

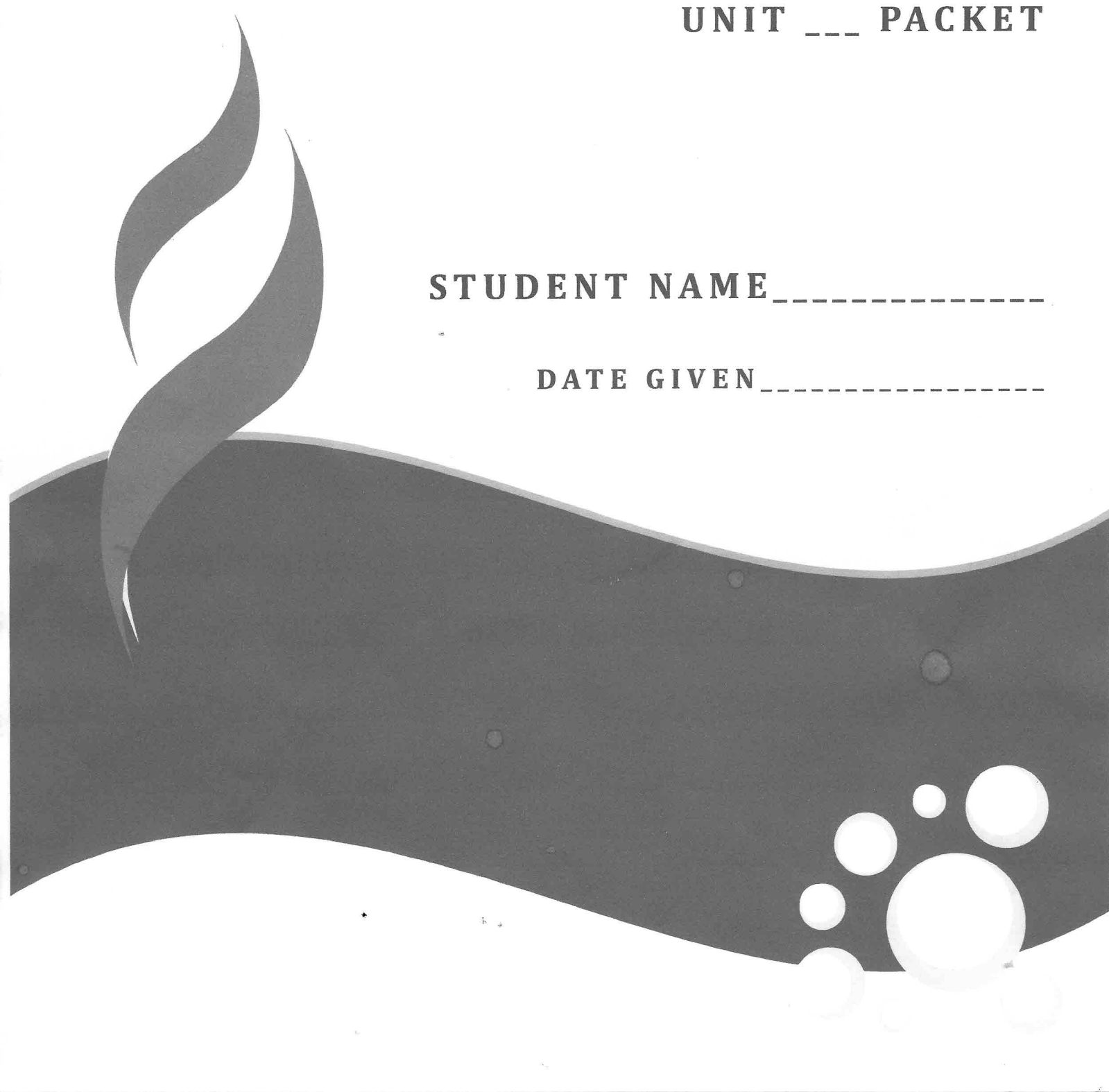
RJHS

MATH CLASS-SMOOT

UNIT ___ PACKET

STUDENT NAME _____

DATE GIVEN _____



**Seventh Grade Math
Unit 1—Rational Operations**

Essential Learning Outcomes

- a) Add and subtract integers.
- b) Multiply and divide integers.
- c) Add and subtract rational numbers expressed as fractions, decimals, or both.
- d) Multiply and divide rational numbers expressed as fractions, decimals or both.

Concepts and Skills to Master

- I can understand, apply, and explain the additive inverse property.
- I can model addition and subtraction of rational numbers, including integers, decimals, and fractions, on a vertical or horizontal number line.
- I can add and subtract rational numbers, including integers, decimals, and fractions.
- I can multiply and divide rational numbers, including integers, decimals, and fractions, and use properties of arithmetic to model multiplications and division of rational numbers.
- I can explain why division by zero is undefined.
- I can use long division to change a fraction into a terminating or repeating decimal.
- I can interpret products and quotients of rational numbers, including integers, decimals, and fractions, in real-world contexts.
- I can model and solve real-world problems using numbers and operations.
- I can explain the solution to a real-world problem in context.

Academic Vocabulary

integer	rational number	additive inverse
commutative property	associative property	distributive property
terminating decimal	repeating decimal	absolute value
sum	difference	product
quotient		

a) $13 + (-21) + 16$
 $29 + (-21)$
8

$4 - 7$
-3

$-4 - 6$
-10

b) $8 \cdot -5$
-40

$-4 \cdot |-3|$
 $-4 \cdot 3$
-12

• Think number line

Record Rules for $\frac{1}{2}$ numbers

• Adding:

• Subtracting:

• Multiply:

• Divide:

$$c) \frac{1}{3} \cdot \frac{1}{2} + \frac{1}{3} \cdot \frac{2}{2}$$

$$\frac{3}{6} + \frac{2}{6}$$

$$\boxed{\frac{5}{6}}$$

$$3) \frac{1}{2} - \frac{1}{3} \cdot \frac{2}{2}$$

$$\frac{3}{6} - \frac{2}{6}$$

$$\boxed{\frac{1}{6}}$$

$$d) \frac{1}{2} \div \frac{1}{3}$$

$$\boxed{\frac{1}{6}}$$

$$\frac{1}{2} \div \frac{1}{3}$$

$$\frac{1}{2} \times \frac{3}{1}$$

$$\boxed{\frac{3}{2} = 1\frac{1}{2}}$$

• Record fraction Rules

+/- :

multiply :

Divide :

Integer.1**Absolute Value and Comparing Integers**

1. Evaluate each.

a. $|4|$

b. $|-47|$

c. $|-13|$

d. $|5|$

e. $|-8|$

f. $|-3|$

g. $|1001|$

h. $|23|$

i. $|92|$

j. $|0|$

k. $|-576|$

l. $|-1|$

2. Complete each statement with $<$, $>$, or $=$.

a. $|3|$ ___ 4

b. 4 ___ -3

c. $|-1|$ ___ -1

d. -7 ___ -11

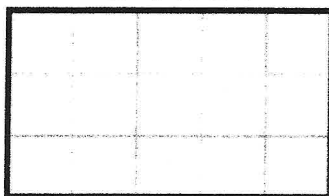
e. 9 ___ $|-9|$

f. $|5|$ ___ -5

3. Long divide. Give answer as an exact decimal.

$$4 \overline{) 23487}$$

4. Find the area of the rectangle:

5 feet**3 feet**

5. Multiply using the standard algorithm.

$$\begin{array}{r} 987 \\ \times 23 \\ \hline \end{array}$$

6. Subtract using the standard algorithm.

$$\begin{array}{r} 137 \\ - 63 \\ \hline \end{array}$$

7. REASONING Determine whether $n \geq 0$ or $n < 0$.

a. $n + |-n| = 2n$

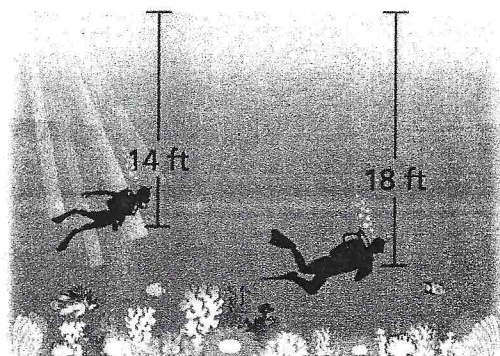
b. $n + |-n| = 0$

8. CORAL REEF The depths of two scuba divers exploring a living coral reef are shown.

a. Write an integer for the position of each diver relative to sea level.

b. Which integer in part (a) is greater?

c. Which integer in part (a) has a greater absolute value?
Compare this absolute value with the depth of that diver.



Integer.2**Adding Integers**

1. Add each pair of integers.

a. $2 + 3$

b. $-9 + (-9)$

c. $10 + (-10)$

d. $5 + (-7)$

e. $5 + (-8)$

f. $-4 + (-16)$

g. $-10 + (-15)$

h. $-3 + (-1)$

i. $-13 + 9$

j. $0 + (-7)$

k. $9 + 3$

l. $-4 + 14$

2. Explain how the commutative and associative properties of addition could be used to help find the sum mentally, then find the sum.

a. $5 + 7 + (-5)$

b. $-12 + 25 + (-15)$

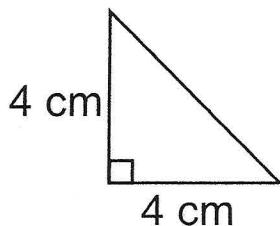
3. Find each sum

a. $13 + (-21) + 16$

b. $22 + (-14) + (-35)$

c. $-32 + (-17) + 42$

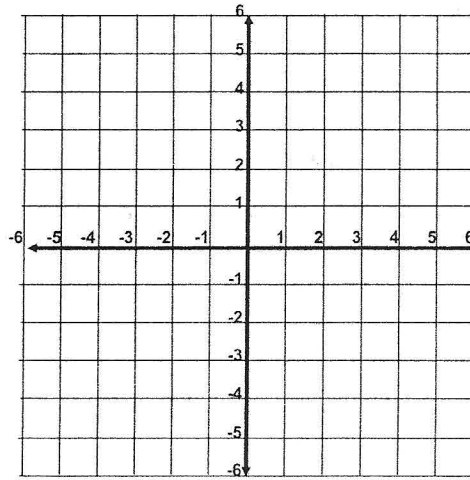
4. AREA Find the area of the triangle.



5. EXPRESSIONS Let x represent the cost of an apple. Write an expression that represents the cost of 7 apples.

6. Plot the four points on the coordinate plane.

$(3, 4)$, $(-3, -1)$, $(-6, 6)$, $(0, 2)$



7. The **Additive Inverse** Property states that for every integer there exists a second integer that you can add to the first integer to yield the sum of zero. For example, the additive inverse of 16 is -16 because $16 + (-16) = 0$. Find the additive inverse of each of the given numbers.

a. 19

b. -1

c. 0

d. -13

8. The **Additive Identity** Property states that there exists a number that you may add to an integer that will not change its value (identity). Fill in all the blanks for the examples of the Additive Identity Property.

a. $3 + \underline{\quad} = 3$

b. $-7 + 0 = \underline{\quad}$

c. $\underline{\quad} + 0 = 18$

d. $\underline{\quad} + 0 = \underline{\quad}$

Integer.3**Subtracting Integers**

1. Rewrite each subtraction expression as an addition expression then evaluate.

a. $4 - 7$

b. $8 - (-5)$

c. $-6 - (-7)$

d. $-2 - 3$

e. $5 - 8$

f. $-4 - 6$

g. $-8 - (-3)$

h. $10 - 7$

i. $-8 - 13$

j. $15 - (-2)$

k. $-6 - (-6)$

l. $0 - 20$

2. Evaluate the expression when $m = -3$, $n = -6$, and $k = 5$.

a. $m + n - k$

b. $6 - n$

c. $|m - n| + |m| - |n|$

3. **MENTAL MATH** Use mental math to solve the equation.

a. $m - 5 = 9$

b. $w - (-3) = 7$

4. Find the mean of the set of numbers. $\{3, 6, 9, 11, 12\}$

5. **MULTIPLE CHOICE** Which value of n makes the value of the expression $4n + 3$ a composite number?

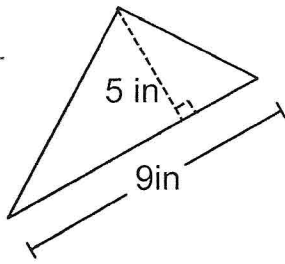
A. 1

B. 2

C. 3

D. 4

6. Determine the area of the triangle.



7. **TEMPERATURE** The table shows the record monthly high and low temperature for a city in Alaska.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
High (°F)	56	57	56	72	82	92	84	85	73	64	62	53
Low (°F)	-35	-38	-24	-15	1	29	34	31	19	-6	-21	-36

- Find the range of temperature for each month.
- What are the all-time high and all-time low temperatures?
- What is the range of the temperature in part (b)?

8. **NUMBER SENSE** For what values of a and b is the statement true?

- $|a - b| = |b - a|$
- $|a + b| = |a| + |b|$
- $|a - b| = |a| - |b|$

Integer.4

Multiplying Integers

1. Evaluate each product.

a. $6 \cdot 4$

b. $7(-3)$

c. $-3(-4)$

d. $-6 \cdot 7$

e. $3 \cdot 9$

f. $8 \cdot (-5)$

g. $-4 \cdot |-3|$

h. $-11 \cdot (-11)$

i. $7(-14)$

j. $-5(10)$

k. $7(7)$

l. $-1 \cdot (-12)$

2. Evaluate each expression if $r = 0$, $s = 7$, and $t = -5$

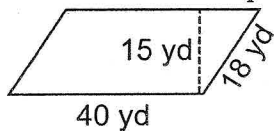
a. $3rs$

b. $|st| - st$

c. $(-s)(-t) + r$

3. Let the expression $2j$ represent the number of jumping jacks you can do in two minutes. What does the expression $5j$ represent?

4. Find the area of the parallelogram.



5. Determine the least common multiple of each set of numbers.

a. 4 and 6

b. 9 and 3

c. 12 and 20

6. Determine the greatest common factor of each set of numbers.

a. 4 and 6

b. 9 and 3

c. 12 and 20

7. Evaluate each expression that involves exponents.

a. $(-4)^2$

b. $(-1)^3$

c. $(-8)^2$

d. -6^2

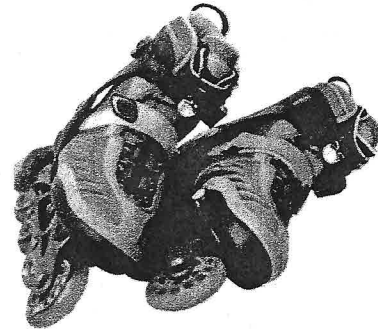
e. $-5^2 \cdot 4$

f. $-2 \cdot (-3)^3$

8. **INLINE SKATES** In June, the price of a pair of inline skates is \$165. The price changes each of the next 3 months.

a. Complete the table

Month	Price of Skates
June	165 = \$165
July	$165 + (-12) = \$$ ___
August	$165 + 2(-12) = \$$ ___
September	$165 + 3(-12) = \$$ ___



b. Describe the change in the price of the inline skates for each month.

c. The table at the right shows the amount of money you save each month to buy the inline skates. Do you have enough money saved to buy the inline skates in August? September? Explain your reasoning.

Amount Saved	
June	\$35
July	\$55
August	\$45
September	\$18

Integer.5

Dividing Integers

1. Divide, if possible.

a. $4 \div (-2)$

b. $21 \div 7$

c. $-20 \div 4$

d. $-18 \div (-3)$

e. $\frac{-14}{7}$

f. $\frac{0}{6}$

g. $\frac{-15}{-5}$

h. $60 \div (-6)$

i. $\frac{18}{0}$

j. $\frac{65}{-5}$

k. $\frac{-84}{-7}$

l. $\frac{0}{-12}$

2. Evaluate each if $j = 5$, $k = -25$, and $h = 0$.

a. $\frac{k}{j}$

b. $\frac{jk}{h}$

c. $\frac{50j}{k}$

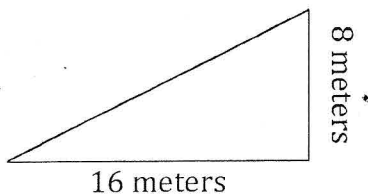
d. $\frac{-100}{j} + \frac{-100}{k}$

3. Find the mean of each set of numbers.

a. $3, -10, -2, 13, 11$

b. $-14, -17, 11, 0, 2$

4. Find the area of the triangle.



5. Evaluate $-8 - 14 \div 2 + 5 \cdot (-2)$

6. Solve $4x = 16$

7. **WHICH ONE DOESN'T BELONG?** Which expression does not belong with the other three? Explain your reasoning?

$$\frac{10}{-5}$$

$$\frac{-10}{5}$$

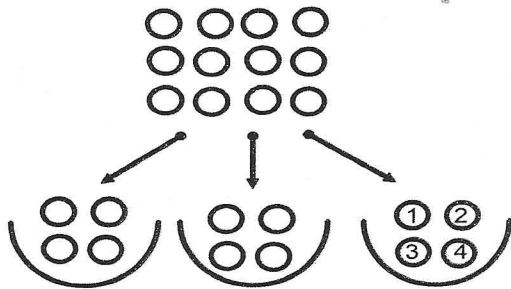
$$\frac{-10}{-5}$$

$$-\left(\frac{10}{5}\right)$$

8. Study the two visual models that demonstrate $12 \div 3 = 4$. Use either model type to explain in three to five complete sentences why division by zero is not possible. You may want to draw an illustration to support your explanation.

12 ÷ 3 Share model

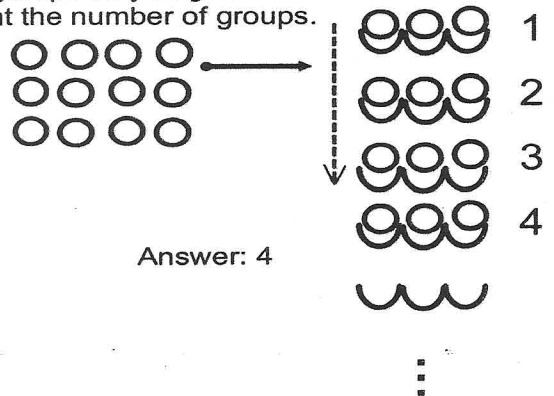
Divide contents into **three** containers and count the number of objects in each container



Answer: 4

12 ÷ 3 Group model

Create groups of **three**, fill in the groups as you go and count the number of groups.



Answer: 4

Rational.1**Fractions and Decimals**

1. Write each rational number as a decimal.

a. $\frac{7}{8}$

b. $-\frac{7}{9}$

c. $\frac{6}{5}$

d. $1\frac{5}{6}$

e. $\frac{2}{3}$

f. $\frac{7}{2}$

2. Write each decimal as a fraction or mixed number in simplest form.

a. -0.9

b. 0.45

c. -0.258

d. -2.125

e. 6.25

f. 0.28

3. Plot each set of numbers on a number line, then list the set of numbers from least to greatest.

a. $-\frac{3}{4}, 0.5, \frac{2}{3}, -\frac{7}{3}, 1.2$

b. $-\frac{11}{5}, -2.4, 1.6, \frac{15}{10}, -2.25$



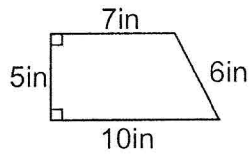
4. **FRACTIONS** Add or Subtract each.

a. $\frac{4}{5} - \frac{2}{5}$

b. $\frac{1}{2} + \frac{1}{3}$

c. $\frac{1}{2} - \frac{1}{3}$

5. Find the area of the trapezoid.



6. Solve $x + 3 = 9$

7. **CHOOSING APPROPRIATE REPRESENTATIONS** For each example, the rational number used is not the most appropriate representation; convert it to the appropriate representation.

(Common fraction: $\frac{a}{b}$, Mixed fraction: $A\frac{b}{c}$, Decimal: $_ . ____$)

a. Kyle filled his tank with gasoline. He paid $\$2\frac{3}{5}$ per gallon.

b. When the cookies were split evenly, each friend got $\frac{15}{4}$ cookies.

c. A recipe for pancakes calls for **2.25** tablespoons of sugar.

d. Oscar is making a wooded box. He cuts a piece of wood to a length of **3.375 inches**.

8. **CRITICAL THINKING** Given: a and b are integers.

a. When is $-\frac{1}{a}$ positive?

b. When is $\frac{1}{ab}$ positive?

Rational.2

Adding Fractions and Decimals

1. Find each sum.

a. $\frac{11}{12} + \left(-\frac{7}{12}\right)$

b. $-1\frac{1}{5} + \left(-\frac{3}{5}\right)$

c. $-42. + 3.3$

d. $-\frac{9}{14} + \frac{2}{7}$

e. $4 + \left(-1\frac{2}{3}\right)$

f. $\frac{15}{4} + \left(-4\frac{1}{3}\right)$

g. $-3.1 + (-0.35)$

h. $12.48 + (-10.66)$

i. $-20.5 + 15.7$

j. $\frac{19}{20} + \left(-\frac{3}{5}\right)$

k. $-\frac{5}{6} + \left(\frac{2}{15}\right)$

l. $\frac{1}{2} + \left(-\frac{1}{3}\right) + \frac{1}{4}$

2. Evaluate each expression when $a = \frac{1}{3}$, $b = -\frac{7}{4}$, $f = -13.6$, and $g = 1.5$. express answer as indicated.

a. $a + b$ [fraction]

b. $a + g$ [fraction]

c. $b + g$ [decimal]

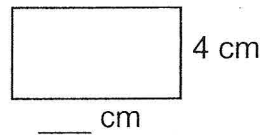
d. $f + g$ [decimal]

3. **BREAK EVEN** The table at the right shows the annual profits (in thousands of dollars) of a county fair from 2008 to 2012. What must the 2012 profit be (in hundreds of dollars) to break even over the five-year period.

Year	Profit (thousands of dollars)
2008	2.5
2009	1.75
2010	-3.3
2011	-1.4
2012	?

4. Find the length of the rectangle.

$$\text{Area} = 24 \text{ cm}^2$$



5. Solve $4x = 28$

6. Find the median of the data.

7	9	5	-3	0	-6	3	7	-1	3	8
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7. **REPEATED REASONING** Evaluate the expression.

$$\frac{19}{20} + \left(\frac{-18}{20}\right) + \frac{17}{20} + \left(\frac{-16}{20}\right) + \cdots + \left(\frac{-4}{20}\right) + \frac{3}{20} + \left(\frac{-2}{20}\right) + \frac{1}{20}$$

8. Evaluate. Answer are either a mixed fraction or a common fraction. You may consider using the commutative and associative properties to assist you.

$$1 + \frac{1}{2} + \frac{1}{3} + \frac{1}{4} + \frac{1}{5} + \frac{1}{6} + \frac{1}{7} + \frac{1}{8} + \frac{1}{9} + \frac{1}{10}$$

Rational.3

Subtracting Fractions and Decimals

1. Find each Difference.

a. $\frac{5}{8} - \left(-\frac{7}{8}\right)$

b. $-1\frac{1}{3} - 1\frac{2}{3}$

c. $-1 - 2.5$

d. $-5 - \frac{5}{3}$

e. $-\frac{1}{2} - \left(-\frac{5}{9}\right)$

f. $7.4 - 8.2$

g. $6.673 - (-8.29)$

h. $\left(-\frac{3}{4}\right) - \frac{2}{3}$

i. $\frac{2}{3} - \frac{1}{3}$

j. $0 - \left(-\frac{2}{11}\right)$

k. $3.14 - (-3.14)$

l. $\frac{5}{6} - \frac{6}{5}$

2. Evaluate each expression when $q = 1\frac{1}{3}$, $r = -2\frac{1}{2}$, $s = 2.4$, $t = -4.2$. express answer as indicated.

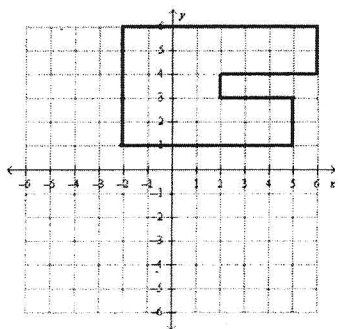
a. $q - r$ [fraction]

b. $q - t$ [fraction]

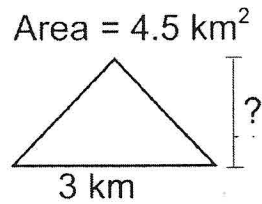
c. $r - s$ [decimal]

d. $t - r$ [decimal]

3. Determine the area of the figure drawn in the coordinate plane.



4. Find the height of the triangle.



5. Solve $x - 13 = 1$

6. **MATCHING** Match each equation with the property it demonstrates.

Properties

Commutative property of addition •

Associative property of addition •

Distributive property of multiplication over addition •

Equations

• $\left(\frac{1}{2} + \frac{1}{3}\right) + \frac{1}{4} = \frac{1}{2} + \left(\frac{1}{3} + \frac{1}{4}\right)$

• $\frac{2}{5} + \left(-\frac{8}{9}\right) + 1 = -\frac{8}{9} + \frac{2}{5} + 1$

• $\frac{1}{2}\left(\frac{3}{4} + 1\right) = \frac{1}{2}\left(\frac{3}{4}\right) + \frac{1}{2}(1)$

7. **REPEATED REASONING** Evaluate the expression.

$$\frac{2}{2} - \frac{1}{2} + \frac{2}{4} - \frac{1}{4} + \frac{2}{6} - \frac{1}{6} + \frac{2}{8} - \frac{1}{8} + \frac{2}{10} - \frac{1}{10}$$

8. Evaluate. Answer as either a mixed fraction or common fraction. You may consider using the commutative and associative properties to assist you.

$$1 - \frac{1}{2} + \frac{1}{3} - \frac{1}{4} + \frac{1}{5} - \frac{1}{6} + \frac{1}{7} - \frac{1}{8} + \frac{1}{9} - \frac{1}{10}$$

1. Find each product. Answer as a fraction when problem contains a fraction; answer as a decimal otherwise.

a. $\frac{1}{2} \cdot \left(-\frac{2}{3}\right)$

b. $-3.6(-2.7)$

c. $\left(\frac{2}{3}\right)\left(\frac{2}{3}\right)$

d. $\left(-\frac{9}{11}\right)\left(-\frac{11}{9}\right)$

e. $-2.87 \cdot 0$

f. $\frac{15}{17} \cdot \left(3\frac{2}{5}\right)$

g. $1.23 \cdot 98.7$

h. $-9.09(-1.01)$

i. $\frac{7}{18} \cdot 9$

j. $2 \cdot \frac{19}{36}$

k. $1.2 \cdot 1.2 \cdot 1.2$

l. $\frac{3}{4} \cdot \frac{3}{4} \cdot \frac{3}{4}$

2. Find each displacement. Use the formula $d = rt$ (*distance = rate • time*).

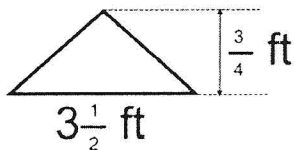
a. $r = 3.4 \text{ mph}$
 $t = -2.5 \text{ hours}$

b. $r = \frac{1}{2} \text{ meters per second}$
 $t = 5\frac{1}{2} \text{ seconds}$

c. $r = -\frac{2}{3} \text{ inches per day}$
 $t = 7 \text{ days}$

d. $r = -16 \text{ centimeters per century}$
 $t = -2.5 \text{ centuries}$

3. Determine the area of the triangle.

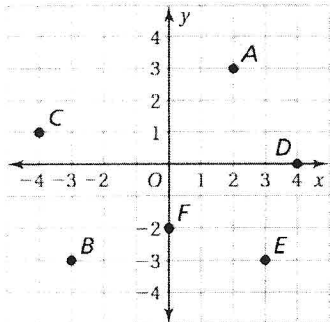


(not drawn to scale)

4. Evaluate $3 + (-2)(7) - 2^2$

5. Solve $x + \frac{1}{2} = \frac{3}{4}$

6. **MULTIPLE CHOICE** What are the coordinates of the point in Quadrant IV?



- A. $(-4, 1)$
- B. $(-3, -3)$
- C. $(0, -2)$
- D. $(3, -3)$

7. **MULTIPLICATIVE INVERSE** The inverse property of multiplication states that for every rational number (except zero) there exists another rational number that you can multiply to obtain the unit: one. Fill in the blanks to complete each example of the inverse property of multiplication.

a. $\frac{2}{3} \cdot (\underline{\quad}) = 1$

b. $0.8 \cdot (\underline{\quad}) = 1$

c. $-2\frac{1}{2} \cdot (\underline{\quad}) = 1$

d. $-1 \cdot (\underline{\quad}) = 1$

8. **REPEATED REASONING** Determine the product.

$$- \frac{1}{2} \cdot \frac{2}{3} \cdot \frac{3}{4} \cdot \frac{4}{5} \cdot \frac{5}{6} \cdot \frac{6}{7} \cdot \frac{7}{8} \cdot \frac{8}{9} \cdot \frac{9}{10} \cdot \frac{10}{11} \cdot \frac{11}{12} \cdot \frac{12}{13} \cdot \frac{13}{14} \cdot \frac{14}{15} \cdot \frac{15}{16} \cdot \frac{16}{17} \cdot \frac{17}{18} \cdot \frac{18}{19} \cdot \frac{19}{20}$$

1. Rewrite each quotient as a product, then evaluate.

a. $\frac{6}{7} \div \frac{3}{5}$

b. $-\frac{7}{10} \div \frac{2}{5}$

c. $-\frac{1}{5} \div 20$

d. $-2\frac{4}{5} \div (-7)$

e. $-10\frac{2}{7} \div \left(-4\frac{4}{11}\right)$

f. $2 \div 18$

2. Use long division to compute each quotient.

a. $19.65 \div 2.5$

b. $-145.68 \div (-1.5)$

c. $-9 \div 0.005$

3. Determine each velocity. Use the formula: *velocity = distance/time*.

a. A person walks $\frac{3}{4}$ mile every $\frac{1}{4}$ hour.

b. The moon's distance from earth changes by 4.5 inches every 2.5 years.

c. The height of Kings Peak is changing by $-\frac{3}{2}$ feet every $2\frac{1}{2}$ centuries.

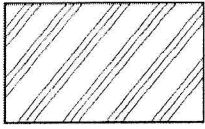
4. Evaluate $\left(\frac{1}{2} + \frac{5}{7}\right) \cdot \left(-\frac{14}{3}\right) \div \frac{9}{10}$

5. Reduce the complex fraction.

$$\frac{\frac{3}{4} + \frac{2}{7}}{\frac{9}{28}}$$

6. Determine the height of the rectangle.

$$\text{Area} = 13.5 \text{ m}^2$$



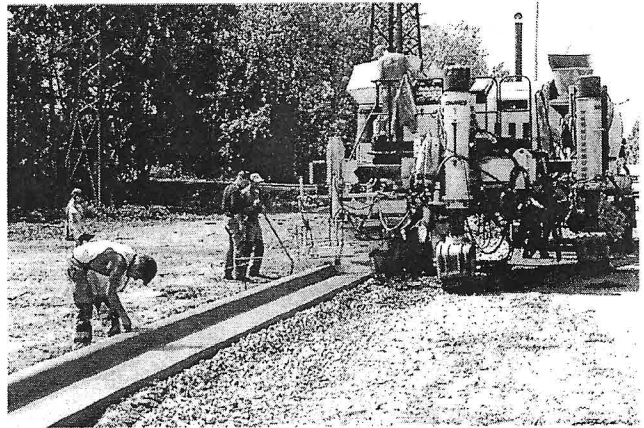
5.4 m

7. **GASOLINE** A 14.5-gallon gasoline tank is $\frac{3}{4}$ full. How many gallons will it take to fill the tank?

8. **CURB AND GUTTER** A curbing crew can lay $\frac{5}{8}$ of a mile per day.

- a. How many miles does the curbing crew lay in a 5-day workweek?

- b. If the crew has contracted to lay $34\frac{3}{8}$ miles of curb for a city government contractor, how many workweeks will it take?



- c. If the crew charges \$90,000 per mile under the contract, how much will the city government contractor pay the crew for the curb?

- d. The owner of the curbing crew spends 60% of the contracted money on supplies and materials and 35% on wages and benefits for his employees. The remainder is profit. What is the total profit for this job?