DISTANCE LEARNING PACKET

8TH GRADE

MATH
Eighth-Grade Math

Please Show Your Work Where Required.

If you would like more practice, you may use MobyMax, Study Island, and IXL.

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Below are formulas you may find useful as you work the problems. However, some of the formulas may not be used. You may refer to this page as you take the test.

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**Mean**

$$\bar{x} = \frac{x_1 + x_2 + x_3 + \ldots + x_n}{n}$$

**Mean Absolute Deviation**

Total Distance (of all values from the mean value)

Number of values

**Interquartile Range:** the difference between the first quartile and third quartile of a set of data

**Volume**

- Right Prism: $V = (\text{area of base}) \times (\text{height})$
- Cylinder: $V = \pi r^2h$
- Sphere: $V = \frac{4}{3} \pi r^3$
- Cone: $V = \frac{1}{3} \pi r^2h$
### Day 11

**Find the missing angle:**

\[ \triangle QAT \sim \triangle UJH. \text{ In } \triangle QAT, \angle Q = 43^\circ \text{ and } \angle J = 47^\circ \text{ in } \triangle UJH. \text{ Find the measure of } \angle T. \]

\[ \angle T \]

**Find the measure of } \angle A:**

\[ \triangle \]

\[ x + 86 \]

\[ x + 56 \]

**Write a similarity statement that matches these triangles.**

\[ \triangle \]

\[ \angle \]

\[ 60^\circ \]

**Identify the relationship of } \angle x \text{ & } \angle y \text{ (lines that appear parallel are):} \]

\[ \]

\[ \]

**Determine the missing angle:**

\[ \]

\[ 160^\circ \]

**Simplify using exponent rules**

\[ 2^9 \cdot 2^5 \]

\[ \frac{6^6}{6} \]

\[ \]

\[ (3^7)^3 \]

\[ (11)^{-1} \]

\[ 7^x \cdot 7^{x+2} \]

\[ \]

\[ 3^{2x-5} \]

\[ \]

\[ \]

**Extra Credit Problem**

**Write the following number in scientific notation.**

\[ 7,303,000 = \]

\[ 0.00063 = \]

\[ \]

**Subtract the following. Write your answer in standard notation.**

\[ 20 - 5.48 \times 10^{-4} \]

**What two integers does } \sqrt{50} \text{ fall between?}**

A) 7 and 8  
B) 8 and 9  
C) 9 and 10  
D) It's exactly 25

**What two integers does } \sqrt{50} \text{ fall between?}**

A) 7 and 8  
B) 8 and 9  
C) 9 and 10  
D) It's exactly 25

**Circle any 2 factors of 400.**

A) 20 and 20  
B) 375 and 25  
C) 2 and 200  
D) 399 and 1

**Select the two roots of 400.**

A) 4 and 100  
B) 40 and 10  
C) 2 and 200  
D) 20 and -20

**Evaluate } \sqrt[3]{-27} \text{**}

**Determine the value of } x \text{ if } \sqrt{x} = 9 \text{**}

\[ \sqrt{x} = -10 \]

**Explain why there are no solutions to this equation.**

\[ \]

\[ \]

\[ \]

\[ \]

\[ \]

\[ \]

\[ \]
Translations

Translation - "slide," a transformation in which an object moves a fixed distance, congruent figures

Example 1: Perform the indicated transformation.

a) Translation 4 units down

b) Translation 1 unit right and 3 units up

Try: Perform the indicated transformation.

a) Translation 2 units right

b) Translation 5 units left and 4 units down

c) Translation 4 units up

d) Translation 3 units right and 3 units down
Example 2: Identify the transformation demonstrated in the graph.

a) Translation 5 units down

Try: Identify the transformation demonstrated in the graph.

a)

Coordinate Notation for Translations:

\((x, y) \rightarrow (x+a, y+b)\), where \(a\) is the change in horizontal location and \(b\) is the change in vertical location

Example 3: Express each transformation using coordinate notation.

a) Translation 2 units right and 1 unit down

\((x, y) \rightarrow (x+2, y-1)\)

b) Translation 5 units left

\((x, y) \rightarrow (x-5, y)\)

Try: Express each transformation using coordinate notation.

a) Translation 3 units left and 1 unit up

b) Translation 3 units up
Translations
Practice

For 1-4, perform the indicated transformation.

1) Translation 1 unit left

2) Translation 5 units down

3) Translation 2 units right and 1 unit up

4) Translation 2 units left and 3 units down

For 5-8, identify the transformation demonstrated in the graph.

5)

6)
For 9-12, express each transformation using coordinate notation.

9) Translation 2 units down

10) Translation 1 unit right and 1 unit up

11) Translation 2 units left and 4 units up

12) Translation 3 units left

For 13-18, mark each statement as true (T) or false (F). For each false statement, correct the underlined word or symbols to make it true.

____ 13) A translation is a turn of a figure.

____ 14) A translation results in a congruent figure.

____ 15) A translation is a transformation where each point in a figure moves a different distance.

____ 16) Coordinate notation for a translation is \((x, y) \rightarrow (-x, -y)\).

____ 17) The resulting translated figure has the same size and shape as the original figure.

____ 18) A translation 2 units left and 1 unit up can be represented by \((x, y) \rightarrow (x+2, y-1)\).
### Day 12

**Find the missing angle:**

![Triangle with angles 50°, 60°, 61°, and unknown angle](image)

**Find the measure of \( xF \):**

![Triangle with angles 80°, 4x + 4°, 7x + 10°, and unknown angle](image)

**Solve for \( x \) in the figure below:**

![Figure with angles (5x+11)° and (4x+110)°](image)

**Extra Credit Problem**

**Find the value of \( x \) below:**

![Line with angles 7x - 1° and 11x + 7°](image)

**What is the measure of the of each angle?**

![Triangle with angles 52°, 54°, and 59°](image)

**Simplify using exponent rules**

\[
x^5 \cdot x^6 = \frac{x^4}{x^5} = (x^3)^3 = (10)^{-2}
\]

**Simplify using exponent rules**

\[
(8^x \cdot 8)^3 = \left(\frac{7x}{73x}\right)^{-2} = (5^x)^3 \cdot 5^{4x}
\]

**Multiply the following. Write your answer in scientific notation.**

\[
0.000065 \cdot 8.5 \times 10^{-5}
\]

**Simplify and write your answer in scientific notation.**

\[
(2 \times 10^{10})^{-2}
\]

**Place \(<, >, or = \) in the blank.**

\[
\frac{26}{3} \text{ or } \sqrt{75}
\]

**Which of the following numbers can be rewritten as a fraction?**

\[
\sqrt{8}, 6.2, 3 \frac{5}{7}, \sqrt{49}, 5,
\]

**Solve the equation for \( x \).**

\[
x^3 = 64
\]

**Solve the equation for \( x \).**

\[
x^2 = 100
\]

**Determine the value of \( x \) if \( \sqrt[3]{x} = -2 \)**

**Evaluate \( \sqrt[3]{64} \)**
Reflection - "flip," a transformation in which an object mirrors across a line, congruent figures.

Example 1: Perform the indicated transformation.

a) Reflection across the x-axis

Try: Perform the indicated transformation.

a) Reflection across the y-axis

b) Reflection across the y-axis

c) Reflection across the y-axis

d) Reflection across the x-axis

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Example 2: Identify the transformation demonstrated in the graph.

a) Reflection across the x-axis

b) Reflection across the y-axis

Try: Identify the transformation demonstrated in the graph.

a) 

b) 

Coordinate Notation for Reflections:

Reflection across the x-axis: \((x, y) \rightarrow (x, -y)\)

Reflection across the y-axis: \((x, y) \rightarrow (-x, y)\)

Example 3: Express each transformation using coordinate notation.

a) Reflection across the x-axis

\[(x, y) \rightarrow (x, -y)\]

b) Reflection across the y-axis and translation 4 units up

\[(x, y) \rightarrow (-x, y+4)\]

Try: Express each transformation using coordinate notation.

a) Reflection across the y-axis

b) Reflection across the x-axis and translation 3 units left
Reflections Practice

For 1-4, perform the indicated transformation.

1) Reflection across the x-axis

2) Reflection across the y-axis

3) Reflection across the y-axis

4) Reflection across the x-axis

For 5-8, identify the transformation demonstrated in the graph.

5)

6)
7) Reflect across the x-axis

8) Reflect across the y-axis

For 9-10, express each transformation using coordinate notation.

9) Reflection across the x-axis
10) Reflection across the y-axis

For 11-14, mark each statement as true (T) or false (F). For each false statement, correct the underlined word or symbols to make it true.

11) A reflection is a slide of a figure.

12) A reflection results in a congruent figure.

13) A reflection is a transformation in which an object mirrors across a line.

14) Coordinate notation for a reflection across the x-axis is (x, y) \(\rightarrow\) (-x, y).

15) Reflect the polygon over the line y=1.
### Day 13

**Explain why if two triangles are congruent, then they have to also be similar.**

- Simplify using exponent rules
  - \( x^{-5} \cdot x^9 \)
  - \( \frac{x^{10}}{x} \)
  - \((x^7)^3\)

**Identify the relationship of \(x\) & \(y\) (lines that appear parallel are):**

![Diagram of parallel lines]

**Determine the missing angle:**

![Diagram of angle with 48°]

**Simplify using exponent rules**

- \( 1 \cdot 1^{17} \)
- \( \frac{2^6}{2^2} \)
- \((3^3)^3\)
- \( \left(\frac{1}{6}\right)^2 \)
- \(2^3 \cdot 4^x\)
- \((6^2)^{-3}\)

**Write the standard form of the following number.**

- \(1.3 \times 10^5 = \)
- \(2.02 \times 10^{-4} = \)

**Which of the following numbers is irrational?**

- \(\sqrt{400}, \sqrt{2}, -\sqrt{9}, -\sqrt{17}\)

**Determine the value of \(x\) if \(\sqrt{x} = 121\)**

**If this cube has a volume of 216 cm\(^3\), then what is the area of the shaded face?**

**Solve the equation for \(x\).**

- \(x^3 = 125\)

**Divide the following. Write your answer in scientific notation.**

- \((9.7 \times 10^{-3}) \div (0.0004)\)

**Add the following. Write your answer in scientific notation.**

- \(527 + 1.78 \times 10^6\)
The Real Number System

Example 1: State all of the real number sets that each number belongs to.

a) 5  
   Natural  
   Whole  
   Integer  
   Rational

b) -3  
   Integer  
   Rational

c) \( \sqrt{2} \)  
   Irrational

d) 0  
   Whole  
   Integer  
   Rational

e) \( \frac{5}{6} \)  
   Rational

f) 1.\overline{7}  
   Rational

g) \( \frac{12}{3} \)  
   Natural  
   Whole  
   Integer  
   Rational

h) \( \sqrt{25} \)  
   Natural  
   Whole  
   Integer  
   Rational

i) \(-\sqrt{100}\)  
   Integer  
   Rational

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Try: State all of the real number sets that each number belongs to.

a) 0          b) \(\sqrt{81}\)          c) -8

d) \(\frac{2}{3}\)          e) \(-\frac{90}{10}\)

f) \(\sqrt{75}\)

g) \(-\frac{9}{10}\)          h) 5.08

i) \(\frac{21}{7}\)

Example 2: List 3 numbers that match each description.

a) A rational number that is not an integer

\(5.2, 3.6, -\frac{1}{2}\)

b) An irrational number

\(\pi, 3.6489..., \sqrt{18}\)

c) A whole number written as a fraction

\(\frac{24}{4}, \frac{27}{9}, \frac{64}{8}\)

\(1, 40, 6\)

d) A natural number

Try: List 3 numbers that match each description.

a) An integer

\(\)  

b) A rational number written as a radical

\(\)  

c) A natural number written as a fraction

\(\)  

d) An irrational number written as a radical

\(\)
The Real Number System
Practice

1) State all the real number sets that each number belongs to.
   a) \(\sqrt{49}\)
   b) \(\frac{9}{3}\)
   c) \(-5\)
   d) \(\sqrt{31}\)
   e) 0
   f) \(-\frac{12}{4}\)
   g) 1.4387
   h) \(\frac{10}{3}\)
   i) 24

2) List 2 numbers that match each description.
   a) A rational number that is not a whole number
      ____________________________
   b) An irrational number written as a decimal
      ____________________________
   c) An integer written as a fraction
      ____________________________
   d) A whole number
      ____________________________

3) Give an example of each.
   a) A product of a natural number and an integer that results in a negative number.
      ____________________________
   b) A product of a natural number and an integer that results in a positive number.
      ____________________________
4) Identify whether each statement is Always (A), Sometimes (S), or Never (N) true.

a) _______ A rational number is an integer.

b) _______ A whole number is an irrational number.

c) _______ A natural number is a rational number.

d) _______ A natural number is an integer.

e) _______ An integer is a natural number.

5) Circle the number that doesn’t belong in each set. Justify your answer.

   a) 5.5 5.5 $\sqrt{5.5}$ $\frac{5}{5}$

   b) $\frac{8}{2}$ $\frac{2}{8}$ $\frac{8}{8}$ $\frac{18}{2}$

   c) $\sqrt{64}$ $\sqrt{49}$ $\sqrt{25}$ $\sqrt{53}$

6) Show that $\sqrt{196}$ is irrational because it is a radical. Tatyana argued that it is rational because it can be simplified to a natural number. Who is correct? Defend your choice.

7) Explain the difference between 0.3715... and 0.3715. Be sure to identify which is a rational number and which is not. Justify your reasoning.
8th Grade Review Day 14

1) The relation defined by the set of ordered pairs \{(0,2), (-2,2), (1,4), (0,-1)\} is not a function. Which of the ordered pairs listed below, if omitted from this relation, will make the resulting set a function?

A) (0,−1)  B) (4,1)  C) (−2,2)  D) (1,4)

2) Is the graph below a function?

```
  +---+---+---+
  |   |   |   |
  +---+---+---+
  |   |   |   |
  +---+---+---+
```

3) What is an equation of the linear function that represents the following table of values?

<table>
<thead>
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<th>y</th>
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<tr>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>3</td>
<td>9</td>
</tr>
</tbody>
</table>

A) \( y = 3x \)  B) \( y = x + 3 \)  C) \( y = x + 2 \)  D) \( y = \frac{1}{3}x \)

4) **Part A**

Use the accompanying graph to determine the rate of change of the linear function shown.

**Part B**

Interpret the meaning of this value in the context of the given situation.

```
          Cab Fare
          +------------------+
          |                   |
          |                   |
          |                   |
          |                   |
          +------------------+
            0          10
            1          12
            2          10
            3          0
            4          0
            5          0
            6          0
```

5) Which of the following properties of an object are **not** preserved under a line reflection?

A) orientation  B) size  C) shape  D) all of these
6) Which of the following properties of an object are not preserved under a rotation?
   A) none of these   B) shape   C) size   D) orientation

7) In the accompanying diagram, what type of transformation makes triangle 2 the image of triangle 1?

   ![Diagram](image)

   A) translation   B) rotation centered at the origin   C) reflection in the y-axis   D) dilation

8) What type of transformation moves \((x, y)\) to \((x - 2, y + 3)\)?

   A) translation   B) reflection   C) rotation   D) dilation

9) Refer to the diagram below.

   ![Diagram](image)

What two transformations took triangle ABC to triangle A"B"C"?

   A) a reflection over the x-axis followed by a translation of \((1, -2)\)
   B) a rotation of 180° about the origin followed by a translation of \((-2, -3)\)
   C) a translation of \((1, -2)\) followed by a reflection over the x-axis
   D) a translation of \((1, -3)\) followed by a rotation of 180° about point A
10) In the diagram below, \( \triangle ABC \) is similar but not congruent to \( \triangle A'B'C' \). What type of transformation is represented by \( \triangle A'B'C' \)?

A) dilation  
B) reflection  
C) rotation  
D) translation

11) In the accompanying diagram, trapezoid LMNP is graphed completely within quadrant III. If trapezoid LMNP were dilated with a scale factor < 0 and centered at the origin, in which quadrant would the image be located?

A) I  
B) II  
C) III  
D) IV

Questions 12 and 13 refer to the following:

In the diagram below, two parallel lines are cut by a transversal. Based on this diagram, identify the angle relationship for the given angle pair.

12) \( \angle 3 \) and \( \angle 6 \)

A) alternate interior angles  
B) corresponding angles  
C) vertical angles  
D) alternate exterior angles

13) \( \angle 3 \) and \( \angle 5 \)

A) supplementary angles  
B) corresponding angles  
C) alternate interior angles  
D) alternate exterior angles
Question 14 refers to the following:

In the diagram below, line $\overrightarrow{AB}$ and line $\overrightarrow{CD}$ are parallel. Line $\overrightarrow{EF}$ intersects line $\overrightarrow{AB}$ at point $G$, and intersects line $\overrightarrow{CD}$ at point $H$.

![Diagram with points A, B, C, D, E, F, G, H]

14) Why must angle $\angle AGH$ be congruent to angle $\angle DHG$ in the diagram shown?

A) The angles are alternate interior angles.
B) The angles are alternate exterior angles.
C) The angles are corresponding angles.
D) The angles are vertical angles.
Square and Cube Roots

Perfect Square - The result of a rational number multiplied by itself.
Example: \(4=2\times2\) so 4 is a perfect square.

Perfect Cube - The result of a rational number multiplied by itself three times.
Example: \(2\times2\times2=8\), so 8 is a perfect cube.

Example 1: Evaluate.

\[
\begin{align*}
\text{a) } \sqrt{21} &= 11 & \text{b) } \sqrt[3]{225} &= -15 & \text{c) } \sqrt[3]{6} &= 2 \\
\text{d) } \sqrt{-100} &\text{ is not a real number} & \text{e) } -\sqrt[3]{125} + \sqrt[3]{16} &= -5 + 4 = -1 & \text{f) } \sqrt[3]{\frac{4}{9}} &= \frac{2}{3}
\end{align*}
\]

Try: Evaluate.

\[
\begin{align*}
\text{a) } \sqrt{27} &\quad \text{b) } \sqrt{81} &\quad \text{c) } -\sqrt{49} \\
\text{d) } 2\sqrt{64} &\quad \text{e) } \sqrt{-144} &\quad \text{f) } \sqrt[5]{\frac{16}{25}}
\end{align*}
\]
Steps for Estimating Radicals:

1) Identify the two perfect squares the radicand is between.

2) Take the square root of each of the perfect squares. (The estimation is between these.)

3) Find the distance between the radicand and each perfect square. Determine which is closer.

4) Estimate the distance to the nearest tenth. (For example, 0.1 is really close to the smaller number, 0.5 is very close to the middle, 0.9 is really close to the larger number.)

Example 2: Estimate to the nearest tenth.

a) \[ \sqrt{121} \quad \sqrt{144} \quad \sqrt{20} \]
\[ 11 \quad 12 \]
Acceptable Estimations: 11.0, 11.1, 11.2

b) \[ \sqrt{144} \quad \sqrt{169} \quad \sqrt{4} \]
\[ 12 \quad 13 \]
Acceptable Estimations: 12.7, 12.8, 12.9

c) \[ \sqrt{25} \quad \sqrt{30} \quad \sqrt{36} \quad \sqrt{6} \]
\[ 5 \quad 6 \]
Acceptable Estimations: -5.5, -5.4

Try: Estimate to the nearest tenth.

a) \[ \sqrt{18} \]

b) \[ \sqrt{359} \]

c) \[ -\sqrt{99} \]

d) \[ \sqrt{111} \]

e) \[ \sqrt{285} \]

f) \[ -\sqrt{39} \]

g) \[ \sqrt{341} \]

h) \[ -\sqrt{262} \]

i) \[ \sqrt{60} \]
Square and Cube Roots
Practice

1) Evaluate.
   a) $\sqrt{1}$  
   b) $\sqrt{4}$  
   c) $-\sqrt{100}$
   d) $\sqrt{25}$  
   e) $-\sqrt{2.16}$  
   f) $\sqrt{44} - \sqrt{8}$
   g) $\sqrt{-64}$  
   h) $\sqrt[3]{27}$  
   i) $\frac{1}{\sqrt{16}}$

2) Estimate to the nearest tenth.
   a) $\sqrt{89}$  
   b) $\sqrt{355}$  
   c) $\sqrt{306}$
   d) $\sqrt{10}$  
   e) $-\sqrt{23}$  
   f) $-\sqrt{105}$
   g) $\sqrt{149}$  
   h) $\sqrt{193}$
   i) $-\sqrt{212}$
3) Order each set of numbers from least to greatest.

a) $\sqrt{63}$, 8.1, $3^2$, $\frac{17}{2}$

b) $\sqrt[3]{27}$, $\sqrt{12}$, 2.7, $\pi$

c) $\sqrt{81}$, $\sqrt{76}$, 9.1, $\pi^2$

d) $\sqrt[3]{64}$, $\sqrt{17}$, $\frac{11}{3}$, 3.3

4) Label each of the following numbers on the number line: $\frac{\pi}{2}$, $\sqrt{15}$, $\sqrt{6}$, $\frac{\sqrt{16}}{2}$, $\sqrt{10}$

5) Circle all of the irrational numbers.

$\sqrt{41}$, $\sqrt{200}$, $\sqrt{31}$, $\sqrt{68}$, $\sqrt{35}$, $\sqrt{25}$, $\pi$, $\sqrt[3]{9}$, $\sqrt{100}$
8th Grade Cumulative Day 15

1) Show that the area of square A plus the area of square B is equal to the area of square C.

2) Part A
Using the lengths of the sides of the triangle below, find the area of each square.

Square A: __________
Square B: __________
Square C: __________

Part B
Show that the sum of the areas of two squares equals the area of the third square.

3) Using the Pythagorean theorem, \(a^2 + b^2 = c^2\), what is the length of the hypotenuse of a right triangle whose legs are 3 and 4?

A) 5       B) 144       C) 25       D) 12

4) What is the measure of one leg of a right triangle if the other leg measures 12 and the hypotenuse measures 20?

A) 16       B) 23       C) 32       D) 8

5) What is the length of the diagonal AH in the rectangular prism shown below, in radical form?

6) A 24-ft ladder is leaning against the side of a building.

If the top of the ladder reaches 20 ft up the building, how far is the bottom of ladder from the base of the building? Round your answer to the nearest foot.

7) Maria needs to construct a right triangle for her industrial arts class. Which set of numbers could represent the lengths of the sides of Maria's right triangle?

A) \{6, 8, 10\}       B) \{3, 5, 7\}       C) \{8, 10, 12\}       D) \{4, 6, 8\}
8) Using the Pythagorean theorem, determine if the following triangle is a right triangle.

```
25 inches
20 inches
15 inches
```

9) What is the length of the hypotenuse of the right triangle pictured below?

```
20
21
```

A) 28    B) 784    C) 1,681    D) 41

10) A 25-foot cable holds a telephone pole in place. The cable is attached to the telephone pole 15 feet above the ground. What is the distance along the ground from the base of the pole to the cable?

A) 20 ft    B) 22 ft    C) 29.1 ft    D) 10 ft

11) Using the Pythagorean theorem, determine if the following triangle is a right triangle.

```
40 inches
32 inches
```

12) The dimensions of a cylinder are shown below. What is the total surface area of this cylinder? Round the answer to the nearest square inch.

```
6 in.
14 in.
8 in.
```

A) 754 in.²   B) 264 in.²   C) 1,583 in.²   D) 504 in.²

Question 13 refers to the following:

Use the formula \( V = \pi r^2 h \) to calculate the volume of a cylinder.

13) What is the volume of the solid below? Round your answer to the nearest tenth of a cubic inch.

```
6 in.
9.5 in.
```

A) 1,073.9 in.³   B) 358.0 in.³   C) 179.0 in.³   D) 1,700.3 in.³

14) The formula \( V = \frac{1}{3} \pi r^2 h \) is used to find the volume of what solid?

A) hemisphere   B) cylinder   C) cone   D) sphere
Solving Equations Involving Squares and Cubes

**Square v. Square Root** - Inverse operations, "undo" one another
Example: $3^2 = 9$ and $\sqrt{9} = 3$

**Cube v. Cube Root** - Inverse operations, "undo" one another
Example: $2^3 = 8$ and $\sqrt[3]{8} = 2$

Example 1: Solve each equation. Leave answers exact.

a) $x^2 = 196$
   $\sqrt{x^2} = \pm\sqrt{196}$
   $x = \pm 14$

b) $x^3 = 64$
   $\sqrt[3]{x^3} = \sqrt[3]{64}$
   $x = 4$

c) $x^3 = 99$
   $\sqrt[3]{x^3} = \sqrt[3]{99}$
   $x = \sqrt[3]{99}$

Try: Solve each equation. Leave answers exact.

a) $x^2 = 14$

b) $x^3 = 1000$

c) $x^2 = 400$

d) $x^2 = 121$

e) $x^3 = 30$

f) $x^3 = 27$

g) $x^2 = 200$

h) $x^2 = 361$

i) $x^3 = 81$
Example 2: Solve each word problem using the Five-Step Method.

a) $6^2$ more than a number squared is the same as $10^2$. Find all possible solutions.

\[
\begin{align*}
  n &= \text{a number} \\
  n^2 + 6^2 &= 10^2 \\
  n^2 + 36 &= 100 \\
  n^2 &= 64 \\
  \sqrt{n^2} &= \pm \sqrt{64} \\
  n &= \pm 8 \\
  \text{The possible solutions are 8 and -8.} \\
  8^2 + 6^2 &= 10^2 \text{ and } (-8)^2 + 6^2 = 10^2
\end{align*}
\]

b) Jenny is thinking of a number. If you raise the number to the third power, the result is 2.16. Find the number.

\[
\begin{align*}
  n &= \text{a number} \\
  n^3 &= 2.16 \\
  \sqrt[3]{n^3} &= \sqrt[3]{2.16} \\
  n &= 6 \\
  \text{The number is 6.} \\
  6^3 &= 2.16
\end{align*}
\]

Try: Solve each word problem using the Five-Step Method.

a) 25 less than a number cubed is the same as 100. Find all possible solutions.

b) Find the side length of a cube given a volume of 343 cubic units.
Solving Equations Involving Squares and Cubes

Practice

For 1-12, solve each equation. Leave answers exact.

1) \( x^2 = 256 \)  
2) \( x^2 = 27 \)  
3) \( x^3 = 1 \)

4) \( x^3 = 100 \)  
5) \( x^3 = 64 \)  
6) \( x^2 = 324 \)

7) \( x^3 = 144 \)  
8) \( x^2 = 6 \)  
9) \( x^2 = 216 \)

10) \( x^2 = 25 \)  
11) \( x^3 = 3 \)  
12) \( x^3 = 8 \)
For 13-14, solve each word problem using the Five-Step Method.

13) 15 less than a number squared is the same as 49. Find all possible solutions.

14) Find the side length of a cube given a volume of 512 cubic units.

15) Alfonso is asked to solve the equation $x^2 + 4^2 = 5^2$. List the steps he should use to accomplish this.

16) Select the equation that does not belong. Justify your choice.

   a) $x^3 = 27$  
   b) $x^3 = 125$  
   c) $x^3 = 196$  
   d) $x^3 = 216$

17) Compare and contrast the solutions and the meaning of $x^2 = 1$ and $x^3 = 1$. 
1. When the point is reflected over the x-axis, what will the new coordinates of the new point be?
   A. (-4,2)  
   B. (4,2) 
   C. (-4, -2) 
   D. (4, -2)

2. Translate the image left 3 and down 7.

3. What is true about the resulting image of a scale factor 3 dilation?

4. Rotate the triangle 180° clockwise.

5. Reflect the image across the dotted line.

6. Dilation, reflection, rotation, or translation?

7. Reflect image over y-axis & translate 2 down.

Use the graph to answer questions 8 & 9.

8. Find the coordinates of point Z after a 90° clockwise rotation.
   A. (3,4)  
   B. (-3,4)  
   C. (4,-3)  
   D. (-4,3)

9. Return to the original figure and find the coordinates of point Z after being reflected over the y-axis.
   A. (3,4)  
   B. (-3,4)  
   C. (4,-3)  
   D. (-4,3)
10. Translate the point 3 down and 5 right. Name the coordinates of the new location.

11. What will the length of the line be after it's rotated 90° clockwise?

Use the diagram to answer questions 12 and 13.

12. Name a pair of alternate exterior angles.

13. Name a pair of corresponding angles.

14. What will the length of line \( PQ \) be after a scale factor 2 dilation?

15. What will the length of line \( PQ \) be after a scale factor \( \frac{1}{2} \) dilation?

16. Describe the transformations that transformed triangle \( W \) to triangle \( V \).

17. These are 2 similar triangles. Find \( x \).

A. \( x = 2 \)  
B. \( x = \frac{2^\frac{1}{2}}{2} \)  
C. \( \frac{3^\frac{1}{2}}{3} \)  
D. 3
Rotations

Rotation – "turn," a transformation in which an object turns about a point, congruent figures

Example 1: Perform the indicated counterclockwise (CCW) transformation.

a) Rotation 180° CCW about the origin

b) Rotation 90° CCW about the origin

Try: Perform the indicated transformation.

a) Rotation 180° CCW about the origin

b) Rotation 270° CCW about the origin

c) Rotation 90° CCW about the origin

d) Rotation 180° CCW about the origin
Example 2: Identify the transformation demonstrated in the graph.

a) Rotation 180° CCW about the origin

b) Rotation 90° CCW about the origin

Try: Identify the transformation demonstrated in the graph.

a) Rotation 180° CCW about the origin

b) Rotation 90° CCW about the origin

Coordinate Notation for Rotations:
Rotation 90° CCW about the origin: \((x, y) \rightarrow (-y, x)\)
Rotation 180° CCW about the origin: \((x, y) \rightarrow (-x, -y)\)
Rotation 270° CCW about the origin: \((x, y) \rightarrow (y, -x)\)

Example 3: Express each transformation using coordinate notation.

a) Rotation 180° CCW about the origin
\((x, y) \rightarrow (-x, -y)\)

b) Rotation 180° CCW about the origin and translation 2 units up
\((x, y) \rightarrow (-x, -y+2)\)

Try: Express each transformation using coordinate notation.

a) Rotation 90° CCW about the origin

b) Rotation 270° CCW about the origin and translation 1 unit left
Rotations
Practice

For 1-4, perform the indicated transformation.

1) Rotation 180° CCW about the origin

2) Rotation 90° CCW about the origin

3) Rotation 270° CCW about the origin

4) Rotation 180° CCW about the origin

For 5-8, identify the transformation demonstrated in the graph.

5)

6)
7) For 9-10, express each transformation using coordinate notation.

9) Rotation 180° CCW about the origin

10) Rotation 270° CCW about the origin

For 11-14, mark each statement as true (T) or false (F). For each false statement, correct the underlined word or symbols to make it true.

_____ 11) A rotation is a turn of a figure.

_____ 12) A rotation results in a congruent figure.

_____ 13) A rotation is a transformation in which an object rotates around a line.

_____ 14) Coordinate notation for a rotation 90° CCW about the origin is $(x, y) \rightarrow (y, -x)$.

15) Rotate the figure 540° CCW about the origin.
1. Which relation is a function? Why?
   A. \{(-1,3), (-2,6), (0,0), (-2,-2)\}  
   B. \{(-2,-2), (0,0), (1,1), (2,2)\}  

2. Which of the following graphs represents a relation that is NOT a function of \(x\)?  
   A.  
   B.  
   C.  
   D.  

3. Fill in the blanks with always, sometimes, or never:  
   "A relation is _______ a function." AND "A function is _______ a relation."  
   A. sometimes  
   B. always  
   C. never  
   D. optional

4. What error was made in the mapping of these ordered pairs?  
   \((1, 2), (1, 4), (2, 3), (3, 4)\)  

5. Which of the following represents a function?  
   A.  
   B.  
   C.  
   D.  

6. Which relation is a function?  
   A.  
   B.  

7. Which relation is a function?  
   A. \{\{(0,0), (1,1), (2,2), (0,3)\}\}  
   B. \{\{(0,0), (0,1), (0,2), (0,3)\}\}  
   C. \{\{(0,0), (0,1), (1,0), (0,2)\}\}  
   D. \{\{(0,0), (2,0), (4,0), (6,-2)\}\}  

8. Which table represents \(y\) as a function of \(x\)?  
   A.  
   B.  
   C.  
   D.  

CC.8.F.1

No Calculator
9. Which of the following graphs represents a relation that is NOT a function of $x$?

A. 

B. 

C. 

D. 

10. You have 11 dolls in December and add dolls each month to your collection. The table shows the number of dolls ($d$) you have each month ($m$) beginning in month one. Which equation can be used to find the total number of dolls ($n$) you have after ($m$) months?

<table>
<thead>
<tr>
<th>$m$</th>
<th>$d$</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>14</td>
</tr>
<tr>
<td>2</td>
<td>17</td>
</tr>
<tr>
<td>3</td>
<td>20</td>
</tr>
<tr>
<td>4</td>
<td>23</td>
</tr>
</tbody>
</table>

A. $d = 3n + 13$  
B. $d = 11n + 3$  
C. $d = 3n + 11$  
D. $d = 13n + 3$

11. Which one of the following equations matches the table?

A. $y = x + 1$  
B. $y = x + 2$  
C. $y = 2x$  
D. $y = 3x$

12. Use the table to answer questions 11 and 12.

<table>
<thead>
<tr>
<th>Tickets</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Price ($)</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
</tbody>
</table>

(On the test, you will choose which one of the 4 graphs is correct.)

13. Which graph matches the table?

<table>
<thead>
<tr>
<th>$x$</th>
<th>$y$</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>4</td>
<td>12</td>
</tr>
<tr>
<td>6</td>
<td>17</td>
</tr>
</tbody>
</table>

A. 

B. 

C. 

D. 

14. Which equation matches the table?

A. $t = -2w$  
B. $t = -3w$  
C. $t = (2w)^2$  
D. $t = w^2$

<table>
<thead>
<tr>
<th>$w$</th>
<th>$t$</th>
</tr>
</thead>
<tbody>
<tr>
<td>-2</td>
<td>4</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>16</td>
</tr>
</tbody>
</table>

15. Which equation describes the relationship between $x$ and $y$?

A. $y = 2x - 9$  
B. $y = 5x - 3$  
C. $y = 8x - 3$  
D. $y = 4x + 1$

<table>
<thead>
<tr>
<th>$x$</th>
<th>$y$</th>
</tr>
</thead>
<tbody>
<tr>
<td>-2</td>
<td>-13</td>
</tr>
<tr>
<td>0</td>
<td>-3</td>
</tr>
<tr>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>4</td>
<td>17</td>
</tr>
</tbody>
</table>
Dilations

Dilation - "d-EYE-lation" (bigger/smaller like pupils), a transformation in which an object increases or decreases in size depending on a scale factor in relation to a specific point, similar figures.

Example 1: Perform the indicated transformation (centered at the origin).

a) Dilation by a scale factor of 2

b) Dilation by a scale factor of $\frac{2}{3}$

Try: Perform the indicated transformation.

a) Dilation by a scale factor of $\frac{3}{2}$

b) Dilation by a scale factor of 2

c) Dilation by a scale factor of $\frac{1}{2}$

d) Dilation by a scale factor of $\frac{2}{3}$
Example 2: Identify the transformation demonstrated in the graph.

Try: Identify the transformation demonstrated in the graph.

Coordinate Notation for Dilations:
Dilation by scale factor \( k \) (centered at the origin): \( (x, y) \rightarrow (kx, ky) \)
Reduction: \( 0 < k < 1 \)
Enlargement: \( k > 1 \)

Example 3: Express each transformation using coordinate notation.

a) Dilation by a scale factor of 2
   \( (x, y) \rightarrow (2x, 2y) \)

b) Dilation by a scale factor of \( \frac{2}{3} \)
   \( (x, y) \rightarrow \left(\frac{2}{3}x, \frac{2}{3}y\right) \)

Try: Express each transformation using coordinate notation.

a) Dilation by a scale factor of \( \frac{1}{2} \)
   \( (x, y) \rightarrow \left(\frac{1}{2}x, \frac{1}{2}y\right) \)

b) Dilation by a scale factor of 3 and translation 5 units right
   \( (x, y) \rightarrow (3x+5, 3y) \)
Dilations Practice

For 1-4, perform the indicated transformation (centered at the origin).

1) Dilation by a scale factor of 2.

2) Dilation by a scale factor of \( \frac{1}{4} \).

3) Dilation by a scale factor of \( \frac{3}{2} \).

4) Dilation by a scale factor of \( \frac{1}{2} \).

For 5-8, identify the transformation demonstrated in the graph.

5)

6)
For 9-10, express each transformation using coordinate notation.

9) Dilation by a scale factor of 4

10) Dilation by a scale factor of \( \frac{2}{3} \)

For 11-14, mark each statement as true (T) or false (F). For each false statement, correct the underlined word or symbols to make it true.

_____ 11) A dilation affects the size of a figure.

_____ 12) A dilation results in a congruent figure.

_____ 13) A dilation is a transformation in which an object increases or decreases in size depending on a scale factor in relation to a specific point.

_____ 14) Coordinate notation for a dilation by a scale factor of 2 is \((x, y) \rightarrow (2x, y)\).

15) Dilate the figure by a scale factor of \( \frac{1}{4} \).
1. Simplify \((x^3)^4 x^3\)  

2. Simplify \(4^2 \cdot 4^{-3}\)  

3. Which expression is equivalent to \((x^4)^{-5}\)  

4. Solve for \(x\): \(x^2 = 64\)  

5. Solve for \(x\): \(x^3 = 64\)  

6. What is the \(\sqrt{121}\)?  

7. If the volume of the cube is 125 units, what is the length of side \(x\)?  

8. About how many times greater is 12,000 miles than \(3 \cdot 10^3\) miles?  

9. Evaluate. \((1.5 \cdot 10^5)(3.18 \cdot 10^{11})\)  

10. Which of the following has no solution?  
    
    A. \(2(x + 5) = 1 + 2x + 9\)  
    B. \(2x - 10 = x - 5\)  
    C. \(5x + 12 = 5(x + 4)\)  
    D. \(2x + 10 = 4x + 2\)  

11. Which of the following has infinite solutions?  
    
    A. \(2(x + 5) = 1 + 2x + 9\)  
    B. \(2x - 10 = x - 5\)  
    C. \(5x + 12 = 5(x + 4)\)  
    D. \(2x + 10 = 4x + 2\)  

12. Find the solution to the following equation. \(6(x + 1) - 2x = 9x - 4\)  

13. Evaluate \(8^3\)  

14. Which is an irrational number?  
    
    A. \(\frac{7}{5}\)  
    B. 1.8  
    C. \(\frac{22}{7}\)  
    D. 9.146592017492403...
15. Which of the following is a rational number?
   A. the square root of a prime number
   B. the length of a side of a square with an area of 25cm²
   C. the non-terminating, non-repeating decimal
   D. the length of the side of a square with an area of 5cm².

16. Which statement is true about the following equation? \(3(x - 3) = 3x - 3\)
   A. The equation has 1 solution.
   B. The equation has 2 solutions.
   C. The equation has no solution.
   D. The equation has infinite solutions.

17. On a number line, \(\sqrt{6}\) would fall between...
   A. 2.1 and 2.2
   B. 2.4 and 2.5
   C. 2.8 and 2.9
   D. 3.1 and 3.2

18. Estimate \(\sqrt{47}\) to the nearest tenth.
   A. 6.5
   B. 6.9
   C. 23.5
   D. 24.5

19. Match the point on the number line above to the square root below.
   A. \(\sqrt{5.5}\)
   B. \(\sqrt{11}\)
   C. \(\sqrt{36}\)
   D. \(\sqrt{40}\)

20. What is \(2.35 \times 10^4\) in standard form?

21. Write \(0.\overline{15}\) as a fraction.

22. Solve for \(x\). \(x^2 = \frac{4}{16}\)
Writing Linear Equations Given a Graph

Slope Intercept Form: $y = mx + b$
- $m =$ slope
- $b =$ y-intercept

$(x, y) \rightarrow$ (independent, dependent)

Example 1. Write the equation of the line represented in each graph.

a) $y = \frac{1}{4}x + 2$

b) $y = -\frac{3}{2}x - 1$

Try: Write the equation of the line represented in each graph.

a)

b)

c)

d)
Steps for Graphing

1) Plot the y-intercept.

2) From that point, count rise over run (slope).

3) Connect the points with a line!

Example 2: Graph each linear equation.

a) \( y = \frac{2}{5}x - 4 \)

b) \( y = -4x + 1 \)

Try: Graph each linear equation.

a) \( y = 2x - 4 \)

b) \( y = \frac{2}{3}x \)

c) \( y = -5 \)

d) \( y = -\frac{1}{3}x + 5 \)
Writing Linear Equations Given a Graph
Practice

For 1-6, write the equation of the line represented in each graph.

1) 

2) 

3) 

4) 

5) 

6)
For 7-10, graph each linear equation.

7) \( y = \frac{3}{2}x \)

8) \( y = 3x + 3 \)

9) \( y = 4 \)

10) \( y = -\frac{1}{2}x + 5 \)

11) Review the student work below. Identify and describe any errors.

Graph \( y = x - 4 \).

Maria's Graph

Nikko's Graph
No Calculators on 1-8

1. What is the area of the smallest square?

2. What is the area of the largest square?

3. What is the distance between Points A and B?

4. Look at line segment MN on the graph. How many units long is line segment MN? Round to nearest tenth.

5. If \( z^3 = y \); then \( z = \)

6. The model is a square with an area of 36 square units. Which of the following equation can be used to determine \( s \), the side length of this model in units?
   
   A. \( s = 36 \)      
   B. \( s = \sqrt{12} \)      
   C. \( s = 6^2 \)      
   D. \( s = \sqrt{36} \)

7. If the cube has a side length of \( g \), then which expression represents the volume of the cube?
   
   A. \( \sqrt[3]{g} \)      
   B. \( \sqrt{g} \)      
   C. \( g^2 \)      
   D. \( g^3 \)

8. Look at Bob’s work for finding the volume of a cone with a height of 3 and a diameter of 8. Find his error.

9. Find the volume of a sphere with a diameter of 8 meters. Leave answer in terms of pi.

***Calculators allowed on 10-21***

10. Estimate the diagonal of the rectangle.

11. Find \( x \).
12. Cylinder X has a radius of 5 inches and a height of 1 inches. Cylinder Y has a radius of 1 inches and a height of 5 inches. How do they compare? (The one on the test has a drawing to make it easier.)

13. A sphere has a radius of 8 meters. Find the volume of the sphere. Leave answer in terms of \( \pi \).

14. A cylinder has a diameter of 6 inches and a height of 8 inches. Approximately how many cubic inches will it hold? Leave answer in terms of \( \pi \).

15. What is the approximate volume of cylinder with a diameter of 6 and a height of 2? Use 3.14 for \( \pi \). Round answer to the nearest tenth.

16. What is the volume of a cone with a height of 4 and a diameter of 8?

17. If the diagonal of the square is 6 feet, what is the measurement of the sides of the square?

18. Find the height of a cylinder that has a diameter of 12 and a volume of 1,017.9 in\(^3\) (rounded). (Use the \( \pi \) button on the calculator.)

19. Find the height of a cone that has a radius of 9 and a volume of 108\(\pi\) ft\(^3\).

20. Find the radius of a sphere that has a volume of 972\(\pi\) in\(^3\).

21. What is the diameter of the sphere in question 20?
Comparing Linear Functions

Greater Rate of Change - Compare the absolute value of the rates of change. Which y-values change quicker than its x-values?

Example: Determine which function has the greater rate of change. Show or explain how you know.

\[
\frac{\text{rise}}{\text{run}} = \frac{-5}{1} = -5
\]

\[
\frac{\text{change in } y}{\text{change in } x} = \frac{4}{1} = 4
\]

\[
|-5| > |4|
\]

\[
\therefore \text{ the graph has a greater ROC}
\]

Try: Determine which function has the greater rate of change. Show or explain how you know.

a)

\[
\begin{array}{c|c}
 x & y \\
 3 & 3 \\
 6 & 4 \\
 9 & 5 \\
 12 & 6 \\
\end{array}
\]

b)

\[
y = -2x + 9
\]
Example 2: Determine which function has the greater initial value. Show or explain how you know.

A car begins a road trip 50 miles from home and travels at a rate of 60 miles per hour.

\[ d = 45t + 55 \]

Starts 55 miles from home.

Try: Determine which function has the greater initial value. Show or explain how you know.

a) A school bus departs for a field trip 70 miles from its destination and travels at a rate of 55 miles per hour.

\[ d = -60t + 65 \]

b) A bicyclist leaves home and travels 14 miles per hour.

<table>
<thead>
<tr>
<th>Time (hours)</th>
<th>Distance (miles)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>10</td>
</tr>
<tr>
<td>1</td>
<td>22</td>
</tr>
<tr>
<td>2</td>
<td>34</td>
</tr>
<tr>
<td>3</td>
<td>46</td>
</tr>
</tbody>
</table>

c) An Afternoon Walk

\[ d = 2.5t + 5 \]
Comparing Linear Functions
Practice

For 1-2, determine which function has the greater rate of change. Show or explain how you know.

1) A car begins a road trip 40 miles from home and travels at a rate of 60 miles per hour.
   \[ d = 50t + 55 \]

2) [Graph of a line with a table]

<table>
<thead>
<tr>
<th>x</th>
<th>y</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>12</td>
</tr>
<tr>
<td>6</td>
<td>10</td>
</tr>
<tr>
<td>9</td>
<td>8</td>
</tr>
<tr>
<td>12</td>
<td>6</td>
</tr>
</tbody>
</table>

For 3-4, determine which function has the greater initial value. Show or explain how you know.

3) [Graph of a line with a table]

<table>
<thead>
<tr>
<th>Time (hours)</th>
<th>Distance (miles)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>3</td>
<td>13</td>
</tr>
</tbody>
</table>
4) A rollerblader leaves home and travels 7 miles per hour. \[ d = 6t + 2 \]

5) Identify each function as proportional or non-proportional. Justify your answers.

a) 

<table>
<thead>
<tr>
<th>( x )</th>
<th>( y )</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>6</td>
</tr>
</tbody>
</table>

b) \[ y = -\frac{4}{5}x \]

c) 

6) The graph of Function A passes through (3, -4) and (6, -8). The graph of Function B passes through (4, 6) and (-2, 0).

a) Write the equation representing Function A.

b) Write the equation representing Function B.

c) Which function has a greater rate of change? Justify your choice.

d) Which function has a greater y-intercept? Justify your choice.

e) Classify each as proportional or non-proportional.
Lesson Topic: Compare magnitude of numbers in scientific notation Part 2

Question 1:

Which of the following best describes the relationship between the numbers $3.5 \times 10^4$ and $7 \times 10^2$?

- $3.5 \times 10^4$ is 50 times larger than $7 \times 10^2$
- $3.5 \times 10^4$ is 200 times larger than $7 \times 10^2$
- $3.5 \times 10^4$ is 5 times larger than $7 \times 10^2$
- $3.5 \times 10^4$ is 2 times larger than $7 \times 10^2$
- $3.5 \times 10^4$ is 500 times larger than $7 \times 10^2$

Question 2:

Which of the following best describes the relationship between the numbers $3.3 \times 10^3$ and $1.1 \times 10^4$?

- $3.3 \times 10^3$ is 300,000 times larger than $1.1 \times 10^4$
- $3.3 \times 10^3$ is 333 times larger than $1.1 \times 10^4$
- $3.3 \times 10^3$ is 3.33 times larger than $1.1 \times 10^4$
- $3.3 \times 10^3$ is 300 times larger than $1.1 \times 10^4$
- $3.3 \times 10^3$ is 3,000,000 times larger than $1.1 \times 10^4$

Question 3:

Which of the following best describes the relationship between the numbers $4.5 \times 10^5$ and $6.0 \times 10^4$?

- $4.5 \times 10^5$ is .133 times larger than $6.0 \times 10^4$
- $4.5 \times 10^5$ is 750 times larger than $6.0 \times 10^4$
- $4.5 \times 10^5$ is 75 times larger than $6.0 \times 10^4$
- $4.5 \times 10^5$ is 1.33 times larger than $6.0 \times 10^4$
- $4.5 \times 10^5$ is 7.5 times larger than $5.0 \times 10^4$

Question 4:

Which of the following best describes the relationship between the numbers $7.5 \times 10^9$ and $5.0 \times 10^7$?

- $7.5 \times 10^9$ is 15,000 times larger than $5.0 \times 10^7$
- $7.5 \times 10^9$ is 15 times larger than $5.0 \times 10^7$
- $7.5 \times 10^9$ is 1,500,000 times larger than $5.0 \times 10^7$
- $7.5 \times 10^9$ is 1,500 times larger than $5.0 \times 10^7$
- $7.5 \times 10^9$ is 150 times larger than $5.0 \times 10^7$

Question 5:
Lesson Topic: Compare magnitude of numbers in scientific notation Part 1

Question 1:
 Complete the statement by entering <, >, or =.

$2.78 \times 10^5 \quad 2.94 \times 10^2$

Question 2:
 Complete the statement by entering <, >, or =.

$4.63 \times 10^5 \quad 2.94 \times 10^7$

Question 3:
 Complete the statement by entering <, >, or =.

$0.043 \times 10^6 \quad 43 \times 10^3$

Question 4:
 Complete the statement by entering <, >, or =.

$0.913 \times 10^6 \quad 2 \times 10^4$

Question 5:
 Complete the statement by entering <, >, or =.

$13.485 \times 10^2 \quad 11.1 \times 10^3$
Interior and Exterior Angle Sums of Triangles

Interior Angle Sum - To find the interior angle sum of any polygon, use \((n-2)180\), where \(n\) = the number of sides. (IAS of triangles is \(180^\circ\))

Example 1: Determine the measure of each interior angle of the triangle.

\[
2x + 1 + 7x - 4 + 7x - 9 = 180
\]

\[
16x - 12 = 180
\]

\[
m\angle A = 2(12) + 25^\circ
\]

\[
m\angle B = 7(12) - 4 = 80^\circ
\]

\[
m\angle C = 7(12) - 9 = 75^\circ
\]

Try: Determine the measure of each interior angle.

a) 

\[
2x + 8
\]

\[
13x - 6
\]

\[
3x - 2
\]

b) 

\[
4x + 2
\]

\[
12x - 17
\]

\[
75^\circ
\]
**Exterior Angle Sum** - The sum of the measures of the exterior angles of a polygon is always 360°.

**Exterior Angle Theorem** - The measure of any exterior angle of a triangle is equal to the sum of the measures of the two remote interior angles.

**Example 2:** Determine the measure of \( \angle ABC \).

\[
2x + 1 + 5x + 9 = 9x - 20 \\
7x + 10 = 9x - 20 \\
-7x -7x \\
10 = 2x - 20 \\
+20 +20 \\
30 = 2x \\
2 2 \\
15 = x
\]

\[m\angle ABC = 5(15) + 9 = 84°\]

**Try:** Determine the measure of the indicated angle.

a) \( \angle DEF \)

b) \( \angle HIG \)
Interior and Exterior Angle Sums of Triangles

Practice

For 1-4, determine the measure of the indicated angle(s).

1) Each interior angle

2) \( \angle DEF \)

3) \( \angle HIG \)

4) \( \angle KLJ \)
5) Determine the measure of each angle:

\( \angle BCA \) \( \angle ACD \) \( \angle BCE \)

\( \angle CAB \) \( \angle DCF \) \( \angle BEC \)

6) Identify and correct the error.

Write and solve an equation to determine the value of \( n \).

\[ n + 28 + n + 30 + 86 = 180 \]
\[ 2n + 144 = 180 \]
\[ 2n = 36 \]
\[ n = 18 \]
Parallel Lines Cut by a Transversal

Parallel Lines - lines that never intersect (line m and line n)

Transversal - a line that passes through two or more other lines (line t)

Alternate Exterior Angles - angles that are outside parallel lines and on either side of the transversal (1&8, 2&7)

Alternate Interior Angles - angles that are inside parallel lines and on either side of the transversal (3&6, 4&5)

Corresponding Angles - angles found in matching corners (1&5, 2&6, 3&7, 4&8)

Vertical Angles - angles that share a vertex and are across from one another when two lines cross (1&4, 2&3, 5&8, 6&7)

Example 1: Identify the angle relationship demonstrated. Then determine the value of x.

These are alternate exterior angles:
\[ 7x + 12 = 9x - 8 \]
\[ -7x \quad -7x \]
\[ 12 = 2x - 8 \]
\[ 12 + 8 \quad +8 \]
\[ 20 = 2x \]
\[ 2 \quad 2 \]
\[ 10 = x \]

Try: Identify the angle relationship demonstrated. Then determine the value of x.

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Same-Side Interior Angles — angles that are inside parallel lines and on the same side of the transversal.

Adjacent Angles — angles that are next to one another and share a side and a vertex, supplementary when parallel lines are cut by a transversal.

Example 2: Identify the angle relationship demonstrated. Then determine the measure of each labeled angle.

These are adjacent (supplementary) angles.

\[ 6x + 13 + 10x - 25 = 180 \]
\[ 16x - 12 = 180 \]
\[ +12 \quad +12 \]
\[ 16x = 192 \]
\[ 16 \quad 16 \]
\[ x = 12 \]
\[ 6(12) + 13 = 85^\circ \]
\[ 10(12) - 25 = 95^\circ \]

Try: Identify the angle relationship demonstrated. Then determine the measure of each labeled angle.

a)

b)
Parallel Lines Cut by a Transversal Practice

For 1-4, identify the angle relationship demonstrated. Then determine the measures of the two unique angle measures in each figure.

1) 
\[16x - 2\] 
\[15x + 4\]

2) 
\[2x + 23\] 
\[4x - 17\]

3) 
\[-10x + 20\] 
\[-4x - 8\]

4) 
\[60x + 37\] 
\[40x - 7\]
5) Use your knowledge of angle relationships to find the values of \( w, x, y, \) and \( z \).

\[
\begin{align*}
\text{w} &= \underline{\quad}^\circ \\
\text{x} &= \underline{\quad}^\circ \\
\text{y} &= \underline{\quad}^\circ \\
\text{z} &= \underline{\quad}^\circ \\
\end{align*}
\]

6) Use your knowledge of angle relationships to find the values of \( a, b, c, \) and \( d \).

\[
\begin{align*}
\text{a} &= \underline{\quad}^\circ \\
\text{b} &= \underline{\quad}^\circ \\
\text{c} &= \underline{\quad}^\circ \\
\text{d} &= \underline{\quad}^\circ \\
\end{align*}
\]

7) An angle is twice the measure of its supplement. Write and solve an equation to find the two angle measures.

\[
\begin{align*}
n &= \text{an angle} \\
180-n &= \text{the angle's supplement}
\end{align*}
\]