-making to love-making. Similarly, small humanoid automata were employed in royal residences and temples in [Egypt](#).

Building on the works of Banū Mūsā, in the 12th century, Muslim polymath [Isma'il Ibn al-Razzaz al-Jazari](#) produced *The Book of Knowledge of Ingenious Mechanical Devices*, with lushly colored illustrations of previously invented devices and his own novel inventions. It describes the mechanics of water clocks with moving figures, robot bands, and tabletop automata. For example, al-Jazari's [Peacock Fountain](#), designed to aid in royal hand-washing, relied on a series of water vessels and floats. According to Rosheim, the water poured from the jewel-encrusted peacock's beak into a basin. As the water drained into containers under the basin, float devices triggered little doors where miniature-servant automata appeared in a sequence, the first offering soap, the second a towel. Turning another valve caused the servants to retreat.



A drawing from Isma'il Ibn al-Razzaz al-Jazari's *The Book of Knowledge of Ingenious Mechanical Devices* shows his concept for the Peacock Fountain, used for royal hand-washing.

The science of automata is thought to have re-emerged in Europe in the 13th century, thanks to the sketchbooks of the French artist [Villard de Honnecourt](#), which describe [several machines and automata](#) such as singing birds and an angel that always turned to face the sun. De Honnecourt may have recorded some of the first [jacquemarts](#), or “jacks-of-the-clocks,” automata activated to blow horns or strike bells on [medieval-town clock towers](#). The Strasbourg Cock, built in France in 1352, features a prime example of the jacquemarts of this era: A rooster, one of 12 figures in rotation on an [astronomical clock](#) in the Cathedral of Our Lady of Strasbourg, would raise its head, flap its wings, and crow three times to announce its hour. In China, inventors continued to build more and more impressive water-wheel animated puppet theaters, as well as elaborate jacquemarts on their water clocks. But unfortunately,

Joseph Needham explains, most records and examples of these mechanical advancements were destroyed by the conquering Ming Dynasty in 1368. Besides clocks and puppet theaters, in Medieval and Renaissance Europe, automata were a key piece of aristocratic “[pleasure gardens](#),” which were the equivalent of modern-day [fun houses](#), filled with slapstick booby traps. In the late 13th century, the [Count Robert II of Artois](#) (1250-1302), commissioned the first known pleasure garden at [Hesdin in France](#). Walking through the maze, the Count’s guest would be startled by statues that spat water at them, fun-house mirrors, a device that smacked them in the head, a wooden garden hermit and metallic owl that spoke, other mechanical beasts, a guard automata that gave orders and hit them, a collapsing bridge, and other devices that shot out or dumped water, soot, flour, and feathers.



Hellbrunn Palace in Salzburg, Austria, still features trick fountains hidden in seats once used by guests of Prince-Archbishop Markus Sittikus for outdoor meals. (Via WikiCommons)

By the 16th and 17th centuries, a handful of eccentric gardens with fountain automata popped up around modern-day Italy, Germany, and France, like the [Villa d’Este](#) at Tivoli

near Rome, which featured elaborate fountains and grottos as well as hydraulic organs and animated birds. Perhaps inspired by Hesdin, the Prince-Archbishop of Salzberg (now in Austria), [Markus Sittikus von Hohenems](#), built a prank-filled “water park” at [Hellbrunn Palace](#) in the 1610s with water-powered automata and music, where guests would be startled by statues that squirted water in their faces and chairs that shot water on their butts. In 1750, more than 100 years after Sittikus’ death, a [water-driven puppet theater](#), with more than 200 busy townspeople automata, was installed at the estate. On a smaller scale than the fountain-filled pleasure gardens were the [Gothic table fountains](#) of the 14th and 15th centuries, which were like miniature animated puppet theaters, showpieces thought to have come to Western aristocrats through Byzantine and Islamic trade. Dozens of figures on the fountain would dance, play music, or spout wine or perfumed water. It’s believed that most of these devices were made of precious metal and later melted down. The one surviving example, made around 1320 to 1340 and now housed at the [Cleveland Museum of Art](#), was a gift from the Duke of Burgundy to Abu al-Hamid II, the sultan of the Ottoman Empire.



This Gothic table fountain with small automata, now at the Cleveland Museum of Art, was thought to be a typical showpiece for European aristocrats in the 14th and 15th centuries. Because such animated fountains were made of precious metals, most were melted down. (Via the [Cleveland Museum of Art](#))

Up until the 15th century, automata technology had been hindered by the limitations of hydraulic, pneumatic, and weight- and steam-driven motion. That changed with the introduction of steel-spring clockwork mechanisms. Previously, engineers had experimented with using tightly wound metal springs to drive automata and timepieces, but the rudimentary metalwork meant the mechanism might only work right once before breaking. In the 15th and 16th centuries, technological advances made in the [steel-working foundries](#) in Nuremberg and Augsburg, Germany, and in Blois, France, were a major breakthrough.

“It wasn’t until the 1400s that Europeans had the sufficient metal refining and foundry techniques to produce a spring that wouldn’t self-destruct,” Morris Museum’s Jere Ryder says. “As time went on, they refined the process further, and the quality of their materials improved.”

Where metalworking flourished, so did horological, or clock-making, technology. Starting around the 1430s, clockmakers in Europe, particularly in [Germany](#) and [France](#), were producing key-wound spring-driven [clocks](#). They continued to develop and improve upon clock mechanics throughout the Renaissance, adding more and more elaborate decorative flourishes. In BBC Four’s “[Mechanical Marvels: Clockwork Dreams](#),” science history professor Simon Schaffer explains that the time-keeping mechanism, which once needed a tower to contain it, got smaller and smaller until [pocket watches](#) could be made with tiny screws and gears that artisans meticulously hand-crafted.



The miniaturization of clockwork eventually led to companies like Bontems in Paris producing small musical automata like this singing-hummingbird box from 1890. (Via WikCommons)

“Clockmakers were usually the technicians making automata,” the Morris Museum’s Jere Ryder says. “They had the access to the materials; they knew the clockwork

mechanisms; they knew the drive systems that would be required. They had all the basic metalworking and metallurgical skills and knowledge at their disposal.”

Unlike the whimsical jacquemarts seen on [public clock towers](#), these robots were strictly for the entertainment of royalty and aristocrats, and were only produced by the most trusted court inventors and artisans. “You have to remember, quality metals were a precious commodity, and you had to have somebody of great importance in your region grant you the access to those materials,” Ryder says. “These metals weren’t available to the masses for fear that they would be used to make arms for insurgents to rise up against the aristocracy. As an inventor, you had to be trustworthy because you were getting a potentially dangerous raw substance in your workshop that you could turn into [weapons](#), and that would be a detriment to your patron.”



A page from Giovanni de Fontana’s sketchbook, *The Book of Warfare Devices*, from 1420.

Some inventors in the early 15th century were still conceptualizing automata through the older technologies of hand cranks and weights and pulleys. Giovanni (or Johannes) de Fontana produced a book of plans for [animated monsters and devils](#) that could spit fire, intended to [debunk magicians](#). But it's hard to say if Fontana successfully built any of these devices, which seem mechanically impractical and unlikely to work. In the mid-15th century, German mathematician and astronomer Johannes Müller von Königsberg, also known as [Regiomontanus](#), is said to have built an iron mechanical fly and a wing-flapping eagle automata—possibly driven by clockwork—that accompanied the Holy Roman Emperor to the gates of Nuremberg, but there are no records of his designs for such machines.

[Leonardo da Vinci](#)'s sketchbooks show a full-size clockwork lion, supposedly a present for King Francois I in the 1510s. Witnesses claimed the mechanical lion, a symbol of Florence, approached the king, opened a “heart cavity” on its side, and revealed a Fleur-de-Lis, the symbol of the French monarchy. Da Vinci's lion has been lost to history, but [a replica was constructed](#) by automata-maker Renato Boaretto for Chateau du Clos Luce, in Amboise, France, in 2009. According to *Robot Evolution* author Mark E. Rosheim, da Vinci's notebooks offer hints that he was working on an android, dressed in a suit of arms, using a system of pulleys and cables based on his drawing of human musculature, possibly operated by a manual hand crank, as many of da Vinci's inventions were. However, it's unclear if he ever built the android, as the relevant pages of his sketchbook are missing.

The writings of Hero of Alexandria were finally translated from Greek into Latin in the 16th century. French engineer [Salomon de Caus](#) studied the work of Hero religiously and replicated the hydraulic-pneumatic singing bird concept. Other inventors relied on new developments in wind-up spring technology. In the service of Holy Roman Emperor Charles V in Spain, Italian clockmaker [Juanelo Turriano](#)—also known as Gianello Della Tour of Cremona and Giovanni Torriani—made several miniature clockwork robots to entertain the easily bored emperor, from flying birds to soldiers to musicians.

“In the Renaissance, only royalty and aristocrats would be able to afford automata, which they'd commission to show that they were more powerful than their neighbors,” Ryder says. “There was a lot of one-upmanship going on at that time. The owner of automata could assert he was important because he could command these miniature lifelike pieces with amazing clockwork mechanisms to perform at will, anytime he wanted them to. At that time, that was probably pretty darn impressive.”

Although few clockwork automata from the 16th century have survived, we know that the artisans building these robots for royal entertainment had mastered wind-up technology to the point of re-creating the nuances of human movement and facial expressions, causing an “[uncanny valley](#)” effect. One remarkable surviving automaton from this era lives at the [Smithsonian Institute](#). A 15-inch-tall key-wound clockwork [Franciscan monk](#), built as early as 1560, possibly by Juanelo Turriano for Charles V, is a startling imitation of life. [The friar](#) walks in a square path, hitting his chest with his right arm, waving a cross and rosary with his left. He nods and turns his head, rolls his eyes, mouths silent prayers, and occasionally lifts his cross to kiss it.

“Underneath the robes, there’s a full clockwork mechanism,” Ryder says. “So you’d have to wind it up, and then he would move across the table with his little feet underneath the robe moving up and down. He really looks like he’s walking.”

Another surviving early clockwork automaton is a 1610 gilt bronze and silver timepiece in the moving form of the goddess Diana on her chariot. It was built for royalty by some unknown maker in Southern Germany, and is now housed at the [Yale University Art Gallery](#). “The chariot’s being drawn across the table slowly by these undulating panthers in front,” Ryder explains. “There’s a monkey on the chariot moving his arm to eat a pomegranate, which is a sign of hospitality. Diana up top has a bronze bow and arrow loaded under tension, as the whole carriage goes down what would have been a large banquet table. It moves for almost 3 feet and stops, her eyes still scanning from side to side with the tick-tock sound, like she’s deciding who her next victim will be. Then, she launches the bronze arrow, and it flies about 6 to 8 feet. It’s a fabulous automaton.”

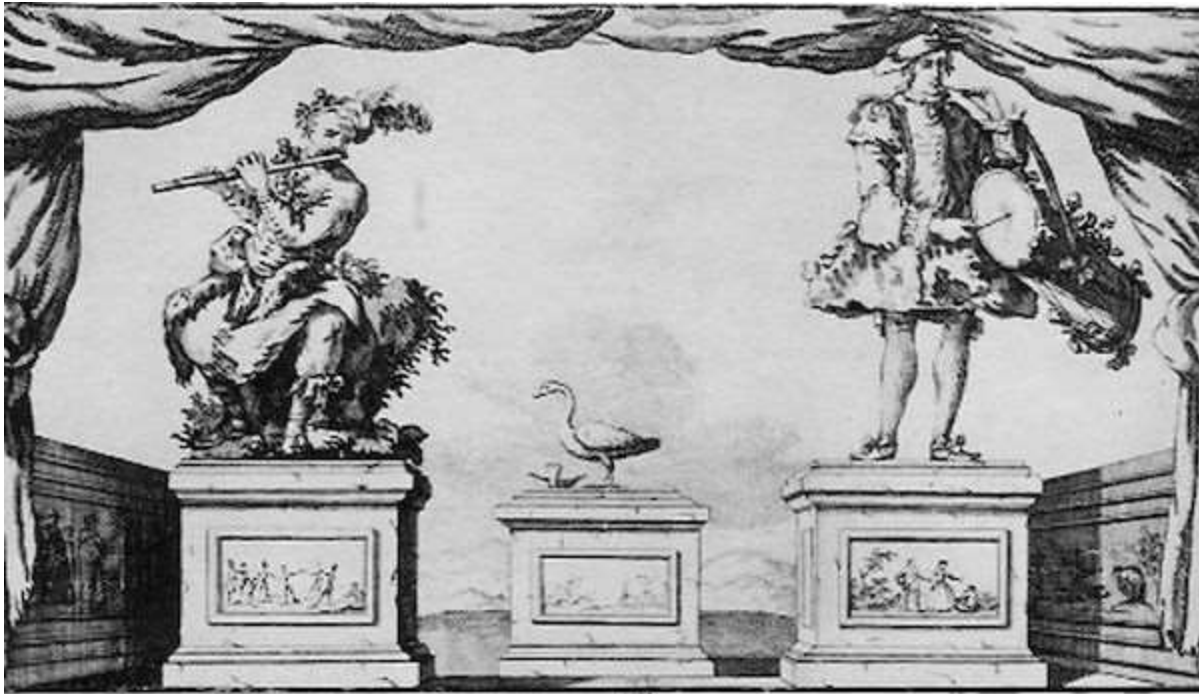
In the mid-17th century, German Jesuit scholar [Athanasius Kircher](#)—the first to describe the automatic barrel organ operated by pinned cylinders—attempted to build a talking head with moving eyes, lips, and tongue, which may have been voiced by an operator talking through a tube. In his 1650 treatise, *Musurgia Universalis*, Kircher also detailed a barrel organ with an [automaton cuckoo](#). Nineteen years later, Domenico Martinelli wrote a book on horology suggesting the cuckoo’s call be used to announce the hours. In 1730, the first so-called cuckoo clock was produced in the [Black Forest](#). But these were not the first small German clocks with moving automata and sound to declare the hours: The Met Museum has a [musical automata clock](#) made by Velt Langenbucher and Samuel Bidermann in Augsburg more than 100 years earlier.



This musical clock with dancing automata, a spinet, and an organ was made by Velt Langenbucher and Samuel Bidermann circa 1625. (Via [The Met Museum](#))

“The Augsburg timepiece has got these commedia dell’arte figures in a rotunda atop it,” Ryder says. “Each one turns as they waltz around, circling each other in what looks like a miniature mirrored home. Below the timepiece, there are two automatic musical instruments that play both independently and together in unison—one is a spinet, which is like a miniature harpsichord, and the other is a flute organ. It’s just an outstanding early Augsburg device that combines mechanical music and automata in the same package.”

The most incredibly intricate, full-sized robots were first built in the 1700s. French inventor [Jacques de Vaucanson](#)—an anatomy student who would later develop the predecessor to the Jacquard automatic loom—created a life-size human automaton called the Flute Player in 1737. Living in the Age of Enlightenment, Vaucanson wanted to figure out if human and animal bodies operated like machines. Modeled after a famous [Antoine Coysevox](#) sculpture of a shepherd, Vaucanson’s weight-driven android [actually blew air](#) from a series of connected pipes, bellows, and valves inside its body through its mouth into a flute. The robot also controlled the sound of the instrument by moving its lips and tongue and pressing its fingers—possibly covered with the leather of real human skin—on the holes, playing with a human level of artistic expression. This stunning machine could play more than 12 distinct tunes.

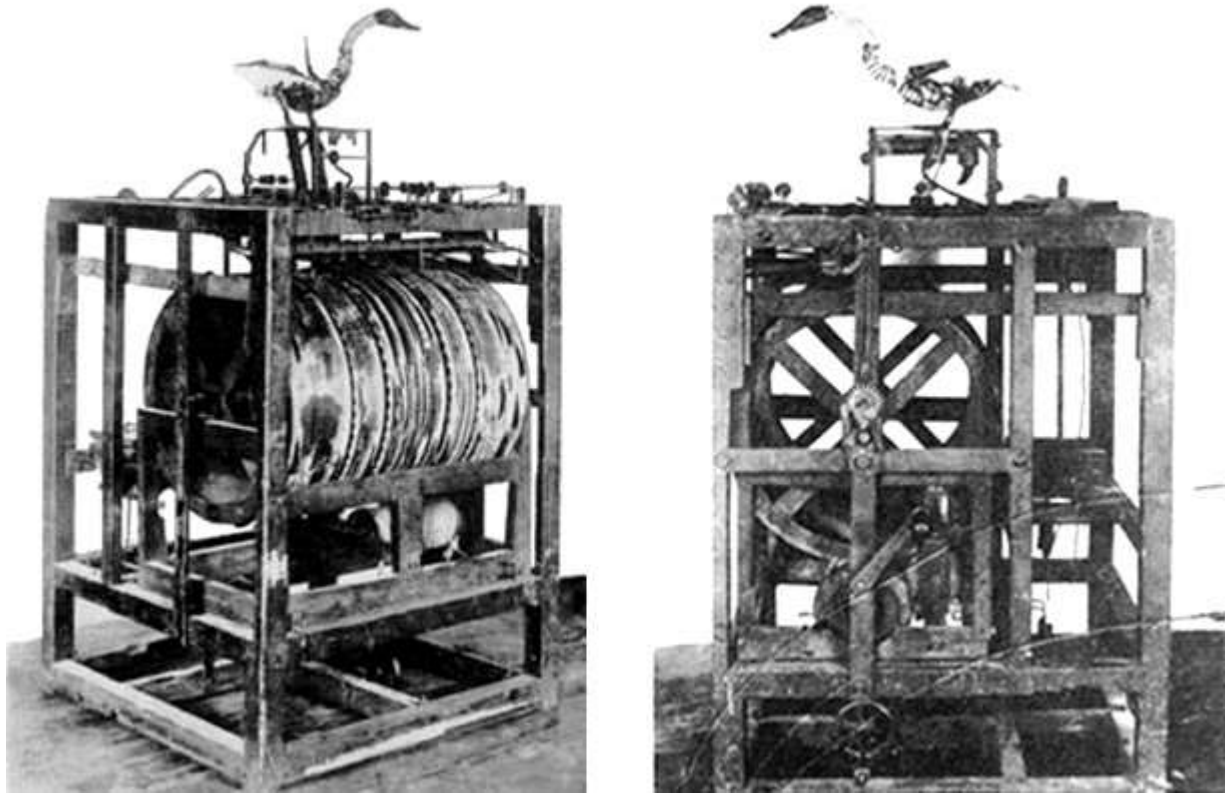


An illustration of three automata built by Jacques de Vaucanson: the Flute Player, the Duck, and the Drummer. (Via the Rare Book and Special Collections Division, Library of Congress)

Vaucanson followed the Flute Player with another life-size android called the Drummer or the Tambourine Player, which played a pipe and a drum, and a bird automata called the Digesting Duck—unfortunately, all three have been lost to time. His [crowd-pleasing duck device](#) could quack, rise up on its legs, flap its wings, move its head, bow its neck, drink, eat, and defecate. Vaucanson, and the French entrepreneurs he later sold them to, took his automata on tour, letting members of the European elite pay a hefty fee to witness this buzzed-about anatomical spectacle. (In the 19th century, magician and clockmaker Jean-Eugène Robert-Houdin claimed he encountered this duck automata and [took it apart](#) to discover the consumed grain and pooped-out breadcrumbs were in

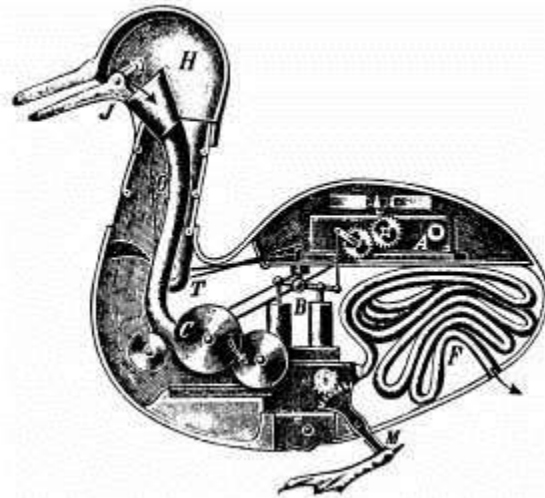
separate chambers, meaning, as brilliant as the device was, no actual “digesting” was involved.)

“Vaucanson held exhibitions in France and Italy that he would invite royalty to,” Ryder says. “Eventually, high-level aristocrats would be invited in, too. That’s how inventors like Vaucanson got money to help subsidize the next project. Those exhibitions weren’t for the masses because they couldn’t afford to get in.” In “[Clockwork Dreams](#),” professor Simon Schaffer explains that, ironically, these robots spelled doom for the aristocrats who funded them. The notion that humans might just be soulless machines—and therefore, the monarchies didn’t have divine authority to subjugate their peasants—eventually led to uprisings against the European elite, like the French Revolution at the end of the century.



Photographs of Vaucanson’s Digesting Duck, taken in the 19th century. (Via WikiCommons)

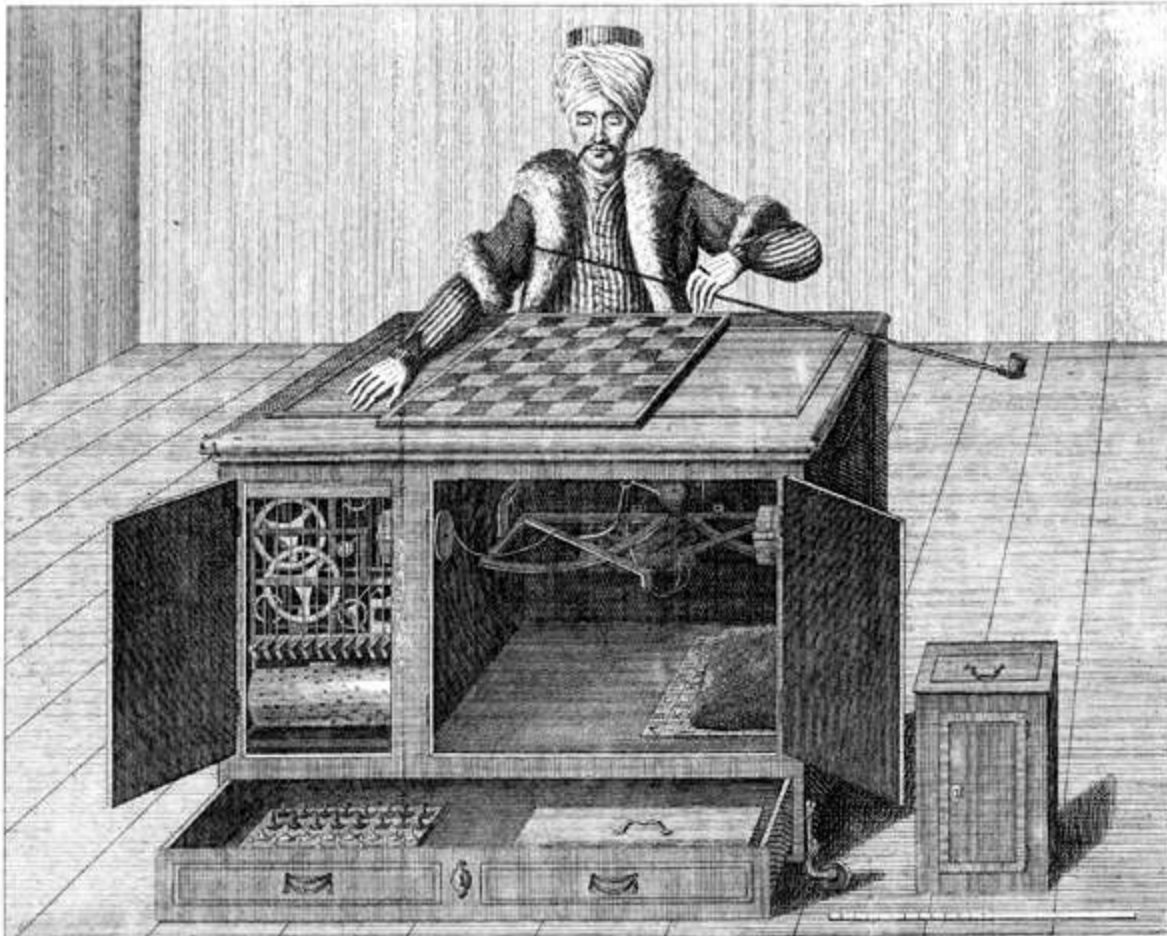
According to *Crescendo of the Virtuoso: Spectacle, Skill, and Self-Promotion in Paris during the Age of Revolution*, by Paul Metzner, Vaucanson’s show-stopping demonstrations were so lucrative that 18th-century showmen, naturally, saw automata as a way to make it big. Mechanics were commissioned to copy Vaucanson and make automata purely for entertainment, not science: These included flute, harpichord, and [dulcimer players](#); singing birds; wine servers; and [more](#). A French inventor and Catholic abbot named Mical was said to have made “an entire orchestra in which the figures, large as life, played music from morning till evening.”



An American artist's drawing, which incorrectly guessed how the Digesting Duck worked. (Via WikiCommons)

Because the stage entrepreneurs were trying to make a buck, Metzner writes, some builders found ways to cut corners making figures now considered “quasi-automata” because they only gave the illusion of lifelike action. For example, with musician quasi-automata, the music was generated by an automatic organ in the base, and the figure only made the motions of playing the instrument. Singing birds were popular among aristocratic women, and they operated much the same way. Similarly, many showmen claimed to have automata that could write or draw, when in reality, they were showing a life-size puppet, or a “pseudo-automata,” whose pen was guided by a living person in a hidden compartment, operating a [pantograph](#).

However, in the mid-18th century, German watchmaker Friedrich von Knauss did develop automata that [could write and draw](#). Following in Vaucanson's footsteps, Knauss first successfully built automata that could play music. Then he developed a machine with a hand that could use a quill to spell out “Huic Domui Deus / Nec metas rerum / Nec tempora ponat” (“May God not impose ends or deadlines on this house”) on a card. He also attempted to build four talking heads and failed. None of Knauss' automata had full bodies.



*W. de Kempelen del. Che a Michel excudit Basilea. P.G. Pinty fecit.
Der Schachspieler wie er seinem Spiele gezeiget wird von vorne. Le Joueur d'Échecs, tel qu'on le montre avant le jeu, par devant.*

A 1783 copper engraving of the Turk, showing the open cabinets and working parts. The inventor Wolfgang von Kempelen was a skilled engraver and may have produced this image himself. (Via WikiCommons)

In 1769, Wolfgang von Kempelen, a mechanician in Austria, created a life-size figure known as [the Turk](#) or the Chess Player, which was dressed as the Western stereotype of a man from Turkey. This spring-driven automated figure was positioned behind a large wheeled cabinet with a [chess board](#) affixed to the top. In his research, Metzner explains that for more than half a century, the Turk put on shows of what appeared to be an incredible display of artificial intelligence, regularly beating audience members at chess. But in the 1830s, it was revealed a man operating a pantograph had been hiding in the cabinet every time. However, Kempelen did have [real engineering talent](#): He made significant advances in the concept of the steam engine, and he, along with Mical and Christian Gottlieb Kratzenstein, developed speaking machines in the 1770s.

Beside the Digesting Duck, another clockwork-fowl automaton that made a splash was [the exquisite Silver Swan](#), built out of real silver by Belgian [roller-](#)

[skate](#) inventor [John Joseph Merlin](#) and London clockmaker and showman [James Cox](#) in 1773. Today, you can watch this gorgeous moving artwork at the [Bowes Museum](#) in England: When wound up, the life-size swan, “floats” on a stream of twisting glass rods, which rotate to the automatic music. Operating with three separate clockwork mechanisms, the swan very elegantly turns to the left and right and preens. Then, it appears to notice a fish in the “water,” catch it in its beak, and swallow it.

Inspired by Vaucanson’s musicians, Swiss clockmaker [Pierre Jaquet-Droz](#) made a clock topped by a flute-playing shepherd figure in the 1760s. Then, he and his assistants, including his adopted son, [Jean-Frédéric Leschot](#), built three mind-bending [spring-driven automata](#) between 1768 and 1774—the Scribe, the Musician, and the Draughtsman. The Scribe looks like a life-size doll of three-year-old boy, and is still operational today. The child is sitting on a stool, holding a quill to a mahogany table. Wound up and given a piece of paper, the Scribe, whose mechanism is made up of nearly 6,000 parts and 40 distinct cams—can dip his quill into ink and write any sentence up to 40 characters long. (However, the programming is so time-consuming his sentence was rarely changed.) His eyes follow the writing with focus and intent. The Scribe is, in many ways, a predecessor to the modern computer.

The Musician is a full-size adolescent girl who plays a non-automatic organ by pressing the keys with her finger. She appears to watch her fingers, breathe, and adjust her body as a real organist would. The Draughtsman, like the Scribe, looks like a toddler boy, and is capable of producing four different drawings—a dog, a portrait of Louis XV, a royal couple, and Cupid driving a chariot pulled by a butterfly. He also fidgets in his chair and occasionally blows on his pencil. All three of these original automata can be [seen in action](#) today at [Musée d’Art et d’Histoire](#) of Neuchâtel, Switzerland.

Jaquet-Droz and his sons toured the royal courts around Europe, China, India, and Japan, demonstrating the three automata to grow their watch-making business. These three blockbusting machines were generally not for sale, although a small number were reproduced for kings. The Jaquet-Droz family, like other watchmakers of the era, offered timepieces and miniature automata incorporated into [clocks](#), [watches](#), [snuff boxes](#), [perfume bottles](#), and [jewelry](#) to their moneyed clientele.

“In the mid- to late 1700s, Switzerland became a center of very fine, high-end automata,” Ryder says. “You had Pierre Jaquet-Droz, Henri Maillardet, and others who made these writing, drawing, and music-playing automata, as well as a wide range of pocket watches, musical perfume bottles with animated figures, and wind-up jewelry, like lockets, brooches, and rings with music and automata. Jaquet-Droz took his extraordinary large automata on the road as the showpieces that would draw future customers from the upper echelons of the aristocracy. The large automata caught the attention of the press, and wealthy people would pay to visit someone’s chateau to see them in action. But then Jaquet-Droz could sell his smaller wares to these same individuals.”



The Draughtsman, the Musician, and the Scribe at Musée d'Art et d'Histoire of Neuchâtel. (Via WikiCommons)

As much as it was good business, it was also a risky endeavor to pack up these delicate robots made of thousands of cams and gears, put them in carriages, and drive them thousands of miles. “When Jaquet-Droz went [down to Madrid](#) to sell to the king’s court, it took 30 days in transit to get there,” Ryder says. “This was high risk and on speculation, because not much of this stuff was sold before he made that trip. He hoped the king and his courtesans would want most of the wares he was bringing. If he didn’t sell it all, then he’d try zigzagging on his way home to try sell the remainder of it. Jaquet-Droz was extremely successful at doing that.”

Swiss clockmaker Henri Maillardet, an apprentice of Pierre Jaquet-Droz, built his own version of the Scribe called [the Draughtsman-Writer](#), with the help of Pierre’s sons Henri Louis Jaquet-Droz and Jean-Frédéric Leschot, in 1800. [Maillardet’s animated doll](#), which now lives at the [Franklin Institute in Philadelphia](#), can write four poems and draw four sketches. Henri Maillardet’s brother Jean-David Maillardet—with the assistance of his son, Julien-Auguste, and his brother Jacques-Rodolphe—built an automata clock called [the Great Magician](#) featuring a conjurer and a set of nine plaques with predetermined questions. The machine can be [seen in action today](#) at the

International Clock Museum in La Chaux-de-Fonds, Switzerland: When you place a question in a drawer, the magician moves about before a window opens, revealing the answer. Questions include “A rare thing? (A friend)” and “What is too easily given? (Advice)”.



A 19th-century tea-serving automaton doll compared with a similar disrobed figure, its internal mechanisms revealed. (Via Tokyo National Science Museum, WikiCommons)

Around the same time as Jaquet-Droz’s and Maillardet’s automata advances, engineers in Edo Period Japan were building table-top, tea-serving robots, servant dolls with perhaps a little more labor-saving functionality than European robots, which were meant to astonish. Once set in motion, a 14-inch-tall “[karakuri](#)” powered by a whale-baleen spring moves toward a guest holding a cup of tea with its head bowed. After the cup is lifted, the robot seems to wait patiently for the guest to drink. When the cup is replaced, the doll makes a 180-degree turn and moves in the opposite direction.

In 1790s India, a life-size musical automata of a tiger mauling a white European flat on his back was built for the Tipu Sultan (also spelled Tippu or Tippoo), who hated the British colonizers and, specifically, the East India Company. [Tipu's Tiger](#) is 5-foot-8-inches long, constructed of wood, and contains a playable 18-note pipe organ. When [a handle is cranked](#), the man emits a wail, the tiger seems to growl, and the man's left arm flails up and down. When the East India Company invaded Tipu's land in the 1799, the automaton was shipped to England, where, ironically, it became a [popular curiosity](#).



Tipu's Tiger, a life-size Indian musical automata of a wild cat eating an Englishman, also contains a playable organ. (From the [Victorian and Albert Museum](#), via WikiCommons)

At the turn of the 19th century, German inventor and showman [Johann Nepomuk Maelzel](#) became obsessed with collecting and demonstrating the marvels of automata and mechanical music. First, he developed an automatic organ that replicated the sounds of a 40-member orchestra, which he called a [Panharmonicon](#) (later classified as an [orchestrion](#)). Then, as Paul Metzner explains in *Crescendo of the Virtuoso*, Maelzel purchased the pseudo-automaton, the Turk, and built a real automaton trumpet player, a real automaton acrobat, and other androids, including talking dolls that spoke one word each. Later, he bought a Draughtsman-Writer by the Jaquet-Droz family. In the early 19th century, he toured the United States with his automata, making a big impression on famous showman [P.T. Barnum](#).

What do all of these machines have in common? They're all illusions of some sort, which made them natural fits for the [magic shows](#) that were growing in popularity in the 19th century. [Jean-Eugène Robert-Houdin](#)—the French magician and inventor Houdini named himself after—built several automata for his 1840s stage shows including a magician, a writer-draftsman, a trapeze acrobat, a singing nightingale, and clowns. Robert-Houdin was also famous for a device that appears to be an [orange tree](#) that blooms and produces real fruit in a matter of minutes. But his true creative contribution to automata were three different devices, each featuring a woman and a canary. At the time, it was popular among high-society ladies to have a pet canary and to use an automatic organ called a serinette to teach the bird tunes. In [Robert-Houdin's scenes](#), the automata women play the serinette multiple times while the automata bird appears to be learning, getting better at the song with each go-round. Other European magicians of the era incorporated automata into their stage shows as well, one even going so far as to steal from Robert-Houdin.



One of Jean-Eugène Robert-Houdin's magic-show automatons of a woman "teaching" a canary with a serinette. (Via [Maison de la Magie](#))

In 1845, German American immigrant Joseph Faber completed his [Euphonia](#), the most impressive talking head yet, a device with a disembodied female head attached to bellows. Demonstrated decades before the [telephone](#), the [phonograph](#), and the [wax cylinder](#) were introduced, this automata could speak in multiple languages through the

operation of 16 keys assigned a basic sound used in European languages, plus a 17th key that controlled its mechanical glottis.

The Industrial Revolution in France paved the way for the trend of automata as parlor entertainment for adults, starting in the mid-19th century. Until then, larger automata were hand-built to impress royalty while most aristocrats could only afford smaller hand-crafted automata trinkets. The rise of the middle class meant more Europeans were wealthy enough to purchase automata devices to entertain guests at their homes, and advances in manufacturing meant parts for these clockwork robots could be produced and assembled like never before—particularly around Paris, which had the perfect mix of material resources, technology, and skilled craftsman to make these moving works of art. Thus, 1860 to 1910 is known as “The Golden Age of Automata,” and the bulk of the Guinness Collection at the Morris Museum comes from this time period.

“That’s when you saw the very well-known Parisian manufacturers, like Gustave Vichy, Eduoard-Henry Phalibois, Blaise Bontems, Jean Rouillet, and his Rouillet & Decamps firm, making automata for the middle class,” Ryder says. “At high-end department and toy stores like [Au Nain Bleu](#) in Paris, you’d see these exotic, extravagant amusements—toys that really weren’t meant for children. They were aimed at the adult population that was doing the Grand Tour of Europe in the [Belle Époque](#) and wanted to go home with a unique souvenir of the region they were visiting. If you visited Switzerland, the country was then internationally known for its timepieces, so you’d buy a clock or watch. The Swiss were also known for their [music boxes](#), invented in 1796, which were manufactured hardly anywhere else, so you might get a music box. But Paris was one of those few places in the world that had the necessary convergence of talent, material, and technology to make automata.

“Parisian manufacturers made up probably 80 percent of the automata market in the late 19th century. There were a few other makers in Germany, Austria, and Czechoslovakia doing something similar, but nowhere near the scale of the half-dozen top Parisian manufacturers.”

The reason Paris became the hotbed of 19th-century automata is that it had gifted artisans in nearly every creative field, as clock-making and mechanical-engineering were not the only skills required to build beautiful automata. Indeed, no one artisan could do it alone.

“So many skills were necessary to create pieces like these,” says Guinness Collection curator Michele Marinelli. “You needed to know metalworking. You needed to be able to create the cams that generate the motion of the piece and the spring motor that drives it. Automata also required other materials like textiles, which is why wives often partnered with their husbands and sewed the costumes for the pieces. Some pieces used materials we would consider exotic, such as tortoiseshell, mother of pearl, furs, feathers, and animal skins, so you would need someone who was skilled in using these materials. It often took multiple people, each working on their specific part, before an automaton could be assembled by the builder, who put his name on it.”

The Parisian automata, like the machines in the Guinness collection, are products of their time, Marinelli explains, when members of the new middle class had the time and money to travel, collect curiosities, and indulge in various amusements. For example, in the first half of the 19th century, circuses and animal menageries were popular attractions, as were taxidermied-filled oddity museums like the American Museum in New York City. After the [Civil War](#) ended in 1864, zoological parks and natural history museums began to open in the United States. The [anatomy of animals](#) and how they moved were great fascinations.

“Animal figures were very popular as automata,” Marinelli says. “They were often used in animated scenes that showed the creatures exhibiting some kind of humanity or in scenes that told specific stories. Victorians loved animals to the point they stuffed and mounted them, including their dead pets. With many of the singing-bird automata from the era, you’re looking at a real bird that had lived and died. Sometimes the animals with real fur look creepy, and not entirely realistic.”

Monkeys, in particular, appear in many Parisian automata. They’re generally wearing lace collars and fancy velvet dress and engaging in genteel activities. “Think about what happened a hundred years prior to this time period—the French Revolution,” Marinelli says. “When you see a monkey automata dressed like that, the makers are mocking the French aristocracy. It’s a political statement.”

Thanks to all the circuses and pantomimes, [clowns](#) were also popular figures. “We have a lot of different clowns in the Guinness collection, performing tricks or things like that,” Marinelli says. “We have a couple Pierrots, which is one of the stock characters from commedia dell’arte—one is sitting on a moon, playing a mandolin. Another Pierrot is sitting at a desk, writing a letter to his love, Columbine.

“Some of them are quite fantastical,” she continues. “We have a clown illusionist by Phalibois who appears to lose his head. We have several other conjurers or magicians. You know the cup-and-ball game, where you lift the cup and there’s a ball underneath, and then when you look under it again, the ball is gone? We have automata that do that. People who see them are amazed.”

Other pieces seem to depict ordinary Victorians engaging in mundane tasks, like dusting parlors or snapping photographs. One of Guinness’ oldest pieces is a chicken that walks, pauses, and lays an egg. “Every automaton tells a story,” Marinelli says. “In a brief moment, it imparts a lot of information to a viewer.”

While these automata delight children, some of them are not exactly G-rated. “We have a chef automata called the *Cuisinière*,” Marinelli says. “It’s based on a French nursery rhyme, *‘Le mère Michel’* (‘The mother of Michel the cat’). The chef’s holding a copper pot in one hand. In the other hand, he’s holding a bottle of booze. The chef was having an affair with the lady of the house. Eventually, she rejected him, and he knew there was something that she loved more than him. With this automaton, you see he’s drinking away his sorrows and taking his revenge on her. The lid of the pot rises and a cat pops up. He’s cooking her beloved cat! Of course, if we’re demonstrating that piece when

children are present, we modify the story. But kids think it's hilarious that there's a cat in the pot."

Victorians were also fascinated with people from other cultures, but often reduced them to exoticized clichés. "Many of these pieces represent stereotypes and inaccurate information about non-Western cultures," Marinelli says. "We have a beautiful 3-foot-tall figure called the Mask Seller. If you look closely, you see she's a Chinese woman wearing Japanese clothing. Again, you're seeing the perceptions of the Belle Époque Europeans and their Euro-centric understanding of the world."

The Golden Age of Automata was a time of head-spinning mechanical developments that might feel familiar to us in the Internet Age. [Photography](#), for example, was first introduced in the 1840s. A well-to-do family in the early 1800s might entertain guests with "moving pictures" in [zoetropes](#) or by playing songs on giant pinned-cylinder machines known as [orchestrions](#), which could replicate the sounds of an entire orchestra.

By the 1860s, [windup clockwork technology](#) was being employed on a smaller scale for [children's toys](#), made out of stamped-and-lithographed tin by German companies [Bing and Märklin](#). Other toy makers produced [mechanical banks](#) whose cast-iron figures were set into motion by depositing a coin. In the 1870s and 1880s, [telephones](#), [light bulbs](#), [automobiles](#), [phonographs](#), and fingered machines that could [play pianos](#) were all introduced, as factory workers spent their Sundays at trolley parks where they could ride [carousels](#) to the loud sounds of automatic band organs, which often featured quasi-automata musicians.

"The development of coin-operated musical instruments and automata was driven by the vending machine industry, which began in the latter half of the 19th century," Marinelli says. "Business owners would lease music machines from the manufacturers, who would come to change the music selections, and of course, those companies took half the nickels. But it was worth it for the store owners, because the music brought people in. At the time, there were no [jukeboxes](#) or [radios](#), so mechanical music was an amazing experience for customers.

"We have a machine that dates to about 1925, a self-playing violin-piano combination called the Violano Virtuoso, that plays beautifully," she continues. "It's electrically powered and, for a nickel, it will play the next song on the 10-song roll. We also have a couple pieces of automata that are coin-operated. One is called the Whistler, which is a boy about 3-foot-tall. He's inside a glass case, and when you put in a nickel, he whistles a tune for you, so you get both the music and the animation."

When electronic robots were developed in the 20th century, becoming both reviled and beloved characters in [science-fiction](#), their characteristic stiff, mechanical movement represented a step backward in terms of creating an illusion of life. Even clockwork tin toys regressed, as they were made to imitate the rigid, metallic robots seen in B movies. "With a real automaton—from the Jaquet-Droz pieces from the late 1700s on through to the Parisian Golden Age between 1850 and 1890—when you wind it up and turn it on, it

has an extremely lifelike articulation of movement,” Ryder says. “It’s not jerky, it’s fluid, and so real it’s eerie. It’s only in the last maybe 10 years or so that electronics and processing power can replicate that kind of human fluidity. Old robot tech was better than any new robot tech until very recently.”



A Thomas Edison talking phonograph doll that recites “Jack and Jill.” (Via the Smithsonian)

The 1890s saw the introduction of [player pianos](#) and [Edison’s amazing talking doll](#). Coin-operated [vending](#) had evolved into [slot machines](#) and coin-operated [Mutoscopes and Kinetoscopes](#) that let one person watch short, sometimes sexy, little movies. By the turn of the century, ice-cream parlors and saloons drew customers with coin-operated orchestrions, barrel organs, and player pianos.

Around 1905, [penny arcades](#) started to [pop up](#) around the United States, many of which featured automata acting out scenes that would be animated by dropping a coin in a slot, as well as coin-op music machines. Some of the most famous coin-op automata of this era include [fortune-teller machines](#) like [Zoltar](#) and the towering [Laffing Sal](#), which was [first made in the 1920s](#) and is thought to be the inspiration for the animatronics you

see at [Disney theme parks](#) and in [Chuck E. Cheese](#) restaurants. [Musée Mecanique](#) in San Francisco has a large collection of such early 20th-century coin-op machines.

Rejecting the Cold War sci-fi mania, in the 1970s, British artists like [Sue Jackson](#), [Ron Fuller](#), Peter Markey, and Paul Spooner began to build old-school automata of animals and humans that were often made of wood and operated by clockwork and hand crank. In 1979, Jackson organized the group into a London collective called [Cabaret Mechanical Theatre](#), which was responsible for a revived interest in automata in the 1980s.

Meanwhile, dystopian science fiction like “Blade Runner” and “Battlestar Galactica” imagined dark futures where artificially intelligent, rebellious robots would be ubiquitous and almost indistinguishable from actual humans. But today, as scientists are developing robots with artificial intelligence for masses, these machines are shedding their humanoid bodies entirely to live in little boxes, like Siri and Alexa do.

Has the dream of [re-creating humanity](#) died? Even in the 19th century, German physicist [Herman von Helmholtz](#) mused that, for the Gilded Age capitalists bankrolling automation, it was much more efficient to replace human laborers with single-function robots. “Nowadays we no longer attempt to construct beings able to perform a thousand human actions,” Helmholtz wrote, “but rather machines able to execute a single action which will replace that of thousands of humans.”

In spite of these developments, [humanoid](#) and [animal-like robots](#) are still built and widely adored today. In 2018, the second [AutomataCon](#) at the [Morris Museum](#) drew more than 300 people, showcasing real, physical androids in all their varied forms—from hand-cranked, hand-carved wooden automata to electronic robots with microprocessors. The makers comprised everyone from woodworkers, jewelers, and steam punks to academics and computer programmers. “The attendees ranged from gray-haired 80-year-olds to little kids participating in our Build Your Own Automata workshop,” Ryder says.

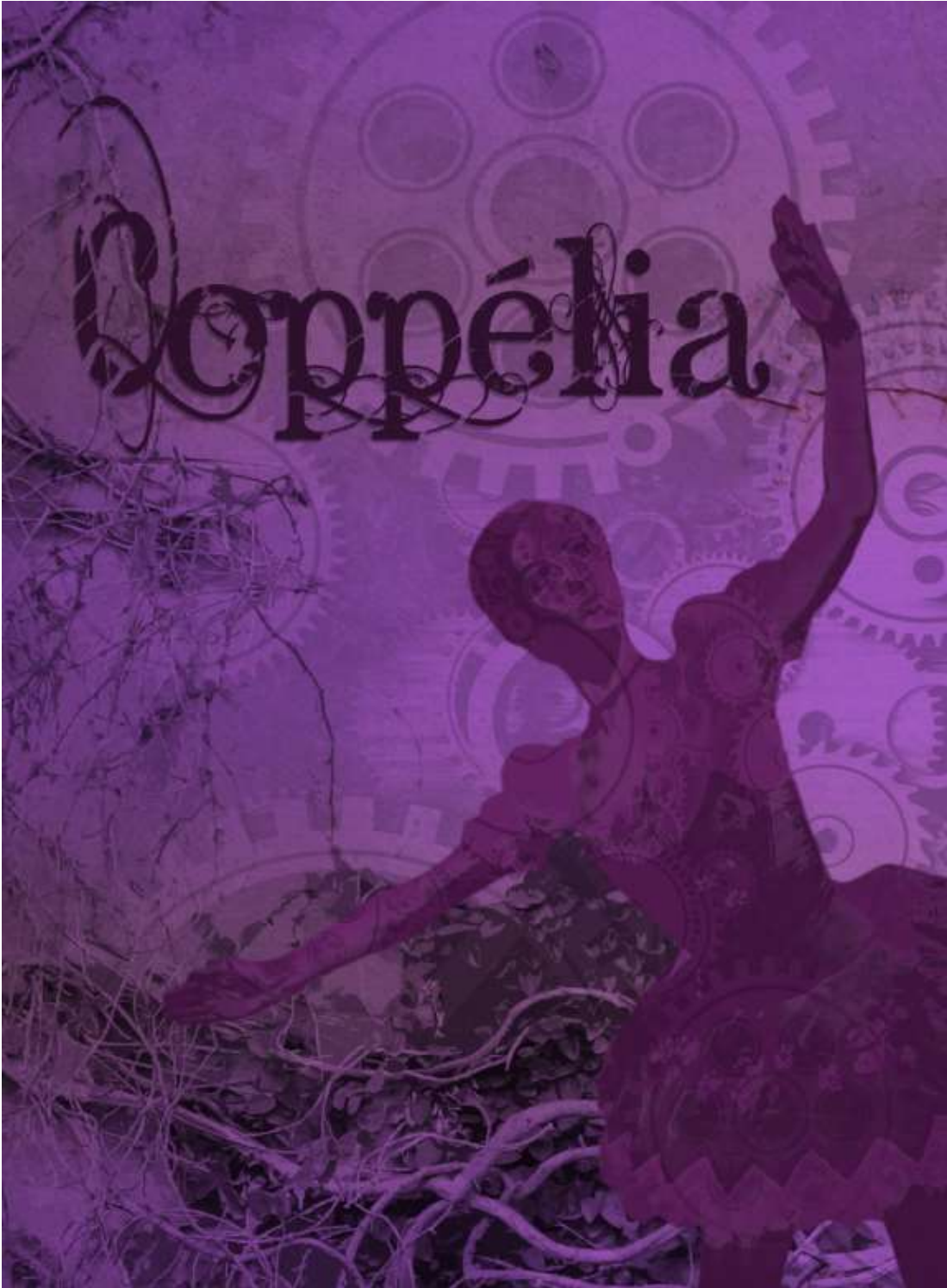
While it’s unlikely we’re ever going to live in a world full of anarchic [Replicants](#) or [Cylons](#), androids and other automata serve almost exactly the same purpose today as they did in the 18th and 19th centuries—to astonish and amuse the people who have the privilege of encountering them.

(To learn more about the Golden Age of Automata, visit the [Murtoogh D. Guinness Collection](#) at the Morris Museum in Morristown, New Jersey. To submit an entry to be considered for the museum’s juried exhibition, “A Cache of Kinetic Art: Simply Steampunk,” which runs March 15 to July 14, 2019, click [here](#). The deadline is September 20, 2018.)

RETRIEVED FROM: <https://www.collectorsweekly.com/articles/ancient-androids/>



Lessons





Coppélia: Re-Writing the Ending

By: Karel Sloane-Boekbinder

Coppélia is one of the most frequently performed and well-loved comic ballets. It was first choreographed at the end of the Romantic era and is considered to be a precursor to the “Classical era” (think Petipa) which then followed.

Coppélia is a comic ballet based upon two stories by E. T. A. Hoffmann: Der Sandmann (The Sandman) and Die Puppe (The Doll). Dr. Coppélius is an inventor who has made a life-size dancing doll. It is so lifelike that Franz, a village youth, becomes infatuated with it and sets aside his true heart's desire, Swanhilda. She shows him his folly by dressing as the doll, pretending to make it come to life and ultimately saving him from an untimely end at the hands of the inventor.

In this lesson, students will become familiar with the characters, settings and events of Coppélia and have an opportunity to create a new ending for this ballet.

Begin this lesson by familiarizing students with the ballet Coppélia. As a class, read the list of characters and character descriptions of Coppélia. Place the list on an Elmo, Promethean Board or SMART board where it can be visible to the whole class. Have students take turns reading aloud to the class.

Distribute a copy of the **Coppélia: Characters and Events** Note Taking sheet and a pencil to each student. As a class, read the synopsis of Coppélia. Place the synopsis on an Elmo, Promethean Board or SMART board where it can be visible to the whole class. Have students take turns reading aloud to the class. As the class reads, ask students to take notes on the characters, settings and events of Coppélia. Once the class finishes reading the synopsis aloud, ask students to write about their favorite character and favorite event.

Next, distribute a copy of the **Coppélia: Re-Writing the Ending** to each student. Ask students to write about the ending of the ballet. Ask students to consider a new way to end the story. Ask students to write down their ideas for a new ending. Once the class has written down their ideas, ask students to take turn reading their ideas for the new ending aloud to the class.

COPPÉLIA

CAST OF CHARACTERS

Dr Coppélius is a lonely old alchemist who lives in a two-storey house on the edge of the village square. He is regarded by the villagers as a sorcerer, someone who conducts strange experiments in his laboratory. They fear him and ridicule him.

Coppélia is his "daughter", a mechanical doll who is so lifelike she is able to fool the villagers into believing she is alive. Doctor Coppélius is so enamoured of this doll that he tries to use magic to bring her to life.

Swanilda is one of the most beautiful girls of the village, Swanilda loves life and her fiancé, Franz. She and her friends are to be married at a mass wedding during the Harvest Festival on the following day.

Franz is engaged to marry Swanilda, he causes her a great deal of dismay when he notices the beautiful "new girl" in the village, Coppélia, throwing kisses at him. Not realising that she is only a mechanical doll, he is determined to discover whether she really loves him or not by breaking into Dr Coppélius' house, where he finds himself in great danger.

The Official Party

The Seigneur and his Lady

The Town Councillor and his Wife

The School Teacher

The Priest

Villagers, Dolls, Attendants

RETRIEVED FROM: <https://australianballet.com.au/education-resources/coppelia-the-story>



A Synopsis of the Ballet, Coppélia - Act 1

The Truth About Love and the Beauty of Coppélia

By [Aaron Green](#)

Updated February 13, 2017

Act I

The story begins during a town festival in celebration of a new town bell that is due to arrive in the coming days. Anyone who wants to be married on that day will be awarded with a special gift of money. Swanilda is engaged to Franz and plans to marry during the festival. Swanilda asks Franz if he loves her and he answers yes, but she senses a lack of sincerity in his reply. She becomes unhappy with her fiancé because it seems he is more interested in getting another girl's attention.

The girl is Coppélia who sits on the toy-maker Dr. Coppélius's balcony reading all day long, paying no heed and showing no care for anyone trying to be social with her. Franz is mesmerized by her beauty and is determined to get her attention. Swanilda is deeply hurt by his distractions and feels he does not love her despite his answers.

Because she doesn't trust his words, Swanilda decides to turn to an old wives' tale for guidance. She holds up an ear of wheat to her ear; if it rattles when she shakes it, then she will know that he loves her. She shakes the wheat furiously, but no rattle can be heard. Confused and upset, she has Franz do the same thing. He tells her it does rattle. She does not believe him and runs away heartbroken.

When Dr. Coppélius leaves his house, he is heckled by a group of small boys. After running them off he finally goes on his way not knowing that he dropped his keys in the process of chasing the boys away. Swanilda finds his keys and is determined to find out more of Coppélia. She and her friends decide to go inside Dr. Coppélius's house. Meanwhile, Franz develops his own plan to meet Coppélia. He climbs up a ladder to Coppélia's balcony.

Act II

Swanilda and her friends find themselves in a large room filled with people, but these people aren't moving. The girls discover that these are not people, but life-size

mechanical dolls. They quickly wind them up and watch them move. In her searching, Swanilda finds Coppélia behind a curtain and discovers that she, too, is a doll.

When Dr. Coppelius returns home, he finds the girls in his house. He becomes angry not only for getting into his house, but for also messing up his workroom, and kicks the girls out. Dr. Coppelius begins cleaning up the mess and notices Franz coming into the window. Instead of shooing him away, he invites him in. Dr. Coppelius wants to bring Coppelia to life and in order to do that, he needs a human sacrifice. His magic spell will take Franz's life and transfer it to Coppélia. Dr. Coppelius gives Franz some wine laced with sleeping powder and Franz begins to fall asleep. Dr. Coppelius then readies his magic spell.

When Dr. Coppelius kicked the girls out, Swanilda stayed and hid behind a curtain. Swanilda dresses up in Coppelia's clothes and pretends to come to life. She wakes up Franz and quickly escapes by winding up all of the mechanical dolls. Dr. Coppelius becomes saddened to find a lifeless Coppélia behind the curtain.

Act III

Swanilda and Franz are about to say their vows when the angry Dr. Coppelius shows up. Feeling bad for causing such a mess, Swanilda offers Dr. Coppelius her dowry in return for his forgiveness. Swanilda's father tells Swanilda to keep her dowry. He pays Dr. Coppelius instead because it was a special day. Swanilda kept her dowry and Dr. Coppelius was awarded his own bag of money. Swanilda and Franz get married and the entire town celebrates by dancing.

RETRIEVED FROM: <https://www.thoughtco.com/coppelia-act-1-synopsis-723765>



NAME _____

Coppélia: Characters and Events

Characters

Setting

Main Events

Favorite Character

Favorite Part



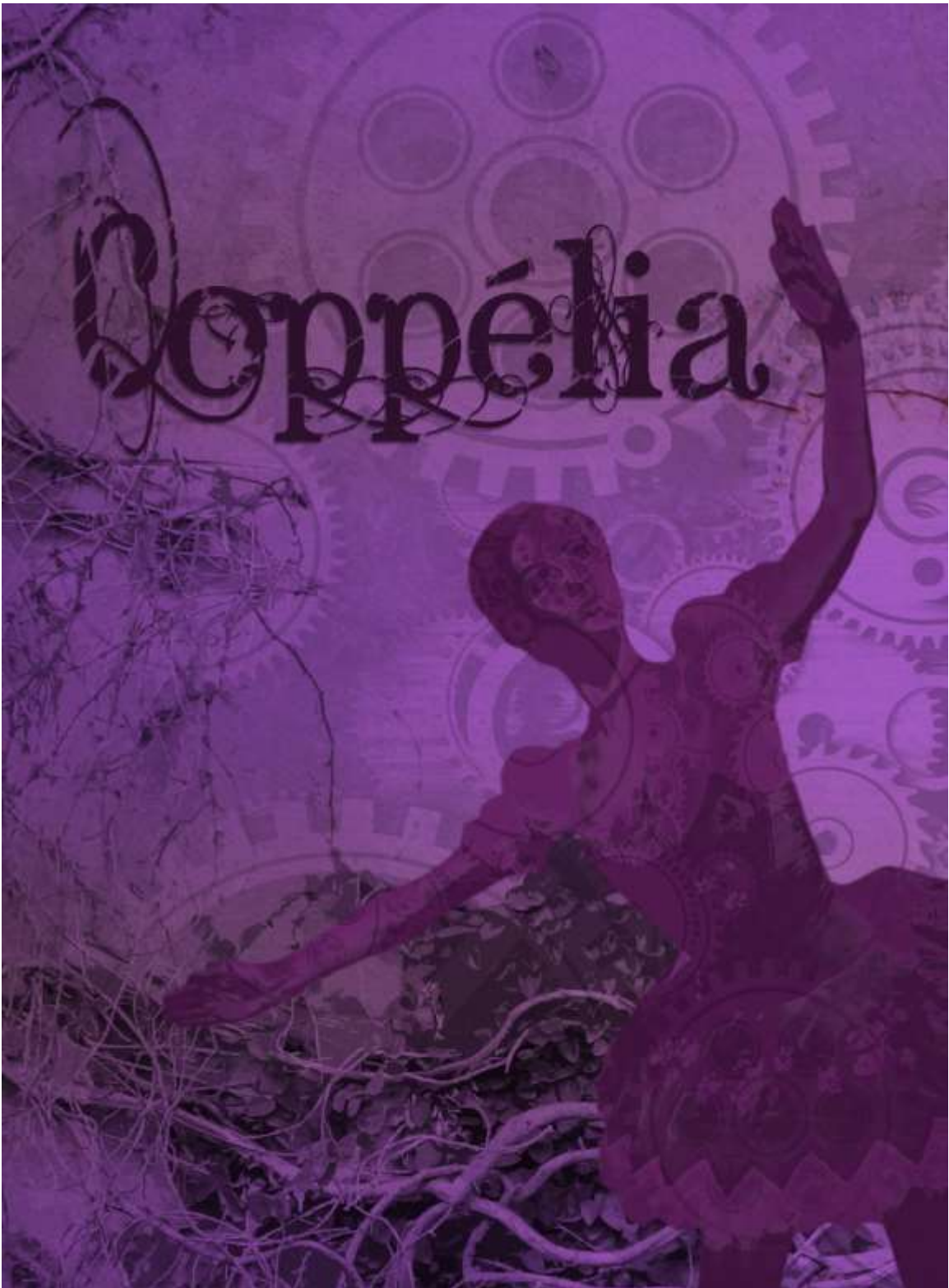
NAME _____

Coppélia: Re-Writing the Ending

Original Ending

New Ending

Student Samples





NAME Samy

Coppélia: Characters and Events

Characters

Frans
Coppélia
Swanilda
Dr. Coppelius

Setting

Workshop

Main Events

Marriage,
Theater of
Life

Favorite Character

No-one,
I like them
all.

Favorite Part

None,
I like it all.



NAME Sample

Coppélia: Re-Writing the Ending

Original Ending

Copelia loves Franz
They get married

New Ending

Copelia is too
good for Franz.
She finds a better
husband.

K-12 Student Standards for English Language Arts » Grade 1

Reading Standards for Literature

Key Ideas and Details

1. Ask and answer questions about key details in a text.
2. a. Retell stories, including key details.
b. Recognize and understand the central message or lesson.
3. Describe **characters**, **settings**, and major **events** in a story, using key details.

Integration of Knowledge and Ideas

7. Use illustrations and details in a story to describe its **characters**, **setting**, or **events**

Range of Reading and Level of Text Complexity

10. With prompting and support read informational texts appropriately complex for grade 1.

Writing Standards

Research to Build and Present Knowledge

8. With guidance and support from adults, recall information from experiences **or gather information from provided sources to answer a question**.

K-12 Student Standards for English Language Arts » Grade 4

Reading Standards for Literature

Key Ideas and Details

1. Refer to details and examples in a text when explaining what the text says explicitly and when **drawing inferences from the text**.
2. Determine a theme of a **story**, drama, or poem from details in the text; summarize the text.
3. Describe in depth a **character**, **setting**, or **event** in a story or drama, drawing on specific details in the text (e.g., a character's thoughts, words, or actions).

Integration of Knowledge and Ideas

7. Make connections between the text of a story or drama and a visual or oral presentation of the text.

Writing Standards

d. Use precise language and domain-specific vocabulary to inform about or explain the topic.

K-12 Student Standards for English Language Arts » Grade 7

Reading Standards for Literature

Key Ideas and Details

1. Cite several pieces of relevant textual evidence to support analysis of what the text says explicitly as well as **inferences** drawn from the text.

3. Analyze the interactions between **individuals**, **events**, and ideas in a text (e.g., how ideas influence individuals or events, or how individuals influence ideas or events).

2. Determine a theme or central idea of a text and analyze its development over the course of the text; provide an objective summary of the text.

3. Analyze how particular elements of a story or drama interact (e.g., how setting shapes the **characters** or **plot**).

Craft and Structure

6. Analyze how an author develops and contrasts the points of view of different characters or narrators in a text.

Writing Standards

3. Write narratives to develop real or imagined experiences or events using effective technique, relevant **descriptive details**, and well-structured event sequences.

d. Use precise words and phrases, relevant descriptive details, and sensory language to capture the action and convey experiences and events.



Comparing the Characters in Coppélia and the Paper Bag Princess

By: Karel Sloane-Boekbinder

Coppélia is one of the most frequently performed and well-loved comic ballets. It was first choreographed at the end of the Romantic era and is considered to be a precursor to the “Classical era” (think Petipa) which then followed.

Coppélia is a comic ballet based upon two stories by E. T. A. Hoffmann: *Der Sandmann* (The Sandman) and *Die Puppe* (The Doll). Dr. Coppélius is an inventor who has made a life-size dancing doll. It is so lifelike that Franz, a village youth, becomes infatuated with it and sets aside his true heart's desire, Swanhilda. She shows him his folly by dressing as the doll, pretending to make it come to life and ultimately saving him from an untimely end at the hands of the inventor.

In this lesson, students will become familiar with the characters of Coppélia and the modern-day fairytale **The Paper Bag Princess**, have opportunities to express their opinions about the characters of Coppélia and explore how the characters of these two stories are similar and different.

Begin this lesson by familiarizing students with the ballet Coppélia. As a class, read the list of characters and character descriptions of Coppélia. Place the list on an Elmo, Promethean Board or SMART board where it can be visible to the whole class. Have students take turns reading aloud to the class.

Distribute a copy of the Comparing the Characters in **Coppélia and the Paper Bag Princess Swanhilda and Princess Elizabeth, Franz and Prince Roland and Dr. Coppelius and the Dragon** Venn diagrams and a pencil to each student. As a class, read the synopsis of Coppélia. Place the synopsis on an Elmo, Promethean Board or SMART board where it can be visible to the whole class. Have students take turns reading aloud to the class. As the class reads, ask students to take notes on the characters of Coppélia.

Next, as a class, read **The Paper Bag Princess** *Adapted from the story by Robert N. Munsch by Jan Lee-Martin*. Place **The Paper Bag Princess** on an Elmo, Promethean Board or SMART board where it can be visible to the whole class. Have students take turns reading aloud to the class. As the class reads, ask students to take notes on the characters of **The Paper Bag Princess**.

Explain students will now have opportunities to express their opinions about the characters in the ballet Coppélia. Distribute a copy of the JPAS **Coppélia Opinionnaire** to each student. Ask

students to complete their **Coppélia *Opinionnaire***. Once the class has completed their **Coppélia *Opinionnaire*** ask students to take turns reading their answers aloud to the class.

Next, distribute a copy of the Comparing the Characters in **Coppélia** and the **Paper Bag Princess** Notetaking sheet to each student. Ask students to use their Comparing the Characters in **Coppélia** and the **Paper Bag Princess** Venn diagrams to help them complete their Notetaking sheet.

COPPÉLIA

CAST OF CHARACTERS

Dr Coppélius is a lonely old alchemist who lives in a two-storey house on the edge of the village square. He is regarded by the villagers as a sorcerer, someone who conducts strange experiments in his laboratory. They fear him and ridicule him.

Coppélia is his "daughter", a mechanical doll who is so lifelike she is able to fool the villagers into believing she is alive. Doctor Coppélius is so enamoured of this doll that he tries to use magic to bring her to life.

Swanilda is one of the most beautiful girls of the village, Swanilda loves life and her fiancé, Franz. She and her friends are to be married at a mass wedding during the Harvest Festival on the following day.

Franz is engaged to marry Swanilda, he causes her a great deal of dismay when he notices the beautiful "new girl" in the village, Coppélia, throwing kisses at him. Not realising that she is only a mechanical doll, he is determined to discover whether she really loves him or not by breaking into Dr Coppélius' house, where he finds himself in great danger.

The Official Party

The Seigneur and his Lady

The Town Councillor and his Wife

The School Teacher

The Priest

Villagers, Dolls, Attendants

RETRIEVED FROM: <https://australianballet.com.au/education-resources/coppelia-the-story>



A Synopsis of the Ballet, Coppélia - Act 1

The Truth About Love and the Beauty of Coppélia

By [Aaron Green](#)

Updated February 13, 2017

Act I

The story begins during a town festival in celebration of a new town bell that is due to arrive in the coming days. Anyone who wants to be married on that day will be awarded with a special gift of money. Swanilda is engaged to Franz and plans to marry during the festival. Swanilda asks Franz if he loves her and he answers yes, but she senses a lack of sincerity in his reply. She becomes unhappy with her fiancé because it seems he is more interested in getting another girl's attention.

The girl is Coppélia who sits on the toy-maker Dr. Coppélius's balcony reading all day long, paying no heed and showing no care for anyone trying to be social with her. Franz is mesmerized by her beauty and is determined to get her attention. Swanilda is deeply hurt by his distractions and feels he does not love her despite his answers.

Because she doesn't trust his words, Swanilda decides to turn to an old wives' tale for guidance. She holds up an ear of wheat to her ear; if it rattles when she shakes it, then she will know that he loves her. She shakes the wheat furiously, but no rattle can be heard. Confused and upset, she has Franz do the same thing. He tells her it does rattle. She does not believe him and runs away heartbroken.

When Dr. Coppélius leaves his house, he is heckled by a group of small boys. After running them off he finally goes on his way not knowing that he dropped his keys in the process of chasing the boys away. Swanilda finds his keys and is determined to find out more of Coppélia. She and her friends decide to go inside Dr. Coppélius's house. Meanwhile, Franz develops his own plan to meet Coppélia. He climbs up a ladder to Coppélia's balcony.

Act II

Swanilda and her friends find themselves in a large room filled with people, but these people aren't moving. The girls discover that these are not people, but life-size

mechanical dolls. They quickly wind them up and watch them move. In her searching, Swanilda finds Coppélia behind a curtain and discovers that she, too, is a doll.

When Dr. Coppelius returns home, he finds the girls in his house. He becomes angry not only for getting into his house, but for also messing up his workroom, and kicks the girls out. Dr. Coppelius begins cleaning up the mess and notices Franz coming into the window. Instead of shooing him away, he invites him in. Dr. Coppelius wants to bring Coppelia to life and in order to do that, he needs a human sacrifice. His magic spell will take Franz's life and transfer it to Coppélia. Dr. Coppelius gives Franz some wine laced with sleeping powder and Franz begins to fall asleep. Dr. Coppelius then readies his magic spell.

When Dr. Coppelius kicked the girls out, Swanilda stayed and hid behind a curtain. Swanilda dresses up in Coppelia's clothes and pretends to come to life. She wakes up Franz and quickly escapes by winding up all of the mechanical dolls. Dr. Coppelius becomes saddened to find a lifeless Coppélia behind the curtain.

Act III

Swanilda and Franz are about to say their vows when the angry Dr. Coppelius shows up. Feeling bad for causing such a mess, Swanilda offers Dr. Coppelius her dowry in return for his forgiveness. Swanilda's father tells Swanilda to keep her dowry. He pays Dr. Coppelius instead because it was a special day. Swanilda kept her dowry and Dr. Coppelius was awarded his own bag of money. Swanilda and Franz get married and the entire town celebrates by dancing.

RETRIEVED FROM: <https://www.thoughtco.com/coppelia-act-1-synopsis-723765>

The Paper Bag Princess

Adapted from the story by Robert N. Munsch by Jan Lee-Martin

Once upon a time there was a young prince called Roland, who lived in the same castle as the Princess Elizabeth. The children had different parents but they always played together and learned together. They both wore rich clothes and had the same toys and the same teachers, and everyone knew that when they grew up they would marry each other.

But one day a dragon appeared from the forest and blew away the castle, in one fiery breath. He captured Prince Roland and flew with him, back to his mountain eyrie. Princess Elizabeth picked herself up, dusted herself down, and resolved to rescue Roland. But first, she had to find something to wear.... everything had been burned up in the fire of the dragon's breath.

Luckily she found a big paper bag, which she pulled over her head and wore as a dress. Then without further ado, she set off through the forest, following the dragon's smoldering tracks, to rescue the prince from his fate.

She travelled a long way, through many hardships, but eventually she reached the dragon's lair and banged bravely on the door. A little window opened and the dragon's big eye peered out.

"What are you doing here, little girl?" he asked. "You are very lucky I've just had my breakfast or I might decide to have toasted princess for lunch."

Princess Elizabeth refused to be frightened by his threat. Instead she said, "Hallo Dragon. My name is Elizabeth and I have heard a lot about you.

"Tell me, is it true that you can destroy five big forests with one fiery breath?" The dragon preened himself and said coyly, "I can do more than that!" "Oh," said Elizabeth, breathlessly. "Could you show me?"

The dragon stirred, opened the gate and stuck his nose out. He took a deep breath and whooshed a river of flame and.... yes, seven big forests were destroyed all at once.

"Oh, that was wonderful," moaned Elizabeth. "I don't suppose you could do it again?"

And the dragon did do it again, burning up another set of forests with the last of his fiery breath.

"Ah, magnificent," breathed Elizabeth.

“And tell me, Mr Dragon, is it really true that you can fly around the world in just five minutes?”

“Yes, of course,” said the dragon. “I suppose you want to see that, too.”

And so he set off, flapping his wings, to return from the opposite direction just five minutes later.

“Oh, that was won-der-ful,” Elizabeth gushed. “I wonder, could you do that again?” Once more the dragon set off, a little bit more slowly this time. When he returned he landed heavily, rolled over and went straight to sleep. Elizabeth approached him carefully, lifted one eyelid to check that he was really asleep, then climbed right over him, straight into the fortress to find Roland.

“There you are!” she said, excitedly, when she found the prince unharmed, still looking magnificent in his velvet jacket. But she didn’t get the welcome she expected.

“Elizabeth!” said the prince in a disapproving voice. “Look at you! You’re all covered in ashes – and what is that dreadful thing you’re wearing! Go and get dressed properly before you approach me!”

“Roland,” said the princess, “you’re a toad! And I’m not going to marry you, after all!”

So Princess Elizabeth and Prince Roland didn’t get married and live happily ever after.

ends

Annick Press 1980 Forty-first printing 2002



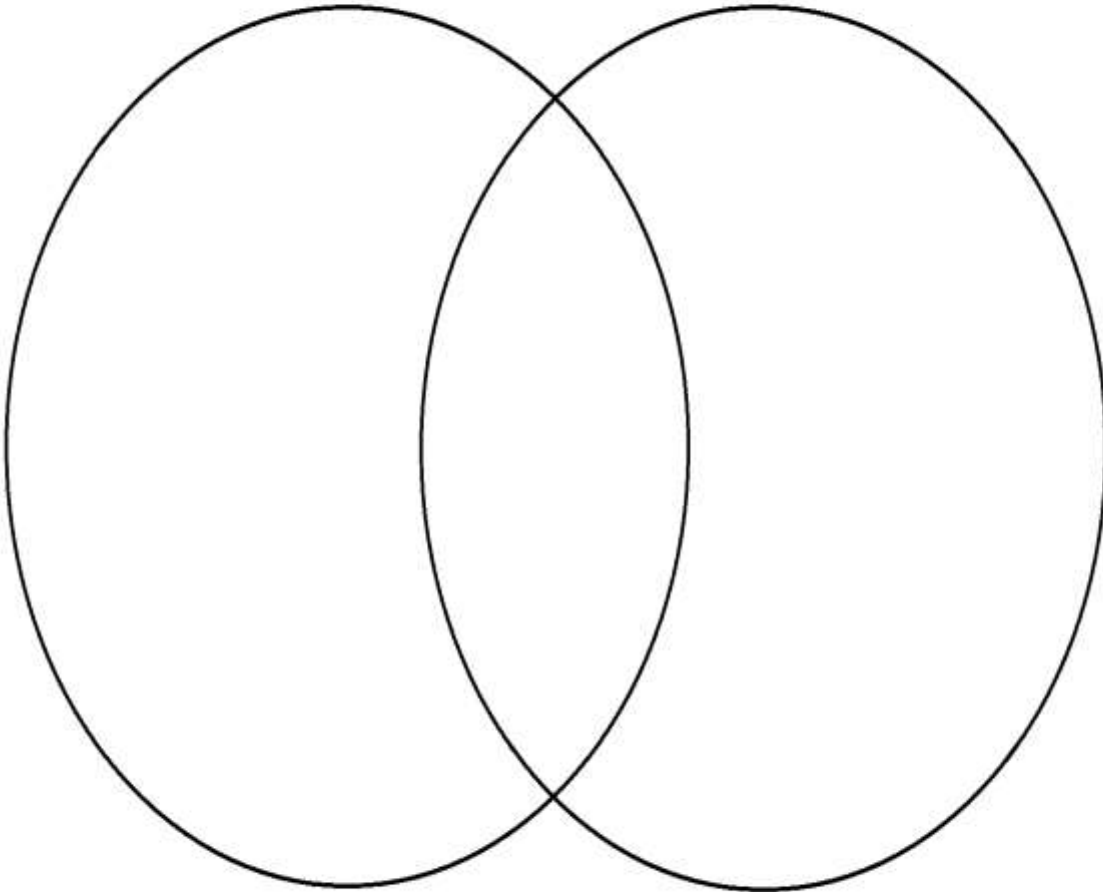
NAME _____

Comparing the Characters in **Coppélia** and the **Paper Bag Princess**

Swanilda and Princess Elizabeth

Swanilda

Princess Elizabeth





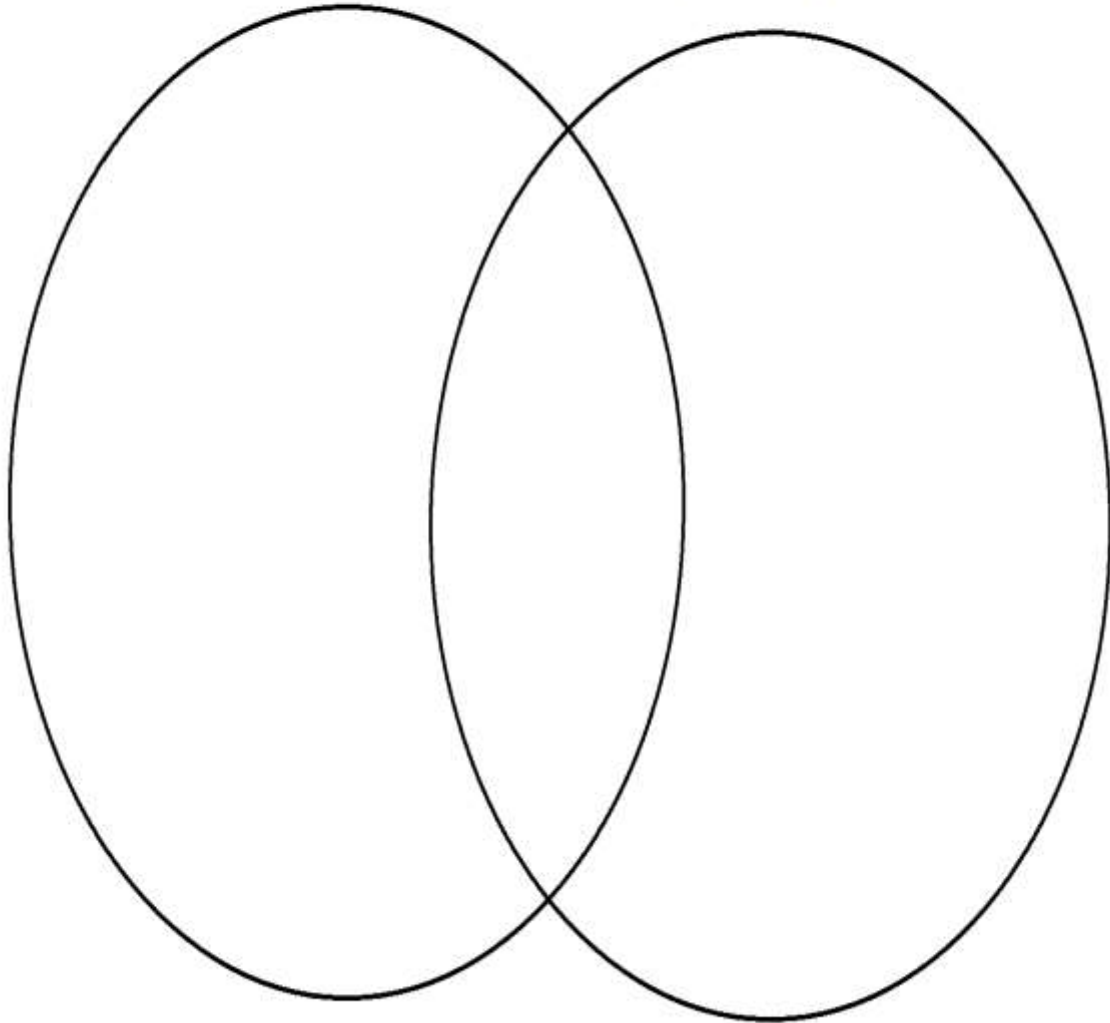
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Comparing the Characters in **Coppélia** and the **Paper Bag Princess**

Franz and Prince Roland

Franz

Prince Roland



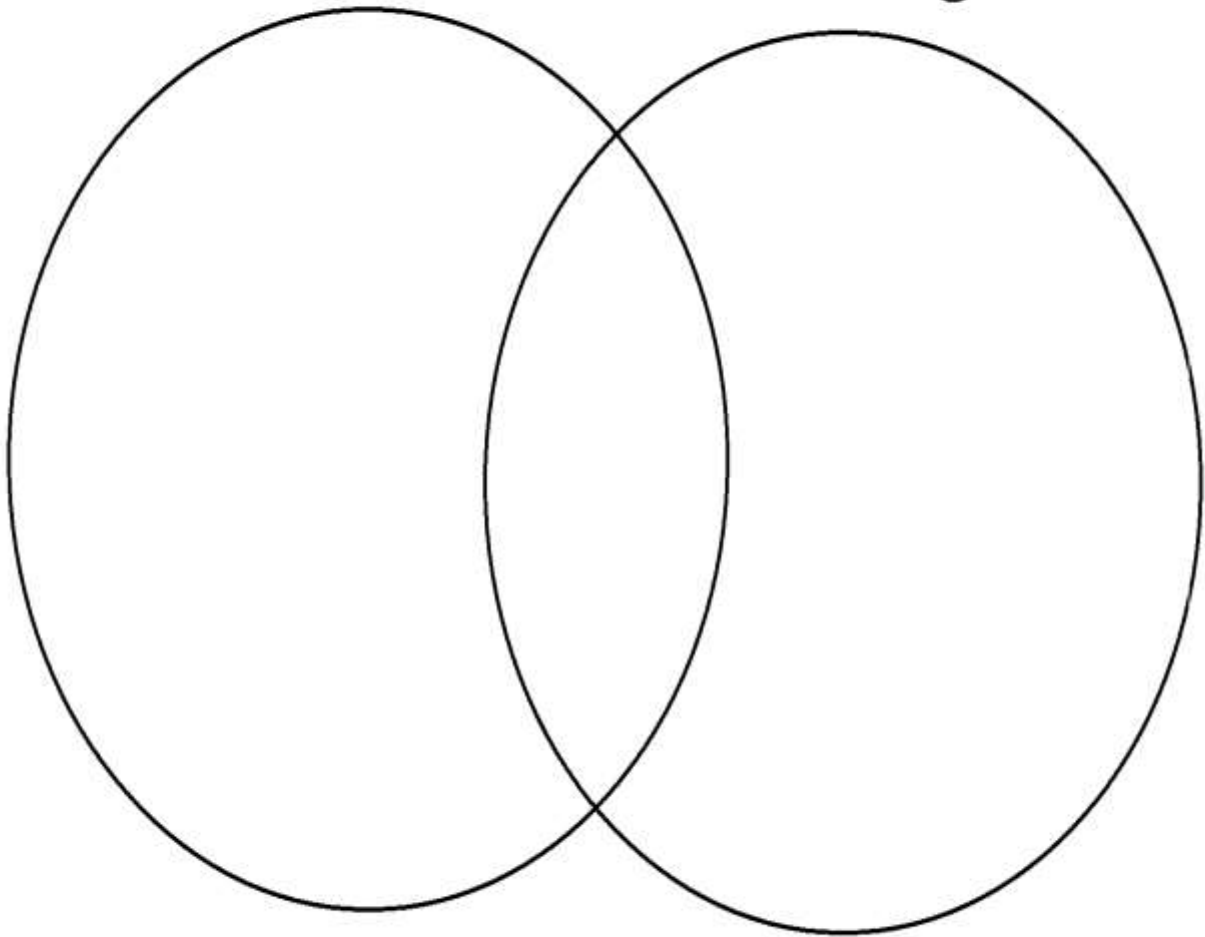


NAME _____

Comparing the Characters in **Coppélia** and the **Paper Bag Princess**

Dr. Coppelius and the Dragon

Dr. Coppelius The Dragon





Coppélia Opinionnaire

Name _____

Exploring Your Opinions about Coppélia

Directions: After each statement, write SA (strongly agree), A (agree), D (disagree), or SD (strongly disagree). Then, in the space provided, briefly explain the reasons for your opinions.

1. In **Coppélia** Swanilda is the hero of the story. _____
Your reasons:

2. In **Coppélia** Franz is falling in love with Coppélia because she is quiet and likes to read. _____
Your reasons:

3. Dr. Coppélius should bring **Coppélia** to life even if it means sacrificing Franz. _____
Your reasons:



NAME _____

Comparing the Characters in **Coppélia** and the **Paper Bag Princess**

1. How are Swanilda and Princess Elizabeth the same?

How are Swanilda and Princess Elizabeth different?

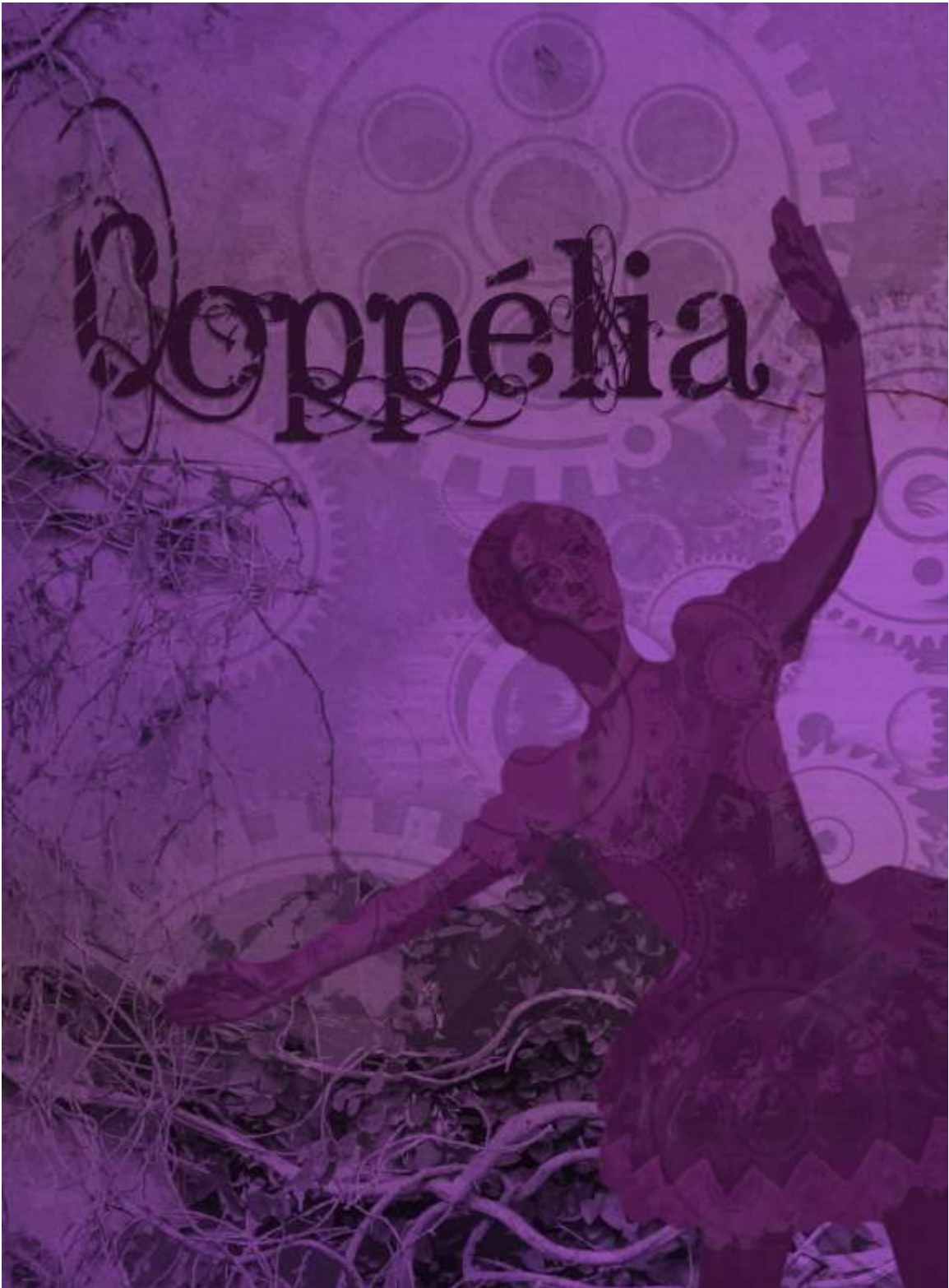
2. How are Franz and Prince Roland the same?

How are Franz and Prince Roland different?

3. How are Dr. Coppélius and the Dragon same?

How are Dr. Coppélius and the Dragon different?

Student Samples





Coppélia Opinionnaire

Name sample

Exploring Your Opinions about Coppélia

Directions: After each statement, write SA (strongly agree), A (agree), D (disagree), or SD (strongly disagree). Then, in the space provided, briefly explain the reasons for your opinions.

1. In **Coppélia** Swanilda is the hero of the story. A
Your reasons:

Swanilda is the hero because she makes the town dance and everyone happy.

2. In **Coppélia** Franz is falling in love with Coppélia because she is quiet and likes to read. A
Your reasons:

I can't explain.

3. Dr. Coppélius should bring **Coppélia** to life even if it means sacrificing Franz. A
Your reasons:

Because Franz truly loves her.



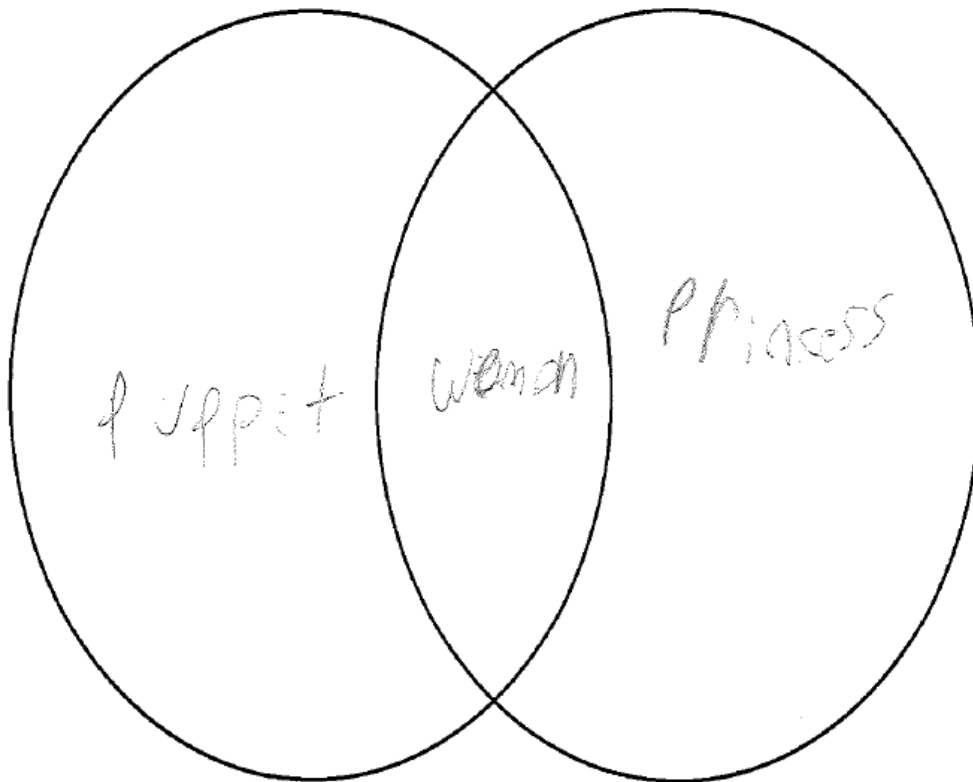
NAME Example

Comparing the Characters in **Coppélia** and the **Paper Bag Princess**

Swanilda and Princess Elizabeth

Swanilda

Princess Elizabeth





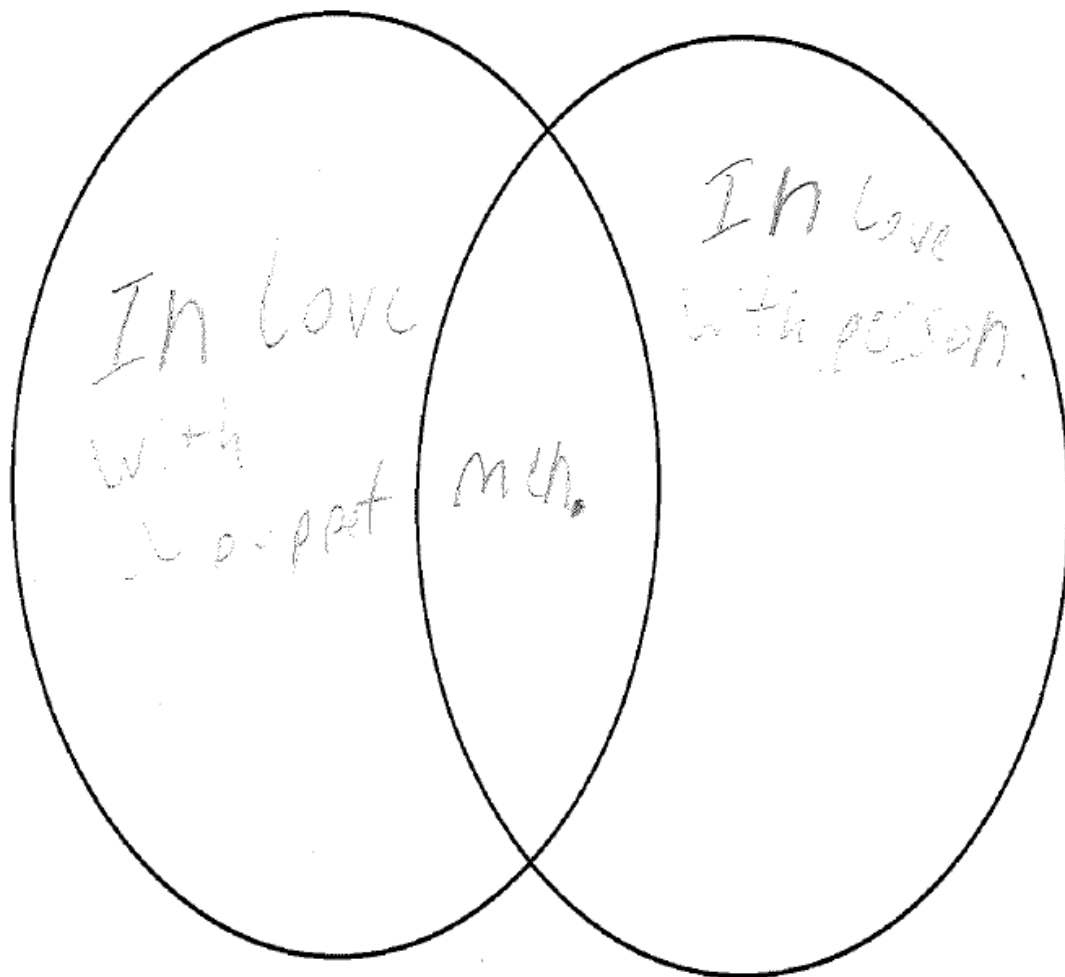
NAME sample

Comparing the Characters in *Coppélia* and the *Paper Bag Princess*

Franz and Prince Roland

Franz

Prince Roland



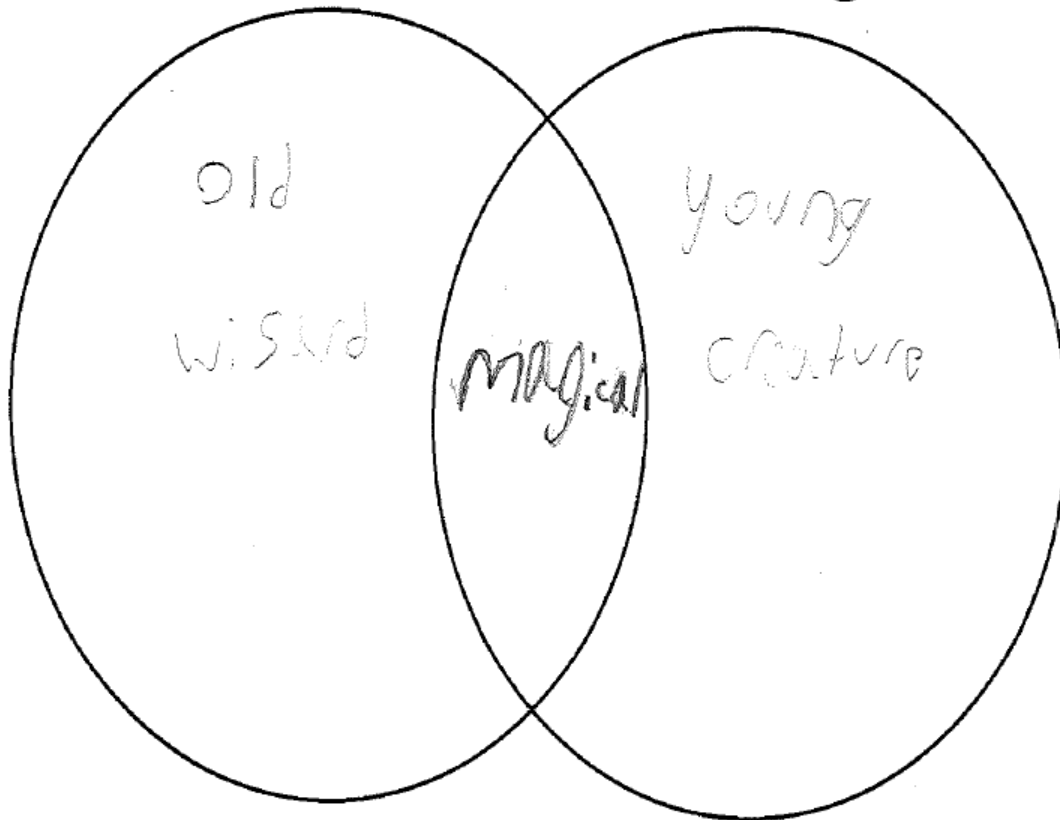


NAME Sample

Comparing the Characters in **Coppélia** and the **Paper Bag Princess**

Dr. Coppelius and the Dragon

Dr. Coppelius The Dragon





Comparing the Characters in **Coppélia** and the **Paper Bag Princess**

1. How are Swanilda and Princess Elizabeth the same?

They are both women.

How are Swanilda and Princess Elizabeth different?

Swanilda is a girl, Elizabeth is a princess.

2. How are Franz and Prince Roland the same?

They are both men.

How are Franz and Prince Roland different?

Franz is a boy, Roland is a prince.

3. How are Dr. Coppélius and the Dragon same?

Both are magical.

How are Dr. Coppélius and the Dragon different?

Dr. Coppélius is a man and the Dragon is a dragon.

K-12 Student Standards for English Language Arts » Grade 1

Reading Standards for Literature

Key Ideas and Details

1. Ask and answer questions about key details in a text.
2. a. Retell stories, including key details.
b. Recognize and understand the central message or lesson.
3. Describe **characters**, settings, and major events in a story, using key details.

Integration of Knowledge and Ideas

7. Use illustrations and details in a story to describe its **characters**, setting, or events

Range of Reading and Level of Text Complexity

10. With prompting and support read informational texts appropriately complex for grade 1.

Writing Standards

Research to Build and Present Knowledge

8. With guidance and support from adults, recall information from experiences **or gather information from provided sources to answer a question**.

K-12 Student Standards for English Language Arts » Grade 4

Reading Standards for Literature

Key Ideas and Details

1. Refer to details and examples in a text when explaining what the text says explicitly and when **drawing inferences from the text**.
2. Determine a theme of a **story**, drama, or poem from details in the text; summarize the text.
3. Describe in depth a **character**, setting, or event in a story or drama, drawing on specific details in the text (e.g., a character's thoughts, words, or actions).

Integration of Knowledge and Ideas

7. Make connections between the text of a story or drama and a visual or oral presentation of the text.

9. Compare and contrast the treatment of similar themes and topics (e.g., opposition of good and evil) and patterns of events (e.g., the quest) in stories, myths, and traditional literature from different cultures. (French **Coppélia** and United States **The Paper Bag Princess**.)

Writing Standards

d. Use precise language and domain-specific vocabulary to inform about or explain the topic.

K-12 Student Standards for English Language Arts » Grade 7

Reading Standards for Literature

Key Ideas and Details

1. Cite several pieces of relevant textual evidence to support analysis of what the text says explicitly as well as **inferences** drawn from the text.

3. Analyze the interactions between individuals, events, and ideas in a text (e.g., how ideas influence individuals or events, or how individuals influence ideas or events).

2. Determine a theme or central idea of a text and analyze its development over the course of the text; provide an objective summary of the text.

3. Analyze how particular elements of a story or drama interact (e.g., how setting shapes the **characters** or **plot**).

Craft and Structure

6. Analyze how an author develops and contrasts the points of view of different characters or narrators in a text.

Writing Standards

3. Write narratives to develop real or imagined experiences or events using effective technique, relevant **descriptive details**, and well-structured event sequences.

d. Use precise words and phrases, relevant descriptive details, and sensory language to capture the action and convey experiences and events.



Coppélia: Ballet Trailblazers, Arabesques, Jetés, Angles and Altitudes

By: Karel Sloane-Boekbinder

Coppélia was a trail blazer. Coppélia was the first ballet to incorporate traditional dances and music, including national dances like the Czárdás (Hungarian) and the Mazurka (Polish.)

Coppélia was the first (and only) ballet to be danced by Guiseppina Bozzacchi, the 16 year old ballerina who originated the lead role of Swanhilda. In fact, Coppélia was the first time Guiseppina Bozzacchi ever danced ballet on stage.

Coppélia was the first ballet to use automata, marionettes or automatized dolls. The Industrial Revolution in France paved the way for the trend of automata as parlor entertainment for adults, starting in the mid-19th century. Until then, larger automata were hand-built to impress royalty while most aristocrats could only afford smaller hand-crafted automata trinkets. The rise of the middle class meant more Europeans were wealthy enough to purchase automata devices to entertain guests at their homes, and advances in manufacturing meant parts for these clockwork robots could be produced and assembled like never before—particularly around Paris, which had the perfect mix of material resources, technology, and skilled craftsman to make these moving works of art. Thus, 1860 to 1910 is known as “The Golden Age of Automata.”

Coppélia blazed an important trail during a time when science and technology were evolving, a time when society was debating the meaning of consciousness and the importance of mechanical vs. human. A hundred years later, trails are continuing to be blazed in ballet. Just as Coppélia was the first ballet to incorporate automata, traditional dances and feature an emerging 16 year old ballerina, Misty Copeland is a trail blazing ballet star. Misty Copeland is the first ever African American woman principal dancer of American Ballet Theatre.

Whether still or in motion, ballet dancers are artistic wonders of the mathematical. Extended arms, heads, torsos, legs and feet become elegant lines and perfectly shaped angles. These lines and angles are also wonderful opportunities to learn about geometric measurement, triangles, angles, medians, perpendicular bisectors, angle bisectors and altitudes. The precision of elegant lines and perfectly shaped angles in ballet technique can be measured using a protractor.

Calculating angles is important not only for the placement of feet and arms, this skill is found in city planning and the mechanics and movement of planes, trains, automobiles, ships and rockets, including plotting and planning the trajectory of a rocket's path of ascent, orbit, reentry

and landing. Precise measure of angles is used for the layout of streets, the planning of parking lots, train stations, gas stations, airports, parks, building lots and what will reside on them. The necessity of this skill is found in the drawing of blue prints and the design of a house office or business, the design of sidewalks, including the ramps that will be used by those traveling by wheel chair, and the placement of parking spots, parking meters, street lights and traffic lights on a city street. The planning and making of anything motorized—things that navigate through traffic, roll on tracks, fly or glide across water, all rely on the ability to measure accurately and calculate angles. In addition to configuring pattern and tempo, dancers have the distinction of being the embodiment of angles and measurement, calculations inherent in the art form.

In this lesson, students will learn facts about Guiseppina Bozzacchi, the first dancer to ever portray Coppélia, Misty Copeland, American Ballet Theatre's first ever African American woman principal dancer, vocabulary for basic ballet positions (types of arabesques) and a movement (jeté) and explore discover the connections between these ballet techniques and geometric measurement.

Begin by explaining students will be learning about the trail blazing ballerina Guiseppina Bozzacchi, learning about the trail blazing first ever African American woman principal dancer and investigating the math involved in some of the movements of the trail blazing ballet Coppélia.

Explain that Coppélia was a trail blazer. Coppélia was the first ballet to incorporate traditional dances and music, including national dances like the Czárdás (Hungarian) and the Mazurka (Polish.) Coppélia was the first (and only) ballet to be danced by Guiseppina Bozzacchi, the 16 year old ballerina who originated the lead role of Swanhilda. In fact, Coppélia was the first time Guiseppina Bozzacchi ever danced ballet on stage.

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As a class, read the Interesting facts about the ballet that you might not know...information sheet. Place the info sheets one at a time on an Elmo, Promethean Board or SMART board where it can be visible to the whole class. Have students take turns reading aloud to the class.

Follow this by reading about trail blazing United States principal dancer of American Ballet Theatre Misty Copeland. Place the biography for Misty Copeland on an Elmo, Promethean Board or SMART board where it can be visible to the whole class. Have students take turns reading her biography aloud to the class.

Explain students will now have an opportunity to learn some of the Ballet Term Definitions for some of the ballet moves in Coppélia. Place the definition for **arabesque** on an Elmo, Promethean Board or SMART board where it can be visible to the whole class. Have students take turns reading aloud to the class. As a class, discuss the definition.

Follow this by reviewing the arabesque diagram, the **Different Arabesque Positions** and the **Different Heights in Arabesque** information sheets. Place each information sheet on an Elmo, Promethean Board or SMART board where it can be visible to the whole class. Have students take turns reading from the information sheets aloud to the class. As a class, discuss the definitions and review the angle positions that are part of arabesque.

Next, place the definition for **Jeté** on an Elmo, Promethean Board or SMART board where it can be visible to the whole class. Have students take turns reading aloud to the class. As a class, discuss the definition.

Follow this by discussing the math involved in ballet positions and movements. Explain that whether still or in motion, ballet dancers are artistic wonders of the mathematical. Extended arms, heads, torsos, legs and feet become elegant lines and perfectly shaped angles. These lines and angles are also wonderful opportunities to learn about geometric measurement, triangles, angles, medians, perpendicular bisectors, angle bisectors and altitudes. The precision of elegant lines and perfectly shaped angles in ballet technique can be measured using a protractor.

Calculating angles is important not only for the placement of feet and arms, this skill is found in city planning and the mechanics and movement of planes, trains, automobiles, ships and rockets, including plotting and planning the trajectory of a rocket's path of ascent, orbit, reentry and landing. Precise measure of angles is used for the layout of streets, the planning of parking lots, train stations, gas stations, airports, parks, building lots and what will reside on them. The necessity of this skill is found in the drawing of blue prints and the design of a house office or business, the design of sidewalks, including the ramps that will be used by those traveling by wheel chair, and the placement of parking spots, parking meters, street lights and traffic lights on a city street. The planning and making of anything motorized—things that navigate through traffic, roll on tracks, fly or glide across water, all rely on the ability to measure accurately and calculate angles. In addition to configuring pattern and tempo, dancers have the distinction of being the embodiment of angles and measurement, calculations inherent in the art form.

As a class, review the information on triangles and triangle centers from **Math is Fun**. Place the information on an Elmo, Promethean Board or SMART board where it can be visible to the whole class. Have students take turns reading aloud to the class. As a class, discuss each definition.

Next, distribute a **Coppélia Examine the Angle, Part 1, Part 2** and a pencil to each student. Using their **Coppélia Examine the Angle, Part 1** ask students to draw an example of each type of triangle: Equilateral Triangle, Isosceles Triangle and Scalene Triangle. Ask students to consider the shape and size of each of their triangles. All triangles equal 180° . Which is a right angle (90°)? Which is less than 90° ? Which is more than 90° ? Then, ask students to label the measurements for all angles.

Follow this by asking students to complete their **Coppélia Examine the Angle, Part 2** sheets. Ask them to begin by drawing three new triangles based on the ones they drew on their **Coppélia Examine the Angle, Part 1** sheets. For each of the three triangles, ask students to draw a line (called a "median") from each corner to the midpoint of the opposite side. Label the centroid for each of the three triangles. Next, draw a perpendicular bisector for each of the three triangles (a line at right angles to the midpoint of each side of the triangle;) label each perpendicular bisector. Now draw an angle bisector for each of the three triangles (a line from a corner so that it splits the angle in half;) label each perpendicular bisector.

Next, distribute a **Coppélia Arabesque** sheet to each student. As a class, review the degrees in a circle. Explain this is an image of Misty Copeland, principal dancer of American Ballet Theatre. She is doing an **Arabesque**, a position where the body is supported on one leg, with the other leg extended directly behind the body with a straight knee. This type of ballet position appears in the ballet **Coppélia**. An **Arabesque** can be measured by degrees of angle. Ask students to measure each of the angles in Misty Copeland's **Arabesque** and write their answers on the sheet.

Next, distribute a **Coppélia Jeté** sheet to each student. Explain this is an image of Misty Copeland, principal dancer of American Ballet Theatre. She is doing a **Jeté**, a type of jump where the dancer extends one leg then jumps off the floor with the other. This type of jump appears in the ballet **Coppélia**. Many jumps are forms of **Jetés**. When a ballet dancer jumps, the **Jeté** creates several kinds of angles. All triangles equal 180° . Ask students to measure and label each of the triangles in Misty Copeland's **Jeté** and write down their answers.

Interesting facts about the ballet that you might not know...

1. Swanhilda was created by a sixteen-year-old Italian girl, Guiseppina Bozzacchi, who had never before played a role on stage. She was completely unknown at the time, but received great reviews. One critic wrote of her, "she is charming, she is charming, she is charming!"



Left: Guiseppina Bozzacchi originated the role of Swanhilda Right: Beckanne Sisk will dance the role of Swanhilda in Festival Ballet Theatre's production of Coppélia. Photo of Beckanne by Dave Friedman

2. The lead role of Franz was originally en travesti, meaning it was played by a woman. Franz would be continued to be played by a woman up until WWII. It was first played by a popular dancer, Eugénie Fiocre, who later became a baroness. As a side note, she was the first ballerina painted by Edward Degas in, "Eugénie Fiocre in La Source."

3. The lead role of Swanhilda was originally written for a famous Russian dancer, Adèle Grantzow. Two other well known dancers were considered for the role, but neither was considered acceptable. The ballet was put on hold for over a year while they sought out a new lead, ultimately deciding on a complete unknown Italian dancer.

4. Coppélia premiered in May 1870, just a few months before France declared war on Prussia. That winter, Paris fell under siege that lasted until January when Paris surrendered. The ballet was only performed twelve times before the theater was shut down in September, and the theater was used as a storage facility during the siege.

5. The lead dancer, Guiseppina Bozzacchi, refused to leave her family in Paris when the Prussian army was advancing on the city. The Paris Opera stopped all pay, and she grew weak from lack of food, contracted smallpox, and died at the age of 17 on the morning of her birthday. Her creation of Swanhilda is the only role she ever performed.

RETRIEVED FROM: <https://www.festivalballet.org/10-facts-about-coppelia/>



Rising star

Misty Copeland makes history as the first African American Female Principal Dancer with the prestigious American Ballet Theatre.

When she discovered ballet, however, Misty was living in a shabby motel room, struggling with her five siblings for a place to sleep on the floor. A true prodigy, she was dancing en pointe within three months of taking her first dance class and performing professionally in just over a year: a feat unheard of for any classical dancer.

Born in Kansas City, Missouri and raised in San Pedro, California, Misty Copeland began her ballet studies at the late age of thirteen. At fifteen, she won first place in the Music Center Spotlight Awards. She studied at the San Francisco Ballet School and American Ballet Theatre's Summer Intensive on full scholarship and was declared ABT's National Coca-Cola Scholar in 2000. Misty joined ABT's Studio Company in September 2000, joined American Ballet Theatre as a member of the corps de ballet in April 2001, and in August 2007 became the company's second African American female Soloist and the first in two decades. In June 2015, Misty was promoted to principal dancer, making her the first African American woman to ever be promoted to the position in the company's 75-year history.

In 2008, Misty was honored with the Leonore Annenberg Fellowship in the Arts, a two-year fellowship awarded to young artists who exhibit extraordinary talent providing them additional resources in order to attain their full potential. Performing a variety of classical and contemporary roles, one of Misty's most important roles was performing the title role in *Firebird*, created on her in 2012 with new choreography by much sought after choreographer Alexei Ratmansky. In December 2014, Misty performed the lead role of "Clara" in American Ballet Theatre's production of *The Nutcracker*, also choreographed by Alexei Ratmansky. In the fall of 2014, she made history as the first black woman to perform the lead role of "Odette/Odile" in American Ballet Theatre's *Swan Lake* during the company's inaugural tour to Australia. Misty reprised the role during ABT's Metropolitan Opera House spring season in June 2015, as well as debuted as "Juliet" in *Romeo & Juliet*.

Misty has been featured in numerous publications and television programs, including CBS Sunday Morning, 60 Minutes, The Today Show, This Week with George Stephanopoulos, MSNBC's Melissa Harris Perry, Vogue, Essence, Ebony, and People Magazine. She was honored with an induction into the Boys & Girls Club National Hall of Fame in May 2012 and received the "Breakthrough Award" from the Council of Urban Professionals in April 2012. She was named National Youth of the Year Ambassador for the Boys & Girls Clubs of America in June 2013. She received the Young, Gifted & Black honor at the 2013 Black Girls Rock! Awards.

Her endorsements, past and present, include American Express, COACH, and Diet Dr. Pepper. In 2014, Under Armour launched Misty as one of the faces of their "I Will What I Want" campaign with a commercial that went viral, gaining over 9,000,000 views to date.

Misty's passion is giving back. She has worked with many charitable organizations and is dedicated to giving of her time to work with and mentor young girls and boys. In 2014,

President Obama appointed Misty to the President's Council on Fitness, Sports, and Nutrition.

Misty is the author of the New York Times Bestselling memoir, *Life in Motion*, co-written with award-winning journalist and author Charisse Jones, published March 2014. She has a picture book titled *Firebird* in collaboration with award-winning illustrator and author Christopher Myers, published September 2014. She received an honorary doctorate from the University of Hartford in November 2014 for her contributions to classical ballet and helping to diversify the art form.

RETRIEVED FROM: <https://mistycopeland.com/about-2/>



Ballet Term Definition

[BalletHub](#) / [Ballet Terms](#) / Arabesque

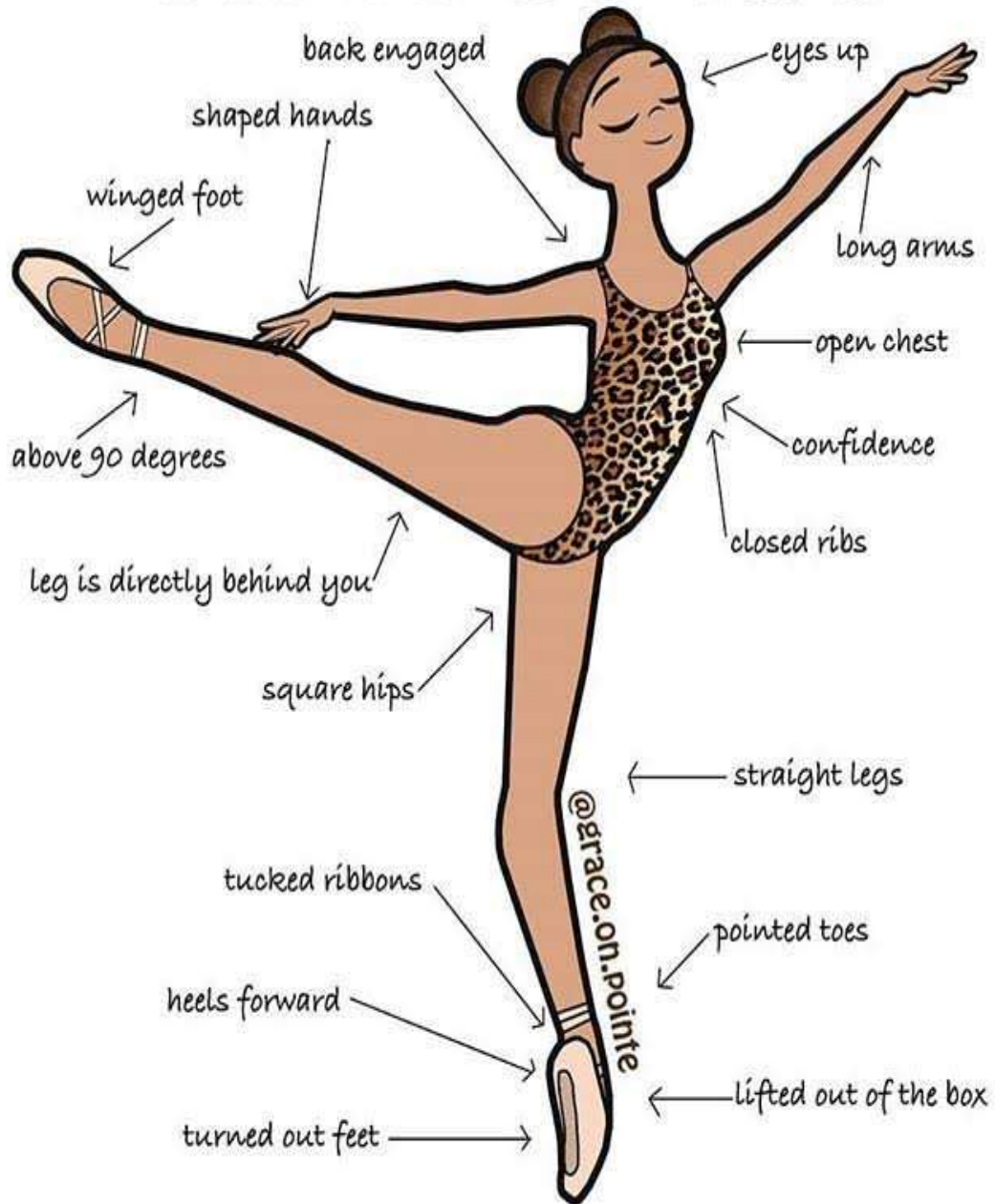
How to say & pronounce Arabesque:

air-uh-BESK

In ballet, **arabesque** is a position where the body is supported on one leg, with the other leg extended directly behind the body with a straight knee.

The standing leg can be straight or in plie, but the back leg must always be straight. Arabesque can be found in almost every aspect of a ballet, both contemporary and classical, as well as other dance forms. Arabesque can be done with the back leg either on the ground (a terre) or raised in the air (en l'air).

Arabesque



Different Arabesque Positions

Arabesque has several different versions, all defined by the position of the dancer's arms. The one constant is that the dancer must have a straight leg directly behind them, or it is not an arabesque. The different positions that can be done are first arabesque, second arabesque or third arabesque.

First Arabesque

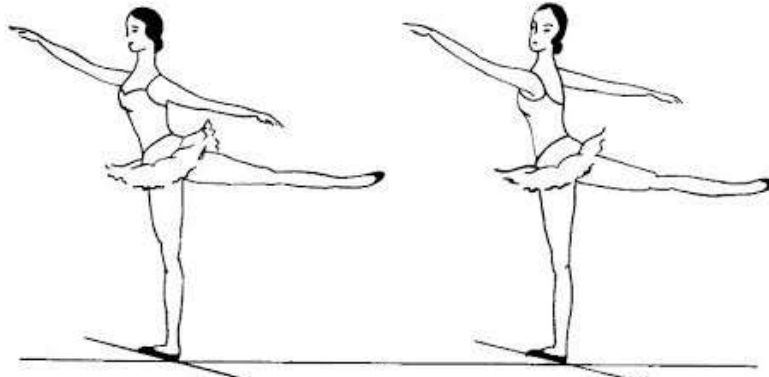
First arabesque is when a dancer in arabesque has the arm that is on the same side as the supporting leg extended out in front of their body, with the other arm extended side or towards the diagonal back.

Second Arabesque

Second arabesque is when a dancer in arabesque has the arm that is on the same side as the back leg extended out in front of their body, with the arm on the side of the supporting leg to the side or diagonal back.

Third Arabesque

Third arabesque is when a dancer in arabesque now has both arms extended in front of the body, with the arm on the same side as the supporting leg slightly higher than the other so the hand is anywhere between the top of their head to a foot above their head. The arm on the side of the leg in arabesque should never move higher than the shoulders.

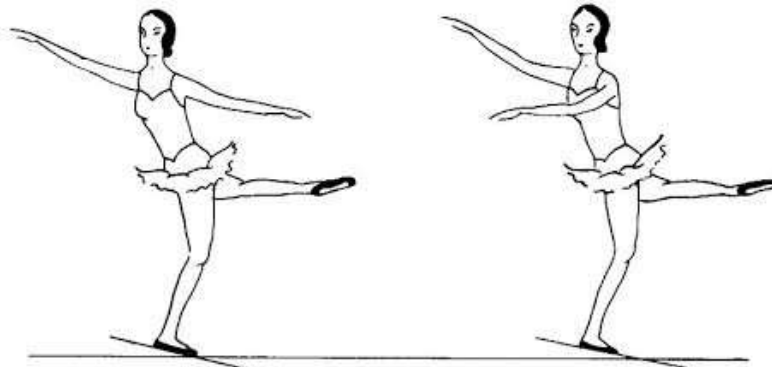


First arabesque.

Second arabesque.



Third arabesque.



Fourth arabesque.

Fifth arabesque.

ARABESQUES: CECCHETTI METHOD

Different Heights in Arabesque

An arabesque can be done at almost any height where the back foot is off the floor. Higher does not mean better! Past 90 degrees, many dancers begin to sacrifice quality for extra height by opening their hips toward the side.

Low

Sometimes a teacher or choreographer may ask for a dancer to do a “low arabesque.” This usually means around 20 degrees. Much lower, and the step may not show well from a distance.

45 Degrees

A very common height, a 45 degree arabesque is quite common in variations, quick, and slow movement. Since 45 degrees is just half of 90 (in the middle between directly horizontal and directly vertical), it is easier for dancers to know where that height is since it’s an actual measure, and not just a description. This also makes for smoother corps work.



90 Degrees

The next height typical for arabesques doubles straight to 90 degrees. There isn’t much in between because it doesn’t look deliberate enough. Slightly below 90, and it may look like the dancer can’t get an arabesque to 90.

Slightly above 45, it may look like a sloppy or over-exaggerated 45 degree arabesque!

90 degrees is often considered the “target” arabesque for many reasons.

1. It is very easy to tell if an arabesque is exactly at 90 degrees or not. If it is parallel with the ground, the dancer looks like they are at 90.
2. It looks very clean. Line of corps dancers all at 90 (Giselle 2nd act for example) looks very deliberate and uniform. Audiences love this!
3. At 90 degrees, there are other things you can do to improve the overall look that don't involve lifting your leg higher. For example, keep your back more upright, or squaring your hips more. Being able to understand this idea is considered an advanced level way of thinking about technique and measure of quality since it doesn't involve the obvious “get your leg higher!”



Over 90

Dancer Shelby Dyer demonstrates an arabesque above 90 degrees with a straight back!

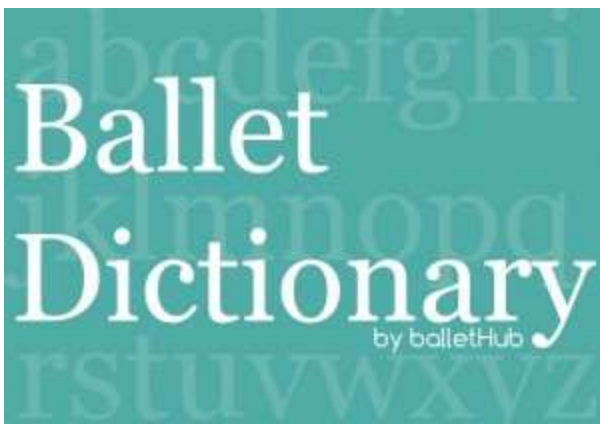
Past 90 degrees in an arabesque is common too, but is often reserved when a dancer is featured alone or for the ballerina with her partner.

Because an arabesque gets considerably harder to do correctly past 90 due to average limitation in hips, asking an entire corps to hit a certain degree above 90 is asking for trouble!

Quality Arabesque

No matter if in class or on stage, a ballet dancer should never forget the basic technique for an arabesque which should always include turned out and straight legs. Every dancer, especially advanced, knows their “maximum arabesque” height where quality isn’t sacrificed. And the even more advanced know when to use it for the most effect.

RETRIEVED FROM: <https://ballethub.com/ballet-term/arabesque/>



Ballet Term Definition

[BalletHub](#) / [Ballet Terms](#) / [Jeté](#)

How to say & pronounce Jeté:

juh-tay

What does Jeté translate to?

throwing or thrown

Jeté is a classical ballet term meaning “throwing” or “thrown.” Though often used with another term, jeté usually describes a type of jump where the dancer extends one leg then jumps off the floor with the other. Many jumps are forms of jetés.

A jeté in its most simple presentation usually refers to a petit jeté as part of petite allegro. But a grande jeté, which means “large throw,” is another common use that describes a jump that starts with throwing or brushing one leg into the air then pushing off the floor.

RETRIEVED FROM: <https://ballethub.com/ballet-term/jete/>



IMAGE OF MISTY COPELAND RETRIEVED FROM 60 MINUTES

Triangles

➔ A triangle has three sides and three angles




➔ The three angles always add to 180°



Equilateral, Isosceles and Scalene

There are three special names given to triangles that tell how many sides (or angles) are equal.

There can be **3**, **2** or **no** equal sides/angles:

	<p>Equilateral Triangle</p> <p>Three equal sides Three equal angles, always 60°</p>
	<p>Isosceles Triangle</p> <p>Two equal sides Two equal angles</p>
	<p>Scalene Triangle</p> <p>No equal sides No equal angles</p>




How to remember? Alphabetically they go 3, 2, none:

- **Equilateral:** "**equal**"-lateral (lateral means side) so they have all **equal sides**

- **Isosceles:** means "equal legs", and we have **two legs**, right?
Also **iSOSceles** has two equal "**Sides**" joined by an "**O**dd" side.
- **Scalene:** means "uneven" or "odd", so no equal sides.

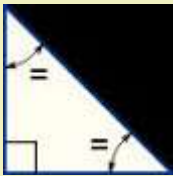
What Type of Angle?

Triangles can also have names that tell you what **type of angle** is inside:

	<p>Acute Triangle</p> <p>All angles are less than 90°</p>
	<p>Right Triangle</p> <p>Has a right angle (90°)</p>
	<p>Obtuse Triangle</p> <p>Has an angle more than 90°</p>

Combining the Names

Sometimes a triangle will have two names, for example:

	<p>Right Isosceles Triangle</p> <p>Has a right angle (90°), and also two equal angles</p> <p>Can you guess what the equal angles are?</p>
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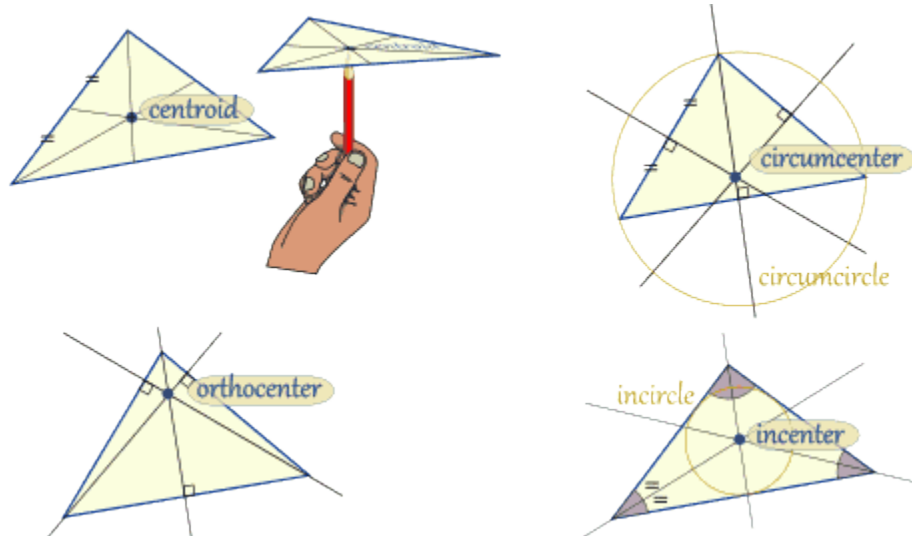
RETRIEVED FROM: <https://www.mathsisfun.com/triangle.html>

Triangle Centers

Where is the center of a triangle?

There are actually *thousands* of centers!

Here are the 4 most popular ones:



Centroid, Circumcenter, Incenter and Orthocenter

For each of those, the "center" is where special lines cross, so **it all depends on those lines!**

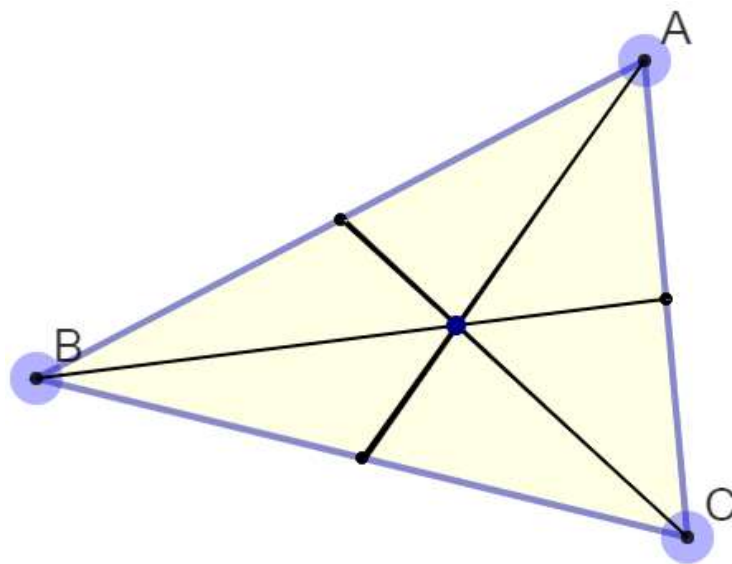
Let's look at each one:

Centroid



Draw a line (called a "median") from each corner to the midpoint of the opposite side.

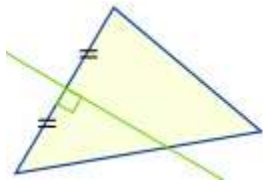
Where all three lines intersect is the [centroid](#), which is also the "center of mass":



Try this: cut a triangle from cardboard, draw the medians. Do they all meet at one point? Can you balance the triangle at that point?

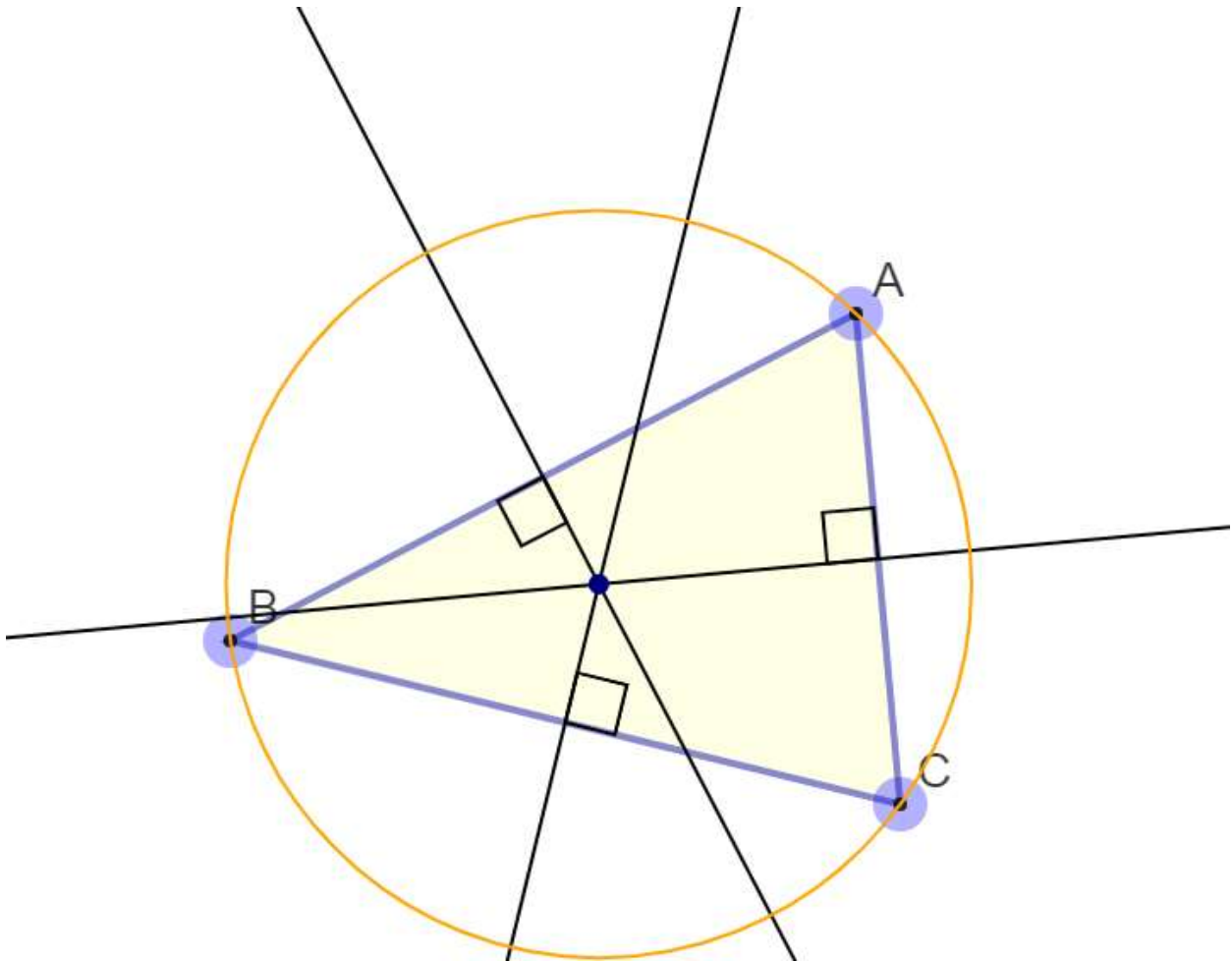


Circumcenter



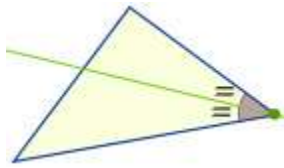
Draw a line (called a "perpendicular bisector") at right angles to the midpoint of each side.

Where all three lines intersect is the center of a triangle's "circumcircle", called the "circumcenter":



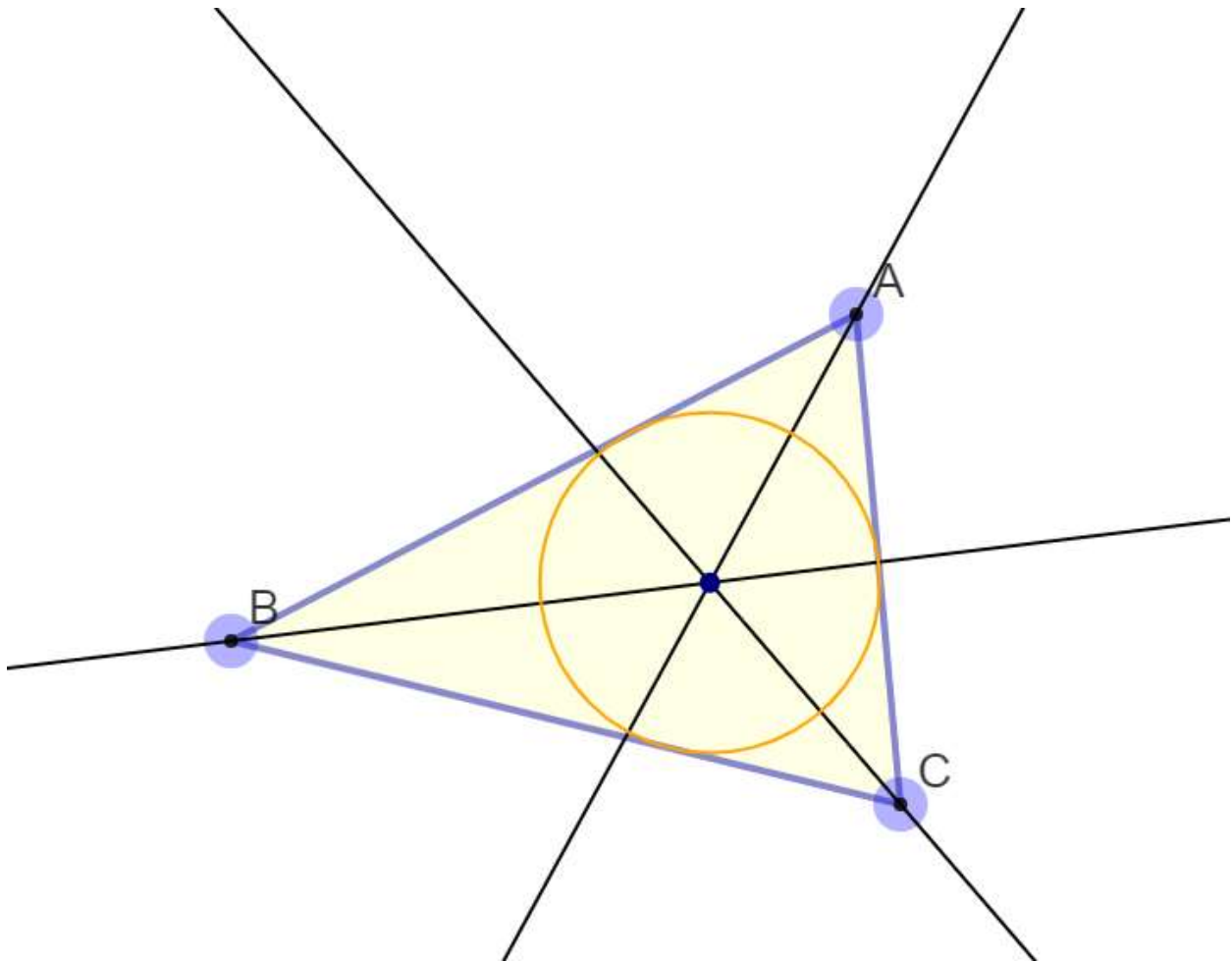
Try this: drag the points above until you get a right triangle (just by eye is OK). Where is the circumcenter? Why?

Incenter



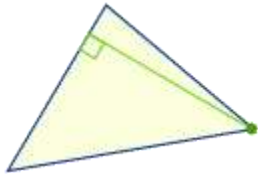
Draw a line (called the "angle bisector") from a corner so that it splits the angle in half

Where all three lines intersect is the center of a triangle's "incircle", called the "incenter":



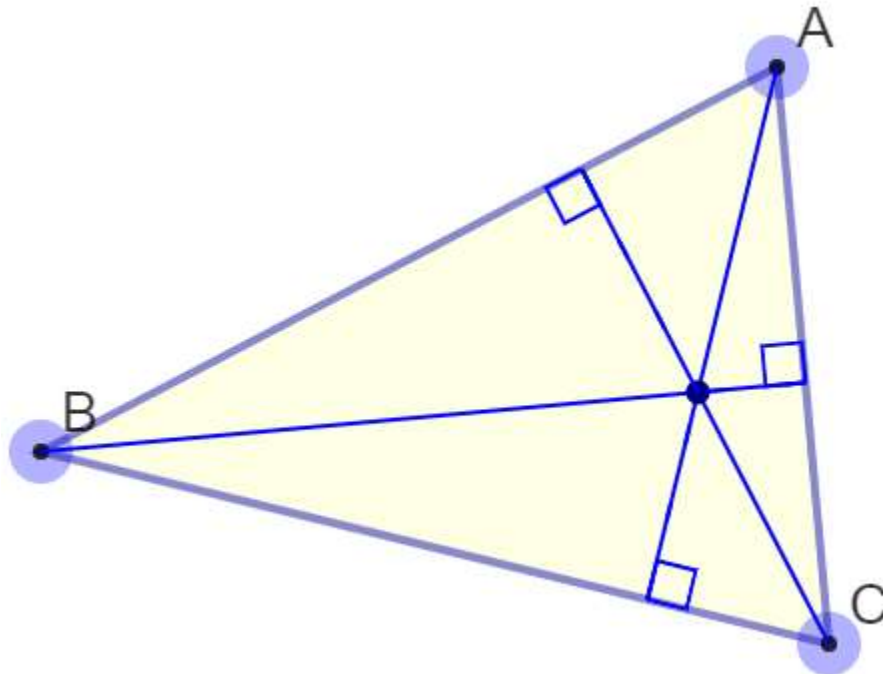
Try this: find the incenter of a triangle using a compass and straightedge at: [Inscribe a Circle in a Triangle](#)

Orthocenter



Draw a line segment (called the "altitude") at right angles to a side that goes to the opposite corner.

Where all three lines intersect is the "orthocenter":



Note that sometimes the edges of the triangle have to be extended outside the triangle to draw the altitudes. Then the orthocenter is also outside the triangle.

RETRIEVED FROM: <https://www.mathsisfun.com/geometry/triangle-centers.html>



Coppélia Examine the Angle, Part 1

Name _____

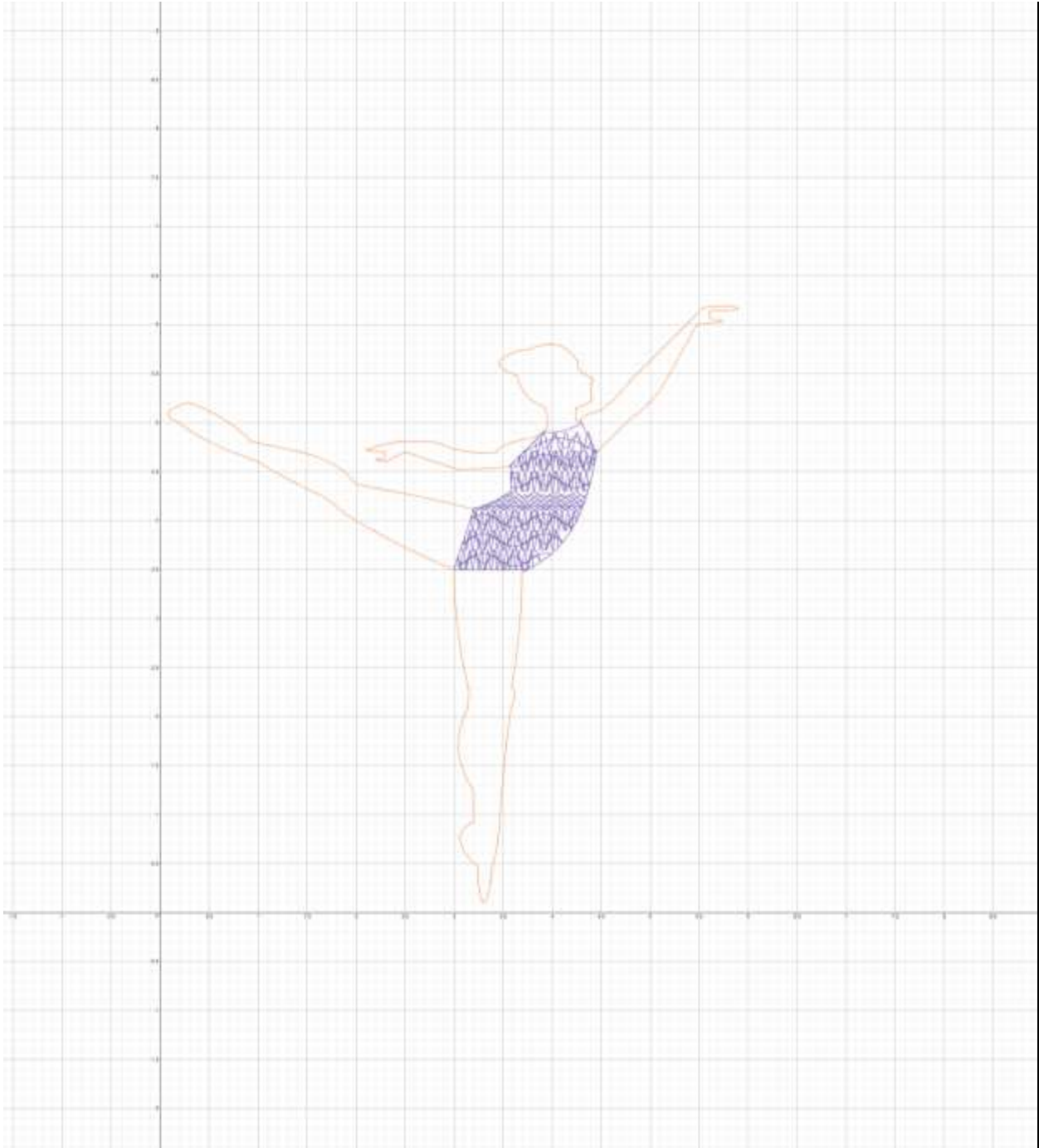
Draw an example of each type of triangle: Equilateral Triangle, Isosceles Triangle and Scalene Triangle. Then, label the measurements for all angles. All triangles equal 180° . Which is a right angle (90°)? Which is less than 90° ? Which is more than 90° ?



Coppélia Examine the Angle, Part 2

Name _____

For each of the three triangles, draw a line (called a "median") from each corner to the midpoint of the opposite side. Label the centroid for each of the three triangles. Next, draw a perpendicular bisector for each of the three triangles (a line at right angles to the midpoint of each side of the triangle;) label each perpendicular bisector. Now draw an angle bisector for each of the three triangles (a line from a corner so that it splits the angle in half;) label each perpendicular bisector.



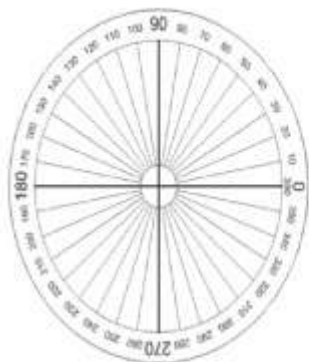
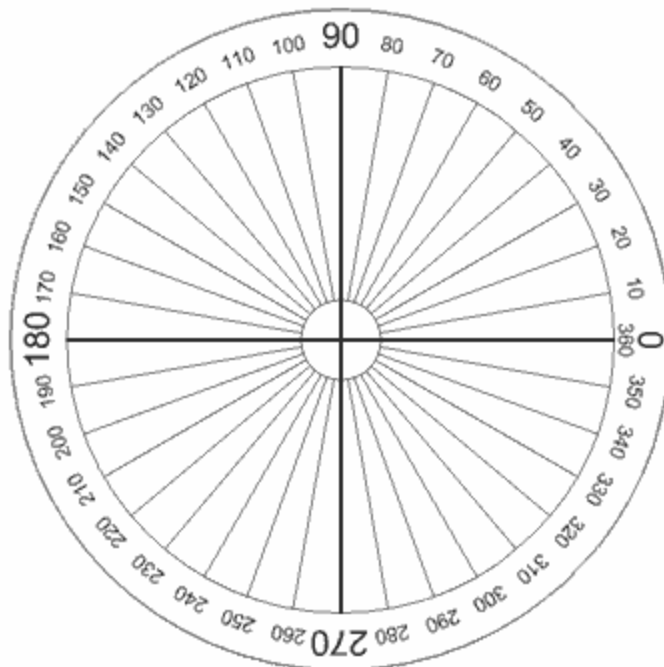
Arabesque past 90°

RETRIEVED FROM: <https://www.desmos.com/calculator/wczh9zybll>



Coppélia Arabesque

Name _____

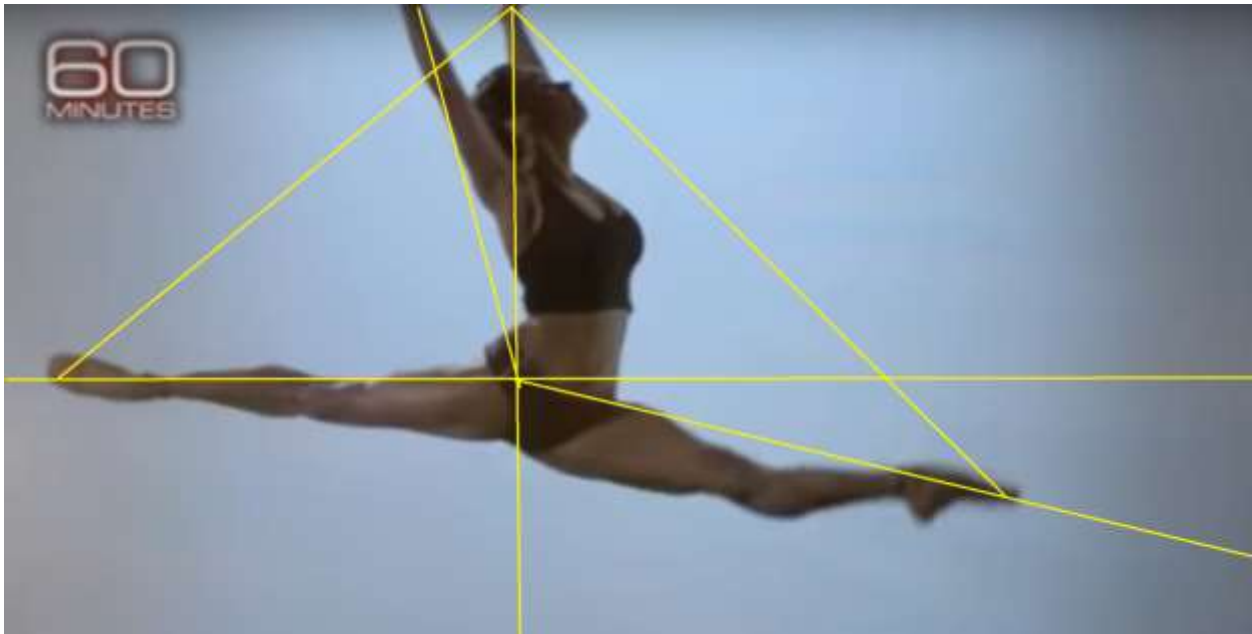


This is an image of Misty Copeland, principal dancer of American Ballet Theatre. She is doing an **Arabesque**, a position where the body is supported on one leg, with the other leg extended directly behind the body with a straight knee. This type of ballet position appears in the ballet **Coppélia**. An **Arabesque** can be measured by degrees of angle. Measure each of the angles in Misty Copeland's **Arabesque**. Write your answers below.



Coppélia Jeté

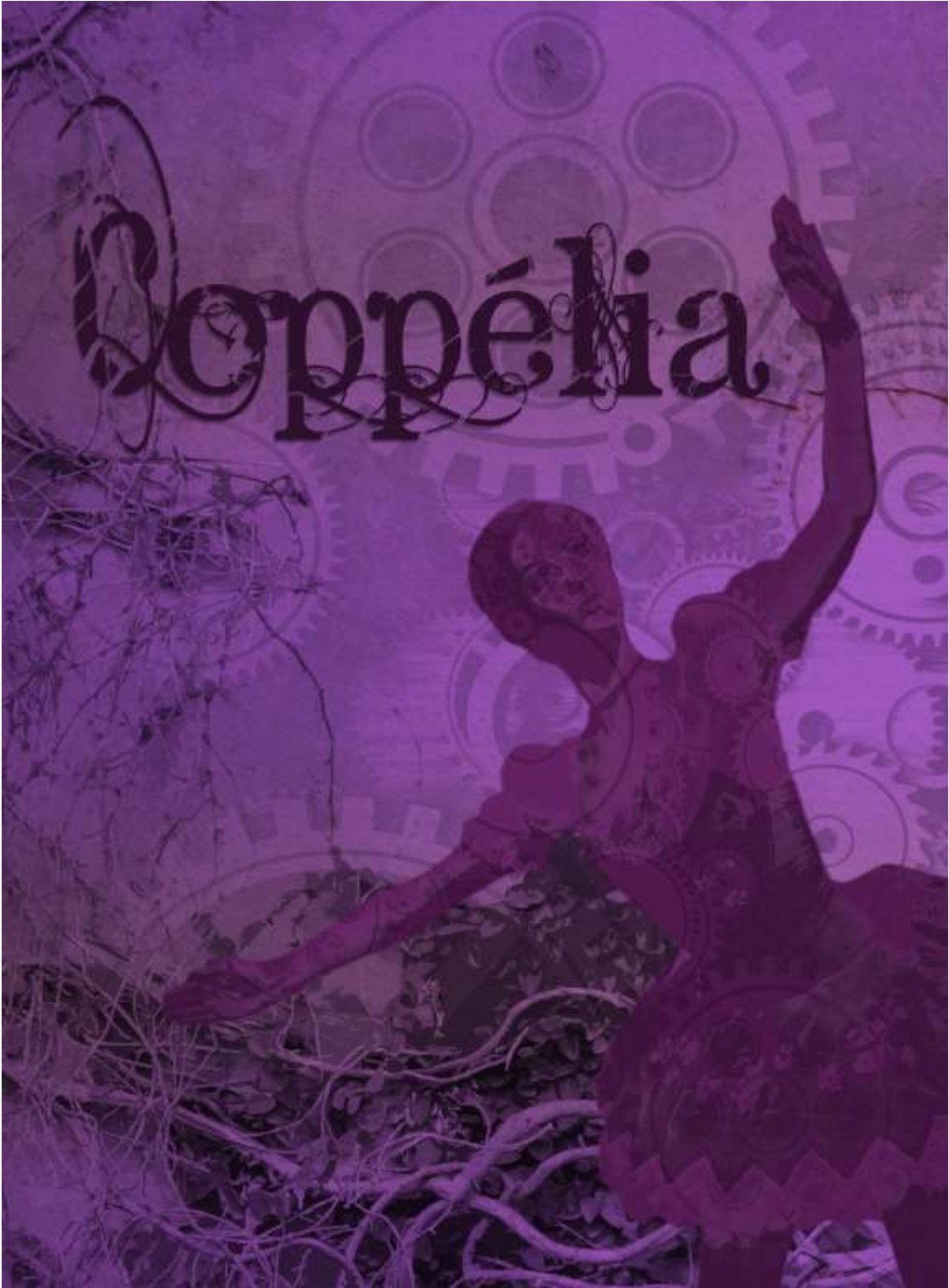
Name _____



This is an image of Misty Copeland, principal dancer of American Ballet Theatre. She is doing a **Jeté**, a type of jump where the dancer extends one leg then jumps off the floor with the other. This type of jump appears in the ballet **Coppélia**.

Many jumps are forms of **Jetés**. When a ballet dancer jumps, the **Jeté** creates several kinds of angles. All triangles equal 180° . Label each of the triangles, what type of triangle is it? Measure each of the angles in Misty Copeland's **Jeté**. Write your answers below.

Student Samples



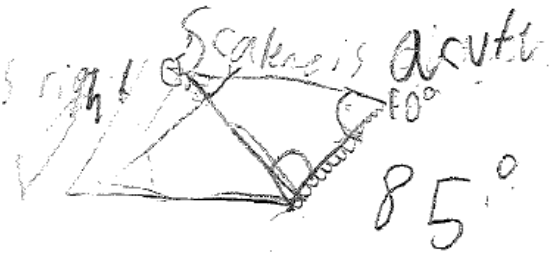


Coppélia Examine the Angle, Part 1

Name Theo

Draw an example of each type of triangle: Equilateral Triangle, Isosceles Triangle and Scalene Triangle. Then, label the measurements for all angles: Which is a right angle (90°)? Which is less than 90° ? Which is more than 90° ?

Equilateral is right



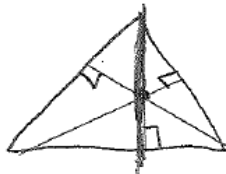


Coppélia Examine the Angle, Part 2

Name Theo

For each of the three triangles, draw a line (called a "median") from each corner to the midpoint of the opposite side. Label the centroid for each of the three triangles. Next, draw a perpendicular bisector for each of the three triangles (a line at right angles to the midpoint of each side of the triangle;) label each perpendicular bisector. Now draw an angle bisector for each of the three triangles (a line from a corner so that it splits the angle in half;) label each perpendicular bisector.

Equilateral is right



angle bisector

IsoSceles



angle bisector

Scalene



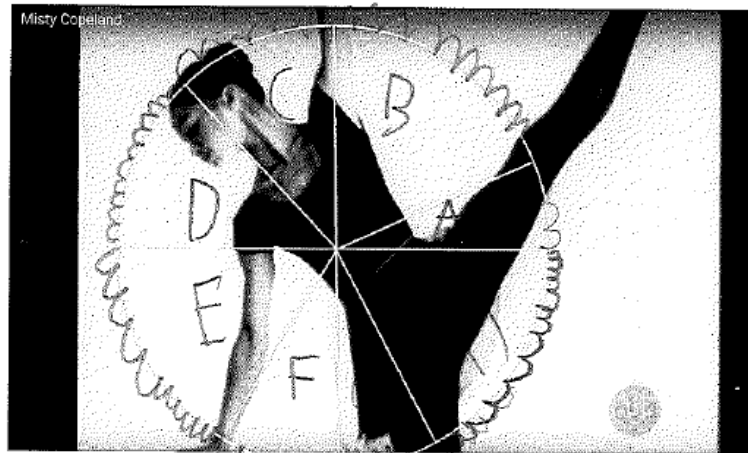
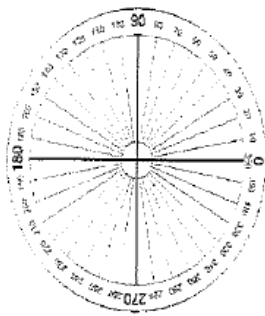
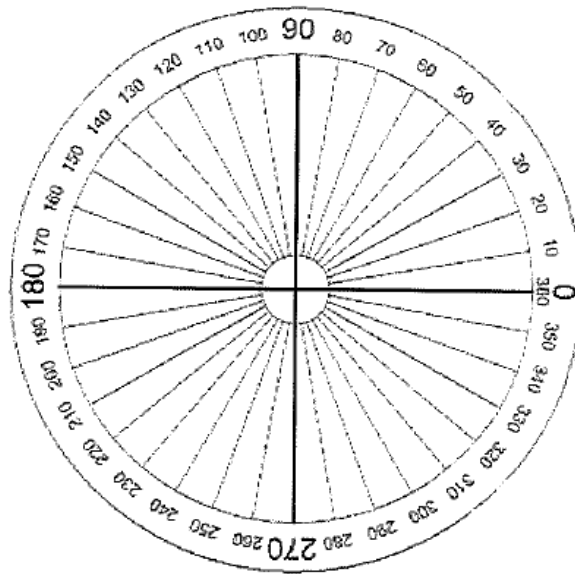
angle bisector

● =
median



Coppélia Arabesque

Name Samuel



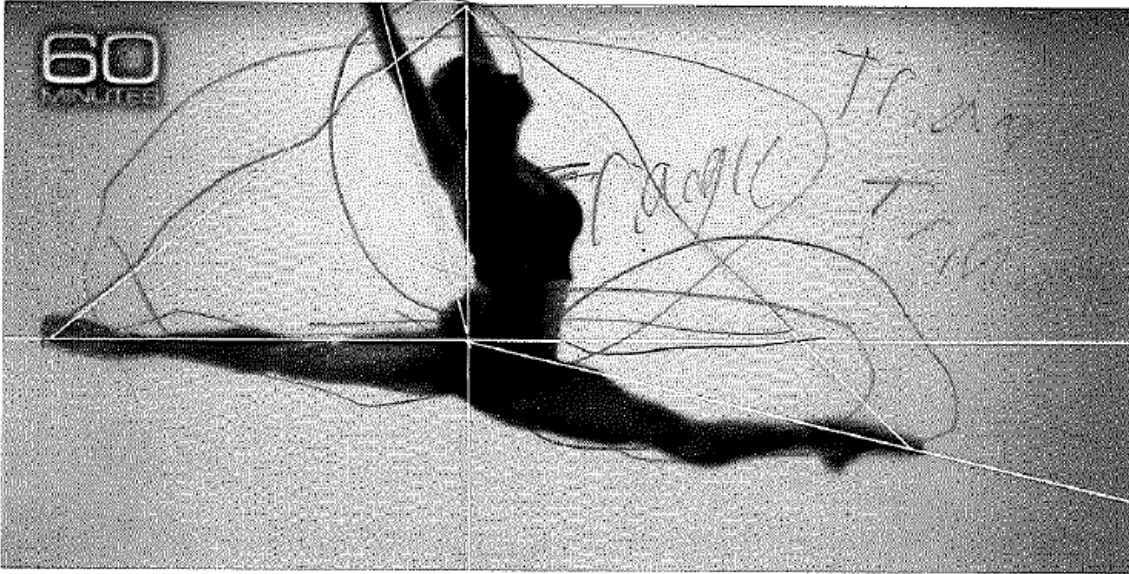
This is an image of Misty Copeland, principal dancer of American Ballet Theatre. She is doing an **Arabesque**, a position where the body is supported on one leg, with the other leg extended directly behind the body with a straight knee. This type of ballet position appears in the ballet **Coppélia**. An **Arabesque** can be measured by degrees of angle. Measure each of the angles in Misty Copeland's **Arabesque**. Write your answers below.

A: 40° B: 110° C: 60° D: 55°
E: 85° F: 60° G: 35° H: 100°



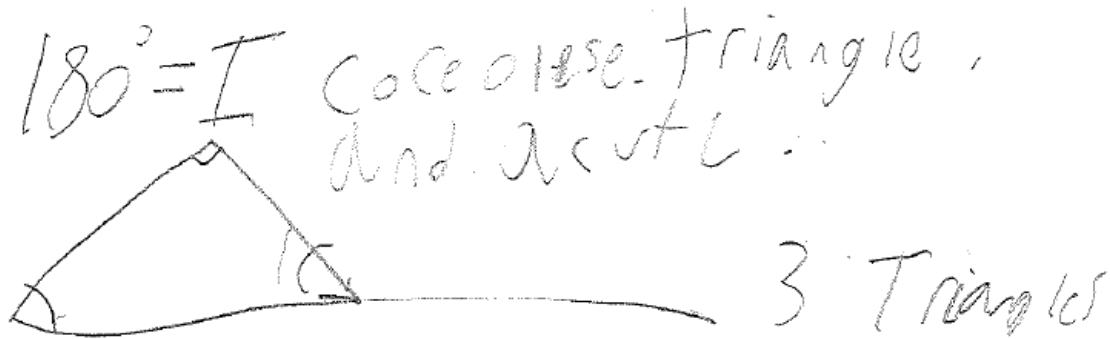
Coppélia Jeté

Name Samuel



This is an image of Misty Copeland, principal dancer of American Ballet Theatre. She is doing a Jeté, a type of jump where the dancer extends one leg then jumps off the floor with the other. This type of jump appears in the ballet **Coppélia**.

Many jumps are forms of jetés. When a ballet dancer jumps, the Jeté creates several kinds of angles. All triangles equal 180° . Label each of the triangles, what type of triangle is it? Measure each of the angles in Misty Copeland's Jeté. Write your answers below.



K-12 Student Standards for English Language Arts » Grade 1

Reading Standards for Literature

Key Ideas and Details

1. Ask and answer questions about key details in a text.
2. a. Retell stories, including key details.
b. Recognize and understand the central message or lesson.
3. Describe **characters**, settings, and major events in a story, using key details.

Integration of Knowledge and Ideas

7. Use illustrations and details in a story to describe its **characters**, setting, or events

Range of Reading and Level of Text Complexity

10. With prompting and support read informational texts appropriately complex for grade 1.

Writing Standards

Research to Build and Present Knowledge

8. With guidance and support from adults, recall information from experiences **or gather information from provided sources to answer a question**.

K-12 Student Standards for English Language Arts » Grade 4

Reading Standards for Literature

Key Ideas and Details

1. Refer to details and examples in a text when explaining what the text says explicitly and when **drawing inferences from the text**.
2. Determine a theme of a **story**, drama, or poem from details in the text; summarize the text.
3. Describe in depth a **character**, setting, or event in a story or drama, drawing on specific details in the text (e.g., a character's thoughts, words, or actions).

Integration of Knowledge and Ideas

7. Make connections between the text of a story or drama and a visual or oral presentation of the text.

9. Compare and contrast the treatment of similar themes and topics (e.g., opposition of good and evil) and patterns of events (e.g., the quest) in stories, myths, and traditional literature from different cultures. (French **Coppélia** Guiseppina Bozzacchi (Italian ballerina and United States ballerina **Misty Copeland**.)

K-12 Student Standards for English Language Arts » Grade 7

Reading Standards for Literature

Key Ideas and Details

1. Cite several pieces of relevant textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.
2. Determine a theme or central idea of a text and analyze its development over the course of the text; provide an objective summary of the text.

K-12 Student Standards for Mathematics» Grade 1

Geometry 1.G

A. Reason with shapes and their attributes.

1. Distinguish between defining attributes (e.g., **triangles** are closed and three-sided) versus non-defining attributes (e.g., color, orientation, overall size); build and draw shapes that possess defining attributes.
2. Compose two-dimensional shapes (rectangles, squares, trapezoids, **triangles**, half-circles, and quarter-circles) and three-dimensional shapes (cubes, right rectangular prisms, right circular cones, and right circular cylinders) to create a composite shape, and compose new shapes from the composite shape.

K-12 Student Standards for Mathematics» Grade 4

Geometry 4.G

A. Draw and identify lines and angles, and classify shapes by properties of their lines and angles.

1. Draw points, lines, line segments, rays, **angles (right, acute, obtuse)**, and perpendicular and parallel lines. Identify these in two-dimensional figures.

K-12 Student Standards for Mathematics» Grade 7

Ratios and Relationships 7.RP

A. Analyze proportional relationships and use them to solve real-world and mathematical problems.

2. Recognize and represent proportional relationships between quantities.
 - a. Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or **graphing** on a coordinate plane and **observing** whether the graph is a straight line through the origin.
 - b. Identify the constant of proportionality (unit rate) in tables, graphs, equations, **diagrams**, and verbal descriptions of proportional relationships.

The Number System 7.NS

Expressions and Equations

- B. Solve real-life and mathematical problems using numerical and algebraic expressions and equations.**

3. Solve **multi-step real-life and mathematical problems** posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies.

Geometry 7.G

A. Draw, construct, and describe geometrical figures and describe the relationships between them.

1. Solve problems involving scale drawings of **geometric figures**, such as computing **actual lengths** and areas from a scale drawing and reproducing a scale drawing at a different scale.

2. Draw (freehand, with ruler and **protractor**, or with technology) **geometric shapes** with given conditions. (**Focus is on triangles from three measures of angles or sides**, noticing when the conditions determine one and only one triangle, more than one triangle, or no triangle.)

3. B. Solve real-life and mathematical problems involving **angle measure**, area, surface area, and volume.



The Choreography of Coppélia and Geometric Measurement

By: Karel Sloane-Boekbinder

This lesson can be used by itself or as a follow up to the math concepts explored in **Coppélia: Ballet Trailblazers, Arabesques, Jetés, Angles and Altitudes.**

Ballet dancers are precision, grace and beauty in motion. Their movements are also wonderful opportunities to learn about geometric measurement, angles, degrees, rotation and angles around a point in particular. The precision of ballet positions and movements can be measured using a protractor. Piqué tour or pique turn is a common ballet turn that is found within the choreography of Coppélia. The positions of the dancer's arms, legs and torso create angles, angles that can be measured. In this lesson, students will learn vocabulary for basic ballet positions (croisé devant, quatrième devant, effacé devant, à la seconde, croisé derriere, ecarté, epaulé and quatrième derrière) and movements (relevé and piqué tour) and discover the connections between these positions and movements and geometric measurement.

Begin this lesson by familiarizing students with the ballet Coppélia. As a class, read the synopsis of Coppélia. Place the synopsis on an Elmo, Promethean Board or SMART board where it can be visible to the whole class. Have students take turns reading aloud to the class.

Next review some of the ballet positions found in Coppélia. As a class, read **BAG OF STEPS: EIGHT POSITIONS**. This article contains both definitions and sketches for croisé devant, quatrième devant, effacé devant, à la seconde, croisé derriere, ecarté, epaulé and quatrième derrière. Place the article on an Elmo, Promethean Board or SMART board where it can be visible to the whole class. Have students take turns reading aloud to the class.

Explain students will now have an opportunity to learn some of the Ballet Term Definitions for some of the ballet movements in Coppélia. Place the definition for **Piqué tour** on an Elmo, Promethean Board or SMART board where it can be visible to the whole class. Have students take turns reading aloud to the class. As a class, discuss the definition.

Next, review the definition for **Relevé lent**. Place the definition for **Relevé lent** on an Elmo, Promethean Board or SMART board where it can be visible to the whole class. Have students take turns reading aloud to the class. As a class, discuss the definition.

Distribute a copy of the quatrième devant, effacé devant, à la seconde, croisé derriere, ecarté, epaulé and quatrième derrière angle measurement sheets and a pencil to each student. As a

class review the degrees of a circle and the angles created by the dancer's legs for *croisé devant*. After the review, ask students to complete their angle measurement sheets.

Distribute copies of the Piqué tour measuring sheets to each student. Explain each image is a step in the rotation of a piqué tour. Ballet dancers in *Coppélia* can do multiple piqué tours in a row, similar to the rotations found in the **What is the measure of the missing angle?** Math is Fun sheet the class reviewed earlier.

Follow this by discussing **The Choreography of Coppélia and Geometric Measurement** angles in a full rotation sheet. Distribute a copy to each student. As a class, review the degrees of angles in a full rotation. Then ask students to use this sheet to help them measure the angles in a Piqué tour or pique turn and answer the questions on toe rotation.

Explain that a Piqué tour or pique turn also involves turning on a point. Pique turns are a series of rotations, the dancer rotating 360° for each turn. The place where the dancer's toe touches the floor is the point of rotation. Ask students to review the position of the dancer's toe in each image and measure the angle. Ask them also to write their answers next to the picture.



A Synopsis of the Ballet, Coppélia - Act 1

The Truth About Love and the Beauty of Coppélia

By [Aaron Green](#)

Updated February 13, 2017

Act I

The story begins during a town festival in celebration of a new town bell that is due to arrive in the coming days. Anyone who wants to be married on that day will be awarded with a special gift of money. Swanilda is engaged to Franz and plans to marry during the festival. Swanilda asks Franz if he loves her and he answers yes, but she senses a lack of sincerity in his reply. She becomes unhappy with her fiancé because it seems he is more interested in getting another girl's attention.

The girl is Coppélia who sits on the toy-maker Dr. Coppélius's balcony reading all day long, paying no heed and showing no care for anyone trying to be social with her. Franz is mesmerized by her beauty and is determined to get her attention. Swanilda is deeply hurt by his distractions and feels he does not love her despite his answers.

Because she doesn't trust his words, Swanilda decides to turn to an old wives' tale for guidance. She holds up an ear of wheat to her ear; if it rattles when she shakes it, then she will know that he loves her. She shakes the wheat furiously, but no rattle can be heard. Confused and upset, she has Franz do the same thing. He tells her it does rattle. She does not believe him and runs away heartbroken.

When Dr. Coppélius leaves his house, he is heckled by a group of small boys. After running them off he finally goes on his way not knowing that he dropped his keys in the process of chasing the boys away. Swanilda finds his keys and is determined to find out more of Coppélia. She and her friends decide to go inside Dr. Coppélius's house. Meanwhile, Franz develops his own plan to meet Coppélia. He climbs up a ladder to Coppélia's balcony.

Act II

Swanilda and her friends find themselves in a large room filled with people, but these people aren't moving. The girls discover that these are not people, but life-size

mechanical dolls. They quickly wind them up and watch them move. In her searching, Swanilda finds Coppélia behind a curtain and discovers that she, too, is a doll.

When Dr. Coppelius returns home, he finds the girls in his house. He becomes angry not only for getting into his house, but for also messing up his workroom, and kicks the girls out. Dr. Coppelius begins cleaning up the mess and notices Franz coming into the window. Instead of shooing him away, he invites him in. Dr. Coppelius wants to bring Coppelia to life and in order to do that, he needs a human sacrifice. His magic spell will take Franz's life and transfer it to Coppélia. Dr. Coppelius gives Franz some wine laced with sleeping powder and Franz begins to fall asleep. Dr. Coppelius then readies his magic spell.

When Dr. Coppelius kicked the girls out, Swanilda stayed and hid behind a curtain. Swanilda dresses up in Coppelia's clothes and pretends to come to life. She wakes up Franz and quickly escapes by winding up all of the mechanical dolls. Dr. Coppelius becomes saddened to find a lifeless Coppélia behind the curtain.

Act III

Swanilda and Franz are about to say their vows when the angry Dr. Coppelius shows up. Feeling bad for causing such a mess, Swanilda offers Dr. Coppelius her dowry in return for his forgiveness. Swanilda's father tells Swanilda to keep her dowry. He pays Dr. Coppelius instead because it was a special day. Swanilda kept her dowry and Dr. Coppelius was awarded his own bag of money. Swanilda and Franz get married and the entire town celebrates by dancing.

RETRIEVED FROM: <https://www.thoughtco.com/coppelia-act-1-synopsis-723765>



BAG OF STEPS: EIGHT POSITIONS

In ballet there are *eight positions of the body* from which all the various steps are executed. All the different schools of ballet use them, with slight variations from one to another (and some methods incorporate more positions or variations, but we are not going to be *picky*, since our aim is just to get familiar with the terminology). In fact, we mentioned one of the positions (*effacé devant*) when we discussed Balloté, so we thought it was a good idea to present them here, since they are used all over the place. These are:

1. *Croisé Devant*
2. *Quatrième Devant*
3. *Effacé Devant*
4. *à la Seconde*
5. *Croisé Derrière*
6. *Ecarté*
7. *Epaulé*
8. *Quatrième Derrière*

Let us start with some French vocabulary

Devant: To the front

Derrière: To the back (close to the rear)

Croisé: Crossed alignment

Seconde: To the second position (lateral)

Écarté: Separated or thrown wide apart

Effacé: Shaded

Epaulé: Shouldered (so when people talk about *épaulement*, they really are referring to the position of the upper body starting from the shoulders and the upper back)

Now one creates positions mixing the different components. Let us explain them carefully

1. *Croisé Devant*

Standing at an oblique angle to the audience (facing a corner), the leg nearer to the audience is the working leg and is extended in **fourth position**, pointing on *tendú* (=stretched) to the front. The arms are placed in **(open) fourth position**, such that the lower arm is on the same side as the extended leg.

2. *Quatrième Devant*

Facing the audience, the working leg is extended to fourth position, pointing on *tendú* to the front, with the arms in second position (open) and the head facing the audience.

3. *Effacé Devant*

Standing at an oblique angle to the audience (facing a corner), such as that part of the body is hidden. The leg further from the audience becomes the working leg and is extended in fourth position, pointing on *tendú* to the front. The arms are placed in (open) fourth position such that the lower arm is on the same side as the extended leg.

4. *à la Seconde*

Facing the audience, the working leg is extended to second position, pointing on *tendú* to the side, with the arms in second position (open) and the head facing the audience. It is also referred as *à la seconde en face*.

5. *Croisé Derrière*

Standing at an oblique angle to the audience (facing a corner). The leg further from the audience becomes the working leg and is extended in fourth position, pointing on *tendú* to the back. The arms are placed in (open) fourth position such that the lower arm is on the same side as the extended leg.

6. *Ecarté*

Facing any corner, the leg nearer to the audience becomes the working leg and is extended in second position, pointing on *tendú* to the side. The arms are in (open) fourth position so the highest arm is on the same side as the extended leg. The head is raised slightly and turned toward the raised arm, so the eyes look into the hand.

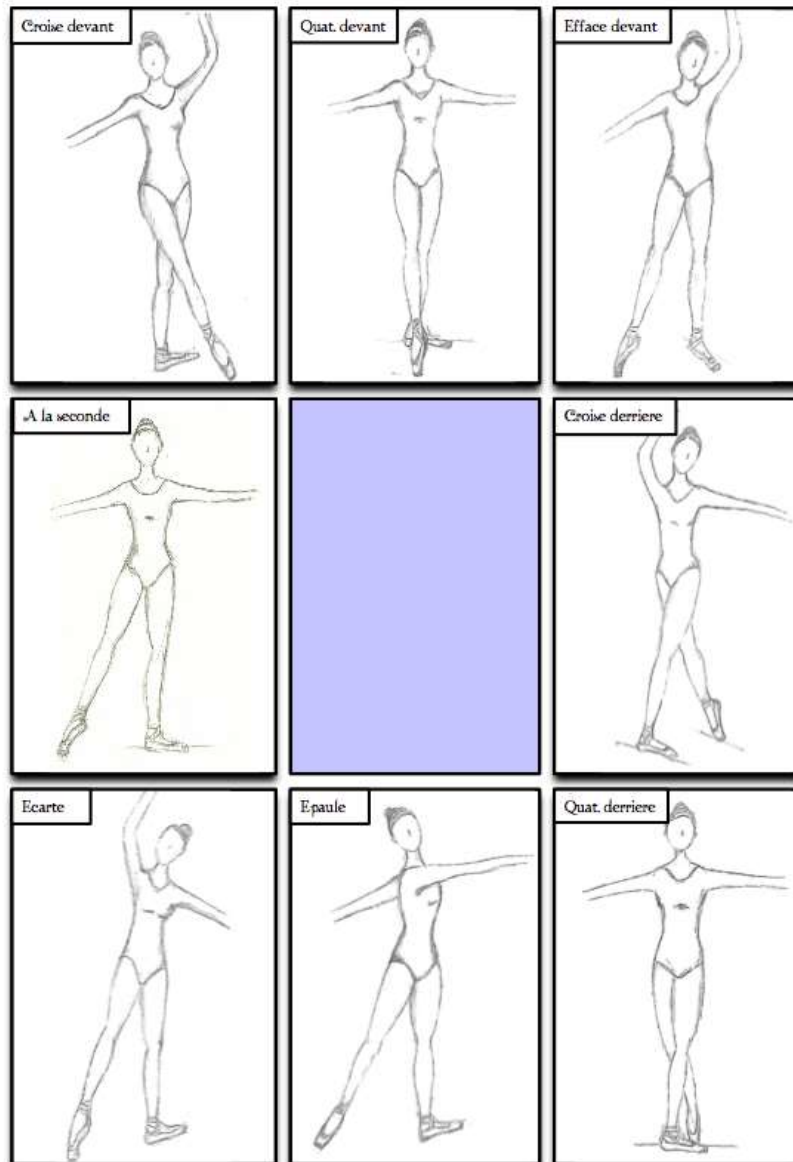
7. *Epaulé*

Standing at an oblique angle to the audience, the dancer stands in arabesque facing one of the corners (the working leg is the one closest to the audience and is extended to the back in fourth position). The arm closest to the audience is extended forward, and the head is inclined and turned towards the audience.

8. *Quatrième Derrière*

Facing the audience, the working leg is extended to fourth position, pointing on tendú to the back, with the arms in second position (open) and the head facing the audience.

All these positions can also be done with the working leg *en l'air* (extended without touching the floor). And since these explanations might seem a bit confusing for the inexperienced, here are some drawings exemplifying the above descriptions:



The Eight Positions of the Body

Further Information: Technical Manual and Dictionary of Classical Ballet by Gail Grant. BN Publishing. ISBN 1607960311.



Linda

Her favourite ballets feel like good books – one can see them 1,000 times and they always feel fresh. Linda loves Giselle, all full-length MacMillan plus Song of the Earth, Robbins's Dances at a Gathering, Balanchine's Serenade and Agon, Ashton's Scènes de Ballet and Symphonic Variations.

RETRIEVED FROM: <http://www.theballetbag.com/2009/05/20/bag-of-steps-eight-positions/>



Ballet Term Definition

[BalletHub](#) / [Ballet Terms](#) / [Piqué tour \(turn\)](#)

How to say & pronounce *Piqué tour (turn)*:

pee-kay two-er

What does *Piqué tour (turn)* translate to?

pricked turn

Piqué tour is a classical ballet term meaning “pricked turn.” It is most commonly used as simply “**pique turn**” which is a very common step for female ballet dancers.

A dancer doing a piqué tour, or **piqué turn**, will step directly on to a full point (when in pointe shoes) or a high demi-pointe right as they begin the turn onto that same leg. A piqué turn can be done with the working leg in passe (both front and back), in arabesque, attitude or any other position that may be given. The freedom for the position is open because *piqué turn* simply describes that the dancer has gone into the turn with a pique as opposed to relevé.

RETRIEVED FROM: <https://ballethub.com/ballet-term/pique-tour-turn/>



Ballet Term Definition

[BalletHub](#) / [Ballet Terms](#) / **Relevé lent**

How to say & pronounce **Relevé lent**:

re-luh-vay lawn

What does **Relevé lent** *translate to?*

slow raising

Relevé lent is a classical ballet term meaning “slow raising.” It is usually used in the Russian Schools of ballet.

It describes when a dancer starts in one of the basic ballet positions of the feet with straight legs, then lifts one leg off the floor while raising up to relevé on the supporting leg while moving in a slow adagio tempo, all without a plié.

Most commonly done as part of an adagio combination at barre, *relevé lent* is not usually seen on stage in ballets. It does however have excellent benefits for building strength.

RETRIEVED FROM: <https://ballethub.com/ballet-term/releve-lent/>



What is the measure of the missing angle?

Straight Angle

180°

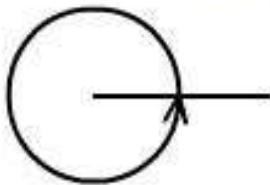


How many degrees are there in a straight angle?

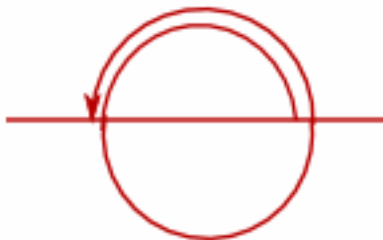
How many degrees are there in one full rotation?

Full Rotation

360°

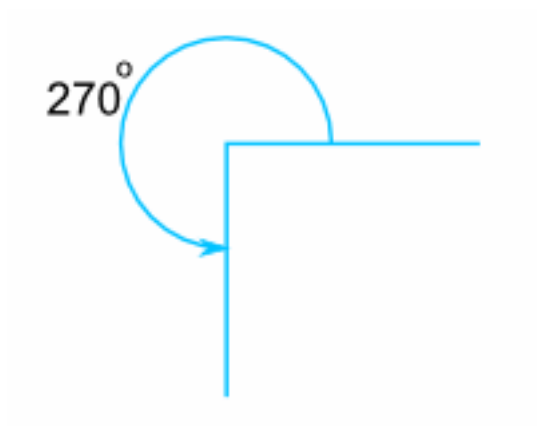
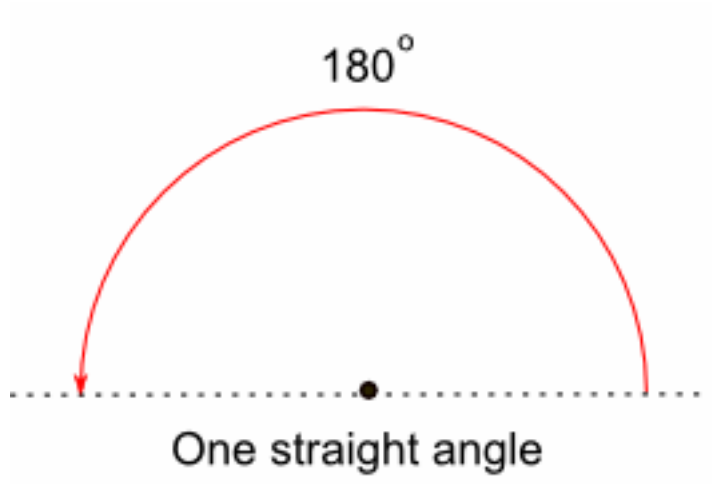


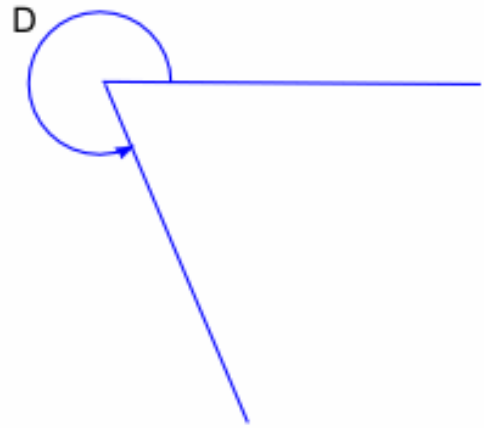
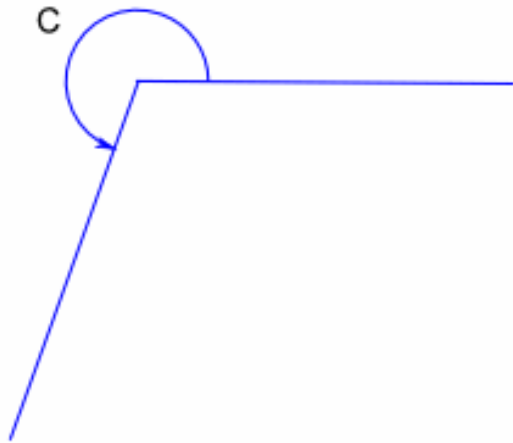
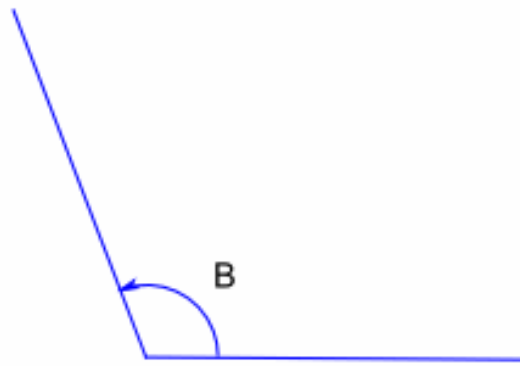
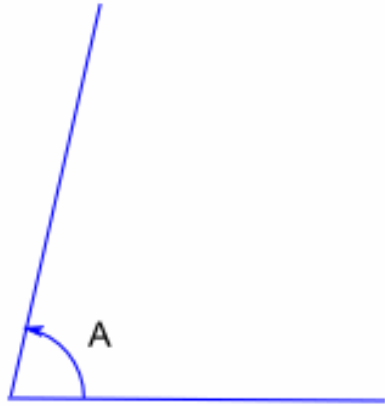
540°



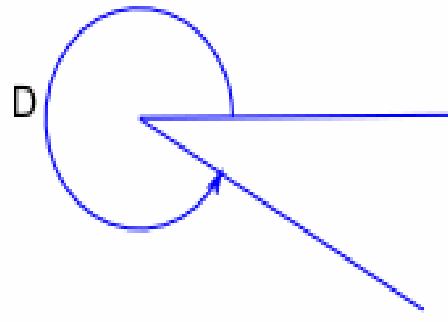
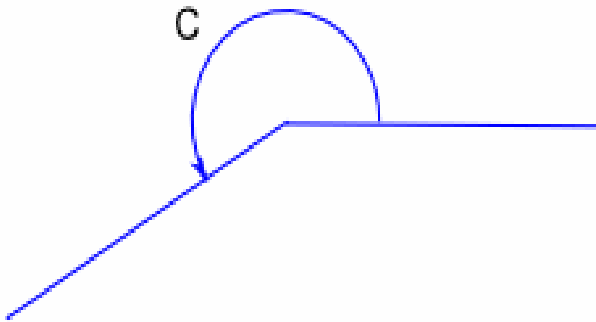
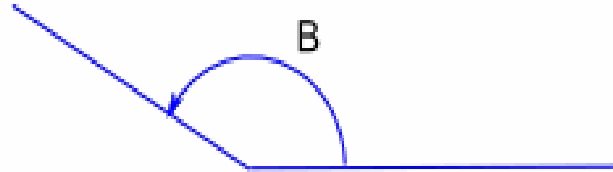
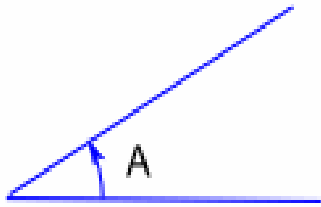
Three straight angles is one and a half full rotations or $3 \times 180^\circ = 540^\circ$

One straight angle is 180°
So, five straight angles = $5 \times 180^\circ = 900^\circ$





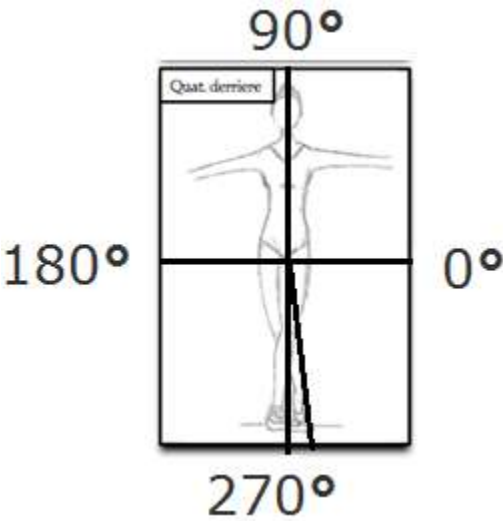
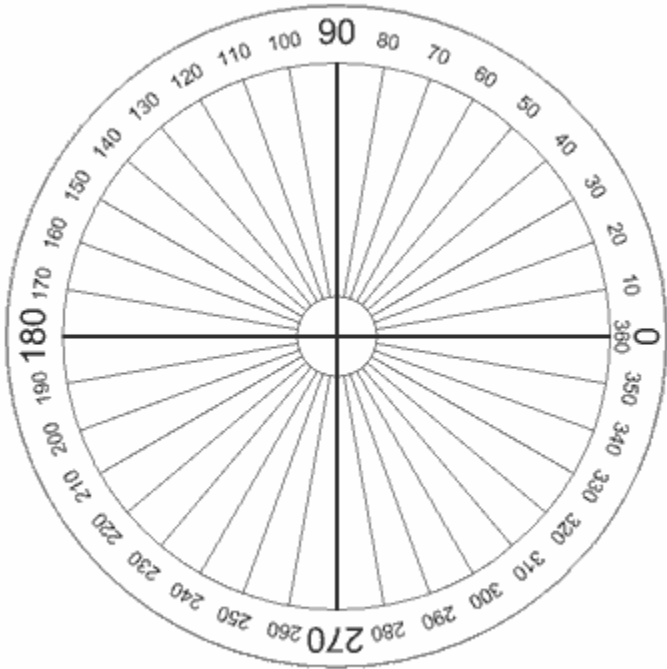
250° is greater than a straight angle (180°), but less than three right angles (270°).
So answer C is correct.



30° is less than one right angle.
Therefore answer A is correct.

RETRIEVED FROM : <https://www.mathsisfun.com/geometry/degrees.html>

Quatrième Derrière

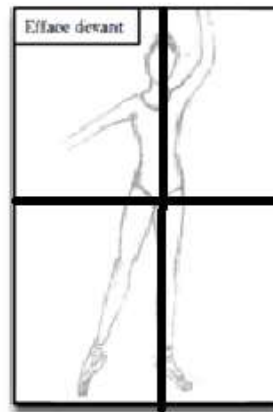
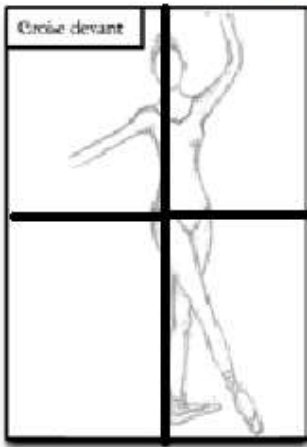




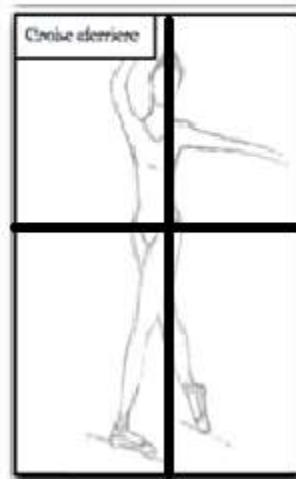
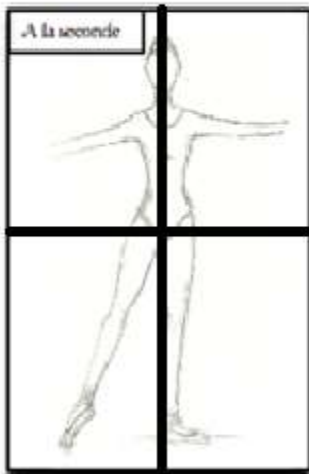
NAME _____

The positions of the dancer's arms, legs and torso create angles. Measure the angles.

Croisé Devant Effacé Devant



à la Seconde Croisé Derrière

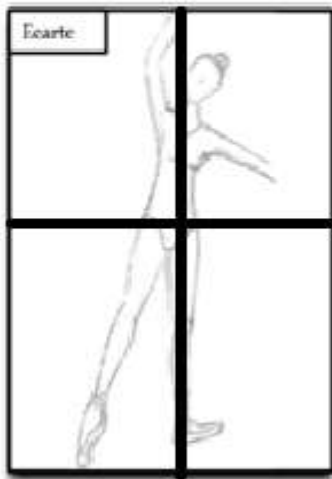




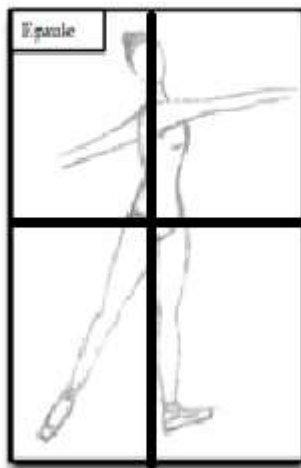
NAME _____

The positions of the dancer's arms, legs and torso create angles. Measure the angles.

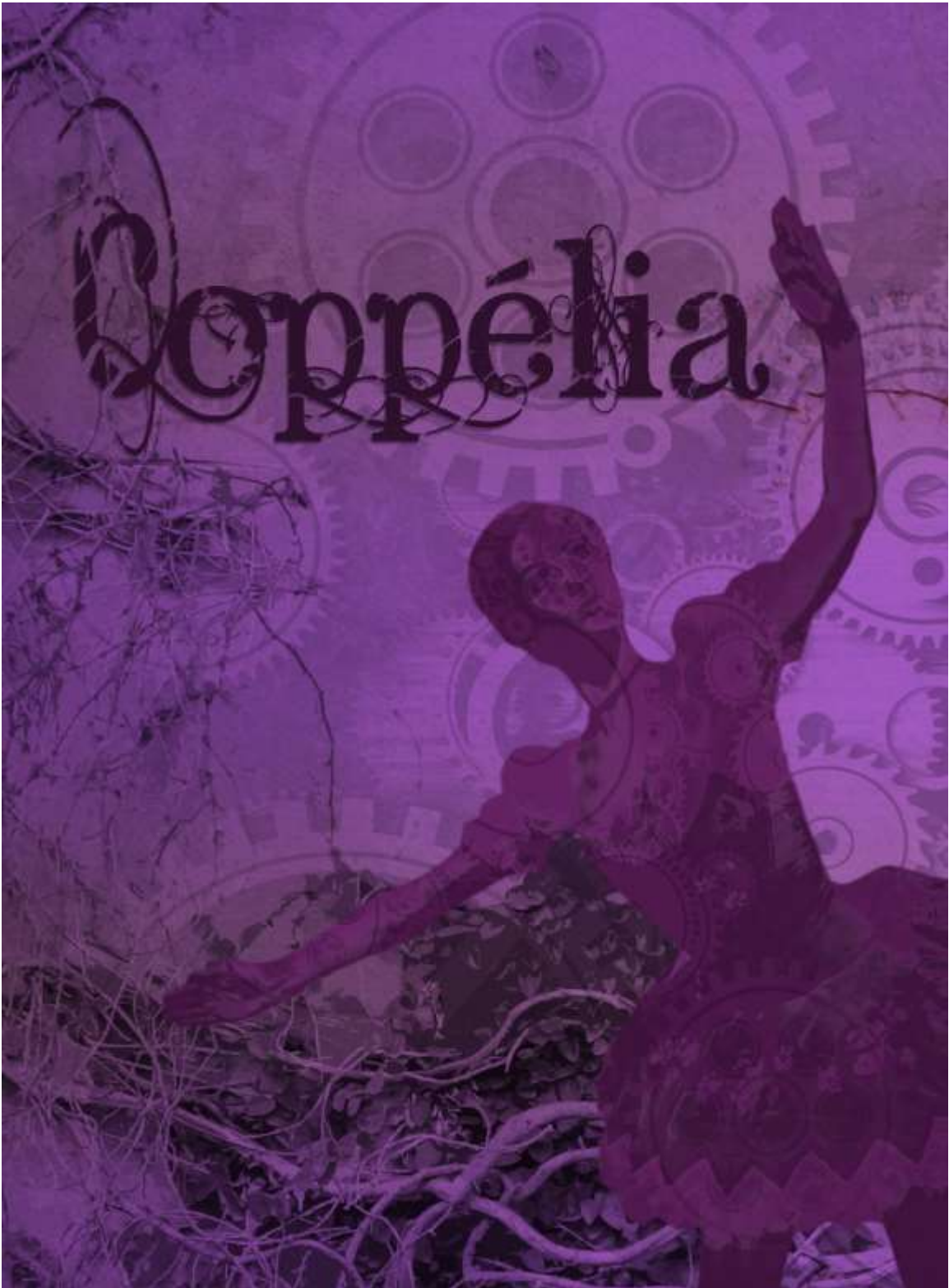
Ecarté



Epaulé

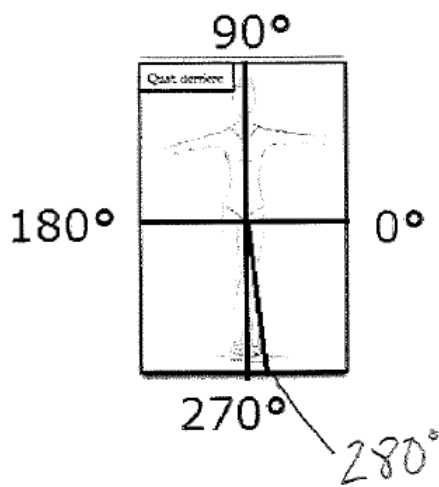
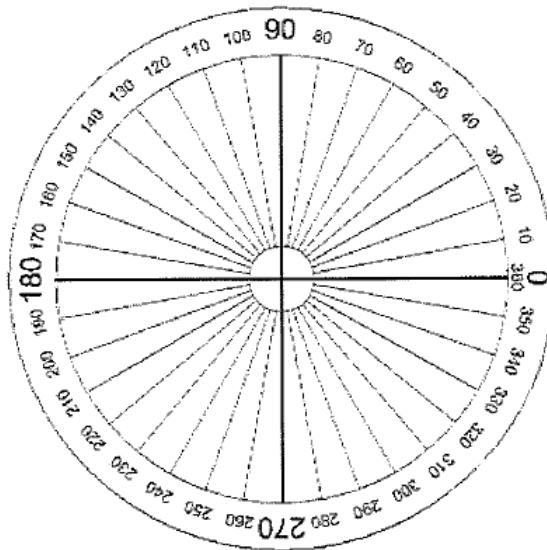
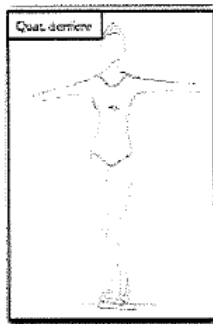


Student Samples





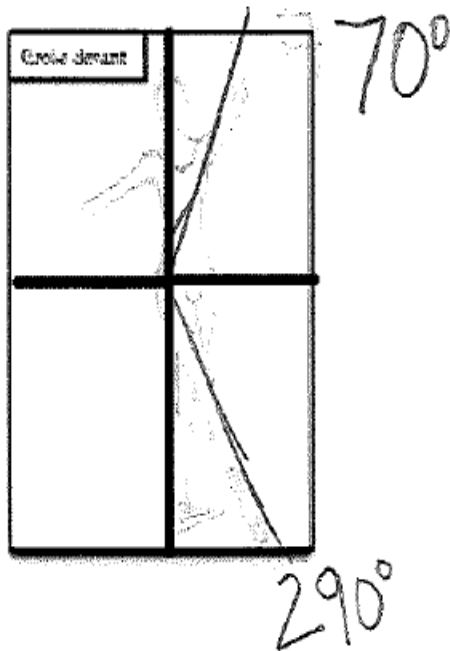
Quatrième Derrière





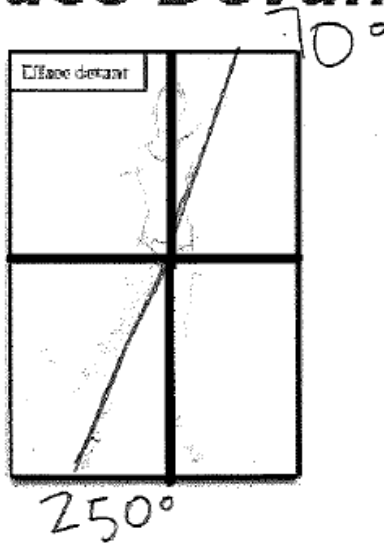
The positions of the dancer's arms, legs and torso create angles. Measure the angles.

Croisé Devant

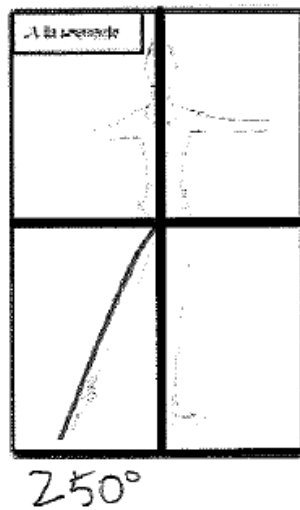




Effacé Devant



à la Seconde

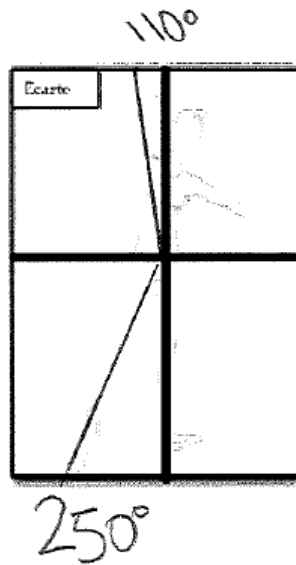




Croisé Derriere

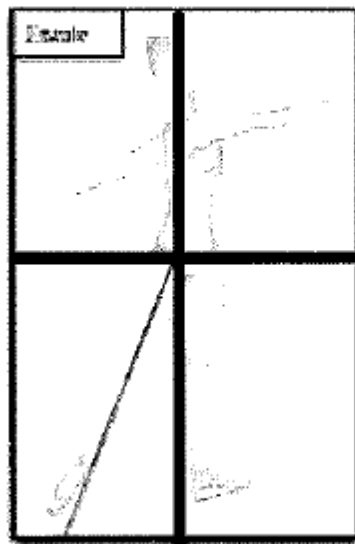


Ecarté





Epaulé



250°

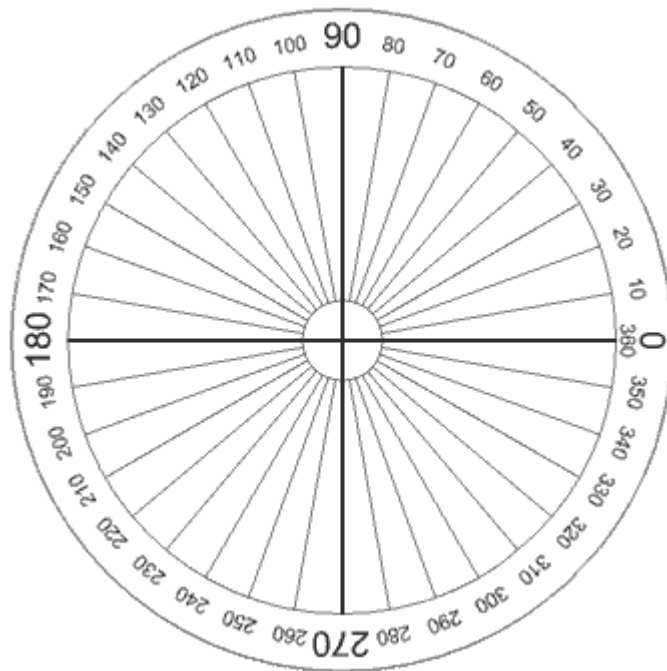
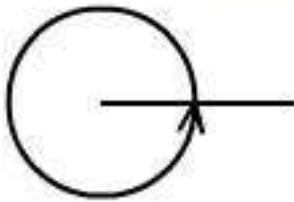


The Choreography of Coppélia and Geometric Measurement

Review the degrees of angles in a full rotation. Then use this sheet to help you measure the angles in a Piqué tour or pique turn and answer the questions on toe rotation.

Full Rotation

360°

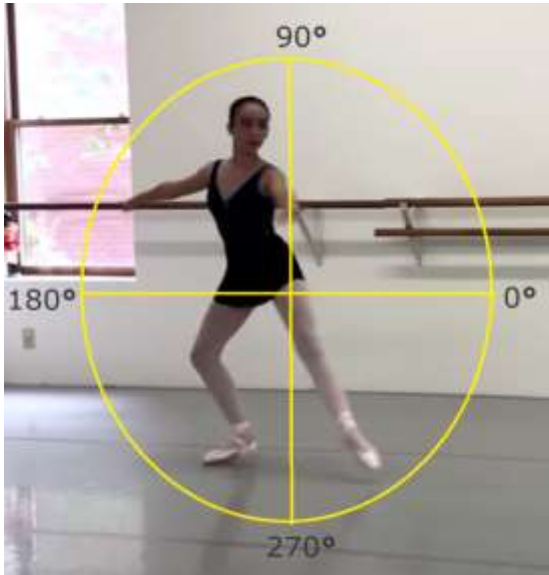




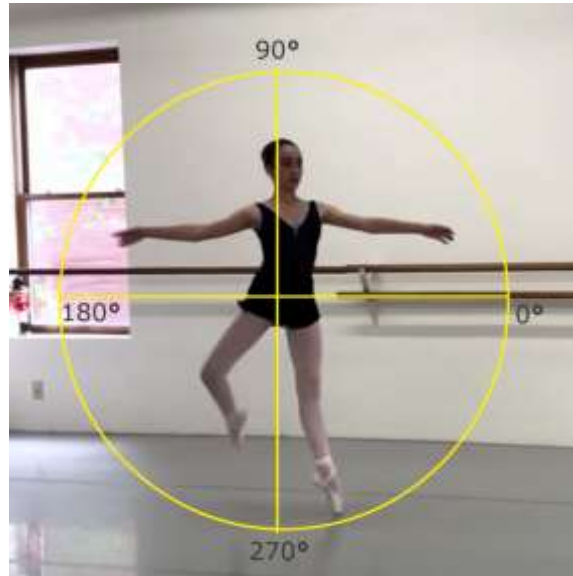
The Choreography of Coppélia and Geometric Measurement

NAME _____

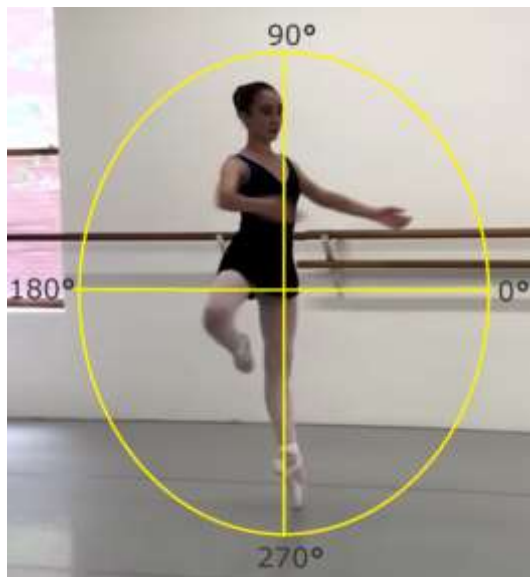
Measure the angles in a Piqué tour or pique turn. Write your answers next to the angle.



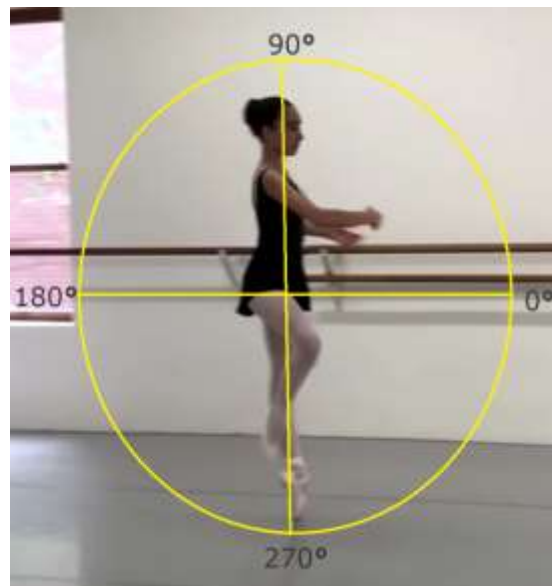
A



B



C



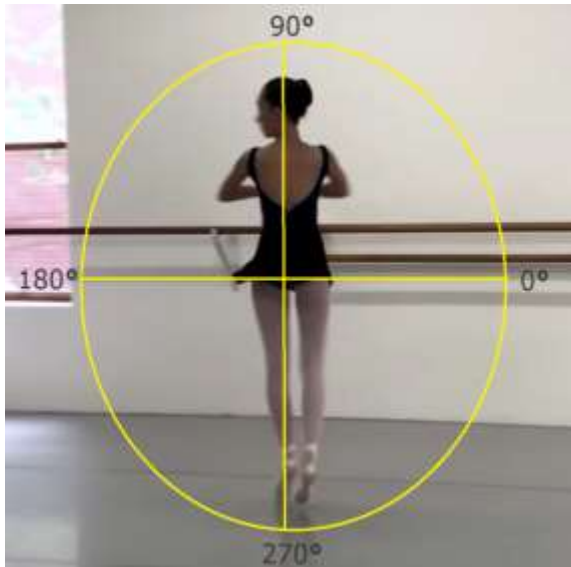
D



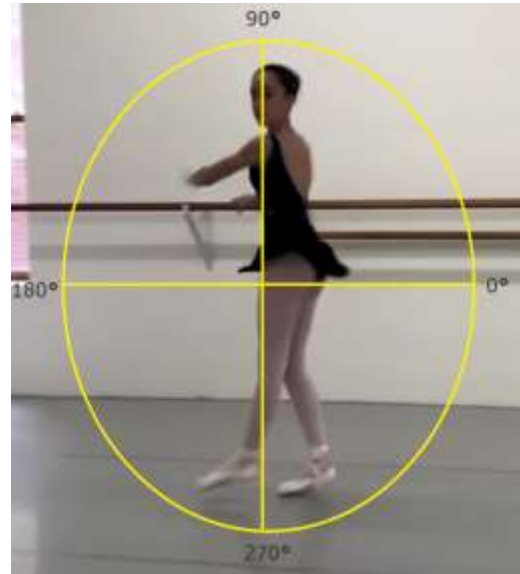
The Choreography of Coppélia and Geometric Measurement

NAME _____

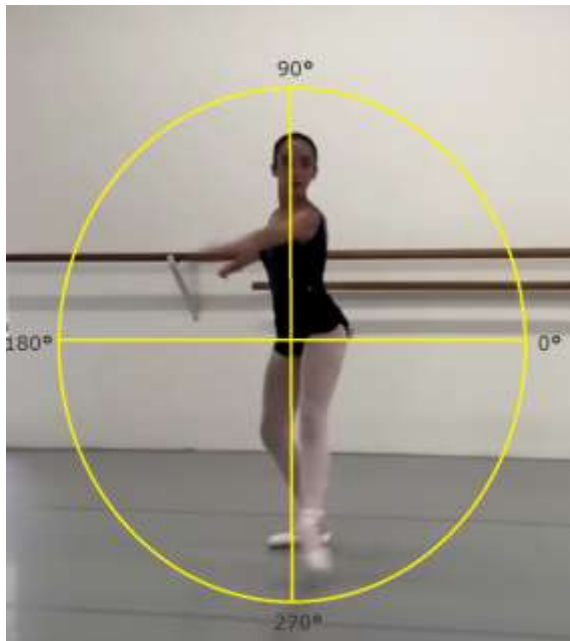
Measure the angles in a Piqué tour or pique turn. Write your answers next to the angle.



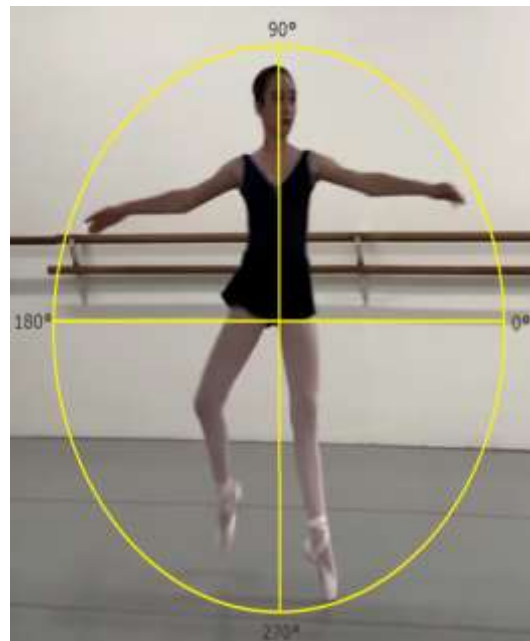
E



F



G



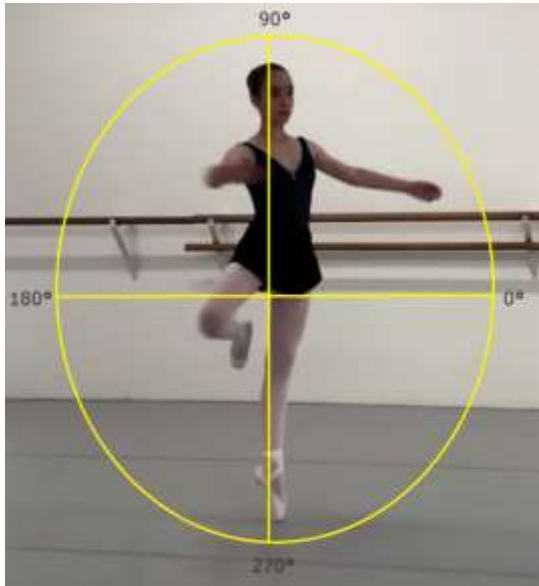
H



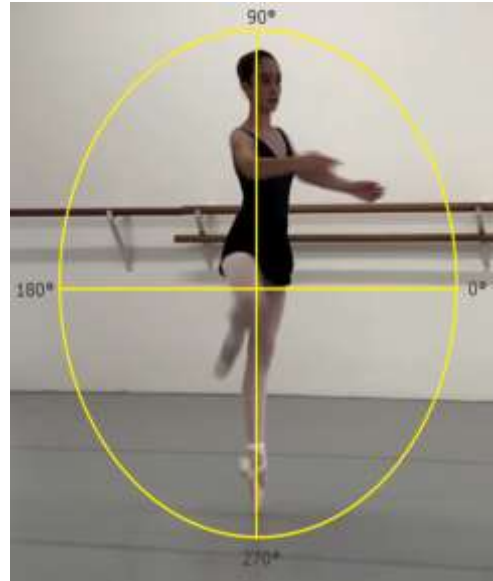
The Choreography of Coppélia and Geometric Measurement

NAME _____

Measure the angles in a Piqué tour or pique turn. Write your answers next to the angle.



I



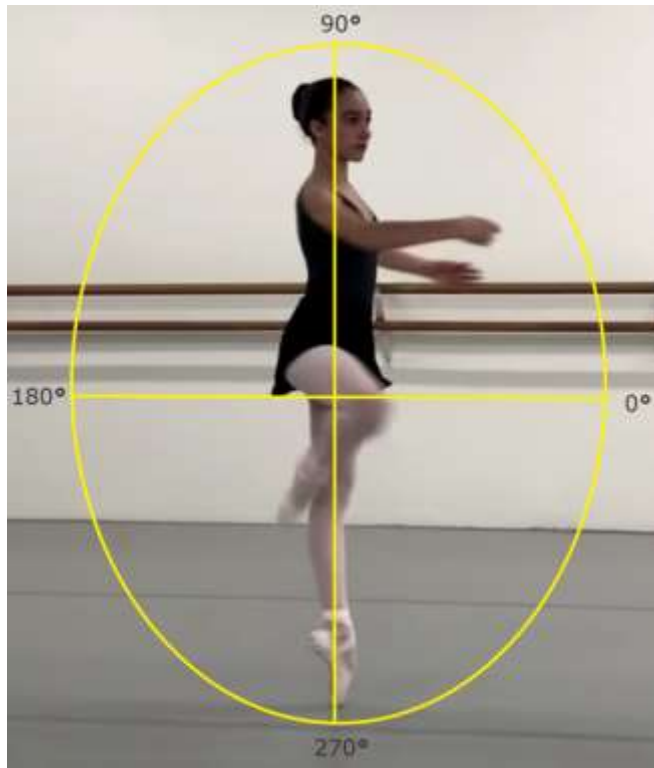
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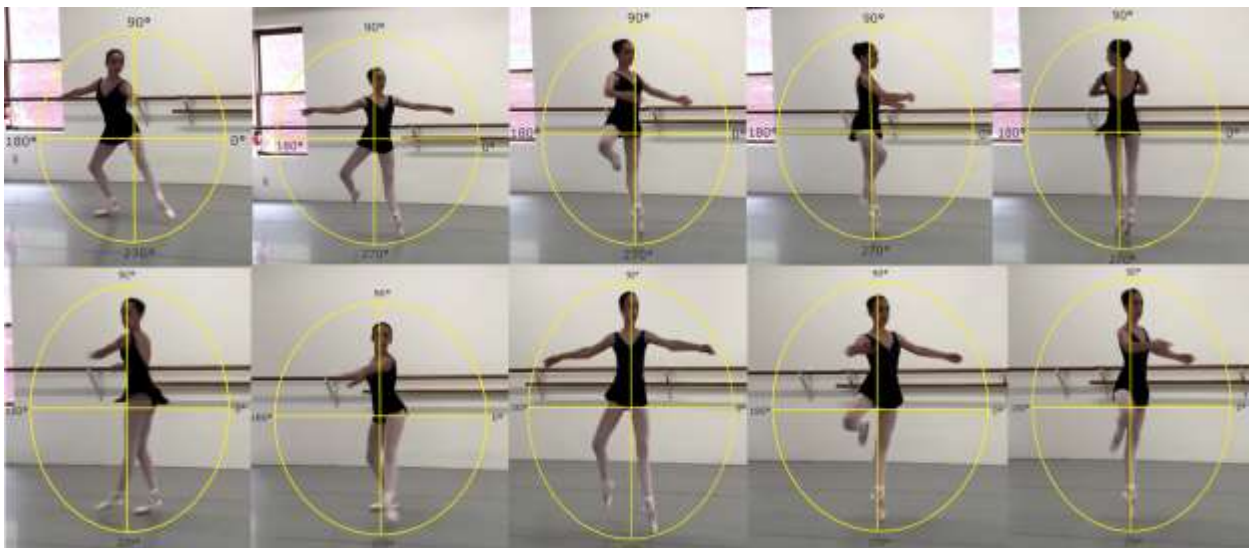
The Choreography of Coppélia and Geometric Measurement

NAME _____

Measure the angles in a Piqué tour or pique turn. Write your answers next to the angle.



K





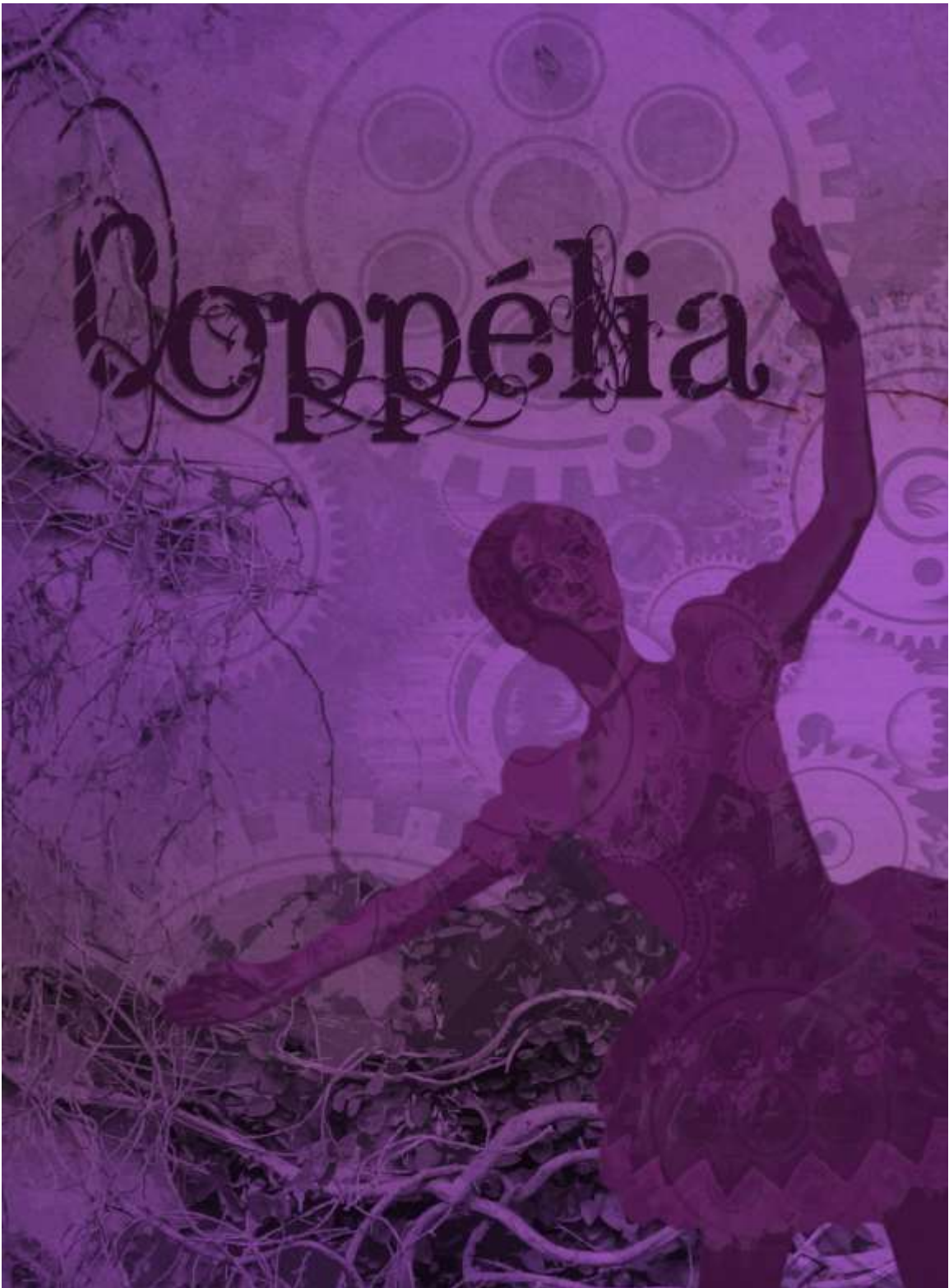
The Choreography of Coppélia and Geometric Measurement

NAME _____

A Piqué tour or pique turn also involves turning on a point. Pique turns are a series of rotations, the dancer rotating 360° for each turn. The place where the dancer's toe touches the floor is the point of rotation. Review the position of the dancer's toe and measure the angle. Write your answers next to the picture.



Student Samples

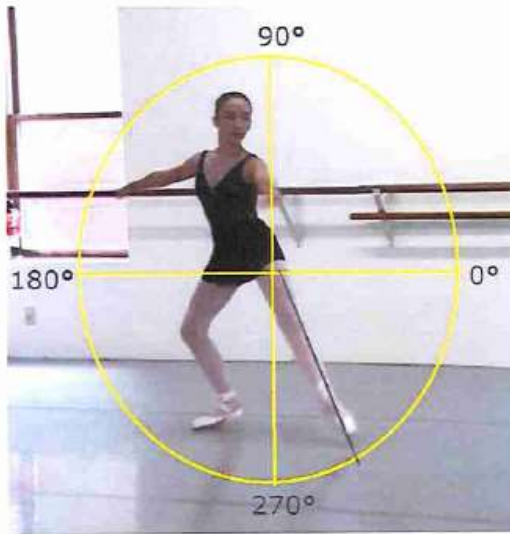




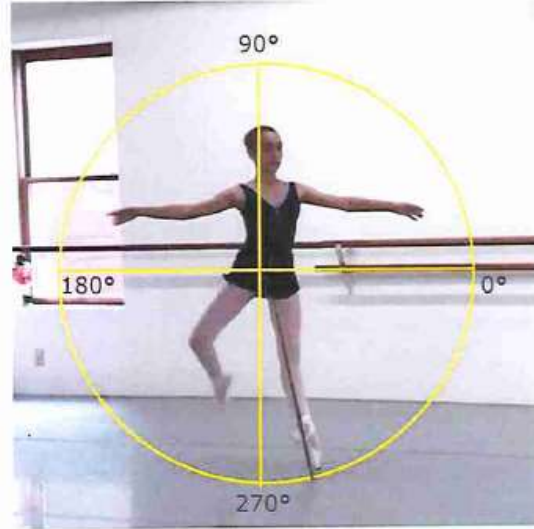
The Choreography of Coppélia and Geometric Measurement

NAME SamPie

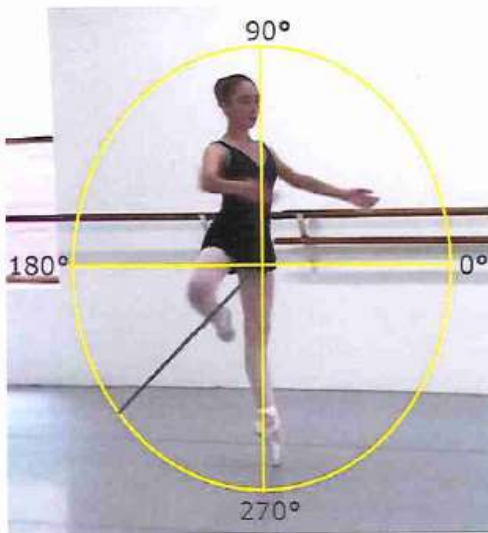
Measure the angles in a Piqué tour or pique turn. Write you answers next to the angle.



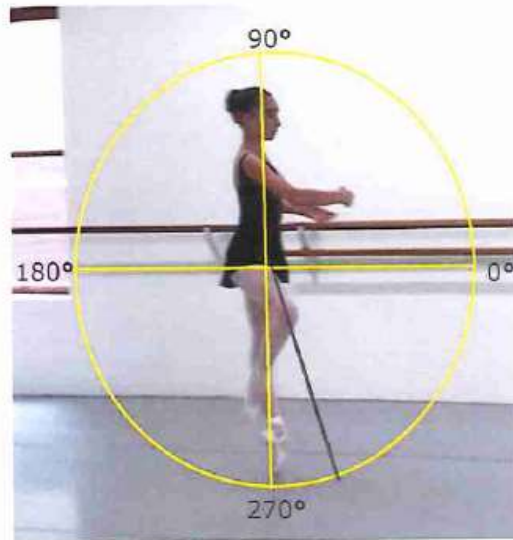
A 300°



B 260°



C 230°



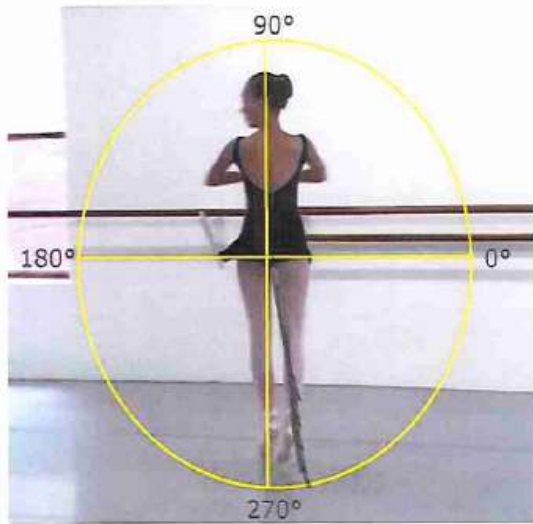
D 290°



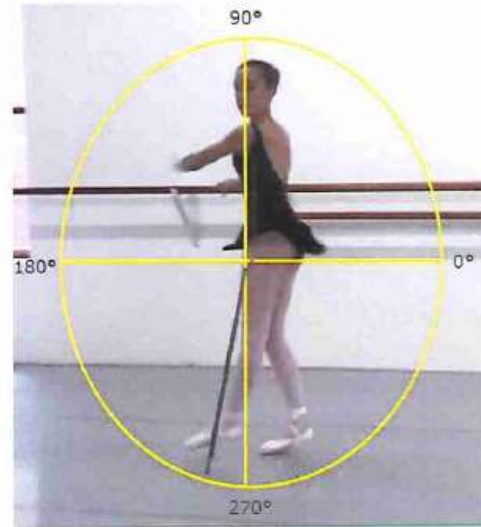
The Choreography of Coppélia and Geometric Measurement

NAME Samie

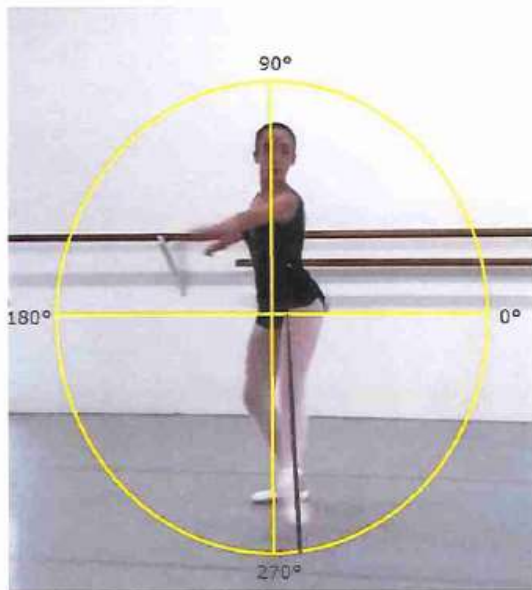
Measure the angles in a Piqué tour or pique turn. Write you answers next to the angle.



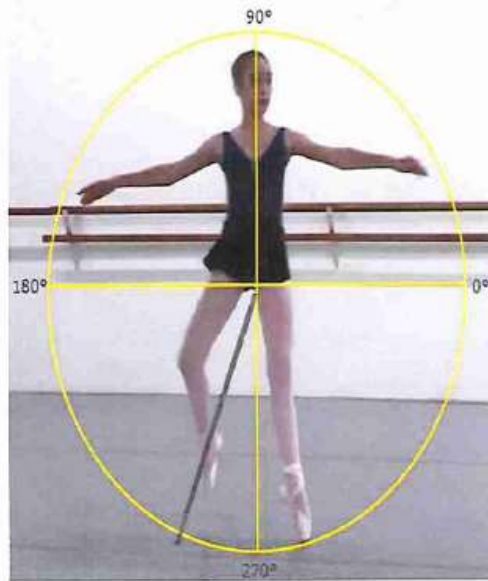
E 280°



F 260°



G 280°



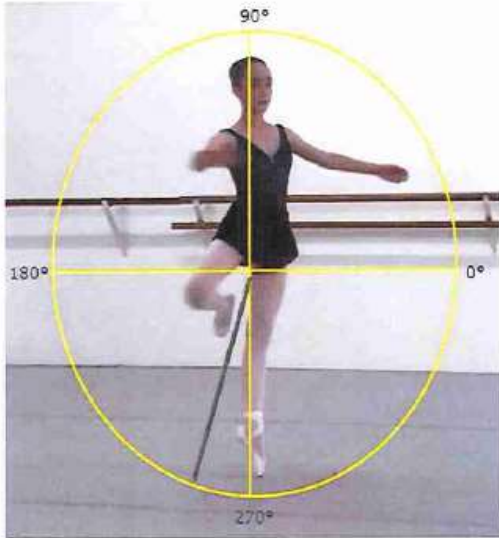
H 240°



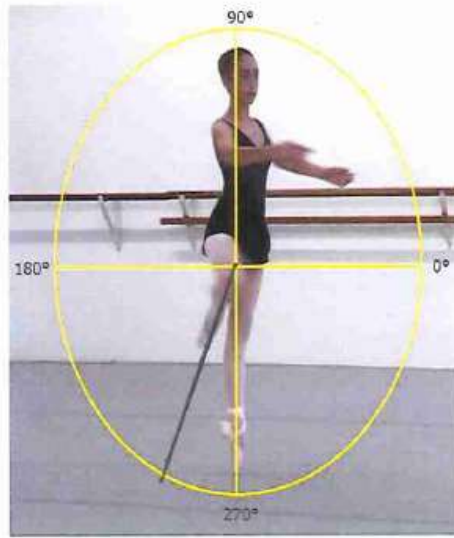
The Choreography of Coppélia and Geometric Measurement

NAME Sample

Measure the angles in a Piqué tour or piqué turn. Write your answers next to the angle.



┆ 255°



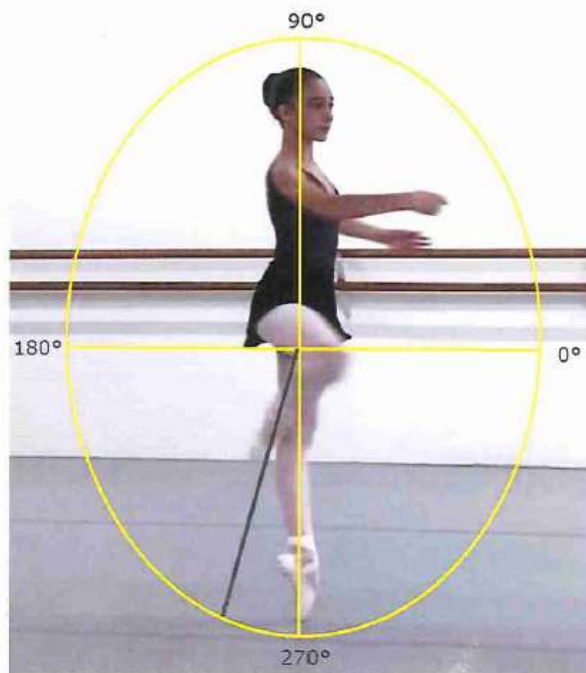
┆ 250°



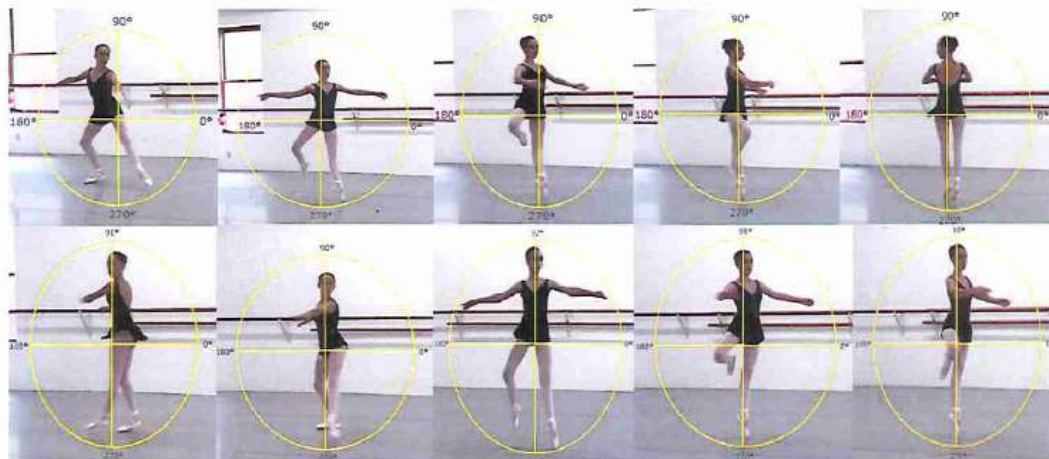
The Choreography of Coppélia and Geometric Measurement

NAME Sample

Measure the angles in a Piqué tour or pique turn. Write your answers next to the angle.



K 245°





The Choreography of Coppélia and Geometric Measurement

NAME Sample

A Piqué tour or pique turn also involves turning on a point. Pique turns are a series of rotations, the dancer rotating 360° for each turn. The place where the dancer's toe touches the floor is the point of rotation. Review the position of the dancer's toe and measure the angle. Write your answers next to the picture.



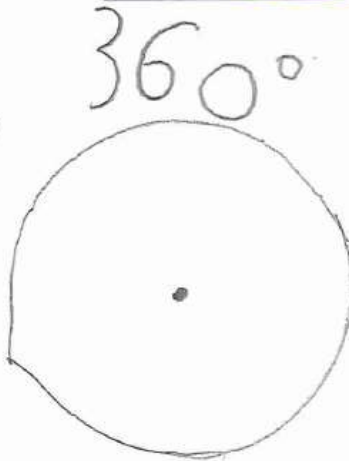
0°



20°



90°



K-12 Student Standards for English Language Arts » Grade 1

Reading Standards for Literature

Key Ideas and Details

1. Ask and answer questions about key details in a text.
2. a . Retell stories, including key details.
b. Recognize and understand the central message or lesson.
3. Describe **characters**, settings, and major events in a story, using key details.

Integration of Knowledge and Ideas

7. Use illustrations and details in a story to describe its **characters**, setting, or events

Range of Reading and Level of Text Complexity

10. With prompting and support read informational texts appropriately complex for grade 1.

Writing Standards

Research to Build and Present Knowledge

8. With guidance and support from adults, recall information from experiences **or gather information from provided sources to answer a question**.

K-12 Student Standards for English Language Arts » Grade 4

Reading Standards for Literature

Key Ideas and Details

1. Refer to details and examples in a text when explaining what the text says explicitly and when **drawing inferences from the text**.
2. Determine a theme of a **story**, drama, or poem from details in the text; summarize the text.
3. Describe in depth a **character**, setting, or event in a story or drama, drawing on specific details in the text (e.g., a character's thoughts, words, or actions).

Integration of Knowledge and Ideas

7. Make connections between the text of a story or drama and a **visual** or oral presentation of the text.

K-12 Student Standards for Mathematics» Grade 1

Geometry 1.G

A. Reason with shapes and their attributes.

1. Distinguish between defining attributes (e.g., **triangles** are closed and three-sided) versus non-defining attributes (e.g., color, orientation, overall size); build and draw shapes that possess defining attributes.
2. Compose two-dimensional shapes (rectangles, squares, trapezoids, **triangles**, half-circles, and quarter-circles) and three-dimensional shapes (cubes, right rectangular prisms, right circular cones, and right **circular cylinders**) to create a composite shape, and compose new shapes from the composite shape.

K-12 Student Standards for Mathematics» Grade 4

Geometry 4.G

A. Draw and identify lines and angles, and classify shapes by properties of their lines and angles.

1. Draw points, lines, line segments, rays, **angles (right, acute, obtuse)**, and perpendicular and parallel lines. Identify these in two-dimensional figures.

K-12 Student Standards for Mathematics» Grade 7

Ratios and Relationships 7.RP

2. Recognize and represent proportional relationships between quantities.
 - a. Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on **a coordinate plane** and observing whether the graph is a straight line through the origin.
 - b. Identify the constant of proportionality (unit rate) in tables, graphs, equations, **diagrams**, and verbal descriptions of proportional relationships.

The Number System 7.NS

Expressions and Equations

B. Solve real-life and mathematical problems using numerical and algebraic expressions and equations.

3. **Solve multi-step real-life and mathematical problems** posed with positive and negative rational numbers in any form (**whole numbers**, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies.

Geometry 7.G

A. Draw, construct, and describe geometrical figures and describe the relationships between them.

1. Solve problems involving scale drawings of geometric figures, such as computing **actual lengths** and areas from a scale drawing and reproducing a scale drawing at a different scale.

2. Draw (freehand, with ruler and protractor, or with technology) **geometric shapes** with given conditions. (**Focus is on triangles from three measures of angles or sides**, noticing when the conditions determine one and only one triangle, more than one triangle, or no triangle.)

3. B. **Solve real-life and mathematical problems involving angle measure**, area, surface area, and volume.



ADDITIONAL RESOURCES

<https://modernismmodernity.org/articles/elaborations-machine-automata-ballets>

<https://www.desmos.com/calculator/shhoaghu8n>

<https://pdfs.semanticscholar.org/eddf/fa3a3da6969d4e0336b9cf61a532d0824a4e.pdf>

<https://www.tes.com/teaching-resource/graph-transformation-ballet-6113551>

https://www.researchgate.net/figure/A-seven-position-ballet-jump-sequence_fig1_10731248

Science of Grand Jeté

<https://sites.google.com/site/icgrandjete/science-of-grand-jete>

Graph Dance 2013

<https://www.youtube.com/watch?v=FvFPqxdhpo>

https://mrta.nyc/wp-content/uploads/2015/09/the_paper_bag_princess1.pdf

<https://www.teachingchildrenphilosophy.org/BookModule/ThePaperBagPrincess>

<https://www.amightygirl.com/the-princess-who-saved-herself>

<https://www.mathsisfun.com/geometry/radians.html>