Solve the problems.

\( \text{The model below represents the expression } 1 \frac{5}{8} + 2 \frac{1}{3}. \)

\[
\begin{array}{ccc}
& \text{ } & \\
& \text{ } & \\
\end{array}
\]

\( \text{Which of the following could NOT be represented by the model?} \)

A. \( 1 + 2 + \frac{6}{11} \)

B. \( 1 \frac{15}{24} + 2 \frac{8}{24} \)

C. \( 1 + 2 + \frac{23}{24} \)

D. \( \frac{39}{24} + \frac{56}{24} \)

\( \text{Mackenzie's footprint is } \frac{7}{12} \text{ foot long. Her dad's footprint is } 1 \frac{1}{6} \text{ feet long. Which equation can be used to find how much longer Mackenzie's dad's footprint is than Mackenzie's?} \)

Select Yes or No for each equation.

a. \( \frac{2}{12} - \frac{7}{12} = ? \)  
   □ Yes  □ No

b. \( \frac{7}{12} + 1 \frac{1}{6} = ? \)  
   □ Yes  □ No

c. \( 1 \frac{1}{6} - \frac{2}{3} = ? \)  
   □ Yes  □ No

d. \( \frac{14}{12} - \frac{7}{12} = ? \)  
   □ Yes  □ No

\( \text{Find two fractions in the list below that can be added using the denominator 18. Write those two fractions in the box.} \)

\[
\frac{1}{4} \quad \frac{5}{6} \quad \frac{7}{12} \quad \frac{1}{8} \quad \frac{4}{9}
\]
Lucy is making a smoothie by following the recipe below.

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 1/3 cups banana</td>
<td></td>
</tr>
<tr>
<td>1/2 cup yogurt</td>
<td></td>
</tr>
<tr>
<td>1 cup strawberries</td>
<td></td>
</tr>
<tr>
<td>3/4 cup orange juice</td>
<td></td>
</tr>
</tbody>
</table>

Place ingredients in blender. Blend until smooth.

**Part A** Explain whether the recipe will make enough for Lucy and 3 friends to each have at least 1 cup of smoothie. If it doesn't make enough, explain how to change the recipe to make enough.

---

**Part B** How much smoothie remains after Lucy gives each of her friends $\frac{3}{4}$ cup of smoothie?

*Show your work.*

**Answer** __________ cups

**Self Check** Go back and see what you can check off on the Self Check on page 93.
Solve the problems.

1. William compares monthly rainfall amounts for the summer months using the table below.

<table>
<thead>
<tr>
<th>Month</th>
<th>Monthly Rainfall</th>
</tr>
</thead>
<tbody>
<tr>
<td>June</td>
<td>$3 \frac{3}{10}$ inches</td>
</tr>
<tr>
<td>July</td>
<td>$3 \frac{3}{4}$ inches</td>
</tr>
<tr>
<td>August</td>
<td>$3 \frac{1}{2}$ inches</td>
</tr>
</tbody>
</table>

About how much more rain fell in July than in June?

A. $\frac{1}{4}$ inch
B. $\frac{1}{2}$ inch
C. 1 inch
D. $1 \frac{1}{2}$ inches

2. Several expressions are shown. Decide if the value of each expression is less than $1 \frac{1}{2}$, between $1 \frac{1}{2}$ and 2, or greater than 2. Write each expression in the correct category in the chart.

$$2 \frac{1}{2} - 1 \frac{1}{8} \quad 1 \frac{5}{11} + \frac{3}{4} \quad 3 \frac{4}{5} - 1 \frac{1}{3} \quad \frac{3}{8} + \frac{9}{10}$$

<table>
<thead>
<tr>
<th>Less than $1 \frac{1}{2}$</th>
<th>Between $1 \frac{1}{2}$ and 2</th>
<th>Greater than 2</th>
</tr>
</thead>
</table>
The table below shows the thickness of coins.

<table>
<thead>
<tr>
<th>Coin</th>
<th>Thickness</th>
</tr>
</thead>
<tbody>
<tr>
<td>quarter</td>
<td>$\frac{3}{4}$ millimeters</td>
</tr>
<tr>
<td>dime</td>
<td>$\frac{7}{20}$ millimeters</td>
</tr>
<tr>
<td>nickel</td>
<td>$\frac{19}{20}$ millimeters</td>
</tr>
<tr>
<td>penny</td>
<td>$\frac{1}{2}$ millimeters</td>
</tr>
</tbody>
</table>

Hailey stacks a dime on top of a penny. She estimates the thickness of the two coins to be less than 3 millimeters.

Write a symbol ($<$, $>$, or $=$) in the box to make the statement true. Then use the statement to tell whether Hailey's estimate is correct.

$$\frac{1}{2} + \frac{7}{20} \quad \square \quad \frac{1}{2} + \frac{1}{2}$$

Is Hailey's estimate correct? □ □

4. Jimmy says $3\frac{4}{9} - 2\frac{5}{6}$ is $1\frac{1}{3}$.

Part A Without finding the actual difference, explain why Jimmy's difference is or is not reasonable.

Part B Find the actual difference.
Show your work.

Solution

Self Check Go back and see what you can check off on the Self Check on page 93.
Solve the problems.

Teddy makes 32 fluid ounces of hot cocoa. He pours equal amounts of cocoa into 5 cups. The amount of hot cocoa in each cup will fall between which two amounts?

A 3 and 4 fluid ounces
B 4 and 5 fluid ounces
C 5 and 6 fluid ounces
D 6 and 7 fluid ounces

Pierce swims 10 laps in a pool in 8 minutes. He spent the same amount of time on each lap. How much time did each lap take him?

A \(\frac{7}{10}\) minute
B \(\frac{8}{10}\) minute
C \(\frac{10}{8}\) minutes
D 1\(\frac{2}{8}\) minutes

Dani needs 8 equal sections from a board that is 13 meters long. Does the expression represent the largest possible length of 1 section of the board, in meters? Select Yes or No for each expression.

a. \(\frac{5}{8}\)  
   Yes  No
b. \(\frac{8}{13}\)  
   Yes  No
c. \(\frac{13}{8}\)  
   Yes  No
d. \(8 \div 13\)  
   Yes  No
e. \(13 \times \frac{1}{8}\)  
   Yes  No
Which situation is represented by \( \frac{25}{9} \)? Circle the letter for all that apply.

A. Melanie equally shares 25 meters of paper to create 9 banners.
B. Quill gives away 9 baseball cards from a pack of 25 cards.
C. George invites 25 kids and 9 adults to his birthday party.
D. Becca creates 9 rows with 25 buttons each.
E. Joe makes 9 equal servings from a 25-ounce bag of peanuts.

Paco is trying to explain to his friend that \( 7 ÷ 2 = \frac{7}{2} \).

**Part A** Draw a model or number line showing \( 7 ÷ 2 = \frac{7}{2} \).

**Part B** Explain the equivalence of \( 7 ÷ 2 \) and \( \frac{7}{2} \) using words.

**Part C** Describe in words a situation that can be represented by \( 7 ÷ 2 \) or \( \frac{7}{2} \).

Go back and see what you can check off on the Self Check on page 93.
Talk through these problems as a class. Then write your answers below.

**Describe** Tell what multiplication problem the model shows.

Explain why.

![Model](image)

**Explain** Landon said that \( \frac{2}{3} \times \frac{1}{6} = \frac{5}{6} \) and that \( \frac{2}{3} \times 4 = \frac{2}{12} \). Tell how Landon found each product, and then explain how to find the correct products.

![Model](image)

**Create** Complete each multiplication table for the unit fractions \( \frac{1}{2} \), \( \frac{1}{3} \), and \( \frac{1}{4} \). Identify a pattern in the products of each table.

<table>
<thead>
<tr>
<th>( \times )</th>
<th>( \frac{1}{2} )</th>
<th>( \frac{1}{3} )</th>
<th>( \frac{1}{4} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \frac{1}{2} )</td>
<td>( \frac{1}{4} )</td>
<td>( \frac{1}{6} )</td>
<td>( \frac{1}{8} )</td>
</tr>
<tr>
<td>( \frac{1}{3} )</td>
<td>( \frac{1}{6} )</td>
<td>( \frac{1}{9} )</td>
<td>( \frac{1}{12} )</td>
</tr>
<tr>
<td>( \frac{1}{4} )</td>
<td>( \frac{1}{8} )</td>
<td>( \frac{1}{12} )</td>
<td>( \frac{1}{16} )</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>( \times )</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \frac{1}{2} )</td>
<td>( \frac{1}{4} )</td>
<td>( \frac{1}{6} )</td>
<td>( \frac{1}{8} )</td>
</tr>
<tr>
<td>( \frac{1}{3} )</td>
<td>( \frac{1}{6} )</td>
<td>( \frac{1}{9} )</td>
<td>( \frac{1}{12} )</td>
</tr>
<tr>
<td>( \frac{1}{4} )</td>
<td>( \frac{1}{8} )</td>
<td>( \frac{1}{12} )</td>
<td>( \frac{1}{16} )</td>
</tr>
</tbody>
</table>
Part A. Start with a sheet of paper. Fold it in half, then fold it in half again. Continue folding the paper in half. As you do, fill in the blanks to tell what fraction of the whole each equal part is.

\[
\frac{1}{2} \times 1 = \\
\frac{1}{2} \times \frac{1}{2} = \\
\frac{1}{2} \times \frac{1}{2} = \\
\frac{1}{2} \times \frac{1}{2} = \\
\]

Part B. Write the products as the terms of a pattern. Then look at the denominators of the fractions. Each time you multiply by \(\frac{1}{2}\), what happens to the denominator?

Without folding the paper, what do you think the next fraction in the pattern will be? Why?

Part C. Now look at the sizes of the equal parts of the folded paper. Each time you fold the paper in half, what happens to the size of the parts?
Solve the problems.

1. The square below represents 1 square unit.

Which expression represents the area of the dark blue section?

A. $\frac{7}{3} \times \frac{3}{1}$ square units
B. $\frac{3}{7} \times \frac{1}{3}$ square units
C. $\frac{1}{7} \times \frac{1}{3}$ square units
D. $\frac{7}{3} \times \frac{1}{3}$ square units

2. Which products could you find by shading the model below? Circle the letter for all that apply.

A. $\frac{3}{4} \times \frac{1}{3}$
B. $\frac{1}{3} \times \frac{1}{6}$
C. $\frac{2}{3} \times \frac{1}{4}$
D. $\frac{5}{3} \times \frac{1}{4}$
E. $\frac{3}{4} \times \frac{3}{4}$
4. Draw an area model to represent the expression $\frac{5}{4}$ inches $\times$ $\frac{4}{5}$ inch.

5. Explain how to find the area of the model you drew in problem 4, then find the area.

6. Write the dimensions of a different rectangle that has the same area as the rectangle you drew in problem 4. Show how you know the area is the same.

Self Check: Go back and see what you can check off on the Self Check on page 93.
Solve the problems.

3. Elise picks 6 pounds of apples. She uses $\frac{1}{2}$ pound of apples to make 1 container of applesauce. How many containers of applesauce can Elise make with all the apples?

A. 12 containers  
B. 6 $\frac{1}{2}$ containers  
C. 5 $\frac{1}{2}$ containers  
D. 3 containers

4. Students are running in a relay race. Each team will run a total of 3 miles. Each member of a team will run $\frac{1}{3}$ mile.

How many students will a team need to complete the race? Circle the correct number below.

$\frac{1}{9}$, 3, 9, 12, 36

You may use the number line to help find your answer.
Mr. Bernstein will cut 8 pies into pieces that are each \( \frac{1}{6} \) of the whole. After he cuts the 8 pies, how many pieces will Mr. Bernstein have? \( \underline{ } \) pieces

Marina has a pattern to make bows that requires \( \frac{1}{4} \) yard of ribbon for each bow.

**Part A** Fill in the table to show how many bows she can make from a given length of ribbon.

<table>
<thead>
<tr>
<th>Ribbon Length (yards)</th>
<th>Number of Bows</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

**Part B** Use words or an equation to describe a rule to find the number of bows Marina can make if you know how many yards of ribbon she has.

**Part C** Use your rule to find how many bows Marina can make if she has 18 yards of ribbon.

**Answer** \( \underline{ } \) bows

---

Go back and see what you can check off on the Self Check on page 93.
Solve the problems.

1. Look at the shape below.

Which is a correct classification for this shape from LEAST specific to MOST specific?

A  polygon, quadrilateral, rectangle  
B  quadrilateral, parallelogram, square  
C  polygon, quadrilateral, square  
D  quadrilateral, rectangle, square

2. Classify the triangles shown below as "scalene," "isosceles," or "obtuse." Sides that are the same length are marked with a slash. Draw the triangles in the correct column of the table. If a triangle fits more than one classification, draw it in all the columns that apply.

```
<table>
<thead>
<tr>
<th>Scalene</th>
<th>Isosceles</th>
<th>Obtuse</th>
</tr>
</thead>
</table>
```


Look at the flow chart below.

Quadrilaterals $\rightarrow$ Trapezoids $\rightarrow$ Parallelograms $\rightarrow$ Rectangles $\rightarrow$ Squares

**Part A** Draw an example of a trapezoid that is not a parallelogram.

**Part B** Explain how trapezoids relate to parallelograms.

**Part C** Can you use the term “parallelogram” to describe a rectangle? Explain your reasoning.

Go back and see what you can check off on the Self Check on page 283.
Solve the problems.

1. Kris ran 3 miles each day for 7 days in a row. One day, she ran an extra \( \frac{1}{2} \) mile. Which expression represents how many miles Kris ran altogether?
   - A. \( 3 + 7 + \frac{1}{2} \)
   - B. \( 3 \times 7 + \frac{1}{2} \)
   - C. \( 3 \times 7 + 3 \frac{1}{2} \)
   - D. \( (3 + \frac{1}{2})\times 7 \)

2. Which expression does NOT represent the statement “divide the difference of 20 and 8 by the sum of 1 and 3”?
   - A. \( \frac{20 - 8}{1 + 3} \)
   - B. \( (20 - 8) \div (1 + 3) \)
   - C. \( \frac{20}{1 + 3} - \frac{8}{1 + 3} \)
   - D. \( (20 - 8) \div (1 + 3) \)

3. Which expression has a value of 8? Circle the letter for all that apply.
   - A. \( 3 \times 8 \div 4 + 2 \)
   - B. \( 3 \times (8 \div 4) + 2 \)
   - C. \( (3 \times 8) \div (4 + 2) \)
   - D. \( (3 \times 8) \div 4 + 2 \)
   - E. \( 3 \times 8 \div (4 + 2) \)
Adam is 2 years old. His sister Lina is 1 year less than three times his age. Write a numerical expression for Lina’s age.

Several expressions are shown below. Decide if the value of the expression is less than, equal to, or greater than 18. Write each expression in the correct category in the chart.

\[
\begin{align*}
\frac{1}{5} \times (9 \times 2) & \quad (9 \times 2) \times (4 - 3) & \quad (9 \times 2) \div 3 & \quad 22 - (9 \times 2) \\
(9 \times 2) + 7 & \quad 4 \times \frac{1}{4} \times (9 \times 2) & \quad 1 \times (9 \times 2) & \quad 3 \times (9 \times 2)
\end{align*}
\]

<table>
<thead>
<tr>
<th>Less than 18</th>
<th>Equal to 18</th>
<th>Greater than 18</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Compare the expressions \(8 \times 3 + 4\) and \(8 \times (3 + 4)\). Explain how to evaluate each expression. Then tell which expression has the greater value.

Show your work.

Self Check: Go back and see what you can check off on the Self Check on page 179.
Solve the problems.

1. How many grams are equivalent to 75 kilograms?
   A. 0.0075 gram
   B. 0.075 gram
   C. 75,000 grams
   D. 750,000 grams

2. How many yards and feet are equivalent to 10,000 feet?
   A. 3,333 yards, 0 feet
   B. 3,333 yards, 1 foot
   C. 277 yards, 28 feet
   D. 30,000 yards, 0 feet

3. Write each measurement below in the table under an equivalent measure. Some of the measurements may not have an equivalent measure.

   \[
   \begin{array}{|c|c|c|c|c|}
   \hline
   \text{\(\frac{1}{2}\) quart} & \text{4 pints} & \text{16 cups} & \text{\(\frac{1}{4}\) gallon} & \text{8 pints} \\
   \hline
   \text{1 gallon} & \text{1 quart} & \text{1 pint} \\
   \hline
   \end{array}
   \]
Five measurements are shown below. Write one of the measurements on each of the lines to create two true equations.

300 millimeters 30 meters 3,000 meters 3 kilometers 3,000 centimeters

____________________ =

____________________ =

How many pints are equivalent to 3 gallons?
Show your work.

Answer ___________________ pints

Complete each conversion below.
Show your work.

a. 3 feet + 7 inches = ___________________ inches

b. 2 gallons - 5 quarts = ___________________ quarts

c. 5 pounds - 38 ounces = ___________________ ounces

d. 60 centimeters + 4 meters = ___________________ centimeters

e. 2,000 meters + 5,000 meters = ___________________ kilometers

f. 1 liter - 150 milliliters = ___________________ milliliters

<table>
<thead>
<tr>
<th>Units of Length</th>
<th>Units of Capacity</th>
<th>Units of Mass</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 foot = 12 inches</td>
<td>1 quart = 2 pints</td>
<td>1 kilogram = 1,000 grams</td>
</tr>
<tr>
<td>1 yard = 3 feet</td>
<td>1 quart = 4 cups</td>
<td></td>
</tr>
<tr>
<td>1 mile = 5,280 feet</td>
<td>1 gallon = 4 quarts</td>
<td></td>
</tr>
<tr>
<td>1 meter = 100 centimeters</td>
<td>1 liter = 1,000 milliliters</td>
<td></td>
</tr>
<tr>
<td>1 meter = 1,000 millimeters</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 kilometer = 1,000 meters</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Go back and see what you can check off on the Self Check on page 211.
Solve the problems.

1. A football field is marked every 5 yards. Garrett ran from the first mark to the eleventh mark. Which shows a correct expression to find the number of feet Garrett ran?

   \[
   \begin{align*}
   1 \text{ yard} &= 3 \text{ feet} \\
   A &\quad 10 \times 5 \div 3 \\
   B &\quad 10 \div 5 \div 3 \\
   C &\quad 10 \times 5 \times 3 \\
   D &\quad 5 \times 3
   \end{align*}
   \]

2. Mr. Wayne's class collected empty soda cans for a recycling project. Each of the 20 students had to collect 40 cans. Each can has a mass of 15 grams. How many kilograms of cans did the class collect to recycle?

   \[
   \begin{align*}
   1 \text{ kilogram} &= 1,000 \text{ grams} \\
   A &\quad 0.6 \text{ kilogram} \\
   B &\quad 12 \text{ kilograms} \\
   C &\quad 12,000 \text{ kilograms} \\
   D &\quad 12,000,000 \text{ kilograms}
   \end{align*}
   \]

3. Susan is stacking boxes on a shelf. Each box is shaped like a rectangular prism and has a length of 2 feet, a width of 15 inches, and a height of 3 inches, as shown below.

   \[
   \begin{align*}
   \text{3 in.} &\quad \text{2 ft} \\
   \text{15 in.}
   \end{align*}
   \]

   Susan will stack the boxes on top of each other, as shown in the diagram below. The space above the shelf is \(1\frac{1}{2}\) yards high.

   What is the greatest number of boxes that Susan can stack on the shelf? 
   
   \[
   \underline{} \quad \text{boxes}
   \]
4. The Russell family is keeping track of the milk they drink each week.
   - The first week they drank 2 gallons, 1 quart, and 1 cup of milk.
   - The second week they drank 3 gallons of milk.

   How many more cups of milk did they drink the second week than the first? _______ cups

   1 gallon = 4 quarts = 16 cups

5. Lana's family entered a 5-kilometer race.

   1 kilometer = 1,000 meters

   Part A Lana's dad said his average step length is about 1 meter. About how many steps will he need to take to finish the race?

   Show your work.

   Answer About ________ steps

   Part B Lana's average step length is about 0.5 meter. How many steps will she need to take to finish the race?

   Show your work.

   Answer About ________ steps

Self Check Go back and see what you can check off on the Self Check on page 211.
Solve the problems.

1. Daniel ran the 400-meter dash in 89.023 seconds. Which of the following expresses this time in words?
   A. eighty-nine and twenty-three hundredths seconds
   B. eighty-nine and two tenths and three thousandths seconds
   C. eighty-nine and twenty-three thousandths seconds
   D. eighty-nine thousand twenty-three seconds

2. What decimal represents $6 \times 1,000 + 2 \times 10 + 3 \times \frac{1}{10} + 5 \times \frac{1}{1,000}$?
   A. 6,020.305
   B. 6,200.350
   C. 6,020.035
   D. 6,002.035

3. A guitar string that plays a very high note is eleven thousandths of an inch thick. A bass string that plays a very low note is ten times as thick. For each quantity, choose either Yes or No to tell whether it is equal to ten times eleven thousandths.
   a. $\frac{1}{100} + \frac{1}{1,000}$
   b. $\frac{1}{10} + \frac{1}{100}$
   c. 0.11
   d. eleven hundredths
   e. eleven ten thousandths
      □ Yes □ No
      □ Yes □ No
      □ Yes □ No
      □ Yes □ No
      □ Yes □ No
Which of the following correctly represent 57.036? Circle the letter for all that apply.

A  \[ 57 + \frac{3}{100} + \frac{6}{1,000} \]

B  \[ 57 + 3 \times \frac{10}{1,000} + 6 \times \frac{10}{1,000} \]

C  \[ 57 + 36 \times 0.01 \]

D  \[ 57 + 36 \times 0.001 \]

E  fifty-seven and thirty-six hundredths

Represent 240.149 in two different ways. Then explain how each way shows the place value of the digits of the number.

Alex wrote 103.903 in expanded form as \[ 100 + 3 \times 1 + 9 \times \frac{1}{100} + 3 \times \frac{1}{1,000} \]. Explain his mistake. Then tell how to correct it.

Self Check: Go back and see what you can check off on the Self Check on page 1.
Solve the problems.

Mrs. Cady constructs a cube with 512 magnetic blocks. Students in her two classes will each make an identical cube. There are 28 students in one class and 25 students in the other class. How many blocks does she need for all her students?

A 5,120  
B 12,800  
C 14,336  
D 27,136

What are the values of the regrouped amounts in the multiplication below?

\[
\begin{array}{r}
\phantom{2}3 \quad 3 \\
\downarrow \quad \downarrow \\
435 \\
\times \quad 17 \\
\hline \\
3,045 \\
+ 4,350 \\
\hline \\
7,395 \\
\end{array}
\]

A 2 and 3  
B 20 and 3  
C 200 and 30  
D 2,000 and 300

Choose Yes or No to tell whether the expression is equivalent to \(179 \times 44\).

a. \(179 \times (4 + 4)\)  
□ Yes  □ No

b. \((179 \times 40) + (179 \times 4)\)  
□ Yes  □ No

c. \((100 \times 4) + (70 \times 4) + (9 \times 4)\)  
□ Yes  □ No

d. \(4,000 + 2,800 + 360 + 400 + 280 + 36\)  
□ Yes  □ No

e. \((100 \times 44) + (70 \times 44) + (9 \times 44)\)  
□ Yes  □ No
Show two different ways to complete the multiplication problem.

\[
\begin{array}{c}
 3 & 1 & 4 \\
\times & 5 & \\
\hline
1 & & 6
\end{array}
\quad
\begin{array}{c}
 3 & 1 & 4 \\
\times & 5 & \\
\hline
1 & & 6
\end{array}
\]

At the start of the day there are 78 boxes of DVDs in a warehouse. Each box has 116 DVDs. Then 19 of the boxes are shipped. Now how many DVDs are left in the warehouse?

Show your work.

Answer: ___________ DVDs

Use the distributive property two different ways to find the product of 127 and 32.

Show your work.
Solve the problems.

1. Which equation can NOT be represented by the model below?

   \[
   \begin{array}{c|c}
   42 & 5,964 \\
   \hline
   \end{array}
   \]

   A. \(5,964 - ? = 42\)
   B. \(5,964 ÷ ? = 42\)
   C. \(42 × ? = 5,964\)
   D. \(5,964 ÷ 42 = ?\)

2. Vera makes a table to help solve the problem \(672 ÷ 16\). Which is the best estimate of the quotient?

   \[
   \begin{array}{c|c|c|c|c|c}
   10 & 20 & 30 & 40 & 50 & 60 \\
   \hline
   160 & 320 & 480 & 640 & 800 & 960 \\
   \hline
   \end{array}
   \]

   A. a number between 30 and 40
   B. a number close to 40
   C. about 52
   D. a number between 50 and 60

3. Use the grid to draw a rectangle with an area of 1,125 square units and a side of 25 units.

   Lisa’s camera has 2,048 megabytes of memory for storing pictures. She has already used half this amount. A high-quality picture uses 16 megabytes of memory. How many high-quality pictures can Lisa store with the remaining memory?
Mr. Kovich writes the problem \(32 \times \Delta = 1,696\) on the board. Write a division equation that can be used to find the value of the triangle, and then find the value of the triangle.

Show your work.

Solution

Mr. Sullivan is organizing teams for the middle school’s annual field day. There are eight classes at the school and 21 students in each class.

Part A What is the total number of students at the school?

Answer ___________ students

Part B Mr. Sullivan wants to have 12 students on each team. How many teams will there be?

Answer ___________ teams

Part C How many fewer students will be on each team if he decides to have 24 teams? Explain your answer using diagrams, pictures, mathematical expressions, and/or words.

Answer ___________ fewer students

Self Check Go back and see what you can check off on the Self Check on page 1.
Solve the problems.

1. Jordan has $11.40 to spend at the used book store. Each book costs $2.85. How many books can Jordan buy?
   A. 3
   B. 4
   C. 5
   D. 6

2. Keith bought 3.4 pounds of peanuts on Monday, 2.5 pounds on Tuesday, and 4 pounds on Wednesday. He is going to divide the peanuts equally between himself and two friends. How many pounds of peanuts will each friend get?
   A. 99 pounds
   B. 33 pounds
   C. 9.9 pounds
   D. 3.3 pounds

3. A sticker is 1.2 centimeters wide. How many stickers will fit edge to edge on a strip of paper that is 108 centimeters long?
   _____ stickers

4. If you put 0.7 on the blank for each equation below, does it make the equation true? Select Yes or No for each equation.
   a. _____ × 5.2 = 36.4
      □ Yes □ No
   b. 49 ÷ _____ = 70
      □ Yes □ No
   c. _____ ÷ 3.5 = 0.02
      □ Yes □ No
   d. 9.1 × _____ = 6.37
      □ Yes □ No
Jamie has 5 jars to fill with beads for a carnival game. She has 7.5 cups of multi-colored beads. Jamie wants to put an equal amount of beads in each jar. How many cups of beads can she place into each jar?

Part A Use pictures to solve the problem.

Answer ________________ cup

Part B Justify your answer.
1. Identify two important U.S. cattle trails in the late 1800s.
   A. Oregon Trail
   B. Great Western Cattle Trail
   C. Chisholm Trail
   D. Santa Fe Trail

2. Match the important American inventors with their inventions.
   A. George Washington Carver
   B. Alexander Graham Bell
   C. Thomas Edison
   1. light bulb
   2. peanut products
   3. telephone

3. Which two U.S. presidents were most responsible for expanding America's role in world affairs in the early 1900s?
   A. William McKinley
   B. William Howard Taft
   C. Calvin Coolidge
   D. Theodore Roosevelt

4. The sinking of the American passenger ship _______ helped bring America into World War I.
   A. Titanic
   B. Queen Mary
   C. Bismarck
   D. Lusitania

5. The Treaty of _______ in 1919 gave terms for ending World War I and was tough on Germany.
   A. Ghent
   B. Versailles
   C. London
   D. Berlin

6. Which event led to the Great Depression in the United States?
   A. Stock Market Crash of 1929
   B. German invasion of Poland
   C. Spanish-American War
   D. Berlin Olympics

7. Match each individual with his contribution to American culture in the 1920s.
   A. Louis Armstrong
   B. Langston Hughes
   C. Babe Ruth
   D. Henry Ford
   1. books about African American culture
   2. baseball home runs
   3. mass-produced cars
   4. jazz music

8. Identify important federal government agencies created as part of the New Deal. (Choose 3)
   A. Civilian Conservation Corps
   B. Environmental Production Agency
   C. Works Progress Administration
   D. Tennessee Valley Authority
   E. United Nations

9. _______ was an important cultural figure of the 1930s who wrote the book Gone With the Wind.
   A. Franklin D. Roosevelt
   B. Duke Ellington
   C. Margaret Mitchell
   D. Jesse Owens

10. Identify leaders of Axis nations during World War II. (Choose 3)
    A. Truman
    B. Hitler
    C. Hirohito
    D. Mussolini
    E. Roosevelt

11. Identify leaders of Allied nations during World War II. (Choose 3)
    A. Roosevelt
    B. Churchill
    C. Mussolini
    D. Stalin
    E. Hitler
12. The United States entered World War II when ________ was attacked.
   ___ A. Cuba
   ___ B. Nagasaki, Japan
   ___ C. Washington, D.C.
   ___ D. Pearl Harbor, Hawaii

13. The global war with no shots fired from the 1950s to 1970s is known as the ________.
   ___ A. Cold War
   ___ B. Iron Curtain
   ___ C. War on Terrorism
   ___ D. Korean War

14. Match the Cold War event or person with his or her goals.
   ___ A. Berlin airlift
   ___ B. Korean War
   ___ C. NATO
   ___ D. Joseph McCarthy
      1. find Communists in U.S. government
      2. supply German city with food
      3. unite democratic nations
      4. stop the spread of Communism

15. The ________ was an event of the early 1960s that people feared would bring global war.
   ___ A. Berlin airlift
   ___ B. creation of the United Nations
   ___ C. Cuban Missile Crisis
   ___ D. March on Washington

16. African Americans were denied access to public facilities in the 1950s and 1960s by ________ laws.
   ___ A. voting rights
   ___ B. Jim Crow
   ___ C. civil rights
   ___ D. carpetbagger

17. President Ronald Reagan's policy toward the Soviet Union influenced which major events? (Choose 2)
   ___ A. destruction of Berlin Wall
   ___ B. Vietnam War
   ___ C. collapse of Soviet Union
   ___ D. 9/11 attacks

18. Label these man-made features on the map:
    Chisholm Trail   Pittsburgh, PA
    Kitty Hawk, NC   Pearl Harbor, HI
    Montgomery, AL   Chicago, IL

19. How did population, transportation, and resources influence the development of agricultural and industrial locations from 1865 to 1900?
20. The legal concept that every person be treated fairly is known as _______.
   A. due process  
   B. fair process  
   C. jury selection  
   D. right process

21. Match each amendment to the voting rights it extends or protects.
   A. 15th Amendment  
   B. 19th Amendment  
   C. 23rd Amendment  
   D. 24th Amendment  
   E. 26th Amendment

   1. Citizens 18 years of age can vote.
   2. Women have the right to vote.
   3. Citizens cannot be charged a poll tax to vote.
   4. Citizens of all races and colors can vote.
   5. Residents of Washington, D.C., can vote in presidential elections.

22. Due process rights can be found in the _______.
   A. Articles of Confederation  
   B. Bill of Rights  
   C. Voting Rights Act  
   D. Civil Rights Act

23. Amendments to the U.S. Constitution can be proposed by a ______ vote of Congress.
    To become law, ______ of states' legislatures must vote to ratify them.
    A. one-half; one-half  
    B. one-third; three-fourths  
    C. three-fourths; two-thirds  
    D. two-thirds; three-fourths

24. When someone makes an economic decision, ______ is the value of the next best option.
    A. currency  
    B. opportunity cost  
    C. savings  
    D. scarcity

25. Match each civic duty or responsibility to its benefit.
    A. obeying laws  
    B. paying taxes  
    C. serving on a jury  
    D. registering for Selective Service

   1. People have rights protected and are kept safe.
   2. A defendant's fellow citizens decide if he or she is guilty or not guilty.
   3. Governments get money needed to provide goods and services.
   4. The government has men it can summon in a military emergency.

26. Specialization makes producing goods and services ______ efficient and _______ people's standard of living.
    A. less; lowers  
    B. more; lowers  
    C. less; increases  
    D. more; increases

27. A person who takes risks to develop new goods and services is called a(n) ______.
    A. consumer  
    B. entrepreneur  
    C. government  
    D. human resource

28. What is the main reason to create a personal budget?
    A. It will help you earn more money.  
    B. It is good to practice math skills.  
    C. It can help you manage your money wisely.  
    D. It will help you decide which career to choose.

29. People earn ______ by selling their labor to a business.
    A. achievements  
    B. income  
    C. promotions  
    D. rights
CHAPTER 19
THE COLD WAR HEATS UP

Key Terms
Korean War
Joseph McCarthy
Nikita Khrushchev
Vietnam War
Cuban Missile Crisis
26th Amendment

Cold War at Home

With the Cold War going on, Americans began to fear that Communist spies might be in the United States. The House of Representatives even created a committee to investigate people accused of Communist activity. In the late 1940s, many people in the entertainment industry were accused of being Communists. They were put on a "blacklist," which meant that movie producers would not hire them.

In 1950, Senator Joseph McCarthy of Wisconsin accused U.S. state department officials of being Communists. This was a serious charge because the state department handles U.S. relations with other countries! His accusations could not be proven. He convinced many Americans that he was protecting the security of the country, and he became a powerful man. People were afraid to speak out against him.

People used the term "McCarthyism" to describe how McCarthy made charges against people without real evidence. His accusations ruined the reputations and lives of many people. In 1954 the Senate made a formal statement condemning McCarthy and his actions.

Reading for Information

Answer the questions.

1. Who was the senator who accused state department officials of being Communists?

2. "McCarthyism" describes making charges against people without ________________

3. What group finally condemned McCarthy for his behavior? ____________________

Discuss It

Has anyone ever accused you of taking something without evidence? Was the accusation true? How did it make you feel?
Tensions with the Soviets

Nikita Khrushchev became premier (leader) of the Soviet Union and head of the Soviet Communist Party at the height of the Cold War. In a 1956 speech to ambassadors from Western countries, he said, "History is on our side. We will bury you!"

This comment alarmed many people in the Western Hemisphere. Because of distrust and uncertainties about each other, the U.S. and Soviet Union each built and stockpiled lots of weapons—and lots of missiles—in preparation for possible war. Now, both sides had nuclear technology. What could possibly go wrong?

Discuss It
Imagine you were living during the Cold War, and you heard about Khrushchev's threat. How would you feel if you were a student during this time?

Threat from Cuba!

In the early 1960s, the Cold War began to heat up. In 1962, the U.S. learned that the Soviet Union had built missile launching pads in Cuba. Cuba is only 90 miles from Florida! The Cuban Missile Crisis had begun. President Kennedy ordered the U.S. Navy to blockade any Soviet ships carrying missiles from getting to Cuba. He also sent troops to Florida in case the U.S. needed to invade Cuba.

Things were tense and American citizens worried that a nuclear war might start. After 13 days of intense negotiations, the Soviet Union said it would remove the Soviet missiles from Cuba if the United States would agree not to invade Cuba. The U.S. government agreed, and people all over the world—especially in the U.S.—breathed a sigh of relief.

The U.S. and the Soviet Union came close to the start of a nuclear war. Leaders of both countries knew that a nuclear war would be devastating. They decided to limit nuclear weapons testing to protect the safety of citizens. They also established a direct telephone line, or "hotline," between Washington and Moscow where the two countries' leaders could contact each other to discuss critical problems.

Vocabulary
blockade: surrounding an enemy's territory in wartime to keep people and supplies from passing

Quick Review
Fill in the blanks.

The ___________________ occurred when the ___________________ armed Cuba.
_____________________ responded by ordering a naval blockade of Cuba and sending troops to Florida. After ___________________ days of negotiations, the Soviets left Cuba and the Cuban Missile Crisis was over.
**Research It**

Research and read President Kennedy’s address to the nation regarding the Cuban Missile Crisis. Summarize each paragraph of his speech in one or two sentences. Then, identify several passages that clearly reveal the president’s purpose in giving the speech. Create a digital presentation to present your information to your class.

**Fact or Opinion**

Write F next to statements regarding the Cuban Missile Crisis that were fact. Write O next to statements that were opinion.

1. “The Soviets have brought missiles within 90 miles of Florida.”
2. “The Soviets intend to start a nuclear war with the United States.”
3. “The U.S. Navy is stopping any ships from reaching Cuba.”
4. “Fidel Castro intends to join the Soviets in fighting a war against America.”
5. “The Soviet Union built missile launching pads in Florida.”

**Cause and Effect**

Actions and reactions can link a chain of events in history. The results of one event are often the cause of another. Complete the graphic organizer to show some of the connected causes and effects of events during the Cuban Missile Crisis.

List two positive results of the Cuban Missile Crisis.

1. 
2. 

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The War in the Pacific

After Pearl Harbor, Japanese forces ruled much of the Pacific Ocean and parts of Asia. That started to change in a series of battles fought in the middle of the Pacific Ocean in 1942. In the Battle of Midway, American forces destroyed four of Japan’s largest aircraft carriers! The Allied Powers continue fighting Japan on the islands in the Pacific over the next few years. The United States and its allies were trying to retake islands in the Pacific and move closer to Japan.

Iwo Jima

Then, in 1945, U.S. Marines invaded and captured the island of Iwo Jima in one of the fiercest battles of the war. Iwo Jima gave the American forces an important supply base. American forces were also getting nearer Japan. Iwo Jima was closer to Japan than other islands they had taken like Midway.

Using Atomic Weapons

Japan was near defeat. But Japan refused to surrender. President Truman worried that many more people would die on both sides if the war did not end. After considering the projected casualties of an ongoing war, President Harry Truman made the decision to use the United States’ new secret weapon.

Scientists in America and its allies had developed the technology for an atomic bomb that would bring destruction that the world had never known. President Truman decided to use the bomb. American bomber planes dropped an atomic bomb on Hiroshima on August 6 and on Nagasaki on August 9. These powerful bombs instantly destroyed the two Japanese cities, and they killed 120,000 people.

VJ Day

As a result of the devastation, Japan surrendered to the American military. August 15, 1945, was VJ Day. World War II officially ended. The Allies had achieved victory over Japan.

Classify Information

Determine if these World War II events took place in Europe or the Pacific. Then place a check in the correct box.

<table>
<thead>
<tr>
<th>World War II Events</th>
<th>Europe</th>
<th>Pacific</th>
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<tbody>
<tr>
<td>VE Day</td>
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<td>Iwo Jima</td>
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<td>VJ Day</td>
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<td>D-Day</td>
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</tbody>
</table>
Desert Plant Adaptations

Plants adapt to living in the Mojave Desert in many ways. One way plants survive is by conserving water. They have spines or thorns that direct air flow and reflect hot sunlight. Waxy leaves hold moisture in to reduce water loss. Shallow roots help plants use every bit of rainfall. Other plants have long roots that allow them to get water from deep in the ground. Desert flowers bloom only when it rains. These adaptations enable a wide variety of plants to survive in the desert.

Answer the questions about the text.

1. How do you know this is expository text?

2. What is the heading? Is it a strong heading for this text? Why or why not?

3. What other text feature does this text include? What information does it give you?
Read each passage. Underline the context clues that help you figure out the meaning of each word in bold. Then, in your own words, write the definition of the word.

1. One kind of adaptation is structural. This means the animal’s body has changed so that it can survive in the climate.

2. Another type of adaptation is behavioral. Desert animals act in ways that help them survive.

3. Since it is so hot during the day, many animals are nocturnal. They rest under rocks or in other cool places during the day and come out at night to hunt for food.

4. Gila monsters come out only at night during the summer. In winter the lizards hibernate. During this period of inactivity, they use very little food and energy.

5. Many different types of snakes live in the desert. Because they are cold-blooded, snakes’ body temperatures change with that of their surroundings.

6. Meerkats are members of the mongoose family that live in Africa. They hunt early in the day to avoid the heat. They live in mobs, or groups, of as many as thirty members. The mob helps keep its members safe.
Taking It to the People

Senator Nelson decided to find another way to show Congress that it was important to care for the environment. In 1969, after visiting the site of an oil spill, he read about college students protesting against the Vietnam War. Why not plan a protest against pollution?

At the time, pollution was a big problem. There were no laws about clean air or clean water. Nelson wanted Congress to pass such laws, but he needed to show that people supported the legislation. He hoped a nationwide protest would do that.

Nelson called for pro-environment demonstrations around the country. The protests were held on April 22, 1970, the day Nelson called Earth Day. About 20 million people across the country took part. 

Congress heard the message. It created the Environmental Protection Agency. During the next few years, Congress passed some of the country’s most important environmental legislation. These laws included the Clean Water Act, the Clean Air Act, and the Endangered Species Act.

Gaylord Nelson left the Senate and politics in 1981, but he did not stop his conservation work. He took a job with the Wilderness Society, an organization that works to protect public wild lands. In 1995, President Bill Clinton gave Nelson the Presidential Medal of Honor for his environmental work.

Nelson’s Legacy

Gaylord Nelson died in 2005, but Earth Day lived on. Every year since 1970, people around the world have gathered on April 22 to celebrate the environment. The message of the demonstrations, however, has changed over the years. Instead of calling for political action, Earth Day protests now focus on what private individuals can do to help the environment. As Gaylord Nelson showed, one person can do quite a lot.
A. Reread the passage and answer the questions.

1. What problem did Gaylord Nelson encounter in the U.S. Senate when he tried to get support for environmental issues?

2. What gave Senator Nelson an idea for a solution?

3. In what way did Senator Nelson's call for demonstrations on Earth Day help the environment?

B. Work with a partner. Read the passage aloud. Pay attention to expression and phrasing. Stop after one minute. Fill out the chart.

<table>
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<tr>
<td>Second Read</td>
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</tbody>
</table>
**Evidence** is details and examples from a text that support a writer's ideas. The student who wrote the paragraph below cited evidence to show how the author's descriptions of a character's feelings help to convey the theme.

| Topic sentence | In “Books for Victory,” the author's descriptions of Carlos's feelings help to convey the theme that all of us can contribute to a cause. The author shows that Carlos had felt bad that his brother didn't have good books to read in the army. He started collecting books to send to the military and got others involved. After Carlos collects books, he feels proud to help his brother and others. By showing that Carlos feels proud after he collects books, the author conveys the message that everyone can contribute to a cause. |
| Evidence | |

Write a paragraph about a text you have chosen. Cite evidence from the text to show how the author's descriptions of a character's feelings help to convey the theme.

Write a topic sentence: ________________________________

Cite evidence from the text:

- ________________________________
- ________________________________
- ________________________________
- ________________________________
- ________________________________

End with a concluding statement: ________________________________
Name ______________________________

A. Add the word parts to create a word with a Greek root. Write the word on the line. Then circle the word below that has the same Greek root.

1. tele + vision = __________________
   automated          telegram          asteroid

2. auto + mobile = __________________
   disaster           automatic          microwave

3. photo + genic = __________________
   philosophy         telephoto         program

4. homo + phone = __________________
   phonics            mechanic          psychic

5. para + graph = __________________
   videophone         invite            graphic

B. Read each sentence. Replace the underlined words with one of the words from the word box below and rewrite the sentence.

- mechanical
- phonics
- autograph
- astronomer
- photograph

6. The scientist who studies stars and planets was able to see Mars.

7. My uncle is studying how to take a picture with his new camera.

8. They were able to get the handwritten name of the famous actress.

9. I understand the science of sounds, so I can read almost any word.

10. People who are able to fix machines will always be able to find a job.
Name _____________________________

Vocabulary Strategy: Greek Roots

<table>
<thead>
<tr>
<th>Greek Root</th>
<th>Meaning</th>
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<tr>
<td>aero</td>
<td>air</td>
</tr>
<tr>
<td>atmos</td>
<td>vapor, steam</td>
</tr>
<tr>
<td>astro</td>
<td>star</td>
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<tr>
<td>bio</td>
<td>life</td>
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<tr>
<td>chemo</td>
<td>chemical</td>
</tr>
<tr>
<td>hydro</td>
<td>water</td>
</tr>
<tr>
<td>logy</td>
<td>the study of</td>
</tr>
<tr>
<td>photo</td>
<td>light</td>
</tr>
<tr>
<td>sphaira</td>
<td>globe, ball</td>
</tr>
<tr>
<td>syntithenai</td>
<td>making or putting together</td>
</tr>
<tr>
<td>therme</td>
<td>heat</td>
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</tbody>
</table>

Read each passage below. For each word in bold, write the Greek root or roots from the box above. Use the Greek roots and context clues to write the word's meaning.

1. “Is there life out there?” is a question scientists who study astrobiology are trying to answer. They look for life in space.
   
   Greek root(s): ____________________________
   
   Meaning: ____________________________

2. During a process called photosynthesis, plants use energy from sunlight to make food.
   
   Greek root(s): ____________________________
   
   Meaning: ____________________________

3. Plants make food and release oxygen into the atmosphere.
   
   Greek root(s): ____________________________
   
   Meaning: ____________________________

4. Aerobic creatures rely on that oxygen to breathe.
   
   Greek root(s): ____________________________
   
   Meaning: ____________________________

5. The animals living around hydrothermal vents eat a form of bacteria that live on or below the ocean floor.
   
   Greek root(s): ____________________________
   
   Meaning: ____________________________
**Word Study: Prefixes**

**Name ____________________________________________**

- dis- means "not," “absence of,” or “opposite of"
- in- means “not” or “opposite of"
- mis- means “wrong” or “not”
- pre- means “before”

**Add a prefix from the box to complete the word in each sentence below. Use context clues to help you decide which prefix to use.**

1. She will ___________ wash the fabric to make sure it will not shrink.
2. Please remember to ___________ connect from the Internet before you turn off the computer.
3. Their visitors will stay for an ___________ definite amount of time.
4. He felt some ___________ comfort when he hurt his leg.
5. If you do not speak clearly, they will ___________ understand your directions.
6. She has little money, so she hopes to find an ___________ expensive gift.
7. The teacher will ___________ view the video before showing it to the class.
8. A friendship can be harmed if there is ___________ trust between two people.
9. Always ___________ heat the oven before you bake bread.
10. I ___________ approve of the way they are behaving.
Vocabulary Strategy: Idioms

Name _____________________________

Read each passage. Underline the idiom in each one. Then, on the lines below the passage, restate the idiom in your own words.

1. “You’re really putting me on the spot,” he said to the person at the other end of the line. “I already have a commitment today, Jim.”

2. After the stock market crash of 1929, his newspaper had laid off most of the reporters. Four years later, they still had only a skeleton crew. He was glad to have a job, but he was overworked and underpaid.

3. Nancy jumped up from her chair and ran to her bedroom to change out of her fishing clothes. “Make tracks,” her dad called down the hallway. “We’re in a hurry!”

4. He explained that they had owned a farm in Oklahoma, but lost it when costs rose. “Upkeep cost an arm and a leg, and the drought killed our chances of a good crop.”

5. Mr. Jenson grinned and ruffled Nancy’s hair. “I taught her everything she knows,” he said. “She’s a chip off the old block.”
Read the passage. As you read, check your understanding by asking yourself what theme or message the author wants to convey.

Grandpa’s Shed

My grandpa is a mountain,
Brooding, looming, tall.
I stand in his shadow, silent as a stone.
Rattling rusty paint cans,
He gestures toward the shed. I gape.
That shed’s a squat gray mushroom,
Needing more than paint to fix.

The old man’s hands are vises,
Prying open paint cans lightning fast.
Astonished, awed, I gasp aloud,
“Red, yellow, green—and PURPLE!”
My words explode like fireworks.
Anticipating anger,
my mouth shuts like a trap.

Grandpa merely dips his brush,
Paints a horse and hound.
“The horse I harnessed as a boy,
Dog was mine too.”

Impulse strikes—a flash of fire.
I seize a brush,
Soon swishing, swirling pictures.
With each stroke, a story,
My words painting pictures.
We share that shed like one vast canvas,
His strokes to mine, my words to his.
We step back, gazing at stories told.
A. Reread the passage and answer the questions.

1. What key details in the poem describe events that happened?

2. What key details tell you about the speaker's feelings?

3. What is the theme, or important message, of the poem?

B. Work with a partner. Read the passage aloud. Pay attention to expression and phrasing. Stop after one minute. Fill out the chart.

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<tr>
<td>Second Read</td>
<td>-</td>
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<td>=</td>
<td></td>
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</tbody>
</table>
Inherited Traits

1 You may have heard the phrase, “You look like your mom,” or “You look like your dad.” Or, maybe you’ve looked at yourself in the mirror and haven’t completely seen yourself. Instead, you see a reflection of one of your parents staring back at you. This is thanks to inherited traits. Inherited traits are characteristics a living thing possesses. Inherited traits are passed down to you from your parents.

2 The way you look comes from the information in your genes passed on to you from your parents. Genes encode information about living things. The color of your eyes and your hair depends on the colors of your parents’ eyes and hair. Another trait that may be passed down is the shape of your nose. Your body shape, such as your height or the length of your legs, is also associated in part to your parents’ bloodlines.

3 Sometimes environmental factors can influence our traits: For example, a human’s body may change shape from their inherited body due to diet. It may change shape based on how they choose to live. While inherited traits are passed down, they can be adapted and changed based on the environment that one is living in.

4 Traits are not just passed down in humans, but in all living things. In plants, the shape of the leaves or color of the flower are passed down from the parent plant. In animals, the number of legs or shape of the beak is passed down. The color of fur or feathers are all examples of inherited traits.

5 Some of our most defining traits are not those that are inherited. Some that define us most are those traits that are learned. For example, if you are really great at playing video games, it is probably not because your parent was really great at playing video games. You became good at video games because you practiced. You learned the skills to become a good video gamer.
Reading and writing are also learned traits. They are controlled with how much you practice them to become efficient at doing them. Talking, playing sports, and even the way you choose to wear your hair are also learned behaviors. When people say they are good at sports because their dad played sports, that may not be entirely true. They are probably good at sports because their dad played sports with them when they were little. He passed his love of sports on to them. If he did not play with them, they probably would not be as good at sports.

Animals learning to do tricks such as a seal balancing a ball on his nose or a dog learning to shake a hand with its leg are examples of learned behaviors. For humans or animals to learn something, much time and devotion needs to be put into learning the skill. Monkeys do not just use sticks as tools without learning how to do this from other monkeys.

If you choose to pierce your ears or dye your hair, these traits will not be passed down to your offspring. However, if children grow up in an environment where this is done, then it may be that they end up doing the same thing. A person's environment can affect the way they look or behave. It does not affect inherited traits that are passed down genetically to the next generation.
1. The author wrote this selection most likely to explain –
   A. how traits are passed down.
   B. how traits can be learned.
   C. the scientific studies of learned and inherited traits.
   D. the differences between learned and inherited traits.

2. The word *defining* means –
   A. *the meaning of a word.*
   B. *what makes us who we are.*
   C. *learned.*
   D. *valued.*

3. What can the reader conclude about inherited traits from the passage?
   A. Inherited traits allow a person to choose what they want to look like.
   B. Inherited traits cannot be changed.
   C. Inherited traits are passed down through the parents’ bloodlines.
   D. Inherited traits are easy to change.
4 Video game skills can be learned and are not inherited. Which evidence in the text supports this conclusion?
   A. People who are good at video games get this skill from their parents.
   B. People who are good at video games have to practice and memorize moves.
   C. People who are good at video games only live in certain countries.
   D. People who are good at video games also do well in school.

5 Which evidence helps the reader understand the meaning of generation in the last paragraph?
   A. Does not affect
   B. Passed down
   C. Next
   D. Can affect the way they look

6 A plant has a waxy leaf. This is an example of –
   A. inherited trait.
   B. learned behavior.
   C. environmental adaptation.
   D. both A and B.
A chimpanzee moves through the forest, looking for food. It spots an anthill about a meter away and moves toward it. Using its long arms, the chimpanzee grabs a thin branch from a tree overhead. First, the chimpanzee takes all the leaves off the branch. Then it sticks the branch down the anthill. A few seconds later, the chimpanzee pulls the branch out. It is covered with ants. The chimpanzee puts the branch in his mouth and quickly eats all the ants. The chimpanzee is able to eat the ants without getting bitten.

The chimpanzee was born with long arms, good eyesight, and fingers. But it was not born knowing how to use a branch to get a snack. What are some characteristics that animals and other organisms are born with? How do they get those characteristics? What are some characteristics that appear or develop after birth?

What is the difference between an instinct and a learned behavior?

We are all born with instincts, or behaviors, or responses to stimuli, that are usually related to survival. The chimpanzee’s instincts tell him he needs to eat, but he had to learn how to catch the ants. Your instincts tell you to eat, but you had to learn how to use a knife and fork.

Humans rely on their instincts every day. If there is a sudden loud noise, your instincts tell you to flinch and duck. It is very difficult to ignore an instinct because the response to the stimuli is built into the species for generations. A cat has an instinct to stalk and chase moving objects. If you dangle a string in front of a cat, you will see the cat’s response to the stimulus as it jumps to catch the string. This natural behavior is automatic, an instinct built into the cat’s brain.

Take a look at the mother and daughter in the picture at the right. How do they look similar? The mother passed on some of her characteristics, or traits, to her daughter. The daughter has her mother’s hair color, nose shape, and eye color. These traits were inherited. When traits are inherited, it means they are passed on from parents to their offspring during reproduction.
Learned Behaviors and Inherited Traits

Some traits are not inherited. The mother has pierced ears and wrinkles. She did not inherit these traits from her parents. They developed some time after she was born. Characteristics that appear during a person’s lifetime are called *acquired traits*. Certain acquired traits, like pierced ears, can be directly observed. These are *physical traits*.

Another type of acquired trait is *learned behavior*. Reading is an example of learned behavior. You inherit eyes that can see and hands that can turn the pages of a book. However, you do not know how to read when you are born. You have to learn how to read. Learning is something that happens during your lifetime.

Many physical traits like eye color and skin color are inherited. But not all physical traits are inherited. For example, have you ever broken a bone? Do you have any scars? These are characteristics that appeared some time after birth. You were not born with a broken bone or a scar. These types of traits are not passed from parents to children.

**What are some examples of plant and animal inherited traits?**

Have you ever seen a beautiful garden of flowers? The color of the flowers is an inherited trait. The general height of the plants, the length of the roots, and the shapes of the leaves are all inherited characteristics. A cactus inherits spines. An evergreen tree inherits needles. These are traits that are passed on from a plant to its offspring.

Most of the traits you see in an animal are inherited. A lion cub inherits claws, sharp teeth, and tan fur from its parents. Some traits you cannot see are also inherited.

*predator*: an animal that hunts and eats other animals

A lion cub inherits the need to eat meat. It also inherits the bones, muscles, and other structures that help it function as a *predator*.

**What are some examples of plant and animal acquired traits?**

Plants do not have brains and do not learn behaviors like animals do. But plants can respond to changes in their environment. Some plants have special chemicals in their *cells* that help them turn toward sunlight. Getting enough sunlight helps plants to make their own food. When a fly lands on a unique plant called a Venus flytrap, the plant responds by closing its modified leaves that look like “jaws” to eat the fly. The ability to respond to these environmental changes, however, is inherited by the plant.
Lion cubs inherit the physical traits they need to be hunters. They have claws and sharp teeth to help them catch and bite their prey. Their tan fur helps them blend into their grassy environment. They have good vision and an excellent sense of smell. But when lion cubs are born, they do not know how to hunt. Hunting is an example of a learned behavior. Cubs have to learn how to hunt by watching their parents. They may even “hunt” each other as practice when they are cubs. It takes months for lion cubs to learn how to use their inherited traits to help them catch and kill food.

A songbird inherits a beak and lungs that help it sing, but it often has to learn the songs from another bird. Evidence of songbird learning includes slight differences across the country for a particular sparrow. Since the adult birds are learning from birds only in their area, the songs can vary across a large distance. A dog learns tricks from its owner. Even you had to learn certain behaviors. As a newborn, did you know how to talk or ride a bicycle? You had to learn these behaviors. You were not born knowing how to do them.

A family adopted a new puppy. Whenever the family members want to take the puppy for a walk, they call him to come to the door. At the same time, one family member grabs a set of keys. After a while, they notice that whenever someone grabs the keys, the puppy comes to the front door without anyone calling him. Is this an inherited characteristic or a learned behavior? Explain your answer.
Instincts, learned behaviors, inherited traits, and acquired traits can be observed every day. Below is a list of activities or features. Write each in the appropriate section of the graphic organizer.

- a baby blinks at a loud noise
- eating with chopsticks
- freckles
- a tattoo of a butterfly
- riding a unicycle
- ivy climbing a brick wall
- mother bird builds a nest

- speaking French
- attached earlobes
- a chipped tooth
- the dog barks at a strange sound
- hair with pink and purple streaks
- tying shoelaces
- face puckers when eating a lemon

<table>
<thead>
<tr>
<th>INSTINCTS</th>
<th>LEARNED BEHAVIORS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<table>
<thead>
<tr>
<th>INHERITED TRAITS</th>
<th>ACQUIRED TRAITS</th>
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<td></td>
</tr>
</tbody>
</table>
Multiple Choice

Name: ___________________ Date: _________ Group: __________

1. A student sees a turtle laying its eggs on the beach. Which of the following is an example of a question the student could ask to decide whether this is a learned behavior or an instinct?

A. How long does it take for turtles of this type to lay their eggs on the beach?

B. Does the turtle have to see other turtles laying eggs on the beach to know how to do that?

C. Do other types of turtles also lay their eggs on the same beach at the same time?

D. After laying the eggs, does the turtle remain on the beach to care for the newly hatched turtles?

2. All of the following can be inherited by the offspring of an apple tree EXCEPT -

A. the shape of its leaves.

B. its broken branches.

C. its type of fruit.

D. its flower color.

3. A student observes a tree that is shaped like a cone. What question would help the student decide whether this shape is inherited or acquired?

A. Do all the trees of this kind have that same cone shape?

B. Are there more birds in the cone-shaped tree?

C. Does this cone-shaped tree produce more seeds?

D. Is there a water source close to the cone-shaped tree?
Multiple Choice

4. A group of students watches sea lions on some rocks. They hear the sea lions barking loudly. Which of the following is the best question to ask to help them figure out if barking is an instinct or a learned behavior?

A. Does the sea lions' barking help them find more food?
B. Do baby sea lions bark from the time they are born?
C. Do other kinds of ocean animals make a similar sound?
D. Does the barking mean there is a predator nearby?

5. The characteristics of a dolphin are shown in the illustration.

The dolphin inherited all of these characteristics from its parents EXCEPT -

A. its blowhole, for breathing.
B. its scars from a motor boat.
C. its long, rounded snout.
D. its broad, flat tail
Classification of Organisms

What do you think about when you hear the word "classification"? Do you think about how items are organized or how they are sorted? Scientists describe classification as a way to organize living things into like groups. For example, if a scientist had many animals, they might use the animals' characteristics, or features, to organize them into animals that look the same. Let's say they have a monkey, a horse, a tortoise, and a snake. Which animals would you classify together? Would you put the monkey and horse together because they both have hair, and then the snake and tortoise together because they both have scales? This is how scientists start to classify organisms.

Do scientists also classify other organisms like plants, insects, and fungi? The answer is yes. Scientists would classify all living organisms based on their characteristics, physiology (organ systems), DNA, and other factors. All of these factors would then allow a scientist to know who is related to who.

What is classification?
We call the process of classification taxonomy, or the study of how things are classified. Taxonomic classification is a process of science that organizes living organisms by their structure, function, and relationships. Classification of organisms allows the identification of shared characteristics, which reveals how organisms interact with the components of their ecosystem.

Why is classification important?
If we did not organize and classify the organisms we came across as scientists, or as individuals, we could not make sense of the world around us. If I called a duck a "dragon," but you called it a "duck," then how would we be able to discuss where it lives, what it eats, what its characteristics are? We couldn't because we wouldn't know it is a duck we are both talking about. Scientists also must use a common language when discussing classification. One classification system uses Latin. Latin is a dead language, or a language that is not used in the world today. This allows scientists to have a common language to use worldwide to describe the same species. For example, if I wanted to discuss a rainbow trout with someone in China, I wouldn't use "rainbow trout," I would use the scientific name of Oncorhynchus mykiss.
What is one method of classification used to group animals?
One way animals are grouped is by whether they are **vertebrates** or invertebrates, or if they have a backbone or not. The vertebrates typically have a backbone, muscles, and a skeleton and are more advanced than the invertebrates. Vertebrates include animals such as mammals, fish, reptiles, birds, and amphibians.

**Vertebrate**: having a backbone

**Mammals**: Mammals are warm-blooded vertebrates with fur or hair as a body covering. Mammals breathe in oxygen with their lungs. Mammals give birth to live babies and take care of their young. The mother's body provides milk for the young.

**Fish**: Fish are cold-blooded vertebrates with scales for a body covering. Fish breathe in oxygen underwater through gills. Fish lay eggs.

**Reptiles**: Reptiles are cold-blooded vertebrates with dry scales or plates as a body covering. Reptiles breathe in oxygen with their lungs. Reptiles lay eggs and the young are able to take care of themselves when they hatch.

**Birds**: Birds are warm-blooded vertebrates with feathers as a body covering. Birds breathe in oxygen with lungs. Birds lay eggs and take care of the young. Birds have beaks instead of teeth.

**Amphibians**: Amphibians are cold-blooded vertebrates with moist, smooth skin. Amphibians breathe in oxygen with lungs and gills. Most amphibians lay eggs. Amphibians live on land and in the water.
On the other hand, invertebrates have no backbone and may or may not have muscles or a type of skeleton. Examples of invertebrates are sponges, jellyfish, and worms. Invertebrates are the most numerous animals and have dominated most aquatic (water) ecosystems.

**invertebrate**: having no backbone

Red worms

Sponges

Sea anemone

Snail

Spider

Orange bell jellyfish
Plants can be classified as well. One of the basic methods of classifying plants is by whether they are seed producing or non-seed producing plants.

- **Seed plants**: Seed plants are grouped into those that have flowers and seeds enclosed in fruit or those that have bare seeds in cones and have no fruit.
- **Non-seed plants**: Non-seed plants have no seeds like ferns, horsetails, and club mosses. Non-seed plants reproduce through the release of spores.

What Do You Think?

Look at the two pictures to the right. Can you use the animal's and plant's characteristics to classify them? Can you use your prior knowledge, experiences, and information you've learned so far to make a quick decision about what these organisms are, what they are related to, and what characteristics they might share with their groups?

Career Corner: Zoologist

A zoologist is someone who studies animals. Zoologists can specialize in the study of one or more species of animals. For example, a zoologist might become a large feline specialist; that is someone who only studies and deals with large cat species such as the tiger, lion, or mountain lion.

Many zoologists work in zoos, aquariums, or in locations around the world where their species may be located. They also do research work, collect species-specific data, and may even help with conservation and preservation efforts. Zoologists also play a large role in educating the public about why the species they research are important to the local and world ecosystems.
Classification of Organisms

Take some time to explore the living organisms in your backyard or in a park near you.
1. You will need to identify two vertebrates, two invertebrates, and two plants.
2. Take pictures or draw detailed, colored pictures of your organisms.
3. Identify the two vertebrates and which vertebrate group they belong to.
4. Identify the two invertebrates.
5. Identify in which group the plants belong.

Use the Internet to help you make your identifications.
What do you know?
The ways in which scientists classify organisms can vary. I might look at an organism’s characteristics and you may choose to look at the DNA evidence; however, good scientists will take all of the information into account before classifying. Read the descriptions of the details taken from an organism in the chart below. Write the method of classification in the right hand column. Then use the second chart below to give an example of an organism these descriptions might have come from.

<table>
<thead>
<tr>
<th>Description</th>
<th>Method of Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organ systems are all present.</td>
<td></td>
</tr>
<tr>
<td>Fur, large paws, long tail, and stripes that are black and orange.</td>
<td></td>
</tr>
<tr>
<td>Has pine needles and pine cones; grows in alpine forests.</td>
<td></td>
</tr>
<tr>
<td>DNA</td>
<td></td>
</tr>
</tbody>
</table>

Example Organism

- 
- 
- 
-
Mauricio’s Zoo

1 “Mauricio! Why is there a fishbowl and an insect farm on my kitchen table?” yelled mom as she began preparing dinner.

2 Bam! Bam! Bam! The sound of loud footsteps came running down the stairs as Mauricio slid into the kitchen.

3 “Sorry, mom. I added some new friends today to my zoo. Meet Rodrigo, my fish, and all of his new friends. There’s Max, Jack, Ernie …” started Mauricio.

4 “Mauricio, I know you love your animals, but they have to stay up in your room. Maybe you should consider giving some of them away. Your room has transformed into its own zoo,” mom suggested.

5 With his mouth hanging open from shock, Mauricio replied, “I could never get rid of them, mom. I love adding new animals to study to my collection. Maybe I can have the attic to use as my zoo?”

6 “If you can clean it out, the attic is all yours for your animals. Remember, they have to be kept in their cages, and I don’t want to see them in my kitchen again,” agreed mom.

7 “Deal!” expressed Mauricio as he bolted back upstairs to his room. His room was filled with cages of all kinds. He had many insect farms filled with lots of invertebrate organisms. As he gathered them all in one corner of his room, he thought about how he would set up the attic after he had it all cleaned out.

8 Mauricio gathered up all of his invertebrate animals including a wide variety of insects, some arachnids including a tarantula, and a farm of snails. Mauricio thought he would put all of these together in his zoo because they had no skeletons. A small section of his room began looking more organized. He had a long way to go.
Mauricio then collected all of his fishbowls and placed them around the large tank in the center of the room, which housed goldfish and bettas. He would put his fish together because they all breathe using gills and have skeletons made from either bone or cartilage. Mauricio wrote each type of fishes' features on a piece of paper and put it near the fish. He planned to hang up signs in the attic with information about each kind of animal in his zoo.

He looked up from his writing and saw his iguana, Iggy, in her enormous cage. He knew the cage would be too large for him to move, so he knew he would need help. Iggy was a reptile that had scales and a skeleton made of bone, and she was cold-blooded. Mauricio had a heat lamp in Iggy's cage to help her regulate her body temperature. He looked to the left of Iggy and saw Thomas his turtle. He put Thomas and Iggy together in his zoo as he began writing his sign to go along with them.

His mom's least favorite animals in Mauricio's zoo were his collection of rodents. He had several mice and even a guinea pig. Mauricio knew that rodent meant "gnawing animal." If he let these animals go, his mom would be more than upset with him because they would be found gnawing away at something. Their incisor teeth continue to grow because they wear away as they gnaw away at hard foods. They would gnaw at the wood in the house. He went over to check on their cage to be sure it was securely fastened shut, and he tied an extra piece of string around it just to be sure it stayed closed.

"What about me?" cawed Sammy, Mauricio's African grey parrot.

"I couldn't forget about you, Sammy. You are my only bird. You are unlike any of my other pets. You have wings and can fly, your beak helps you eat, and your feathers keep you dry and warm. Your skeleton is very thin, so you can be light enough to fly. You will be your own special attraction at my zoo."

Sammy chirped, "Like it. Like it."

Mauricio couldn't forget about Charlotte his cat and Dodger his dog. However, he didn't think they would be fitting to put in the zoo as they liked to roam the house. So, instead, he took pictures of them that he would add to his zoo.

"Wow, I have a lot of animals," thought Mauricio. He ran downstairs to share his plans for his zoo with his mom.
17 "My zoo is going to be so cool. I have a lot of different animals. I'm going to make it easy for people to find the different animals by sorting them into their special classifications. I want this to be a learning zoo, so I'm making informational signs for people to read up on my animals and learn about them. I can't wait to get them up into the attic. Mom, will you help me?" asked Mauricio.

18 "I would be glad to," replied Mom. "I will help you after dinner."
1 Read the following.

_With his mouth hanging open from shock, Mauricio replied, “I could never get rid of them, mom. I love adding new animals to study to my collection. Maybe I can have the attic to use as my zoo?”_

From this, the reader can tell that Mauricio—

A. is determined to learn more about animals.
B. often gets what he wants.
C. knows how to get his way with his mom.
D. is a caring individual who enjoys taking care of animals.

2 What is the meaning of **transformed** in paragraph 4?

A. To change into a new substance
B. To change in form or use
C. To use electricity
D. To change character

3 According to the story, the reason Mauricio is classifying his animals for his zoo is so—

A. people can learn about his animals.
B. people can easily find the animals.
C. the animals will be happy.
D. it will be easier to feed the animals.
4 Based on mom’s action from the story, she most likely thinks Mauricio—
   A. should get rid of all of his animals.
   B. needs to organize his animals and keep them in his room.
   C. is not responsible to take care of his animals.
   D. should set his animals free back into the wild.

5 Read the following.
   “I couldn't forget about you, Sammy. You are my only bird. You are unlike any of
   my other pets. You have wings and can fly, your beak helps you eat, and your
   feathers keep you dry and warm. Your skeleton is very thin, so you can be light to
   fly. You will be your own special attraction at my zoo.”

The author uses the description of the African grey parrot to show—
   A. what the bird looks like.
   B. how much Mauricio loves Sammy.
   C. that the bird has features that are different from other animals.
   D. that Sammy is Mauricio’s favorite pet.

6 Mom contributes to solving Mauricio’s problem by—
   A. allowing him to use the attic for his zoo.
   B. making him clean the insect farms off the table.
   C. helping him move the animals into the attic.
   D. suggesting he classify his animals into groups.
The reader can predict that Mauricio will—

A. open his zoo to make money.
B. be a zoologist when he gets older.
C. keep all of his animals in the attic from now on.
D. keep his dog and cat in his attic zoo.
Multiple Choice

Name: ___________________ Date: ___________ Group: ___________

1 Which of the following characteristics is used when determining whether to place an animal in the vertebrate group or the invertebrate group?

A  Ability to walk on two legs
B  Presence of a spinal cord
C  Method of respiration
D  Flow of blood through body

2 What question can be used to sort fish, such as a bass, from amphibians, such as a frog?

A  Does the organism use gills to breathe?
B  Does the organism eat insects?
C  Is the organism able to move around?
D  Does the organism lay eggs?
Multiple Choice

3 Using the information in the table, which one of the following is a vertebrate?

<table>
<thead>
<tr>
<th>Animal</th>
<th>Diet</th>
<th>Reproduction</th>
<th>Backbone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grasshopper</td>
<td>Plants</td>
<td>Egg laying</td>
<td>None</td>
</tr>
<tr>
<td>Iguana</td>
<td>Plants</td>
<td>Egg laying</td>
<td>Present</td>
</tr>
<tr>
<td>Jellyfish</td>
<td>Small fish</td>
<td>Egg laying</td>
<td>None</td>
</tr>
<tr>
<td>Spider</td>
<td>Insects</td>
<td>Egg laying</td>
<td>None</td>
</tr>
</tbody>
</table>

A Grasshopper
B Iguana
C Jellyfish
D Spider

4 Which of the following questions could we ask to distinguish a mammal, such as a spider monkey, from a reptile, such as a crocodile?

A Does the animal have four limbs?
B Does the animal lay eggs to reproduce?
C Does the animal consume food for energy?
D Does the animal have a backbone?
Multiple Choice

5 The table provided shows the characteristics of several different plants.

<table>
<thead>
<tr>
<th>Plant</th>
<th>Produces Seeds</th>
<th>Has Flowers</th>
<th>Has Roots, Stems, and Leaves</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rose</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Pine Tree</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Fern</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Algae</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

Which one of the plants described below could be classified in the same group as one of the plants in the table?

A Plant A: Does not produce seeds; has roots, stems, and flowers.

B Plant B: Produces seeds; has roots, stems, and leaves but no flowers.

C Plant C: Does not produce seeds; has roots, stems, and leaves, and has flowers.

D Plant D: Produces seeds; has no roots, stems, leaves, or flowers.