

Name: _____

Key

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Mid-Module 3 STUDY GUIDE**Directions: Show all work for full credit.**

1. Use the expression below to answer parts (a) and (b).

Correction → $-16y - 4(x - 5y) + \frac{1}{3}(2y - 9x)$
 $-36y$

- a. Write an equivalent expression in standard form, and collect like terms.

$$-36y - 4x + 20y + 2y - 3x$$

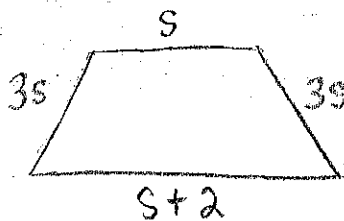
$$-14y - 7x = -7(2y + x)$$

- b. Express the answer from part (a) as an equivalent expression in factored form.
 (Hint: Find a common factor)

$$-7(2y + x) \text{ or } 7(-2y - x)$$

2. Use the information to solve the problems below.

- a. The longest side of a trapezoid is 2 cm longer than the shortest side. The remaining two sides are both three times as long as the shortest side. If the perimeter of the trapezoid is 32 cm, write and solve an equation to find the lengths of all ^{four} sides of the trapezoid.



Let s = shortest side
 Let $s+2$ = longest side
 Let $3s$ = remaining two sides

$$s + 3s + (s+2) + 3s = 32$$

$$8s + 2 = 32$$

$$\begin{array}{r} -2 \quad -2 \\ \hline \end{array}$$

$$\frac{8s}{8} = \frac{30}{8}$$

$$s = \frac{15}{4} = 3\frac{3}{4} \text{ cm}$$

$$s = 3\frac{3}{4} \text{ cm}$$

$$s+2 = 5\frac{3}{4} \text{ cm}$$

$$3s = 45/4 = 11\frac{1}{4} \text{ cm}$$

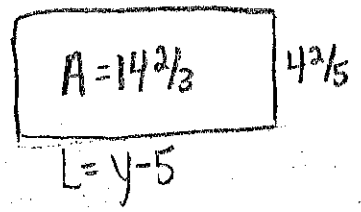
- b. The length of a rectangle is $(y-5)$ inches long, and the width is $4\frac{2}{5}$ inches. If the area is $14\frac{2}{3}$ square inches, write and solve an equation to find the length of the rectangle.

$$\frac{2}{55} \div \frac{5}{275}$$

$$\frac{110}{3} \div \frac{22}{5} = \frac{110}{3} \times \frac{5}{22}$$

$$= \frac{275}{33} = 8\frac{11}{33} \text{ cm}$$

$$= 8\frac{1}{3} \text{ cm}$$



$$14\frac{2}{3} + 22 =$$

$$\frac{44}{3} + \frac{22}{1} =$$

$$\frac{44}{3} + \frac{66}{3} = \frac{110}{3}$$

$$A = LW$$

$$14\frac{2}{3} = (y-5)(4\frac{2}{5})$$

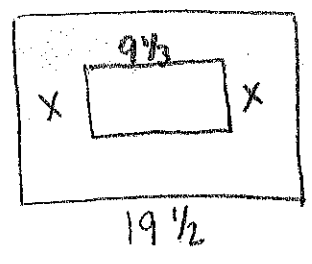
$$14\frac{2}{3} = (4\frac{2}{5})y - 22$$

$$\frac{110}{3} = 4\frac{2}{5}y$$

$$\frac{110}{3} \div 4\frac{2}{5} = y$$

$$8\frac{1}{3} = y \quad L = 8\frac{1}{3} - 5 = 3\frac{1}{3} \text{ cm}$$

3. A picture $9\frac{1}{3}$ feet long is to be centered on a wall that is $19\frac{1}{2}$ feet long. How much space is there from the edge of the wall to the picture?



- a. Solve the problem arithmetically.

$$\frac{39}{2} - \frac{28}{3} =$$

$$\frac{117}{6} - \frac{56}{6} = \frac{61}{6}$$

$$19\frac{1}{2} - 9\frac{1}{3} = 10\frac{1}{6} \div 2 = \frac{61}{6} \times \frac{1}{2} = \frac{61}{12} = 5\frac{1}{12} \text{ ft.}$$

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- b. Solve the problem algebraically.

$$x + 9\frac{1}{3} + x = 19\frac{1}{2}$$

$$\begin{array}{r} 2x + 9\frac{1}{3} = 19\frac{1}{2} \\ -9\frac{1}{3} \quad -9\frac{1}{3} \\ \hline \end{array}$$

$$\frac{2x}{2} = \frac{61}{6} \div 2$$

$$x = 5\frac{1}{2} \text{ ft}$$

$$\begin{aligned} \frac{39}{2} - \frac{28}{3} &= \frac{117}{6} - \frac{56}{6} \\ &= \frac{61}{6} = \end{aligned}$$

- c. Compare the approaches used in parts (a) and (b). Explain how they are similar.

The algebraic solution and the arithmetic solution are the same. The operations used are the same as well, however the algebraic solution used an equation and variables to solve.

4. In August, Mrs. Wood begins school shopping for her 7th grade classroom.

- a. One day, she bought 30 dry-erase markers for \$0.75 each and 12 dry erasers for x dollars each. She spent a total of \$39.34. Write and solve an equation to find the cost of one dry eraser.

Let x = cost of dry eraser

$$30(0.75) + 12x = 39.34$$

$$\begin{array}{r} 22.50 + 12x = 39.34 \\ -22.50 \quad -22.50 \\ \hline \end{array}$$

$$\frac{12x}{12} = \frac{16.84}{12}$$

$$x = \$1.40$$

- b. The following day, Mrs. Wood returned to the store to purchase some more markers. She had \$30 to spend. When she arrived at the store, the erasers were $\frac{1}{3}$ off. What is the greatest amount of markers Mrs. Wood can purchase if she purchases another eraser in addition to the markers?

Hint: First find the sale price of the erasers. Sale price = original price – discount

Next, write and solve an inequality to determine how many markers can be purchased given that she only has \$30 to spend and already bought an eraser.

$$\text{sale price} = (1.40)(\frac{2}{3}) = \$0.93 \quad \text{or} \quad 1.40 - 1.40(\frac{1}{3}) = \$0.93$$

Let $y = \#$ markers purchased

$$\begin{array}{r} 0.75y + 0.93 \leq 30.00 \\ -0.93 \quad -0.93 \\ \hline 0.75y \leq 29.07 \\ \frac{0.75y}{0.75} \leq \frac{29.07}{0.75} \\ y \leq 38.76 \end{array}$$

The greatest amount of markers she can buy is 38.

5. Harper wants to have a paintball party for his birthday with a few of his friends, but he can spend no more than \$150. The paintball place charges a flat fee of \$55 for a private party and \$12.50 per person for supplies.

- a. Write an inequality that represents the total cost of Harper's birthday for p people given his budget.

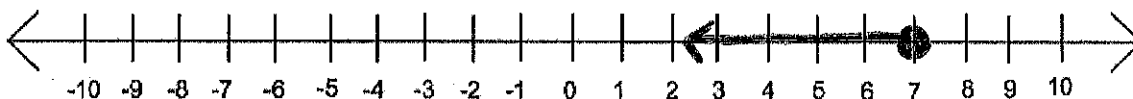
$$55 + 12.50p \leq 150$$

- b. How many people can Harper pay for (including himself) while staying within the limitations of his budget?

$$\begin{array}{r} 55 + 12.50p \leq 150 \\ -55 \quad -55 \\ \hline 12.50p \leq 95 \\ \frac{12.50p}{12.50} \leq \frac{95}{12.50} \\ p \leq 7.6 \end{array}$$

7 people can attend the party

- c. Graph the solution of the inequality from part (a).



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6. Mackenna and Gia are planning to go skating with Mackenna's family. The rink charges one rate for four-wheel skate rentals and another rate for inline skate rentals. Mackenna and Gia both decided to rent inline skates, while Mackenna's brother, mom and dad all decided to rent four-wheel skates.

- a. Write an expression for the total cost of the skate rentals. Define the variables.

i = cost of inline skate rental

f = cost of 4-wheel skate rental

$$\begin{array}{cccccc} \text{Mackenna} & \text{Gia} & \text{mom} & \text{dad} & \text{brother} & \\ i & i & f & f & f & = \end{array} \boxed{2i + 3f}$$

- b. The cost of the inline skate rental was double the cost of the four-wheel skates. Write an equation to represent the relationship between the two types of rentals.

$$i = 2f$$

- c. The family purchased refreshments and spent a total of \$21.75. If the total amount of money spent on rentals and refreshments was \$72.50, use an equation to find the cost of one four-wheel skate rental.

$$2i + 3f + 21.75 = 72.50$$

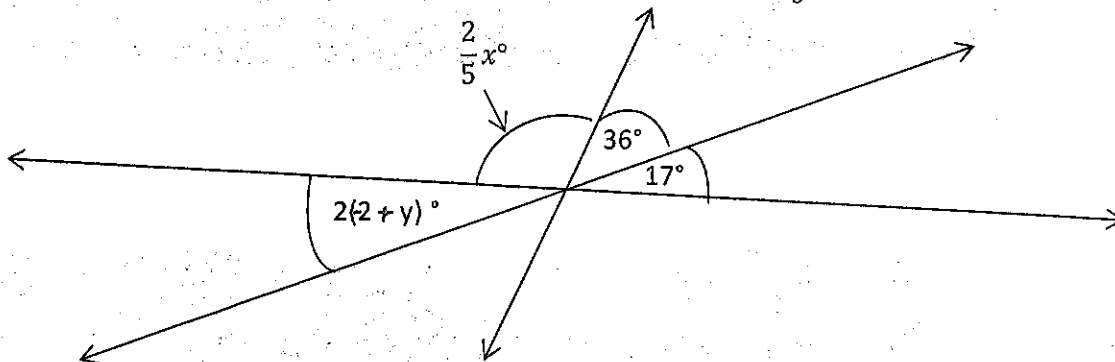
$$2(2f) + 3f + 21.75 = 72.50$$

$$\begin{array}{r} \checkmark \\ 7f + 21.75 = 72.50 \\ -21.75 \quad -21.75 \\ \hline \end{array}$$

$$\frac{7f}{7} = \frac{50.75}{7}$$

$$\boxed{f = \$7.25}$$

7. The three lines shown in the diagram below intersect at the same point. The measures of some of the angles in degrees are given as $2(2 - y)^\circ$, $\frac{2}{5}x^\circ$, 17° , 36° .



- a. Write and solve an equation that can be used to find the value of y .
Hint: Use your knowledge of vertical angles.

$$\begin{aligned}
 2(2+y) &= 17 \\
 \cancel{4} + 2y &= 17 \\
 \cancel{+4} &\quad +4 \\
 \hline
 2y &= 21 \\
 \frac{2y}{2} &= \frac{21}{2} \\
 \boxed{y} &= 10.5
 \end{aligned}$$

- b. Write and solve an equation that can be used to find the value of x .
Hint: Remember how many degrees are in a straight line.

$$\begin{aligned}
 \frac{2}{5}x + 36 + 17 &= 180 \\
 \frac{2}{5}x + \cancel{53} &= 180 \\
 \frac{2}{5}x &\quad - 53 \\
 \hline
 \frac{2}{5}x &= 127 \\
 \frac{\frac{2}{5}x}{\frac{2}{5}} &= \frac{127}{\frac{2}{5}}
 \end{aligned}$$

$$127 \div \frac{2}{5} = 127 \times \frac{5}{2}$$

$$\boxed{x = 317.5}$$