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The Flying Machine

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Teacher's Guide

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BEFORE THE PLAY

SYNOPSIS

Since childhood, Orville and Wilbur Wright have been fascinated with the idea of human flight. The varied, ill-fated attempts of certain brave souls throughout history, as well as more contemporary and promising progress, inspire these two bicycle mechanics from Dayton, Ohio to take up the challenge of flight for themselves. They battle fate, physics, and foul weather to become the first to achieve motorized human flight in their aeroplane at Kitty Hawk, North Carolina.

THEMES

Science, Engineering, Physics, Trust, Bravery, History, Perseverance, and Character Counts

THEATRE TERMS

VISUAL & PERFORMING ARTS
3.0 Historical & Cultural Context

Make sure you know the following terms so you can use them later.

SCRIPT: The written play that tells actors what to say and what to do.

ACTORS: The people who say the words and do the actions on stage.

CHARACTER: The person or thing that an actor pretends to be or portrays.

DIRECTOR: The person who tells the actors how to say the words and how to do the actions.

SCENERY or SET: The backdrops, furniture, and other pieces that show the audience where the play is happening.

COSTUMES or WARDROBE: The clothes and other items actors wear to show who they are.

PROPS: The things that actors use (such as a book or broom) during the play.

SOUND: The sound effects (like a doorbell or thunder) that help to tell the story.

LIGHTING: The lights that help the audience to see the actors and scenery on the stage.

THEATER: The place where a play is performed. It is from the Greek word *THEATRON*, which means “*watching place*”.

DISCUSSION QUESTIONS

LISTENING & SPEAKING 1.0 Strategies: Comprehension
3:1.1-3 4:1.1-2 5:1.1-2 6:1.1-2 7:1.1-2 8:1.2

LISTENING & SPEAKING 1.0 Strategies: Organization and Delivery of Oral Communication

3:1.5, 1.7 4:1.7-9 5:1.5-6 6:1.5-7

VISUAL & PERFORMING ARTS

1.0 Artistic Perception

1. What is the difference between a live play and a movie?
2. More theatres are using projected photos and videos as part of their shows. How do you think projections can help you understand and enjoy a play better?
3. Identify the people and things needed to put on a play using the theatrical terms list.
4. What is the difference between an actor and a character? How can you tell when an actor plays more than one character during a play?
5. Sometimes characters in a play speak to each other, while other times they may speak to the audience. Why do you think a character would speak to the audience?

DURING AND AFTER THE PLAY

AUDIENCE BEHAVIOR

While watching a live theatre performance, it is important to sit attentively and listen. It does not mean that you need to be silent. Be sure to laugh at the funny parts (or cry at the sad parts), and certainly applaud at the end! Actors love it when an audience is involved with the show by actively watching and listening.

DISCUSSION QUESTIONS:

LISTENING & SPEAKING 1.0 Strategies: Comprehension

3:1.1-3

4:1.1-2

5:1.1-2

6:1.1-2

7:1.1-2

8:1.2

LISTENING & SPEAKING 1.0 Strategies: Organization and Delivery of Oral Communication

3:1.5, 1.7

4:1.7-9

5:1.5-6

6:1.5-7

READING 3.0 Literary Response and Analysis

6:3.5

VISUAL & PERFORMING ARTS

1.0 Artistic Perception

4.0 Aesthetic Valuing

5.0 Connections, Relationships, Applications

1. Who was your favorite character or what was your favorite scene? Why?
2. Refer back to the Theatre Terms list on page 3. What examples of these terms did you find in the play?
 - a. What did you think of the scenery, costumes, and props? Did they help you to understand the story the actors told and the problems they struggled to solve? Why or why not?
 - b. How did the music, sound effects, and projections used during the show help you to understand the story being told?
3. When a playwright has his/her characters speak to the audience, then the playwright is using a convention called *direct address*. This is different from a soliloquy, where the character talks to him/herself while alone on stage.
 - a. Name some examples of other plays or movies where the convention of direct address is used. How is it used and why?
 - b. How and why was direct address used in this play? Was it used effectively—why or why not?
4. What did the actors, music, lighting, or scenery do to tell you when the story moved from one location to another? Was this effective? Why or why not?
5. List the differences between a biography and an autobiography.
 - a. How would the perspectives and biases of the authors of each affect the way story and facts are presented in each?
 - b. How do you think the perspectives and biases of Orville and Wilbur Wright affected the story and facts they presented?

CLASSROOM ACTIVITIES

READING & VOCABULARY

VISUAL & PERFORMING ARTS

5.0 Connections, Relationships, Applications

Activity 1: Winged Words

The following words will be heard during the play and can be used during discussion and other activities.

LISTENING & SPEAKING: 1.0 Strategies: Organization and Delivery of Oral Communication

3:1.7

- | | | |
|----------------|---------------|-----------------|
| 1. blueprint | 6. dedication | 11. magnanimous |
| 2. discovery | 7. aeronautic | 12. decline |
| 3. sacrifice | 8. mechanical | 13. contribute |
| 4. improvement | 9. proprietor | 14. contraption |
| 5. aviation | 10. cycle | |

1. Use a DICTIONARY to do the following:
 - a. Define each word and identify its part(s) of speech
 - b. Divide each word into syllables and identify its roots, prefixes, and suffixes.
 - c. Identify words with multiple meanings and explain the different ways they can be used.
 - d. Select five words and write a sentence for each.

READING 1.0 Vocabulary and Concept Development

3:1.7-8

4:1.3, 6

5:1.4

6:1.2-3

Activity 2: Worldly Words

READING 1.0 Vocabulary and Concept Development

4:1.4,6

5:1.4

6:1.2

1. Define the meaning of the Greek prefix “meta” as it is used today and how it affects the meanings of the words we attach it to. How would you define the word “metatheatre” or “metatheatrical?” Were any parts of *The Flying Machine* metatheatrical? How so?
2. Some words can have very specific meanings for people working in specific fields of science, art, engineering, and literature, in addition to their more common meanings. Research the meanings of the following words as they are used in the aviation field, and draw pictures to explain their multiple shades of meaning.

roll

pitch

yaw

airflow

drag

ANTI-BULLYING

VISUAL & PERFORMING ARTS

5.0 Connections, Relationships, Applications

Thematic discussion questions for *The Flying Machine*

1. Siblings like Orville and Wilbur seem to always know how to get under each others’ skin, don’t they? What do you think is different between teasing, put downs, and constructive criticism?
2. How do you know when it is okay to tease or joke with someone about something they said or did? When is it not okay?
3. If someone’s words or actions hurt your feelings, what can you do to make them stop without hurting your friendship/relationship?

CLASSROOM ACTIVITIES

Activity 3: Rave Reviews!

WRITING: 2.0 Applications

4:2.2 5:2.2 6:2.4

Reviews give insightful and critical opinions on theatrical productions that help people decide if they want to go see a show or not. Write a review that gives your honest opinion of B Street's production of *The Flying Machine* and tell why people should or should not go see it. Be sure to:

1. include a short summary of the play
2. mention actors who performed well (or badly) and any outstanding design features (scenery, costumes, lighting, sound, projections)

LISTENING AND SPEAKING

VISUAL & PERFORMING ARTS

5.0 Connections, Relationships, Applications

LISTENING AND SPEAKING: 1.0 Strategies:
Comprehension

LISTENING AND SPEAKING: 1.0 Strategies:
Organization and Delivery of Oral Communication

Listen carefully to your classmates' presentations and ask them questions. Do you agree with them? Are you persuaded? Why or why not?

WRITING

VISUAL & PERFORMING ARTS

5.0 Connections, Relationships, Applications

WRITING: 1.0 Strategies: Organization and Focus,
Penmanship, Evaluation and Revision

Be sure to revise and edit what you write.

Activity 4: Chasing the Story

WRITING: 2.0 Applications

3:2.1 4:2.1 5:2.1 6:2.1 7:2.1 8:2.1

LISTENING AND SPEAKING 2.0: Applications

3:2.1-2 4:2.1 5:2.1 6:2.1 7:2.1 8:2.1

VISUAL & PERFORMING ARTS

2.0 Creative Expression

Choose a prompt from below and write a story to share with the class. You can write this story in the form of a first-person narrative, a speech, a play, a newspaper article, or any other form you choose.

The Flying Machine is written autobiographically—it brings us face to face with Orville and Wilbur Wright as they tell about their lives from their perspectives:

- A. Interview a classmate, friend, or family member and write his or her biography. Ask them about their happiest moments, saddest moments, and/or greatest challenges, and then show how their decisions and other life events brought them to these points.
- B. Write your autobiography—interview yourself or have someone else ask you about your happiest moments, saddest moments, and/or greatest challenges. How did these points in your life come about and what did you learn from them?

OR

In *The Flying Machine*, Orville and Wilbur Wright tackle the problem of human flight—how can people fly using wings and motors without crashing? All good storytelling includes a compelling conflict that characters must overcome and/or solve.

- A. Think of a problem you solved lately and write a story about it. What was the problem? How did you solve it? Who helped you and who got in your way?
- B. Research a community or historical problem and write the story of how it was solved. Was something invented to solve it? Wars fought? Treaties signed or laws passed? Who helped to solve the problem and who got in the way?

CLASSROOM ACTIVITIES

MATH

MATHEMATICS

3.MD:2 4.MD:2,3 5.MD:1

VISUAL & PERFORMING ARTS

5.0 Connections, Relationships, Applications

Activity 5: Measuring Up

Solve the following word problems,

1. Wilbur and Orville must take a train from Dayton, OH to Kitty Hawk, NC. If they travel for 4 hours in the morning, 5 hours in the afternoon, and 4 hours after dinner, how long will the trip take them?
2. The Wright brothers are testing their aeroplane at Kitty Hawk. If their first flight lasts 57 seconds and their second flight lasts 75 seconds, how much longer did the second flight last than the first?
3. The first glider the Wright brothers tested had 2 wings each with a wingspan of 17ft by 5ft. What is the area of each wing of this glider (excluding curvature)? The motorized glider, or aeroplane, had 2 wings each with a wingspan of 40ft by 7ft. What is the area of this wingspan (excluding curvature)?

Activity 6: Convert This!

Solve the following word problems.

1. The Wright brothers' first aeroplane flew approximately 100ft. How far is this in miles? How far in yards?
2. In order for their aeroplane to fly, the Wright brothers needed an engine weighing under 200lbs. They ended up building an engine that weighed 178lbs. Express this in ounces and tons.
3. In problem 3 of the last activity, express the length, width, and area of each glider's wings in inches and yards.
4. Today, it would take approximately 11.5 hours to drive from Dayton, OH to Kitty Hawk, NC (without stopping). If you drove at 60mph, how many miles would you be driving? How long would this trip take in minutes and seconds?

SCIENCE, HISTORY AND SOCIAL SCIENCE

HISTORY AND SOCIAL SCIENCE

Ancient Civilizations, Medieval and Early Modern Times, Growth and Conflict

SCIENCE: Physical Science, Life Science, Earth Science

VISUAL & PERFORMING ARTS

5.0 Connections, Relationships, Applications

Activity 7: Getting It Wrong

Many scientists and inventors throughout history have stumbled along their paths of discovery because they based their work on incorrect assumptions or misunderstood observations and concepts. The Wright Brothers were no different!

Discuss one or more of the following ideas, believed to be true and correct at sometime during the course of history. Who challenged these ideas, and what impact did their challenge have on future discoveries?

1. The Earth is flat
2. The Sun and planets revolve around the Earth
3. Asia can be reached from Europe by sailing west
4. Everything is made up of four elements: Earth, Air, Fire, and Water

CLASSROOM ACTIVITIES

Activity 8: Time Flies

Use the following activity to help your students understand the evolution of aviation technology and theory that the Wright Brothers drew from to achieve their monumental first flight.

During the play, Orville and Wilbur mention several people who, throughout history, have experimented with flight and contributed to the body of knowledge they pulled from as they built their airplane. These people mentioned include:

Louis Pierre Mouillard	Samuel Langley	Otto Lilienthal
Alphonse Penaud	Octave Chanute	Montgolfier Brothers
George Cayley	Percival G. Spencer	Francis Herbert Wenham
Icarus		

As a class, discuss what ideas, techniques, and technologies Orville and Wilbur drew upon as they built their airplanes, and which ones they developed on their own.

Divide your students into groups and assign one or more of the people listed above to each group, or assign others who made advancements in physics, engineering, and aviation during the time periods you are studying.

Have your students research the experiments conducted, observations noted, and/or conclusions drawn by those assigned. What did they discover and when, and whose discoveries made their work possible? Have each group share their findings with the class. Have all other students take notes during each presentation.

As a class, develop a timeline showing the technological and theoretical breakthroughs that lead to Orville and Wilbur's flight based on the presentations given. Show how each person's discoveries paved the way for those to come.

Activity 9: Business Sense

HISTORY AND SOCIAL SCIENCE

Continuity and Change: 3.5

WRITING: 1.0 Strategies: Organization and Focus

5:1.2

When Wilbur and Orville Wright started their bicycle repair company, they did it because they saw a need in the community—bicycle repair and maintenance—that they had the skills to fill. Imagine a business that you would like to start using the following questions:

- Would you sell things or provide a service?
- Would you run your business from a storefront or online?
- Who would your most likely customers be? How would you find them?
- What resources present in your community would you draw from?
- What need would your business meet for your community? What opportunities would it create?

Describe your business in writing, answering all of the questions above, and share it with the class. You can do this in an essay, speech, brochure, website, or other form of your choosing. How can you most effectively persuade people to support your business?

CLASSROOM ACTIVITIES

CHARACTER COUNTS

Thematic Questions for *The Flying Machine*

Trust and Respect:

1. Which characters from the play would you trust?
2. Which characters would you not trust and why?
3. Respect can be broken down in this acronym: TASC: Thoughtful, Aware, Sensitive, Courteous. What examples of these attributes did you see in the play?
4. What would have happened if...
 - a. Orville and Wilbur had not been willing to listen to each other's ideas and concerns?
 - b. Orville and Wilbur had not trusted Daniels to write about their work?
5. What are some good ways to build trust among your siblings and close friends? What are some effective ways to lose trust among friends and family members? How so?
6. Charlie works for Orville and Wilbur as their employee, and Orville and Wilbur are his employers. What are some effective and ineffective ways to build trust and respect between employers and employees? Did you see any of these in the play?

Perseverance

1. What does it mean to persevere? When and why is it important to persevere?
2. What characters in the play persevered? How did they persevere?
3. What would have happened if...
 - a. Orville and Wilbur had quit trying to build bicycles after they failed to fix their first one?
 - b. Wilbur had quit reading or trying to educate himself after his accident?
4. Explain a time when you have persevered like Orville and Wilbur. Why did you do this and how were your efforts rewarded?
5. Sometimes persevering requires sacrifice. What sacrifices did Orville and Wilbur make in order to make their discoveries and achieve their goals?
6. What sacrifices have you had to make in order to persevere and achieve your goals?

Bravery:

1. What is bravery? When in your life have you seen people act bravely?
2. Is bravery a personality trait, or do people choose to be brave?
3. Did you see any characters choose to act bravely? What did they do and why?
4. Discuss how people like Orville and Wilbur can and do act bravely in the following situations:
 - a. Starting your own business
 - b. Creating, patenting, and marketing new inventions
 - c. Experimenting with new technologies and discovering new things
5. Describe a time when you chose to be brave. Why did you make this choice and what were the results of your bravery? What sacrifices did you have to make to be brave?

Teamwork and Cooperation

1. When during the play did you see characters cooperate and work as a team? What resulted from this?
2. What happened when characters didn't cooperate?
3. When can competition between people and teams be useful and constructive? When is it unconstructive?
4. Think of a time when you worked with a team to achieve a goal. Could you have achieved the goal without your team? Why or why not?

RESOURCES & ADDENDUMS

SOURCES & FURTHER LEARNING

Books:

The Wright Brothers: Inventors Whose Ideas Really Took Flight by Mike Venezia. ISBN: 9780531237328

The Wright Brothers: First in Flight by Samuel Willard Crompton
ISBN: 9780791093566

Electronic Resources:

Celebrating 100 Years of Flight: Interactive Timeline

<http://teacher.scholastic.com/activities/flight/timeline.htm>

Beginners Guide to Aeronautics

<http://www.grc.nasa.gov/WWW/K-12/airplane/index.html>

Learning the “Wright” Way to Fly—Lesson Guide

<http://www.nasa.gov/content/lesson-title-learning-the-wright-way-to-fly/#.VBVehxabBuk>

Learning to Fly: The Wright Brothers’ Adventure—Lesson Guide

<http://www.nasa.gov/audience/foreducators/topnav/materials/listbytype/Learning.to.Fly-The.Wright.Brothers.Adventure.html>

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Winged Words Word Search

Find the following words in the word search.

10

- | | | |
|----------------|---------------|-----------------|
| 1. blueprint | 6. dedication | 11. magnanimous |
| 2. discovery | 7. aeronautic | 12. decline |
| 3. sacrifice | 8. mechanical | 13. contribute |
| 4. improvement | 9. proprietor | 14. contraption |
| 5. aviation | 10. cycle | |

I N O Q A L H M G Y O K O Y D
E M O M E C H A N I C A L R E
S A P I U J K G P U U C C E C
E I V R T N U N S B I I O V L
P T C I O A N A K H K T N O I
G R V N A V C N J R T U T C N
I H O U U T E I E B W A R S E
V U K P J V I M D M P N I I J
F J F A R D E O E E E O B D G
J A E V D I P U N N D R U F Q
P I U F W N E S P G T E T R C
N O I T P A R T N O C A E Y T
I B Q Y P A S F O N E T C S H
T N I R P E U L B R D L B N H
S A C R I F I C E G E S X E V