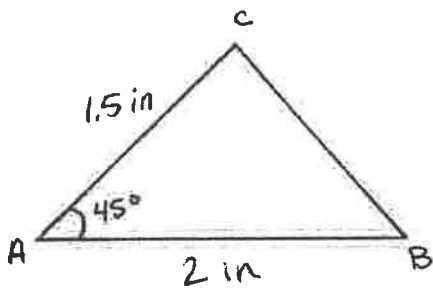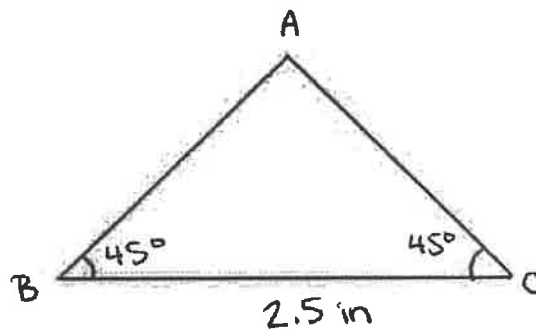Name **Key**

Date _____ Period _____

Drawing Triangles (7.G.2 Draw)

Using a ruler and protractor/angle ruler, draw and label the triangle with the following properties.
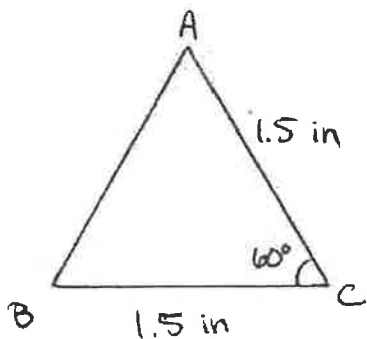
1. $\overline{AB}$ = 2 in., $\angle CAB$ = 45° and $\overline{AC}$ = 1.5 in.

c

1.5 in

45°

A

2 in

B

2. $\angle ABC$ = 45°, $\angle BCA$ = 45°, and $\overline{BC}$ = 2.5 in.

A

45°

B

45°

C

2.5 in

3. $\angle BCA$ = 60°, $\overline{BC}$ = 1.5 in., and $\overline{AC}$ = 1.5 in.

A

1.5 in

60°

B

C

1.5 in

4. $\angle ABC$ = 50°, $\angle BCA$ = 70°, and $\overline{BC}$ = 2 in.

A

50°

B

70°

C

2 in

Name _Key_

Date _____   Period _____
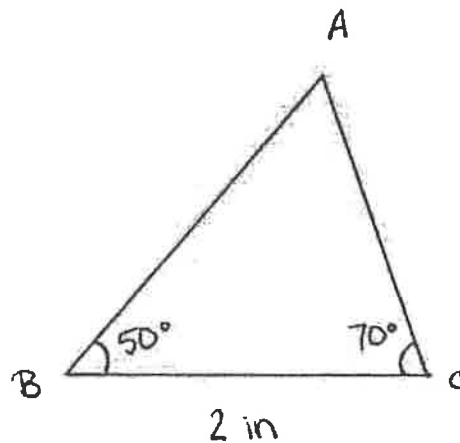
Unique, Not Unique, and Impossible Triangles (7.G.2 Identify)

1. A triangle has sides of 15 and 27. The measurement of the longest side is missing.

   Ted says that one possibility for the unknown side length is 50. Do you agree with Ted? Why or why not?

   No, because the sum of the two shorter sides must be greater than the longest side to form a triangle, and 15 + 27 is less than 50.

2. A triangle has sides of 5 and 9. The measurement of the longest side is missing.

   Ted says that one possibility for the unknown side length is 10. Do you agree with Ted? Why or why not?

   Yes, because the sum of the two shorter sides must be greater than the longest side to form a triangle, and 5 + 9 is greater than 10.

3. A triangle has sides of 6 and 12. The measurement of the longest side is missing.

   Ted says that one possibility for the unknown side length is 18. Do you agree with Ted? Why or why not?

   No, because the sum of the two shorter sides must be greater than the longest side to form a triangle, and 6 + 12 = 18.

4. Is a triangle with angle measures 40°, 30°, and 120° possible? Explain why or why not.

   No, because the angles in a triangle must add to 180°, and 40 + 30 + 120 = 190.

5. Is a triangle with angle measures 85°, 35°, and 60° possible? Explain why or why not.

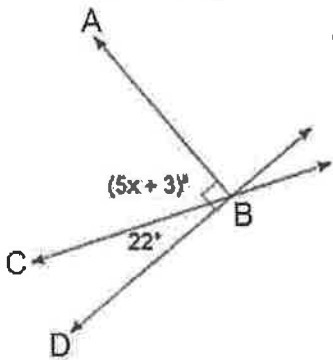   Yes, because the angles in a triangle must add to 180°, and 85 + 35 + 60 = 180.

   Is a triangle with angle measures 50°, 25°, and 95° possible? Explain why or why not.

   No, because the angles in a triangle must add to 180°, and 50 + 25 + 95 = 170.

Name __Key__

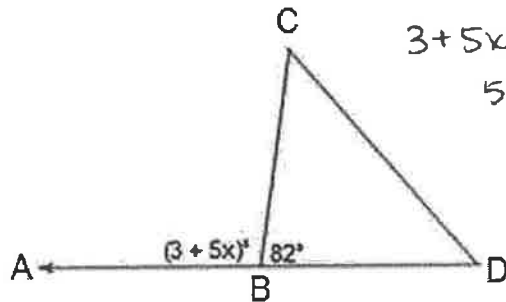Date _____   Period _____

Angle Relationships (7.G.5)

For each problem, write and solve an equation to find the value of x. Then, use that value to find the measure of $\angle ABC$. The diagrams are not to scale.

1. $x =$ __13°__ $\angle ABC =$ __5(13)+3 = 68°__
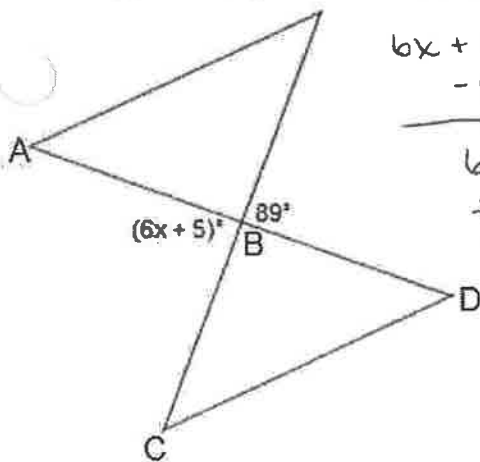

$5x + 3 + 22 = 90$

$5x + 25 = 90$

$-25 \quad -25$

$\rule{3cm}{0.4pt}$

$5x = 65$

$\div 5 \quad \div 5$

$x = 13$

2. $x =$ __19°__ $\angle ABC =$ __3+5(19) = 98°__

$3 + 5x + 82 = 180$

$5x + 85 = 180$

$-85 \quad -85$

$\rule{3cm}{0.4pt}$

$5x = 95$

$\div 5 \quad \div 5$

$x = 19$

3. $x =$ __14°__ $\angle ABC =$ __6(14)+5 = 89°__

$6x + 5 = 89$

$-5 \quad -5$

$\rule{3cm}{0.4pt}$

$6x = 84$

$\div 6 \quad \div 6$

$x = 14$

4. $x =$ __10°__ $\angle ABC =$ __4(10)+3 = 43°__

$4x + 3 = 43$

$-3 \quad -3$

$\rule{3cm}{0.4pt}$

$4x = 40$

$\div 4 \quad \div 4$

$x = 10$
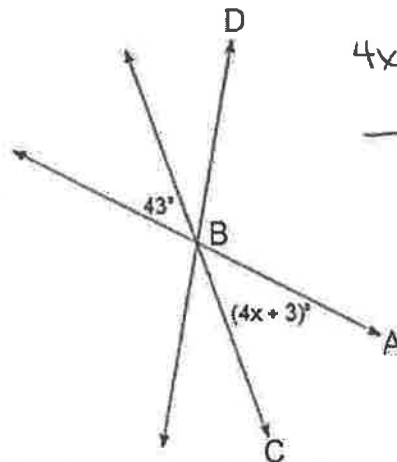
5. $x =$ __42°__ $\angle ABC =$ __2(42)+29 = 113°__

$2x + 29 + 36 + 211 = 360$

$2x + 276 = 360$

$-276 \quad -276$

$\rule{3cm}{0.4pt}$

$2x = 84$

$\div 2 \quad \div 2$

$x = 42$

6. $x =$ __45°__ $\angle ABC =$ __2(45)+21 = 111°__
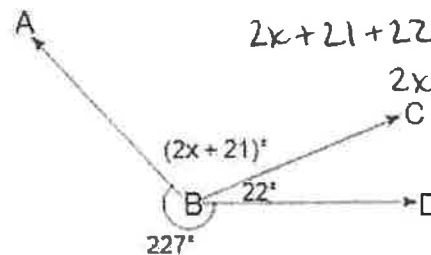
$2x + 21 + 22 + 227 = 360$

$2x + 270 = 360$

$-270 \quad -270$

$\rule{3cm}{0.4pt}$

$2x = 90$

$\div 2 \quad \div 2$

$x = 45$

Name __key__

Date _____

Period _____

Opposite Quantities (7.NS.1a)

1. **Which of the following describe a situation where the combination results in zero? There may be more than one correct answer.**

    ~~A.~~ Alison ran 3.5 miles and burned 450 calories. When she finished she ate a taco that was 425 calories.

    $$-450 + 425 \neq 0$$

    (B.) The chef made 4 dozen pancakes. There were 16 customers that ordered and ate 3 pancakes each.

    $$4(12) + 16(-3) = 0$$
    $$48 + -48 = 0$$

    (C.) Julie owes her sister $25. She gives her $17 on Tuesday and $8 on Friday.

    $$25 + -17 + -8 = 0$$

    ~~D.~~ The Math Magicians are playing Math Fever! They get a 100-point question wrong, a 250-point question right, and a 350-point question wrong.

    $$-100 + 250 + -350 \neq 0$$

    ~~E.~~ In the desert, the temperature at noon was 112 degrees. Over the course of the next 10 hours, the temperature decreased 12 degrees per hour.
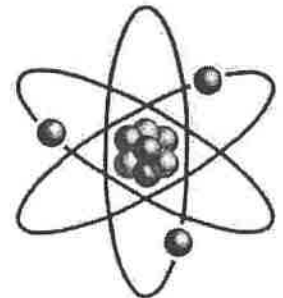
    $$112 + 10(-12) \neq 0$$
    $$112 + -120 \neq 0$$

2. **At right is a picture of an atom, and the protons and neutrons that make up the nucleus. A proton has a charge of $+1$, while an electron has a charge of -1. The charge of an atom at rest is zero. The element gold has 79 protons. How many electrons does it have?**
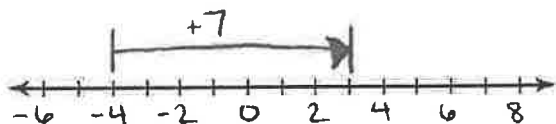
    $$79 + -79 = 0$$

    79 electrons
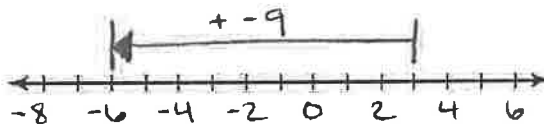
Name __Key__

Date _____   Period _____

Real World Addition and Subtraction (7.NS.1b, 7.NS.1c)

Model the following number sentences using a number line. Find the answer to the number sentence.
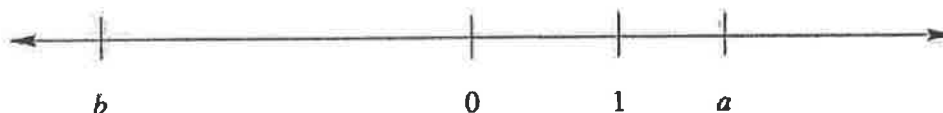
1. $-4 + 7 =$ **3**

$+7$

-6 -4 -2 0 2 4 6 8

2. $3 + -9 =$ **-6**

$+ -9$

-8 -6 -4 -2 0 2 4 6

3. A number line is shown below. The numbers 0 and 1 are marked on the line, as are two other numbers, _a_ and _b_. Assume the number line is drawn to scale.

b 0 1 a

Using the number line above, decide if each answer will be positive, negative, or zero.

$a + b =$ __negative__ $b + 1 =$ __negative__

$a + -b =$ __positive__ $a + -2 =$ __negative__

4. Decide whether each of the following statements is _true_ or _false_. Give examples to support your choice.

   A. The sum of two negative numbers is always negative.

   true $-2 + -2 = -4$

   B. The sum of a positive number and a negative number is always negative.
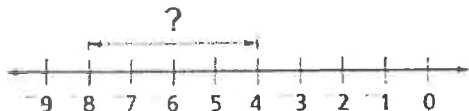
   false $10 + -1 = 9$ $5 + -7 = -2$

   C. The difference of two negative numbers is always negative.

   false $-2 - -10 = 8$ $-9 - -5 = -4$

   D. A negative number minus a positive number is always negative.

   true $-2 - 10 = -12$

5. Write two absolute value expressions for the distance between the two points on the number line below. Then, find the value of each expression.

   $|-8 - -4| = |-4| = 4$

   $?$

   -9 -8 -7 -6 -5 -4 -3 -2 -1 0

   $|-4 - -8| = |4| = 4$

6. For the pair of points below, write and evaluate two absolute value expressions to represent the distance between the points. Then, make a number line to show the distance between the points.

   7 and -3

   10

   -4 -2 0 2 4 6 8 10
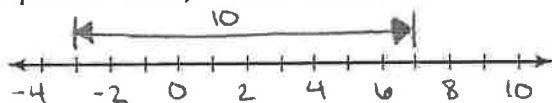
   $|7 - -3| = |10| = 10$

   $|-3 - 7| = |-10| = 10$

Which of the following expressions below are equivalent to $-15 + 12$? Circle ALL that apply.

   A. $12 + 15$ B. $15 + -12$ (C.) $-15 - -12$ D. $-15 - 12$

Name _____Key_____

Date _____   Period _____

Addition and Subtraction of Rational Numbers (7.NS. 1d)

Find each <u>sum</u> or <u>difference</u>. Show work for problems with fractions and decimals.

1. $-8 + -11 =$ **-19**

2. $12 - 30 =$ **-18**

3. $16 + -4 =$ **12**

4. $-15 - -7 =$ **-8**

5. $-6 + -9 =$ **-15**

6. $-3 - 5 =$ **-8**

7. $-4 + 11 =$ **7**

8. $-6 - -14 =$ **8**

9. $8 + -15 =$ **-7**

10. $-11.8 + 2.6 =$ **-9.2**

$$\begin{array}{r} \overset{0}{1}1.8 \\ -\ 2.6 \\ \hline 9.2 \end{array}$$

11. $-6.1 - 3.998 =$ **-10.098**

$$\begin{array}{r} 6.100 \\ +\ 3.998 \\ \hline 10.098 \end{array}$$

12. $-5.8 - -4.79 =$ **-1.01**

$$\begin{array}{r} 5.\overset{7}{8}0 \\ -4.79 \\ \hline 1.01 \end{array}$$

13. $8.4 + -1.61 =$ **6.79**

$$\begin{array}{r} \overset{7}{8}.\overset{13}{4}0 \\ -\ 1.61 \\ \hline 6.79 \end{array}$$

14. $\frac{2}{3} - -2\frac{4}{9} =$ **$3\frac{1}{9}$ or $\frac{28}{9}$**

$$\frac{6}{9} + \frac{22}{9} = \frac{28}{9}$$

15. $3\frac{3}{5} + -2\frac{1}{2} =$ **$1\frac{1}{10}$ or $\frac{11}{10}$**

$$\frac{18}{5} - \frac{5}{2} = \frac{36}{10} - \frac{25}{10} = \frac{11}{10}$$

16. $-1\frac{1}{3} + 1\frac{4}{11} =$ **$\frac{1}{33}$**

$$-\frac{4}{3} + \frac{15}{11} = \frac{-44}{33} + \frac{45}{33} = \frac{1}{33}$$

17. $-3\frac{1}{6} - -2\frac{4}{9} =$ **$-\frac{13}{18}$**

$$\frac{-19}{6} + \frac{22}{9} = \frac{-57}{18} + \frac{44}{18} = \frac{-13}{18}$$

Name _Key_

Date _____   Period _____

Real World Multiplication and Division (7.NS.2a, 7.NS.2b)

1. Use the distributive property to write an expression equal to each of the following expression.

   a. $-3(7 + -9)$

   $-3 \cdot 7 + -3 \cdot -9$

   b. $(-2 \cdot -6) - (-2 \cdot -11)$

   $-2(-6 - -11)$

2. Mark takes 6 friends to play paintball. It costs $10.25 to play and $8.75 to rent the equipment, per person. Include units with your answer.

   a. Using your understanding of the distributive property, write TWO equivalent number sentences (one factored and one expanded) that would find the total cost for all seven people.

   $7(10.25 + 8.75)$

   $7 \cdot 10.25 + 7 \cdot 8.75$

   b. What is the total cost for all seven people? Show your work and include units.

   $\begin{array}{r} 10.25 \\ + 8.75 \\ \hline 19.00 \end{array}$ $\begin{array}{r} 19 \\ \times 7 \\ \hline 133 \end{array}$ $\boxed{\$133}$

3. A football team loses an average of 3 yards per play. How many yards have they lost after 4 plays? Show your work and include units with your answer.

   $-3 \cdot 4 = \boxed{-12 \text{ yards}}$

4. Select ALL values equal to $-\frac{2}{9}$.

   A. $-\dfrac{-2}{9}$ Ⓑ $-\dfrac{-2}{-9}$ C. $\dfrac{-2}{-9}$ Ⓓ $\dfrac{-2}{9}$ Ⓔ $\dfrac{2}{-9}$

5. Together, siblings Brandon, Brooke, Trent, and Trisha owe their parents $100. How much does each sibling owe if they share the debt equally? Show your work and include units with your answer.

   $-100 \div 4 = \boxed{-\$25}$

Name __Key__

Date _____   Period _____

<u>Multiplication and Division of Rational Numbers (7.NS.2c, 7.NS.2d)</u>

Find each <u>quotient</u> or <u>product</u>. Show work for problems with fractions and decimals.

1. $-8 \cdot 6 = -48$

2. $\frac{-45}{-5} = 9$

3. $-12 \cdot -4 = 48$

4. $-15 \div 3 = -5$

5. $7 \cdot -4 = -28$

6. $60 \div -6 = -10$

7. $8.31 \cdot -3.4 = -28.254$

$$\begin{array}{r} \overset{1}{8}.31 \\ \times \ 3.4 \\ \hline 3324 \\ + 24930 \\ \hline 28254 \end{array}$$

8. $-3.3 \div 4 = -0.825$

$$\begin{array}{r} 0.825 \\ 4\overline{)3.300} \\ -32 \\ \hline 10 \\ -8 \\ \hline 20 \end{array}$$

9. $-7.7 \cdot -1.5 = 11.55$

$$\begin{array}{r} \overset{3}{7}.7 \\ \times 1.5 \\ \hline 385 \\ +770 \\ \hline 1155 \end{array}$$

10. $5\frac{5}{6} \div -3\frac{1}{3} = -\frac{7}{4}$ or $-1\frac{3}{4}$

$$\frac{35}{6} \div \frac{-10}{3}$$

$$\frac{35}{6} \cdot \frac{-3}{10} = \frac{-105}{60} = -\frac{7}{4}$$

11. $-1\frac{1}{4} \cdot 1\frac{1}{2} = -\frac{15}{8}$ or $-1\frac{7}{8}$

$$\frac{-5}{4} \cdot \frac{3}{2} = \frac{-15}{8}$$

12. $-1\frac{1}{2} \div -5\frac{2}{5} = \frac{5}{18}$

$$-\frac{3}{2} \div \frac{-27}{5}$$

$$-\frac{3}{2} \cdot \frac{-5}{27} = \frac{15}{54} = \frac{5}{18}$$

Find the decimal equivalent. Show your work.

13. $\frac{-7}{-12} = 0.58\overline{3}$

$$\begin{array}{r} 0.5833 \\ 12\overline{)7.0000} \\ -60 \\ \hline 100 \\ -96 \\ \hline 40 \\ -36 \\ \hline 40 \\ -36 \\ \hline 4 \end{array}$$

14. $\frac{5}{-8} = -0.625$

$$\begin{array}{r} 0.625 \\ 8\overline{)5.000} \\ -48 \\ \hline 20 \\ -16 \\ \hline 40 \\ -40 \\ \hline 0 \end{array}$$

15. $\frac{-11}{3} = -3.\overline{6}$

$$\begin{array}{r} 3.66 \\ 3\overline{)11.00} \\ -9 \\ \hline 20 \\ -18 \\ \hline 20 \\ -18 \\ \hline 2 \end{array}$$

16. $\frac{-13}{-8} = 1.625$

$$\begin{array}{r} 1.625 \\ 8\overline{)13.000} \\ -8 \\ \hline 50 \\ -48 \\ \hline 20 \\ -16 \\ \hline 40 \\ -40 \\ \hline 0 \end{array}$$

Name __Key__

Date _____ Period _____

Order of Operations (7.NS.3)

Find the value of each expression. Show all steps.

1. $-12 \div -2 \cdot (4-5)$

$-12 \div -2 \cdot (-1)$

$6 \cdot -1$

$\boxed{-6}$

2. $2 - 6 - (-1 + 12 \div 3)$

$2 - 6 - (-1 + 4)$

$2 - 6 - 3$

$-4 - 3$

$\boxed{-7}$

3. $2 \cdot (3 + -10) \div 2$

$2 \cdot (-7) \div 2$

$-14 \div 2$

$\boxed{-7}$

4. $2 \cdot (3 + -12) \div 6 \cdot -3$

$2 \cdot (-9) \div 6 \cdot -3$

$-18 \div 6 \cdot -3$

$-3 \cdot -3$

$\boxed{9}$

5. $-3\frac{1}{6} \cdot \left(\frac{3}{2} - -1\frac{3}{4} - 2\frac{1}{4}\right)$

$-3\frac{1}{6} \cdot \left(\frac{4}{4} - -\frac{7}{4} - 2\frac{1}{4}\right)$

$-3\frac{1}{6} \cdot \left(\frac{13}{4} - \frac{9}{4}\right)$

$-\frac{19}{6} \cdot \left(\frac{4}{4}\right)$

$-\frac{19}{6} \cdot 1$

$\boxed{-\frac{19}{6} \text{ or } -3\frac{1}{6}}$

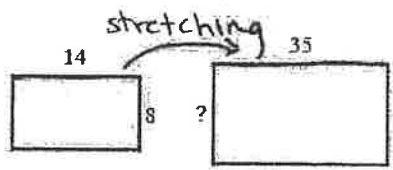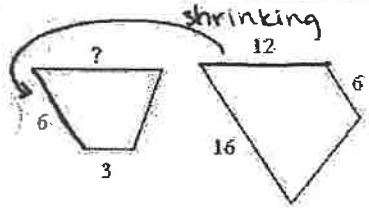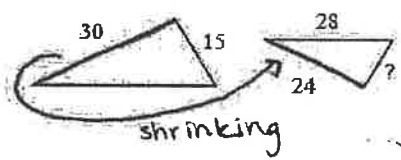6. $3.1 \cdot (-2.3 - 0.4) - 1.083$

$3.1 \cdot -2.7 - 1.083$

$-8.37 - 1.083$

$\boxed{-9.453}$

$\begin{array}{r} 2.3 \\ +0.4 \\ \hline 2.7 \end{array}$

$\begin{array}{r} 3.1 \\ \times 2.7 \\ \hline 2\,1\,7 \\ +6\,2\,0 \\ \hline 8\,37 \end{array}$

$\begin{array}{r} 8.370 \\ +1.083 \\ \hline 9.453 \end{array}$

Name __key__

Date _____ Period _____

Similar Figures Problems (7.G.1 Solve)

Each pair of polygons are similar. Find the missing side length. Show your work to find and use scale factor.

1. scale factor ___$\frac{1}{3}$___

   missing side __7 units__

   shrinking

   ? ⟋ 24

   3 ⟍ 8 ⟍ 21

   24 corresponds with 8, so
   SF = 8 ÷ 24 = $\frac{1}{3}$

   21 corresponds with ?, so
   ? = 21 · $\frac{1}{3}$ = 7

2. scale factor ___2.5___

   missing side __20 units__

   stretching

   14 → 35

   8 ?

   35 corresponds with 14, so
   SF = 35 ÷ 14 = 2.5

   8 corresponds with ?, so
   ? = 8 · 2.5 = 20

3. scale factor ___0.5___

   missing side __8 units__

   shrinking

   ? 12

   6   6
   3   16

   12 corresponds with 6, so
   SF = 6 ÷ 12 = 0.5

   16 corresponds with ?, so
   ? = 16 · 0.5 = 8

4. scale factor ___0.8___

   missing side __12 units__

   shrinking

   30   15   28

   24   ?

   30 corresponds with 24, so
   SF = 24 ÷ 30 = 0.8

   15 corresponds with ?, so
   ? = 15 · 0.8 = 12

5. A figure has a perimeter of 35 meters and an area of 75 meters². A larger similar figure is created using a scale factor of 2.5.

   a. What is the <u>perimeter</u> of the larger figure? Show your work.

   $$35 \cdot 2.5 = \boxed{87.5 \text{ meters}}$$

   b. What is the <u>area</u> of the larger figure? Show your work.

   $$75 \cdot 2.5^2 = 75 \cdot 6.25 = \boxed{468.75 \text{ meter}^2}$$

6. A figure has a perimeter of 30 feet and an area of 54 feet². A smaller similar figure is created using a scale factor of 0.75.

   a. What is the <u>perimeter</u> of the smaller figure? Show your work.

   $$30 \cdot 0.75 = \boxed{22.5 \text{ ft}}$$

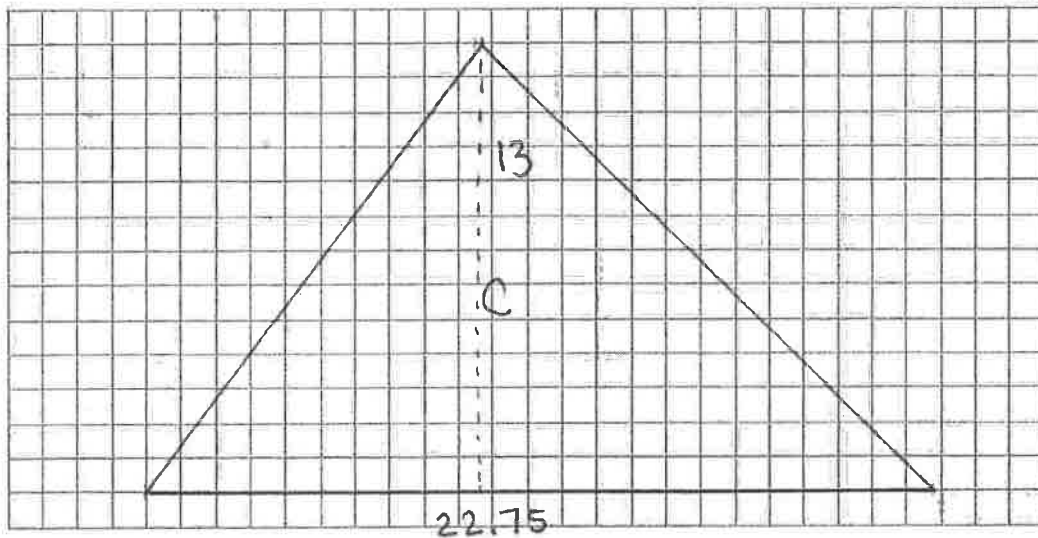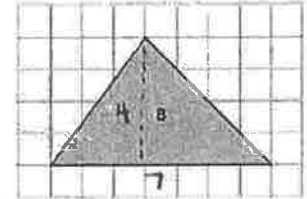   b. What is the <u>area</u> of the smaller figure? Show your work.

   $$54 \cdot 0.75^2 = 54 \cdot 0.5625 = \boxed{30.375 \text{ ft}^2}$$

Name _____ key _____

Date _____   Period _____

## Making Scale Drawings (7.G.1 Reproduce)

1. Triangle B is sketched below. Triangle C is similar to Triangle B. The scale factor from B to C is 3.25. <u>Draw and label</u> Triangle C on the grid below.
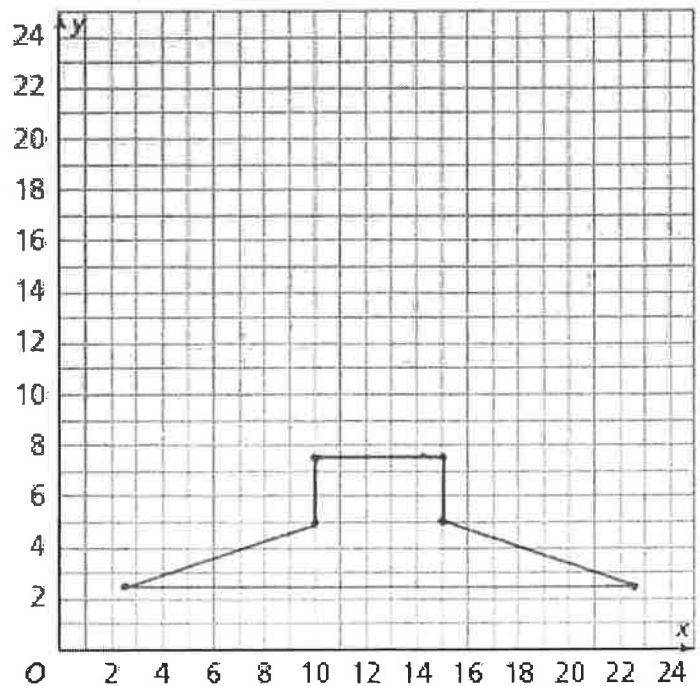
$$h = 4 \cdot 3.25 = 13$$
$$b = 7 \cdot 3.25 = 22.75$$

13

C

22.75

2. Mug's Hat and its coordinates are below. Apply a scale factor of (*2.5x, 2.5y*) to find the new coordinates. Then, plot the coordinates of the similar figure on the grid at right.
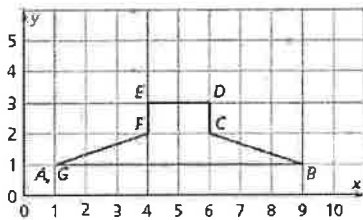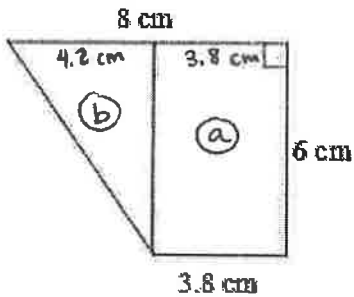

Point	Mug's Hat (x, y)	similar hat (2.5x, 2.5y)
A	(1, 1)	(2.5, 2.5)
B	(9, 1)	(22.5, 2.5)
C	(6, 2)	(15, 5)
D	(6, 3)	(15, 7.5)
E	(4, 3)	(10, 7.5)
F	(4, 2)	(10, 5)
G	(1, 1)	(2.5, 2.5)

Name _____key_____

Date _____   Period _____

Area of Composed Figures (7.G.6)

Find the area of the figures below by using the formulas for rectangles and triangles. Show all work.

1.

8 cm
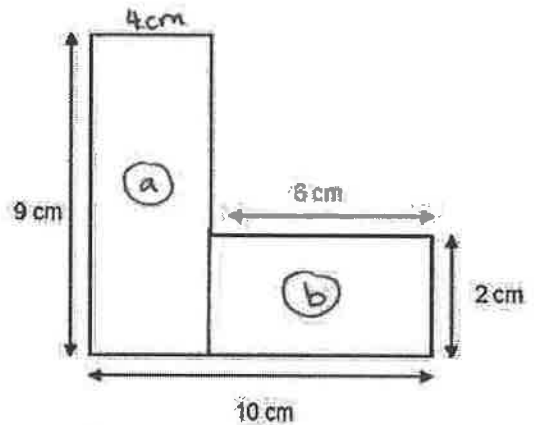
4.2 cm   3.8 cm

ⓑ   ⓐ

6 cm

3.8 cm

ⓐ $6 \cdot 3.8 = 22.8$

ⓑ $\frac{1}{2} \cdot 6 \cdot 4.2 = 12.6$

$A = 22.8 + 12.6 = \boxed{35.4 \ cm^2}$

2.

4cm

ⓐ

9 cm   8 cm

ⓑ   2 cm

10 cm

ⓐ $4 \cdot 9 = 36$

ⓑ $2 \cdot 6 = 12$

$A = 36 + 12 = \boxed{48 \ cm^2}$

3.

6

6   ⓓ

9   ⓐ   ⓑ   ⓒ   6

3   ⓔ

6

15
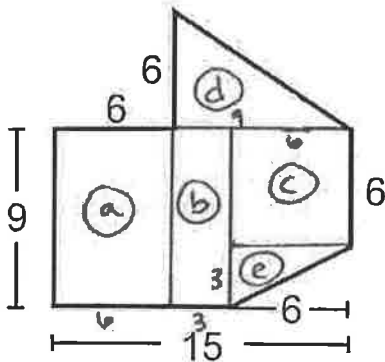
ⓐ $9 \cdot 6 = 54$

ⓑ $9 \cdot 3 = 27$
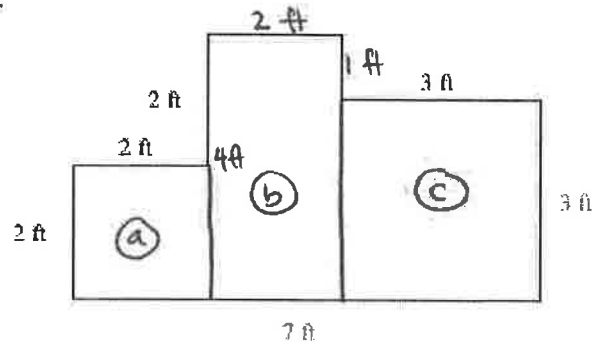
ⓒ $6 \cdot 6 = 36$

ⓓ $\frac{1}{2} \cdot 6 \cdot 9 = 27$

ⓔ $\frac{1}{2} \cdot 3 \cdot 6 = 9$

$A = 54 + 27 + 36 + 27 + 9 = \boxed{153 \ units^2}$

4.

2 ft

1 ft   3 ft

2 ft

2 ft   4ft

ⓑ   ⓒ

2 ft   ⓐ   3 ft

7 ft

ⓐ $2 \cdot 2 = 4$

ⓑ $2 \cdot 4 = 8$

ⓒ $3 \cdot 3 = 9$

$A = 4 + 8 + 9 = \boxed{21 \ ft^2}$