Lesson 1 Practice Problems

Problem 1

a. Is a temperature of -11 degrees warmer or colder than a temperature of -15 degrees?

b. Is an elevation of -10 feet closer or farther from the surface of the ocean than an elevation of -8 feet?

c. It was 8 degrees at nightfall. The temperature dropped 10 degrees by midnight. What was the temperature at midnight?

d. A diver is 25 feet below sea level. After he swims up 15 feet toward the surface, what is his elevation?

Possible Solutions

a. Warmer

b. Farther

c. -2 degrees

d. -10 feet or 10 feet below sea level

Problem 2

a. A whale is at the surface of the ocean to breathe. What is the whale's elevation?

b. The whale swims down 300 feet to feed. What is the whale's elevation now?

c. The whale swims down 150 more feet more. What is the whale's elevation now?

d. Plot each of the three elevations as a point on a vertical number line. Label each point with its numeric value.

Possible Solutions

a. 0. (Sea level is 0 feet above or below sea level.)

b. -300 feet. (The whale is 300 feet *below* sea level.)

c. -450 feet. (The whale was 300 feet *below* sea level, and now it is an additional 150 feet below sea level.)

d. A number line with 0, -300, and -450 marked.

Problem 3

From Grade 6, Unit 6, Lesson 5

Explain how to calculate a number that is equal to $\frac{2.1}{1.5}$.

Possible Solutions

Answers vary. Sample response: $\frac{2.1}{1.5}$ means $2.1 \div 1.5$. This can be done by long division. (The question doesn't require it, but the quotient is 1.4.)

Problem 4

From Grade 6, Unit 6, Lesson 4

Write an equation to represent each situation and then solve the equation.

a. Andre drinks 15 ounces of water, which is $\frac{3}{5}$ of a bottle. How much does the bottle hold? Use x for the number of ounces of water the bottle holds.

b. A bottle holds 15 ounces of water. Jada drank 8.5 ounces of water. How many ounces of water are left in the bottle? Use y for the number of ounces of water left in the bottle.

c. A bottle holds z ounces of water. A second bottle holds 16 ounces, which is $\frac{8}{5}$ times as much water. How much does the first bottle hold?

Possible Solutions

a. $\frac{3}{5}x = 15$. Solution: 25.

b. $y + 8.5 = 15$. Solution: 6.5.

c. $\frac{8}{5}z = 16$ Solution: 10. Equations equivalent to these are also acceptable.

Problem 5

From Grade 6, Unit 4, Lesson 13

A rectangle has an area of 24 square units and a side length of $2\frac{3}{4}$ units. Find the other side length of the rectangle. Show your reasoning.

Possible Solutions

$8\frac{8}{11}$. Sample reasoning: $24 \div \frac{11}{4} = 24 \cdot \frac{4}{11} = \frac{96}{11} = 8\frac{8}{11}$.

Lesson 2 Practice Problems
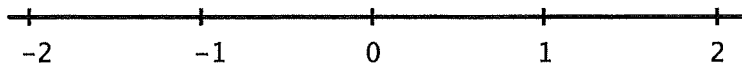
Problem 1

For each number, name its opposite.

a. -5

b. 28

c. -10.4

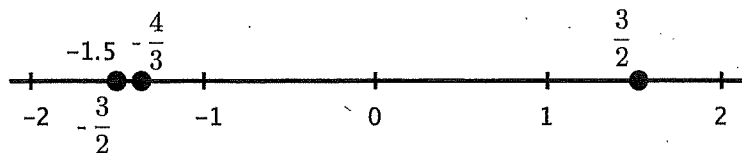d. 0.875

e. 0

f. -8,003

Possible Solutions

a. 5

b. -28

c. 10.4

d. -0.875

e. 0

f. 8,003

Problem 2

Plot the numbers -1.5, $\frac{3}{2}$, $-\frac{3}{2}$, and $-\frac{4}{3}$ on the number line. Label each point with its numeric value.
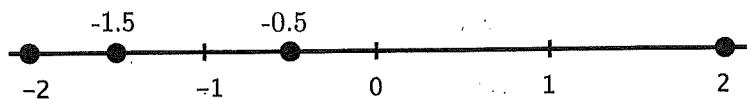

Possible Solutions

Lesson 2 Practice Problems

Problem 3

Plot the following points on a number line.

- -1.5
- the opposite of 0.5
- the opposite of -2
- -2

Possible Solutions

Problem 4

From Grade 6, Unit 7, Lesson 1

a. Represent each of these temperatures in degrees Fahrenheit with a positive or negative number.

   i. 5 degrees above zero

   ii. 3 degrees below zero

   iii. 6 degrees above zero

   iv. $2\frac{3}{4}$ degrees below zero

b. Order the temperatures above from the coldest to the warmest.

Possible Solutions

a. $5, -3, 6, -2\frac{3}{4}$

b. $-3, -2\frac{3}{4}, 5, 6$

Problem 5

From Grade 6, Unit 6, Lesson 5

Solve each equation.

a. $8x = \frac{2}{3}$

b. $1\frac{1}{2} = 2x$

c. $5x = \frac{2}{7}$

d. $\frac{1}{4}x = 5$

e. $\frac{1}{5} = \frac{2}{3}x$

Possible Solutions

a. $x = \frac{2}{24}$ (or equivalent)

b. $x = \frac{3}{4}$ (or equivalent)

c. $x = \frac{2}{35}$ (or equivalent)

d. $x = 20$

e. $x = \frac{3}{10}$ (or equivalent)

Problem 6

From Grade 6, Unit 6, Lesson 5

Write the solution to each equation as a fraction and as a decimal.

a. $2x = 3$

b. $5y = 3$

c. $0.3z = 0.009$

Possible Solutions

a. $x = \frac{3}{2}$ or $x = 1.5$

b. $y = \frac{3}{5}$ or $y = 0.6$

c. $z = \frac{0.009}{0.3}$ or $z = 0.03$ or $z = \frac{3}{100}$

Problem 7

From Grade 6, Unit 3, Lesson 4

There are 15.24 centimeters in 6 inches.

a. How many centimeters are in 1 foot?

b. How many centimeters are in 1 yard?

Lesson 2 Practice Problems

Possible Solutions

a. 30.48 centimeters

b. 91.44 centimeters

Lesson 3 Practice Problems

Problem 1

Decide whether each inequality statement is true or false. Explain your reasoning.

a. -5 > 2

b. 3 > -8

c. -12 > -15

d. -12.5 > -12

Possible Solutions

a. False, -5 is to the left of 2.

b. True, 3 is to the right of -8.

c. True, -12 is to the right of -15.

d. False, -12.5 is to the left of -12.

Problem 2

Here is a true statement: $-8.7 < -8.4$. Select **all** of the statements that are equivalent to $-8.7 < -8.4$.

A. -8.7 is further to the right on the number line than -8.4.

B. -8.7 is further to the left on the number line than -8.4.

C. -8.7 is less than -8.4.

D. -8.7 is greater than -8.4.

E. -8.4 is less than -8.7.

F. -8.4 is greater than -8.7.

Possible Solutions

B, C, F

Problem 3

From Grade 6, Unit 7, Lesson 4

The table shows five states and the lowest point in each state.

state	lowest elevation (feet)
California	-282
Colorado	3350
Louisiana	-8
New Mexico	2842
Wyoming	3099

Put the states in order by their lowest elevation, from least to greatest.
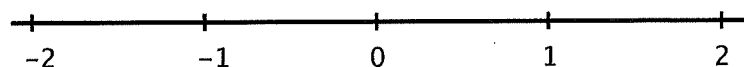
Possible Solutions

California, Louisiana, New Mexico, Wyoming, Colorado

Problem 4

From Grade 6, Unit 7, Lesson 2

Plot each of the following numbers on the number line. Label each point with its numeric value.

$0.4, -1.5, -1\frac{7}{10}, -\frac{11}{10}$

Possible Solutions

A correct solution has four points plotted in the following order from left to right: $-1\frac{7}{10}, -1.5, -\frac{11}{10}$ (between -2 and -1), 0.4 (between 0 and 1).

Problem 5

From Grade 6, Unit 6, Lesson 6

Each lap around the track is 400 meters.

a. How many meters does someone run if they run:
   2 laps?   5 laps? x laps?

b. If Noah ran 14 laps, how many meters did he run?

c. If Noah ran 7,600 meters, how many laps did he run?

Possible Solutions

a. 800 meters ($400 \cdot 2 = 800$), 2,000 meters ($400 \cdot 5 = 2,000$), $400x$ meters or equivalent

b. 5,600 ($400 \cdot 14 = 5,600$)

c. 19 ($7600 \div 400 = 19$)

Problem 6

From Grade 6, Unit 3, Lesson 16

A stadium can seat 16,000 people at full capacity.

a. If there are 13,920 people in the stadium, what percentage of the capacity is filled? Explain or show your reasoning.

b. What percentage of the capacity is not filled?

Possible Solutions

a. 87% is filled, because $13,920 \div 16,000 = 0.87$.

b. 13% remains, because $100 - 87 = 13$.

Lesson 4 Practice Problems

Problem 1

Select **all** of the numbers that are *greater than* -5.

A. 1.3

B. -6

C. -12

D. $\frac{1}{7}$

E. -1

F. -4

Possible Solutions

A, D, E, F

Problem 2

Order these numbers from least to greatest: $\frac{1}{2}, 0, 1, -1\frac{1}{2}, -\frac{1}{2}, -1$

Possible Solutions

$-1\frac{1}{2}, -1, -\frac{1}{2}, 0, \frac{1}{2}, 1$

Problem 3

Here are the boiling points of certain elements in degrees Celsius:

- Argon: -185.8

- Chlorine: -34

- Fluorine: -188.1

- Hydrogen: -252.87

- Krypton: -153.2

List the elements from least to greatest boiling points.

Possible Solutions

Hydrogen, fluorine, argon, krypton, chlorine

Problem 4

From Grade 6, Unit 7, Lesson 2

Explain why zero is considered its own opposite.

Possible Solutions

Answer vary. Sample response: Opposites are equally distant from 0. Since 0 is the only number that is 0 units from 0, it has to be its own opposite. $0 + 0 = 0$.

Problem 5

From Grade 6, Unit 6, Lesson 9

Explain how to make these calculations mentally.

a. $99 + 54$

b. $244 - 99$

c. $99 \cdot 6$

d. $99 \cdot 15$

Possible Solutions

Answers vary. Sample responses:

a. 153; this is one less than $100 + 54 = 154$.

b. 145; this is one more than $244 - 100 = 144$.

c. 594; this is one 6 short of 100 sixes or 600.

d. 1485; this is one 15 short of 100 fifteens or 1500.

Problem 6

From Grade 6, Unit 4, Lesson 11

Find the quotients.

a. $\frac{1}{2} \div 2$

b. $2 \div 2$

c. $\frac{1}{2} \div \frac{1}{2}$

d. $\frac{38}{79} \div \frac{38}{79}$

Possible Solutions

a. $\frac{1}{4}$

b. 1

c. 1

d. 1

Problem 7

From Grade 6, Unit 3, Lesson 4

Over several months, the weight of a baby measured in pounds doubles. Does its weight measured in kilograms also double? Explain.

Possible Solutions

Yes. Explanations vary. Sample explanation: The weight itself doubles, so any measurement of the weight using the same units will also double. We can also see that by saying if the weight is x pounds, then double that weight would be $2x$ pounds. The weight in kilograms will be $x \div 2.2$, and the double weight will be $(2x) \div 2.2$ or $2(x \div 2.2)$, which is also double.

Lesson 5 Practice Problems

Problem 1

Write a positive or negative number to represent each change in the high temperature.

  a. Tuesday's high temperature was 4 degrees less than Monday's high temperature.

  b. Wednesday's high temperature was 3.5 degrees less than Tuesday's high temperature.

  c. Thursday's high temperature was 6.5 degrees more than Wednesday's high temperature.

  d. Friday's high temperature was 2 degrees less than Thursday's high temperature.

Possible Solutions

  a. -4

  b. -3.5

  c. +6.5 or 6.5

  d. -2

Problem 2

Decide which of the following quantities can be represented by a positive number and which can be represented by a negative number. Give an example of a quantity with the opposite sign in the same situation.

  a. Tyler's puppy gained 5 pounds.

  b. The aquarium leaked 2 gallons of water.

  c. Andre received a gift of $10.

  d. Kiran gave a gift of $10.

  e. A climber descended 550 feet.

Possible Solutions

Answers vary. Sample responses:

  a. Positive. Tyler's puppy lost 5 pounds.

  b. Negative. 2 gallons of water was added to the aquarium.

  c. Positive. Andre gave a gift of $10.

  d. Negative. Kiran received a gift of $10.

e. Negative. A climber ascended 550 feet.

Problem 3

Make up a situation where a quantity is changing.

a. Explain what it means to have a negative change.

b. Explain what it means to have a positive change.

c. Give an example of each.
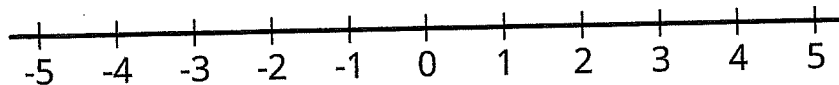
Possible Solutions

Answers vary. Sample response: They were selling candy at the concession stand.

a. When they sell candy, the change is negative.

b. When they get more candy to sell, the change is positive.

c. For example, in one hour the number of packages of candy changed by -5 because they sold 5, and in the next hour it changed by 20 because they got 20 more to sell.

Problem 4

From Grade 6, Unit 7, Lesson 2

a. On the number line, label the points that are 4 units away from 0.

b. If you fold the number line so that a vertical crease goes through 0, the points you label would match up. Explain why this happens.

c. On the number line, label the points that are $\frac{5}{2}$ units from 0. What is the distance between these points?

Possible Solutions

a. On the number line, -4 and 4 should be labeled.

b. The two points match up because they are opposites; they are the same distance from 0.

c. 2.5 and -2.5 should be labeled. The distance between them is 5 units, because each one is 2.5 units away from 0.

Problem 5

From Grade 6, Unit 6, Lesson 12

Evaluate each expression.

a. $2^3 \cdot 3$

b. $\frac{4^2}{2}$

c. 3^1

d. $6^2 \div 4$

e. $2^3 - 2$

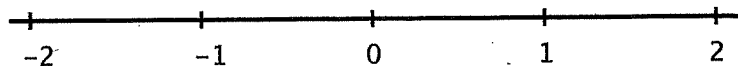f. $10^2 + 5^2$

Possible Solutions

a. 24

b. 8

c. 3

d. 9

e. 6

f. 125

Lesson 6 Practice Problems

Problem 1

On the number line, plot and label all numbers with an absolute value of $\frac{3}{2}$.

```
+———————+———————+———————+———————+
-2      -1       0       1       2
```

Possible Solutions

Points $\frac{3}{2}$ and $\frac{-3}{2}$, $1\frac{1}{2}$ and $-1\frac{1}{2}$, or 1.5 and -1.5 should be plotted.

Problem 2

The temperature at dawn is $6°C$ away from 0. Select **all** the temperatures that are possible.

A. -12°C

B. -6°C

C. 0°C

D. 6°C

E. 12°C

Possible Solutions

B, D

Problem 3

Order from least to greatest:

|-2.7| 0   1.3 |-1| 2

Possible Solutions

0 |-1| 1.3   2 |-2.7|

Problem 4

From Grade 6, Unit 6, Lesson 16

Elena donates some money to charity whenever she earns money as a babysitter. The table shows how much money, d, she donates for different amounts of money, m, that she earns.

d	4.44	1.80	3.12	3.60	2.16
m	37	15	26	30	18

a. What percent of her income does Elena donate to charity? Explain or show your work.

b. Which quantity, m or d, would be the better choice for the dependent variable in an equation describing the relationship between m and d? Explain your reasoning.

c. Use your choice from the second question to write an equation that relates m and d.

Possible Solutions

a. Elena donates 12% of her income to charity. Sample reasoning: We want to know what percent of 30 is 3.6, so we can write $30p = 3.6$. To solve this, divide 3.6 by 30, which is 0.12. So 12% of 30 is 3.6.

b. Answers vary. Sample response: Since the amount of the donation depends on how much money she earns, d would be better as the dependent variable. If she wants to donate a certain amount and needs to figure out how much she needs to earn to achieve that donation, then m would be better as the dependent variable.

c. $d = .12m$ or equivalent $m = \frac{100}{12}d$ or $m = d \div .12$ or equivalent

Problem 5

From Grade 6, Unit 6, Lesson 12

How many times larger is the first number in the pair than the second?

a. 3^4 is _____ times larger than 3^3.

b. 5^3 is _____ times larger than 5^2.

c. 7^{10} is _____ times larger than 7^8.

d. 17^6 is _____ times larger than 17^4.

e. 5^{10} is _____ times larger than 5^4.

Possible Solutions

a. 3

b. 5

c. 7^2 or 49

d. 17^2 or 289

e. 5^6 or 15,625

Problem 6

From Grade 6, Unit 5, Lesson 11

Lin's family needs to travel 325 miles to reach her grandmother's house.

a. At 26 miles, what percentage of the trip's distance have they completed?

b. How far have they traveled when they have completed 72% of the trip's distance?

c. At 377 miles, what percentage of the trip's distance have they completed?

Possible Solutions

a. 8% of the trip, because $26 \div 325 = 0.08$.

b. 234 miles, because $0.72 \cdot 325 = 234$.

c. 116% of the trip, because $377 \div 325 = 1.16$.

Lesson 7 Practice Problems

Problem 1

In the context of elevation, what would $|-7|$ feet mean?

Possible Solutions

The vertical distance between the point at -7 feet and sea level (0 feet).

Problem 2

Match the statements written in English with the mathematical statements.

A. The number -4 is a distance of 4 units away from 0 on the number line.

B. The number -63 is more than 4 units away from 0 on the number line.

C. The number 4 is greater than the number -4.

D. The numbers 4 and -4 are the same distance away from 0 on the number line.

E. The number -63 is less than the number 4.

F. The number -63 is further away from 0 than the number 4 on the number line.

1. $|-63| > 4$

2. $-63 < 4$

3. $|-63| > |4|$

4. $|-4| = 4$

5. $4 > -4$

6. $|4| = |-4|$

Possible Solutions

A. 4

B. 1

C. 5

D. 6

E. 2

F. 3

Problem 3

Compare each pair of expressions using >, <, or =.

a. -32 _____ 15

b. |-32| _____ |15|

c. 5 _____ -5

d. |5| _____ |-5|

e. 2 _____ -17

f. 2 _____ |-17|

g. |-27| _____ |-45|

h. |-27| _____ -45

Possible Solutions

a. -32 < 15 because 15 is further right on the number line.

b. |-32| > |15| because -32 is further from zero than 15.

c. 5 > -5 because 5 is further right on the number line than -5.

d. |5| = |-5|, because 5 and -5 are the same distance away from zero.

e. 2 > -17 because 2 is further right on the number line than -17.

f. 2 < |-17| because -17 is more than 2 units away from zero.

g. |-27| < |-45| because -45 is further from zero than -27.

h. |-27| > -45 because 27 > -45.

Problem 4

From Grade 6, Unit 7, Lesson 5

Mai received and spent money in the following ways last month. For each example, write a signed number to represent the change in money from her perspective.

a. Her grandmother gave her $25 in a birthday card.

b. She earned $14 dollars babysitting.

c. She spent $10 on a ticket to the concert.

d. She donated $3 to a local charity

e. She got $2 interest on money that was in her savings account.

Possible Solutions

a. +25 or 25

b. +14 or 14

c. -10

d. -3

e. + 2 or 2

Lesson 7 Practice Problems

Problem 5

From Grade 6, Unit 7, Lesson 1

Here are the lowest temperatures recorded in the last 2 centuries for some US cities. Temperatures are in degrees Fahrenheit.

- Death Valley, CA was -45 in January of 1937.
- Danbury, CT was -37 in February of 1943.
- Monticello, FL was -2 in February of 1899.
- East Saint Louis, IL was -36 in January of 1999.
- Greenville, GA was -17 in January of 1940.

a. Which of these states has the lowest record temperature?

b. Which state has a lower record temperature, FL or GA?

c. Which state has a lower record temperature, CT or IL?

d. How many more degrees colder is the record temperature for GA than for FL?

Possible Solutions

a. CA

b. GA

c. CT

d. 15 degrees

Problem 6

From Grade 6, Unit 5, Lesson 13

Find the quotients.

a. $0.024 \div 0.015$

b. $0.24 \div 0.015$

c. $0.024 \div 0.15$

d. $24 \div 15$

Possible Solutions

a. 1.4

b. 14

c. 0.14

d. 1.4

Lesson 8 Practice Problems

Problem 1

At the book sale, all books cost less than $5.

a. What is the most expensive a book could be?

b. Write an inequality to represent costs of books at the sale.

c. Draw a number line to represent the inequality.

Possible Solutions

a. $4.99

b. Answer varies. Sample response: If p is the price of a book, then $p < 5$.

c. The number line has an open circle and an arrow drawn to the left starting with 5.

Problem 2

Kiran started his homework *before* 7:00 p.m. and finished his homework *after* 8:00 p.m. Let h represent the number of hours Kiran worked on his homework.

Decide if each statement it is definitely true, definitely not true, or possibly true. Explain your reasoning.

a. $h > 1$

b. $h > 2$

c. $h < 1$

d. $h < 2$

Possible Solutions

a. Definitely true. Kiran worked from 7:00 until 8:00 and some additional time.

b. Possibly true. It is true if Kiran started his homework at 6:15 and stopped at 8:30. It could also be false if Kiran started his work at 6:45 and finished at 8:15.

c. Definitely false. $h > 1$ is true.

d. Possibly true. $h > 2$ might be true, but it might also be false.

Problem 3

From Grade 6, Unit 6, Lesson 14

Consider a rectangular prism with length 4 and width and height d.
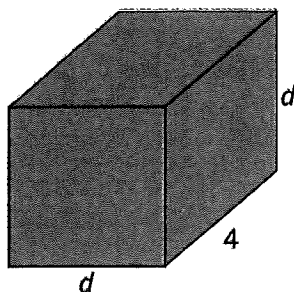
a. Find an expression for the volume of the prism in terms of d.

b. Compute the volume of the prism when $d = 1$, when $d = 2$, and when $d = \frac{1}{2}$.

Possible Solutions

a. $4d^2$

b. When $d = 1$, the volume is 4. When $d = 2$, the volume is 16. When $d = \frac{1}{2}$, the volume is 1.

Problem 4

From Grade 6, Unit 7, Lesson 7

Match the mathematical statements with the statements written in English. All of these statements are true.

A. $|-12| > -15$

B. $-15 < -12$

C. $|-15| > |-12|$

D. $|-12| = 12$

E. $12 > -12$

F. $|12| = |-12|$

1. The number -15 is further away from 0 than the number -12 on the number line.

2. The number -12 is a distance of 12 units away from 0 on the number line.

3. The distance between -12 and 0 on the number line is greater than -15.

4. The numbers 12 and -12 are the same distance away from 0 on the number line.

5. The number -15 is less than the number -12.

6. The number 12 is greater than the number -12.

Possible Solutions

A. 3

B. 5

C. 1

D. 2

E. 6

F. 4

Problem 5

From Grade 6, Unit 6, Lesson 11

Here are five sums. Use the distributive property to write each sum as a product with two factors.

a. $2a + 7a$

b. $5z - 10$

c. $c - 2c^2$

d. $r + r + r + r$

e. $2x - \frac{1}{2}$

Possible Solutions

Answers vary. For examples:

a. $(2 + 7)a$ or $9a$

b. $5(z - 2)$

c. $c(1 - 2c)$

d. $(1 + 1 + 1 + 1)r$ or $4r$

e. $2(x - \frac{1}{4})$ or $\frac{1}{2}(4x - 1)$

Lesson 9 Practice Problems

Problem 1

a. Select **all** numbers that are solutions to the inequality $k > 5$.

   i. 4

   ii. 5

   iii. 6

   iv. 5.2

   v. 5.01

   vi. 0.5

b. Draw a number line to represent this inequality.

Possible Solutions

a. $6, 5.2, 5.01$

b. The number line should show an open circle above the number 5 and an arrow pointing to the right.

Problem 2

A sign on the road says: "Speed limit, 60 miles per hour."

a. Let s be the speed of a car. Write an inequality that matches the information on the sign.

b. Draw a number line to represent the solutions to the inequality.

c. Could 60 be a value of s? Explain your reasoning.

Possible Solutions

a. $s < 60$ or $s = 60$, or equivalent

b. The number line should show a closed circle at 60 and an arrow pointing to the left.

c. Yes, 60 is the limit.

Lesson 9 Practice Problems

Problem 3

One day in Boston, MA, the high temperature was 60 degrees Fahrenheit, and the low temperature was 52 degrees.

a. Write one or more inequalities to describe the temperatures T that are between the high and low temperature on that day.

b. Show the possible temperatures on a number line.

Possible Solutions

a. $52 < T$ and $T < 60$ or equivalent

b. A graph showing empty circles at 52 and 60 and all of the numbers between.

Problem 4

From Grade 6, Unit 7, Lesson 7

Select **all** the true statements.

A. $-5 < |-5|$

B. $|-6| < -5$

C. $|-6| < 3$

D. $4 < |-7|$

E. $|-7| < |-8|$

Possible Solutions

A, D, E

Problem 5

From Grade 6, Unit 6, Lesson 15

Match each equation to its solution.

A. $x^4 = 81$

B. $x^2 = 100$

C. $x^3 = 64$

D. $x^5 = 32$

1. 2
2. 3
3. 4
4. 10

Possible Solutions

A. 2

B. 4

C. 3

D. 1

Problem 6

From Grade 6, Unit 3, Lesson 14

a. The price of a cell phone is usually $250. Elena's mom buys one of these cell phones for $150. What percentage of the usual price did she pay?

b. Elena's dad buys another type of cell phone that also usually sells for $250. He pays 75% of the usual price. How much did he pay?

Possible Solutions

a. 60%

b. $187.50

Sample reasoning:

number	percentage
250	100
10	4
150	60
62.5	25
187.5	75