

6th grade  
Bryant Middle School  
Holiday Packet



Turn this packet in completed on  
January 6<sup>th</sup> and you will be  
entered into a raffle.

Remember to read at least 20 minutes each day  
too!

**No calculators for  
the math please!**

# Lesson 6.6 Adding Decimals

To add decimals, line up the decimal points. Then, add as you would whole numbers.

$$\begin{array}{r} 26.2 \\ + 5.3 \\ \hline 31.5 \end{array}$$

$$\begin{array}{r} 4.65 \\ 0.08 \\ + 7.34 \\ \hline 12.07 \end{array}$$

$$\begin{array}{r} 0.086 \\ + 4.172 \\ \hline 4.258 \end{array}$$

Add.

	a	b	c	d	e
1.	$\begin{array}{r} 3.2 \\ + 8.5 \\ \hline \end{array}$	$\begin{array}{r} 0.73 \\ + 0.88 \\ \hline \end{array}$	$\begin{array}{r} 1.84 \\ + 2.39 \\ \hline \end{array}$	$\begin{array}{r} 1.44 \\ + 8.37 \\ \hline \end{array}$	$\begin{array}{r} 4.23 \\ + 16.21 \\ \hline \end{array}$
2.	$\begin{array}{r} 0.014 \\ + 2.301 \\ \hline \end{array}$	$\begin{array}{r} 27.12 \\ + 13.09 \\ \hline \end{array}$	$\begin{array}{r} 42.325 \\ + 2.014 \\ \hline \end{array}$	$\begin{array}{r} 6.54 \\ + 3.98 \\ \hline \end{array}$	$\begin{array}{r} 0.63 \\ + 5.72 \\ \hline \end{array}$
3.	$\begin{array}{r} 2.72 \\ 3.51 \\ + 4.22 \\ \hline \end{array}$	$\begin{array}{r} 68.52 \\ 1.72 \\ + 0.55 \\ \hline \end{array}$	$\begin{array}{r} 27.15 \\ 105.21 \\ + 2.63 \\ \hline \end{array}$	$\begin{array}{r} 7.2 \\ 8.8 \\ + 17.5 \\ \hline \end{array}$	$\begin{array}{r} 0.5 \\ 0.6 \\ + 2.12 \\ \hline \end{array}$
4.	$\begin{array}{r} 5.3 \\ + 2.8 \\ \hline \end{array}$	$\begin{array}{r} 68.68 \\ + 8.48 \\ \hline \end{array}$	$\begin{array}{r} 32.132 \\ + 14.212 \\ \hline \end{array}$	$\begin{array}{r} 76.8 \\ + 24.3 \\ \hline \end{array}$	$\begin{array}{r} 1.119 \\ + 2.881 \\ \hline \end{array}$
5.	$\begin{array}{r} 6.50 \\ + 8.72 \\ \hline \end{array}$	$\begin{array}{r} 486.25 \\ + 103.88 \\ \hline \end{array}$	$\begin{array}{r} 168.42 \\ + 35.69 \\ \hline \end{array}$	$\begin{array}{r} 25.093 \\ + 3.112 \\ \hline \end{array}$	$\begin{array}{r} 14.001 \\ + 2.883 \\ \hline \end{array}$
6.	$\begin{array}{r} 0.113 \\ + 0.658 \\ \hline \end{array}$	$\begin{array}{r} 4.211 \\ + 8.385 \\ \hline \end{array}$	$\begin{array}{r} 68.682 \\ + 25.529 \\ \hline \end{array}$	$\begin{array}{r} 2.004 \\ + 6.138 \\ \hline \end{array}$	$\begin{array}{r} 48.6 \\ + 53.9 \\ \hline \end{array}$
7.	$\begin{array}{r} 3.165 \\ 2.125 \\ + 1.612 \\ \hline \end{array}$	$\begin{array}{r} 0.018 \\ 0.403 \\ + 0.504 \\ \hline \end{array}$	$\begin{array}{r} 0.234 \\ 0.605 \\ + 0.721 \\ \hline \end{array}$	$\begin{array}{r} 4.005 \\ 2.903 \\ + 0.021 \\ \hline \end{array}$	$\begin{array}{r} 53.751 \\ 0.848 \\ + 2.905 \\ \hline \end{array}$

# Lesson 6.7 Subtracting Decimals

To subtract decimals, line up the decimal points. Then, subtract as you would whole numbers.

$$\begin{array}{r} 25.8 \\ - 11.3 \\ \hline 14.5 \end{array}$$

$$\begin{array}{r} \phantom{0}17.\overset{3}{4}1 \\ - 15.33 \\ \hline 2.08 \end{array}$$

$$\begin{array}{r} \phantom{0}16\phantom{0}13\phantom{0}1 \\ \phantom{0}17.\overset{16}{4}\overset{13}{6}8 \\ - 8.573 \\ \hline 8.895 \end{array}$$

Subtract.

a

$$\begin{array}{r} 1. \quad 0.8 \\ - 0.3 \\ \hline \end{array}$$

b

$$\begin{array}{r} 2.6 \\ - 1.8 \\ \hline \end{array}$$

c

$$\begin{array}{r} 3.7 \\ - 1.8 \\ \hline \end{array}$$

d

$$\begin{array}{r} 0.96 \\ - 0.27 \\ \hline \end{array}$$

e

$$\begin{array}{r} 1.9 \\ - 0.4 \\ \hline \end{array}$$

$$\begin{array}{r} 2. \quad 18.62 \\ - 11.58 \\ \hline \end{array}$$

$$\begin{array}{r} 0.458 \\ - 0.295 \\ \hline \end{array}$$

$$\begin{array}{r} 0.867 \\ - 0.532 \\ \hline \end{array}$$

$$\begin{array}{r} 8.6 \\ - 7.3 \\ \hline \end{array}$$

$$\begin{array}{r} 11.6 \\ - 8.8 \\ \hline \end{array}$$

$$\begin{array}{r} 3. \quad 43.6 \\ - 27.3 \\ \hline \end{array}$$

$$\begin{array}{r} 15.32 \\ - 14.95 \\ \hline \end{array}$$

$$\begin{array}{r} 0.65 \\ - 0.32 \\ \hline \end{array}$$

$$\begin{array}{r} 2.695 \\ - 0.128 \\ \hline \end{array}$$

$$\begin{array}{r} 8.04 \\ - 0.93 \\ \hline \end{array}$$

$$\begin{array}{r} 4. \quad 8.456 \\ - 4.238 \\ \hline \end{array}$$

$$\begin{array}{r} 27.8 \\ - 13.4 \\ \hline \end{array}$$

$$\begin{array}{r} 62.435 \\ - 38.203 \\ \hline \end{array}$$

$$\begin{array}{r} 14.8 \\ - 8.9 \\ \hline \end{array}$$

$$\begin{array}{r} 12.68 \\ - 4.92 \\ \hline \end{array}$$

$$\begin{array}{r} 5. \quad 19.6 \\ - 2.8 \\ \hline \end{array}$$

$$\begin{array}{r} 18.507 \\ - 9.362 \\ \hline \end{array}$$

$$\begin{array}{r} 54.82 \\ - 28.66 \\ \hline \end{array}$$

$$\begin{array}{r} 76.8 \\ - 35.1 \\ \hline \end{array}$$

$$\begin{array}{r} 188.4 \\ - 93.1 \\ \hline \end{array}$$

$$\begin{array}{r} 6. \quad 14.72 \\ - 12.86 \\ \hline \end{array}$$

$$\begin{array}{r} 7.403 \\ - 5.941 \\ \hline \end{array}$$

$$\begin{array}{r} 4.08 \\ - 1.39 \\ \hline \end{array}$$

$$\begin{array}{r} 8.6 \\ - 7.3 \\ \hline \end{array}$$

$$\begin{array}{r} 5.8 \\ - 0.9 \\ \hline \end{array}$$

$$\begin{array}{r} 7. \quad 88.4 \\ - 19.2 \\ \hline \end{array}$$

$$\begin{array}{r} 48.663 \\ - 12.205 \\ \hline \end{array}$$

$$\begin{array}{r} 9.92 \\ - 4.38 \\ \hline \end{array}$$

$$\begin{array}{r} 7.4 \\ - 3.7 \\ \hline \end{array}$$

$$\begin{array}{r} 21.25 \\ - 15.08 \\ \hline \end{array}$$

**Check What You Learned****SHOW YOUR WORK****Adding and Subtracting Decimals**

Solve each problem.

8. For a craft project Alaina needs 5.7 inches of red ribbon, 8.3 inches of blue ribbon, and 4.9 inches of white ribbon. How many inches of ribbon does she need altogether?

Alaina needs \_\_\_\_\_ inches of ribbon.

Arrange the lengths of ribbon in order from shortest to longest. \_\_\_\_\_

The color of the longest ribbon is \_\_\_\_\_.

The color of the shortest ribbon is \_\_\_\_\_.

What is the difference between the longest and shortest lengths? \_\_\_\_\_ inches

9. Maurice wants to buy a pair of basketball shoes that are on sale for \$64.95. He has \$38.50 saved from his lawn mowing job. How much more money does he need?

Maurice needs \_\_\_\_\_.

10. Joanna went to the store and bought three items which cost \$8.57, \$12.26, and \$14.81. What was the total cost of these three items?

The total cost of the 3 items was \_\_\_\_\_.

11. Ellen wants to go to soccer camp. The cost is \$100. She has saved \$53.75. How much more money does she need?

Ellen needs \_\_\_\_\_.

8.

9.

10.

11.

**Lesson 7.1** Multiplying Decimals

The number of digits to the right of the decimal point in the product is the sum of the number of digits to the right of the decimal point of the factors.

$$\begin{array}{r} 0.4 \\ \times 0.2 \\ \hline 0.08 \end{array}$$

$$\begin{array}{r} 0.28 \\ \times 0.6 \\ \hline 0.168 \end{array}$$

$$\begin{array}{r} 3.2432 \\ \times 0.13 \\ \hline 97296 \\ + 32432 \\ \hline 0.421616 \end{array}$$

If needed, add zeros as place holders.

Multiply.

a

$$\begin{array}{r} 1. \quad 0.7 \\ \times 8 \\ \hline \end{array}$$

b

$$\begin{array}{r} 0.08 \\ \times 0.5 \\ \hline \end{array}$$

c

$$\begin{array}{r} 0.325 \\ \times 0.3 \\ \hline \end{array}$$

d

$$\begin{array}{r} 1.68 \\ \times 8 \\ \hline \end{array}$$

e

$$\begin{array}{r} 25 \\ \times 0.7 \\ \hline \end{array}$$

$$\begin{array}{r} 2. \quad 0.03 \\ \times 3.06 \\ \hline \end{array}$$

$$\begin{array}{r} 0.162 \\ \times 0.3 \\ \hline \end{array}$$

$$\begin{array}{r} 8.03 \\ \times 3.5 \\ \hline \end{array}$$

$$\begin{array}{r} 0.297 \\ \times 7.1 \\ \hline \end{array}$$

$$\begin{array}{r} 76.4 \\ \times 3.6 \\ \hline \end{array}$$

$$\begin{array}{r} 3. \quad 53.64 \\ \times 0.37 \\ \hline \end{array}$$

$$\begin{array}{r} 328.1 \\ \times 0.63 \\ \hline \end{array}$$

$$\begin{array}{r} 9.806 \\ \times 31 \\ \hline \end{array}$$

$$\begin{array}{r} 600.3 \\ \times 0.034 \\ \hline \end{array}$$

$$\begin{array}{r} 895 \\ \times 0.63 \\ \hline \end{array}$$

$$\begin{array}{r} 4. \quad 27.1 \\ \times 3.54 \\ \hline \end{array}$$

$$\begin{array}{r} 3.263 \\ \times 18 \\ \hline \end{array}$$

$$\begin{array}{r} 1.253 \\ \times 12 \\ \hline \end{array}$$

$$\begin{array}{r} 58.9 \\ \times 0.038 \\ \hline \end{array}$$

$$\begin{array}{r} 0.82 \\ \times 0.82 \\ \hline \end{array}$$

$$\begin{array}{r} 5. \quad 0.283 \\ \times 0.6 \\ \hline \end{array}$$

$$\begin{array}{r} 0.178 \\ \times 53 \\ \hline \end{array}$$

$$\begin{array}{r} 0.83 \\ \times 0.23 \\ \hline \end{array}$$

$$\begin{array}{r} 3.6 \\ \times 0.025 \\ \hline \end{array}$$

$$\begin{array}{r} 48.2 \\ \times 0.26 \\ \hline \end{array}$$

**Lesson 7.4** Problem Solving**SHOW YOUR WORK**

Solve each problem.

1. A package weighs 2.6 pounds. How much do 8 of the same-sized packages weigh?

The packages weigh \_\_\_\_\_ pounds.

1.

2. A paving stone is 0.625 inch thick. How thick is a stack of 37 paving stones?

The stack is \_\_\_\_\_ inches thick.

2.

3. Prizes for a carnival booth cost \$0.37 each. How much do 1,000 prizes cost?

The prizes cost \_\_\_\_\_.

3.

4. Mrs. Anderson bought party favors for the 24 students in her class. Each favor costs \$2.27. How much did all the party favors cost?

The favors cost \_\_\_\_\_.

4.

5. A box of grass seed weighs 0.62 pound. How much does a box containing 0.75 times as much grass seed weigh?

The box weighs \_\_\_\_\_ pound.

5.

6. A sheet of plastic wrap is 0.013 inch thick. How thick is a stack of 27 sheets of that same wrap?

The stack is \_\_\_\_\_ inch thick.

6.

# Lesson 7.5 Dividing Decimals by Whole Numbers

Place a decimal point in the quotient directly above the decimal point in the dividend. Divide as if both were whole numbers.

$$\begin{array}{r} 0.2 \\ 8 \overline{) 1.6} \\ \underline{-1.6} \end{array}$$

$$\begin{array}{r} 0.015 \\ 7 \overline{) 0.105} \\ \underline{-7} \phantom{00} \\ 35 \phantom{0} \end{array}$$

$$\begin{array}{r} .121 \\ 6 \overline{) .726} \\ \underline{-6} \phantom{00} \\ 12 \phantom{0} \\ \underline{-12} \phantom{00} \\ 06 \phantom{0} \end{array}$$

$$\begin{array}{r} .6253 \\ 5 \overline{) 3.1265} \\ \underline{-30} \phantom{00} \\ 12 \phantom{00} \\ \underline{-10} \phantom{000} \\ 26 \phantom{00} \\ \underline{-25} \phantom{000} \\ 15 \phantom{00} \end{array}$$

Divide.

a

b

c

d

1.  $6 \overline{) 46.2}$

$7 \overline{) 3.43}$

$5 \overline{) 1.025}$

$8 \overline{) 1.384}$

2.  $9 \overline{) 8.181}$

$7 \overline{) 2.877}$

$3 \overline{) 15.024}$

$7 \overline{) 2.058}$

3.  $6 \overline{) 3.72}$

$3 \overline{) 0.0174}$

$4 \overline{) 9.88}$

$5 \overline{) 28.25}$

4.  $9 \overline{) 16.83}$

$5 \overline{) 0.1875}$

$6 \overline{) 4.68}$

$4 \overline{) 24.8}$



# Lesson 7.8 Dividing by Two Digits

Multiply the divisor and dividend by 10, by 100, or by 1000 so the divisor is a whole number.

$$\begin{array}{r} 3.5 \overline{)14.0} = 35 \overline{)140} \\ \text{Multiply} \\ \text{by 10.} \end{array}$$

$$\begin{array}{r} 4 \\ 35 \overline{)140} \\ \underline{-140} \end{array}$$

$$\begin{array}{r} 0.42 \overline{)16.80} = 42 \overline{)1680} \\ \text{Multiply} \\ \text{by 100.} \end{array}$$

$$\begin{array}{r} 40 \\ 42 \overline{)1680} \\ \underline{-168} \\ 0 \end{array}$$

$$\begin{array}{r} 0.27 \overline{)8100} = 27 \overline{)8100} \\ \text{Multiply} \\ \text{by 1000.} \end{array}$$

$$\begin{array}{r} 300 \\ 27 \overline{)8100} \\ \underline{-8100} \end{array}$$

Divide.

a

b

c

d

1.  $2.3 \overline{)5.06}$

b.  $3.4 \overline{)289}$

c.  $5.2 \overline{)2.08}$

d.  $7.2 \overline{)10.8}$

2.  $0.45 \overline{)18}$

b.  $0.22 \overline{)11.66}$

c.  $0.63 \overline{)25.2}$

d.  $0.98 \overline{)63.7}$

3.  $0.032 \overline{)96}$

b.  $0.015 \overline{)0.45}$

c.  $0.068 \overline{)0.017}$

d.  $0.012 \overline{)0.0144}$

4.  $2.4 \overline{)0.96}$

b.  $0.62 \overline{)24.8}$

c.  $0.016 \overline{)0.08}$

d.  $0.85 \overline{)5.1}$

# 'Tis the Season

Hanukkah, Christmas, and Kwanzaa are three important holidays celebrated in December. Do you celebrate a holiday in December?

**Hanukkah** is a Jewish holiday also known as the Feast of Lights. This year, the eight-day holiday begins at sundown on December 9 [2001]. The Hebrew word *hanukkah* means "dedication<sup>1</sup>."

**Christmas** is a Christian holiday that celebrates the birth of Jesus Christ. The word "Christmas" comes from old English words that mean "mass of Christ."

**Kwanzaa** is an African American holiday that celebrates the **harvest**<sup>2</sup> of first **crops**<sup>3</sup>. The holiday begins on December 26 and lasts seven days.

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<sup>1</sup> **dedication:** to mark the opening of a public building usually by a formal ceremony

<sup>2</sup> **harvest:** the gathering of crops

<sup>3</sup> **crops:** plants including fruits or vegetables

Question Sheet

Name: \_\_\_\_\_

Date: \_\_\_\_\_

**“Tis the Season” Questions**

- \_\_\_\_ 1. \_\_\_\_\_ is (are) celebrated for more than 1 day.
  - a. Hanukkah
  - b. Christmas
  - c. Kwanzaa
  - d. Hanukkah and Kwanzaa
  
- \_\_\_\_ 2. The author writes that in 2001, Hanukkah began on December 9th.
 

Hanukkah

  - a. always begins on December 9th.
  - b. begins on a different date every year.
  - c. is not celebrated every year.
  - d. is celebrated several times a year.
  
- \_\_\_\_ 3. \_\_\_\_\_ celebrate(s) a birthday.
  - a. Hanukkah
  - b. Christmas
  - c. Christmas and Hanukkah
  - d. Christmas and Kwanzaa
  
- \_\_\_\_ 4. \_\_\_\_\_ are a time for celebration.
  - a. Christmas and Hanukkah
  - b. Hanukkah and Kwanzaa
  - c. Christmas and Kwanzaa
  - d. Hanukkah, Christmas, and Kwanzaa
  
- \_\_\_\_ 5. What is the main idea of this passage?

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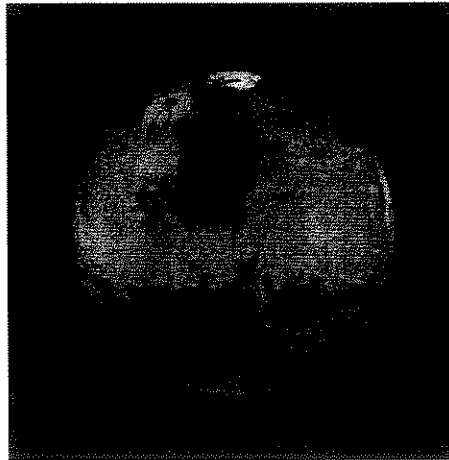


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## 3, 2, 1... Blast Off!



NASA

Now you can take a trip to Mars without ever leaving Earth.

A kid reporter journeyed to Mars aboard Disney's new space ride. Find out how close her ride was to the real thing.

*Weekly Reader* kid reporter Sonia Mia Diaz blasted into space. This 10-year-old from Florida was on a journey to Mars.

Sonia Mia rocketed to Mars aboard a new ride called Mission: SPACE. She experienced the ride during its opening week at Walt Disney World's Epcot Center in Orlando, Florida.

After her mission, Sonia Mia interviewed Sue Bryan, one of the ride's creators. Sonia Mia learned that Disney worked closely with the National Aeronautics and Space Administration (NASA) to develop the new space attraction. The ride lets people experience what a trip to Mars might be like in the future.

### A Space Adventure

On her journey, Sonia Mia never actually left the ground. The ride gives people the feeling of blasting off and traveling through space. "We really wanted people to feel as close as they could to what it's like to be an astronaut," said Bryan.

Sonia Mia read quotes about space exploration as she waited in line. Information about space history fills the attraction. There is even a moon car called a lunar rover on loan from a museum.

## An Intense Liftoff

Before boarding the shuttle, Sonia Mia and three other riders were given different roles for the mission. Those roles included commander, pilot, navigator, and engineer.

Sonia Mia was assigned to be the engineer. In real life, Sally Ride, the first U.S. woman in space, performed the same role.

After Sonia Mia strapped herself in, the shuttle moved into launch position. The countdown began, and the shuttle blasted off! During the mission, Sonia Mia and her team used buttons and joysticks to perform the tasks associated with their roles. The ride lasted about 4 minutes.

The mission was as intense as Sonia Mia had hoped. What was her favorite part? The liftoff! "I liked the intensity of the blastoff and the air pressure on my face," she said.

## A Realistic Ride?

So how did the ride live up to a real space shuttle mission? Weekly Reader caught up with NASA astronaut Winston Scott to ask him that question.

Scott launched into space on two shuttle flights. He tested out Mission: SPACE and gave it a big thumbs up. "It's a thrill a minute," he said.

Although no astronauts have been to Mars yet, Scott said the ride's liftoff was realistic. The feeling of moving up the launch pad and being forced back into your seat were similar to those felt on a shuttle.

However, he points out, there are differences. In an actual launch, astronauts feel about three times the force of **gravity**. Gravity is the force that pulls things toward Earth.

The blastoff on the ride was also shorter than an actual liftoff. And, he said, riders don't experience weightlessness. On a real space shuttle, astronauts become weightless because there is no gravity.

For many people, the ride brings to mind the courage of space explorers. As Sonia Mia pointed out, "Going on the ride made me think about how brave astronauts are."

## Interview With an Imagineer

Sonia Mia Diaz interviewed Sue Bryan, one of the forces behind Mission: SPACE. Here's what Sonia Mia learned.

**Sonia Mia:** What is an Imagineer?

**Sue Bryan:** Imagineers are people who work for Disney.

In general, Imagineering is about storytelling. We build attractions that put people who visit our parks into different worlds and stories. We also use technology to tell stories.

**Sonia Mia:** What was your role in creating the ride?

**Bryan:** I'm the senior show producer, which is like being a movie director. A movie director guides people and directs the show, including the lighting, music, artists, and motion you experience on the ride.

**Sonia Mia:** Where did your team get the inspiration for Mission: SPACE?

**Bryan:** People have always had an interest in space. The time and technology were right to create this new space attraction. We worked closely with NASA to develop the science and technology behind the attraction. No one has ever put people into a ride system like this before.

**Sonia Mia:** Before the ride, I was warned not to move my head or close my eyes because of motion sickness. I didn't feel sick, but might a person if he or she does those things?

**Bryan:** That could happen if you move your head, because of the technology used to create the ride. We give those recommendations because we want people to feel most comfortable. Some people can move their heads, and it doesn't bother them at all.

**Sonia Mia:** How many times have you been on Mission: SPACE?

**Bryan:** At last count, I've ridden it more than 400 times!

Name: \_\_\_\_\_ Date: \_\_\_\_\_

1. Visitors riding on Mission: SPACE are given roles before they board the shuttle. Which role is NOT offered on the ride?

- A pilot
- B navigator
- C scientist
- D engineer

2. What did astronaut Winston Scott find *similar* about the Mission: SPACE ride compared to his real space missions?

- A the feeling of moving up the launch pad
- B the feeling of three times the force of gravity during launch
- C the amount of time of the blast off
- D the feeling of weightlessness in space

3. Why would the ride creators work closely with NASA to build Mission: SPACE?

- A to provide space suits to riders
- B to understand the dangers of space travel
- C to make the ride as realistic as possible
- D to help prepare astronauts to visit Mars

4. Read the following sentence: "On a real space shuttle, astronauts become weightless because there is no gravity."

In the passage, the word **weightless** most nearly means

- A heavy
- B light
- C thick
- D weak

5. What is this passage mainly about?

- A a new museum
- B a new roller coaster
- C a new computer
- D a new space ride

6. How did Sonia Mia travel to Mars without leaving Earth?

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7. Sue Bryan tells Sonia Mia that she has ridden Mission: SPACE more than 400 times. As the senior show producer, why would it be important for her to ride that many times?

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8. The question below is an incomplete sentence. Choose the word that best completes the sentence.

\_\_\_\_\_ it feels like you are blasting off into space, the Mission: SPACE ride is quite thrilling.

- A yet
- B because
- C so
- D although

9. Answer the questions based on the sentence below.

Imagineers at Disney World Parks build attractions to put people in different worlds and stories.

Who? imagineers

(do) What? \_\_\_\_\_

Where? \_\_\_\_\_

Why? \_\_\_\_\_



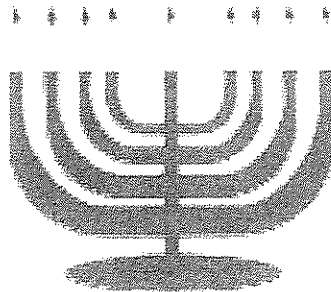
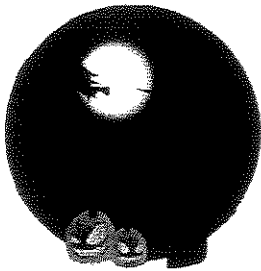
**10.** Read the vocabulary word and definition below and complete questions 10a, 10b, and 11.

**Vocabulary Word:** associated (as · so · ci · at · ed): connected.

**10a.** Read the five sentences below and underline the word **associated** in each sentence.

1. Sue Bryan associated creating rides with storytelling.
2. The children associated birthdays with cake and presents because they received these every year.
3. The dog associated the bell with a treat because every time his owner rang the bell, he got a treat.
4. The police officers had to learn all the laws associated with their jobs, so they knew what to do on the job.
5. After visiting the farm and seeing how cows produced milk, the boy associated milk with cows.

**10b.** Which image is most likely associated with Halloween?



**11.** What qualities do you associate with being a successful student?

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## "Seven Minutes of Terror," Eight Years of Ingenuity



"Sometimes when we look at it, it looks crazy," remarked Adam Steltzner, an engineer who works for the National Aeronautics and Space Administration—known more commonly to the world as NASA. "It is the result of reasoned engineering thought. But it still looks crazy."

In a video story entitled "Seven Minutes of Terror," Steltzner was joined on camera by an eloquent cast of entry-descent-landing engineers (or "EDL Engineers"). Working from the Jet Propulsion Laboratory (JPL) in California, their team introduced the world to one of the most daring, inventive feats of engineering the world had ever witnessed: the pinpoint landing of NASA's Curiosity rover on Mars.

The seven minutes explored in that story—and experienced by the world in early August 2012—took place after seven years of engineering, one year of space flight, and countless hours of collaboration on the perfect landing. Dubbed the Mars Science Laboratory ("MSL"), this mission brought together more than 7,000 people, working in organizations from all over the world, to accomplish its goals. Split into two parts, the launch and the landing, MSL is one of the greatest technological accomplishments of human history.

The most impressive thing about MSL is that no mission this ambitious had ever been attempted in the past. The landing presented problems that could not be compared directly to anything done before. But thanks to the rigorous work of hundreds of engineers, NASA ended up making a new mark on Mars.

### **The Launch**

The MSL launch took place on November 26, 2011. Blasting from the Earth at a speed of 12,582 miles per hour, the rockets that broke free of Earth's orbit and sent the Mars-bound shuttle on its way were the most routine part of the mission. For decades NASA has specialized in space launches, drawing on some of the brightest minds on the planet to determine what it takes to bring a shuttle to the stars.

Planning the shuttle's trip to the red planet (Mars's nickname, due to its color)—a voyage lasting about 36 weeks at maximum cruise velocity—was also not exactly a new challenge for engineers working on the MSL mission. NASA had already landed two rovers, named "Spirit" and "Opportunity," on the surface of the red planet. Based on the principles of astronomy, the launch engineers at JPL had very precise requirements for making the journey from Earth to Mars.

The key to these requirements was an understanding of orbits. Although Mars is significantly farther from the sun than Earth, both planets orbit the same star. Their distance from each other changes during each cycle, but Earth comes into alignment with Mars once every 26 months—"lapping" it in a perpetual race around the sun. Observing this pattern, astronomers can work with engineers to pinpoint the optimal month, day, and time for a space shuttle to leave Earth on a speedy one-way trip.

Drawing on centuries of knowledge of the laws of physics, scientists designed rockets and a shuttle to accommodate Curiosity. Years of calculation, construction, careful planning and computer modeling resulted in a vessel that cruised purposefully through space, reaching the orbit of Mars at just the right time to attempt a landing.

Through it all, the margin for error was nearly non-existent. The movement of interplanetary bodies in space is much more demanding than the movement of cars on a highway, or even airplanes in the stratosphere. Miscalculating a vector or failing to account for any aspect of the orbits could lead to a \$2 billion failure.

Fortunately, NASA had taken on this challenge before. Its engineers had both the experience and the tenacity to succeed again. What came after the launch was different story.

### **The Landing**

Spirit and Opportunity, the two NASA rovers that landed on Mars in 2004, used a combination of parachutes, rockets, and hi-tech airbags to protect themselves. Much like launch and spaceflight, each step of the landing sequence was planned and simulated to the very last detail. Learning from a prior Mars mission, EDL engineers were able to recreate some of the same maneuvers used in that sequence.

Unfortunately, the specific requirements of MSL made it difficult to depend on past experience. While NASA had constructed the biggest supersonic parachute ever made, parachuting was far from enough. Since the atmosphere of Mars is 100 times thinner than the atmosphere of Earth, the parachute alone could not reduce the speed of descent past 200 miles per hour—a breakneck speed that would surely damage Curiosity upon landing.

Curiosity outweighed any earlier rover and contained over 150 pounds of sensitive scientific devices, so an airbag solution was ruled out. Instead, EDL engineers designed a maneuver that would allow the entry capsule to turn sharply and activate powerful rockets to finish the job. Once this maneuver was complete, the capsule could attempt a vertical landing.

Successfully executing the switch from a parachute entry to a controlled, rocket-fueled descent was a feat that could have gone wrong at any moment. Still, even this was not enough to succeed. Once the parachute was cut, and a full radar system was online to guide Curiosity to the surface, the force from the rockets could kick up so much dust that the dust itself would damage the rover.

Eternally thinking one step ahead, EDL engineers designed a "sky crane" to complete the final step of the landing sequence. When it was 20 feet above Martian soil, the capsule lowered Curiosity onto the surface with a set of cables.

Moving from 13,000 miles per hour to zero miles per hour in just seven minutes, Curiosity finally touched down. The capsule, with all rockets still firing, blasted back into the sky and crash-landed elsewhere on the planet. The landing was a success.

### **The Ongoing Mission**

MSL is the latest of NASA's attempts to learn more about Mars. The most popular inquiry is whether Mars may have, at any point in its long history, supported life as we know it. The search for these signs, however, is one piece of a much greater picture.

The mission has eight scientific objectives, each one broken into specific goals and all coming together to form a more detailed understanding of all things Mars. Curiosity, a rover the size of a station wagon, contains advanced instruments that will help it probe, sample, record, and analyze its way through Martian terrain. Collecting evidence on the biological, geological, chemical, and radiological profile of the red planet will prepare NASA for the next space flight to Mars. Another rover mission, building on the work of Curiosity, is planned to launch in 2020.

Ultimately, scientists hope to learn enough about Mars to bring human beings to the surface for a manned research mission. Some, working with entrepreneur Elon Musk, are even devising a plan to colonize the planet just one decade later. Skeptics debate whether or not such an outrageous idea could ever be made into reality.

Looking back at NASA's solutions to the great technical challenge of the Curiosity landing, it's hard to feel too skeptical about humankind's ability to reach for the stars.

Name: \_\_\_\_\_ Date: \_\_\_\_\_

1. What is Curiosity?

- A** a parachute used to land on Mars
- B** another name for the National Aeronautics and Space Administration
- C** a space rover that landed on Mars
- D** a video made by NASA engineers

2. What sequence of events is described in this passage?

- A** the sequence of events that led to Opportunity landing on Mars
- B** the sequence of events that led to Curiosity landing on Mars
- C** the sequence of events that led to the creation of NASA
- D** the sequence of events that will need to take place for Mars to be colonized

3. In order to land on Mars, Curiosity had to use a parachute, rockets, and a sky crane.

What can be concluded from this information?

- A** Landing on Mars is a simple process.
- B** Landing on Mars is a complicated process.
- C** Landing on Mars is a waste of time.
- D** Landing on Mars in the future is unrealistic.

4. What helped make the Mars Science Laboratory mission successful?

- A** one person working by himself for decades
- B** two countries competing with each other
- C** a lot of people working together for years
- D** hi-tech airbags first used in 2004

5. What is this passage mainly about?

- A** a mission to Mars
- B** life on Mars
- C** what being an engineer is like
- D** the history of NASA

6. Read the following sentence: "The **mission** has eight scientific objectives, each one broken into specific goals and all coming together to form a more detailed understanding of all things Mars."

What does the word **mission** mean?

- A a problem that develops when people do not prepare for something as much as they should
- B a short period of time when people feel extremely nervous about something
- C the movement of interplanetary bodies
- D an important task to be carried out by a person or group of people

7. Choose the answer that best completes the sentence below.

Engineers spent years getting Curiosity ready; \_\_\_\_\_, it landed on Mars.

- A finally
- B however
- C third
- D such as

8. Describe the video story "Seven Minutes of Terror."

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9. Which seven minutes of terror does the video’s title refer to? Support your answer with evidence from the passage.

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10. Why might the engineers who worked on Curiosity have felt terror as they watched it land? Support your answer with evidence from the passage.

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