

Algebra I Midterm

What is an algebraic expression for the word phrase?

1. 6 times the difference of w and s

$$6(w - s)$$

2. A square field has an area of 489 ft^2 . What is the approximate length of a side of the field? Give your answer to the nearest foot.

$$\sqrt{x} = 489$$

$$\sqrt{x^2} = \sqrt{489}$$

$$x \approx 22.11 \text{ ft}$$

$$x = 22 \text{ ft}$$

3. You made two deposits to your bank account this month. One deposit was \$21.07, and the second deposit was \$21.19. Your balance at the end of the month is \$72.31, and you made no withdrawals. Write and evaluate an expression for your balance at the beginning of the month.

$$x + 21.07 + 21.19 = 72.31$$

$$x + 42.26 = 72.31$$

$$-42.26 \quad -42.26$$

$$x = 30.05$$

4. A souvenir maker wants to create a scale model of the Empire State Building. The Empire State Building is 1472 feet tall and has a base with dimensions 286 ft by 286 ft. If the model is 9 in. tall, approximately what are the dimensions of its base in inches?



$$1.75 \text{ in} \times 1.75 \text{ in}$$

$$\frac{286 \text{ ft}}{1472 \text{ ft}} = \frac{x \text{ in}}{9 \text{ in}}$$

$$x = 1.75 \text{ in}$$

5. Simplify the expression $6ab + 4ab - 9ab$. What is the coefficient of the simplified expression?

$$6ab + 4ab - 9ab$$

$$1ab$$

$$1$$

6. Angela and Neil are going to the movies. They each bought a medium popcorn, and Neil got a small soft drink. Angela had a \$5 gift certificate to put toward the cost, and Neil paid the rest, which came to \$28.90. A movie ticket costs \$10.50 and a medium popcorn costs \$5.40. How much does a small soft drink cost at the theater?

$$5 + 28.90 = 2(10.50) + 2(5.40) + x$$

$$33.90 = 21.00 + 10.80 + x$$

$$33.90 = 31.80 + x$$

$$-31.80 \quad -31.80$$

$$2.10 = x$$

7. What equation do you get when you solve $c - d = c + px$ for x ?

$$\frac{-c - c}{p} = \frac{px}{p}$$

$$\frac{-d}{p} = x$$

8. On a certain day 1 US dollar is equivalent in value to 90 Japanese yen. Lucy is going on a trip to Japan. She has \$1200 to spend. How many yen is this?

$$\frac{1 \text{ US}}{90 \text{ yen}} = \frac{1200}{x \text{ yen}}$$

$$x = 10,800 \text{ yen}$$

What is the solution of the proportion?

9. $\frac{x-10}{9} = \frac{5}{20}$

$$\begin{aligned} 20(x-10) &= 9(5) \\ 20x - 200 &= 45 \\ \frac{20x - 200}{20} &= \frac{45}{20} \end{aligned}$$

$x = 12.25$

10. What is the total cost of a \$71.91 meal at a restaurant after including a 16% tip?

$$\frac{16}{100} = \frac{x}{71.91}$$

$$\frac{1150.56}{100} = \frac{100x}{100}$$

$11.51 = x$

$$\begin{array}{r} 71.91 \\ + 11.51 \\ \hline 83.42 \end{array}$$

11. Suppose you had d dollars in your bank account. You spent \$14 but have at least \$49 left. How much money did you have initially? Write and solve an inequality that represents this situation.

① $d - 14 \geq 49$
 $\quad +14 \quad +14$

② $d \geq 63$

What are the solutions of the inequality?

12. $(-\frac{1}{6}x - 7 < \frac{1}{2})$ Mult. by 6

$$\begin{aligned} -x - 42 &< 3 \\ +42 &+42 \end{aligned}$$

$$\begin{aligned} -x &< 45 \\ -1 &-1 \end{aligned}$$

$x > 45$

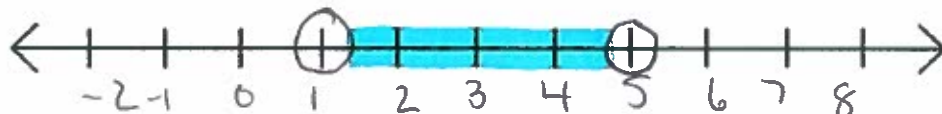
What are the solutions of the compound inequality? Graph the solutions.

13. $-2 < 2x - 4 < 6$

$$\begin{aligned} +4 &+4 &+4 \end{aligned}$$

$$\frac{2 < 2x < 10}{2 \quad 2 \quad 2}$$

$1 < x < 5$



14. Starting from 1.8 miles away, a car drives towards a speed check point and then passes it. The car travels at a constant rate of 55 miles per hour. The distance of the car from the check point is given by $d = |1.8 - 55t|$. At what times is the car 0.8 miles from the check point?

$$0.8 = |1.8 - 55t|$$

$$\begin{array}{r} 0.8 = 1.8 - 55t \\ -1.8 \quad -1.8 \\ \hline -1 = -55t \\ \frac{-1}{-55} = \frac{-55t}{-55} \\ 0.018 = t \end{array}$$

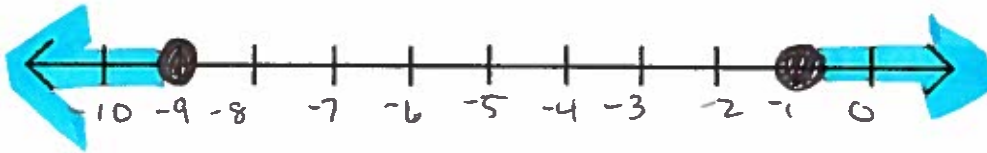
$$\begin{array}{r} -0.8 = 1.8 - 55t \\ -1.8 \quad -1.8 \\ \hline -2.6 = -55t \\ \frac{-2.6}{-55} = \frac{-55t}{-55} \\ 0.047 = t \end{array}$$

0.018 sec, 0.047 sec

What are the solutions of the inequality? Graph the solution.

15. $|d+5| \geq 4$

$$\begin{array}{r} d+5 \geq 4 \\ -5 \quad -5 \\ \hline d \geq -1 \end{array} \quad \text{or} \quad \begin{array}{r} d+5 \leq -4 \\ -5 \quad -5 \\ \hline d \leq -9 \end{array}$$



16. The ordered pairs (1, 49), (2, 64), (3, 81), (4, 100), and (5, 121) represent a function. What is a rule that represents this function?

$$y = .50x + 72.04$$

17. Crystal earns \$5.75 per hour mowing lawns.

- Write a rule to describe how the amount of money m earned is a function of the number of hours h spent mowing lawns.

$$m = 5.75h$$

- How much does Crystal earn if she works 3 hours and 30 minutes?

$$3 \text{ hours } 30 \text{ min} = 3.5 \text{ hrs}$$

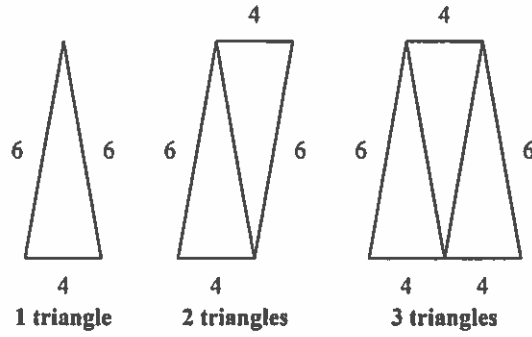
$$m = 5.75 (3.5)$$

$$m = \$20.13$$

Name: _____

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In the diagram below, what is the relationship between the number of triangles and the perimeter of the figure they form?



18. Represent the above relationship by filling in the table below.

Number of Triangles	Perimeter
1	16
2	20
3	24

19. During a clothing store's Bargain Days, the regular price for T-shirts is discounted by \$3. There is a state sales tax of 5%, and the \$3 discount is applied before the sales tax is calculated.

a. Write an expression that shows the regular price r of a T-shirt minus the \$3 discount.

$$r - 3$$

b. Write a rule for the function $p(r)$ that expresses the final price p of a T-shirt with the discount applied and sales tax added.

$$1.05(r - 3) \text{ or}$$

$$(r - 3) + 0.05(r - 3)$$

c. How much would you pay during Bargain Days for a shirt regularly priced at \$18.50?

$$\$16.28$$

$$1.05(18.50 - 3)$$

$$1.05(15.50)$$

$$\$16.28$$

20. Suppose y varies directly with x , and $y = 7$ when $x = 6$. What direct variation equation relates x and y ? What is the value of y when $x = -10$?

$$\begin{aligned} y &= ax \\ 7 &= a \cdot 6 \\ \frac{7}{6} &= a \end{aligned}$$

$$\begin{aligned} y &= \frac{7}{6}x \\ y &= \frac{7}{6}(-10) \\ y &= -\frac{70}{6} = -3\frac{5}{3} \end{aligned}$$

Write an equation in slope intercept form that represents the line that passes through the two points.

21. (4, 6), (8, 3)

$$\frac{3 - 6}{8 - 4} = \frac{-3}{4}$$

$$y = \frac{-3}{4}x + b$$

$$6 = \frac{-3}{4}(4) + b$$

$$6 = -3 + b$$

$$\begin{array}{r} +3 +3 \\ \hline 9 = b \end{array}$$

$$y = \frac{-3}{4}x + 9$$

Write an equation in point-slope form for the line through the given point with the given slope.

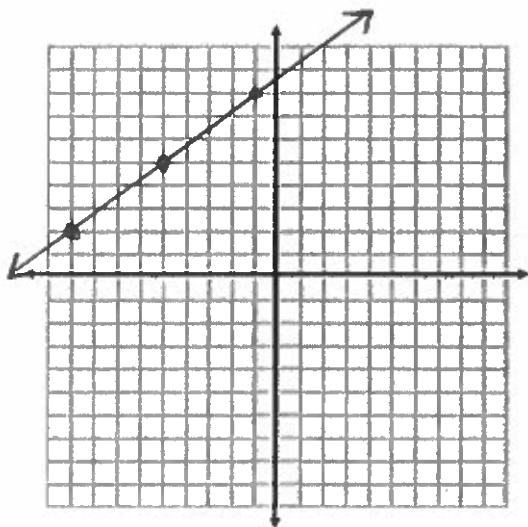
22. (9, -10); $m = -\frac{5}{2}$

$$y - (-10) = -\frac{5}{2}(x - 9)$$

$$y + 10 = -\frac{5}{2}(x - 9)$$

Graph the equation.

23. $y - 5 = \frac{3}{4}(x + 5)$



$m = \frac{3}{4}$
 $(-5, 5)$

Find the x- and y-intercept of the line.

24. $-\frac{9}{7}x + \frac{4}{5}y = 7$

x-int ($y=0$)
 $-\frac{9}{7}x + \frac{4}{5}(0) = 7$
 $-\frac{9}{7}x = 7$
 $-\frac{9}{7}x = 7 \cdot \frac{-7}{9}$
 $x = -\frac{49}{9}$

y-int ($x=0$)
 $-\frac{9}{7}(0) + \frac{4}{5}y = 7$
 $\frac{4}{5}y = 7$
 $\frac{4}{5}y = 7 \cdot \frac{5}{4}$
 $y = \frac{35}{4}$

Write an equation for the line that is parallel to the given line and passes through the given point.

25. $y = \frac{5}{4}x - 9$; $(-12, -34)$ → same slope

a. ~~$y = \frac{4}{5}x + 19$~~

b. ~~$y = \frac{4}{5}x - 19$~~

c. $y = \frac{5}{4}x - 19$

d. $y = \frac{5}{4}x + \frac{61}{2}$

$y = \frac{5}{4}x + b$
 $-34 = \frac{5}{4}(-12) + b$
 $-34 = -15 + b$
 $-15 + 15$

 $-19 = b$

Write the equation of a line that is perpendicular to the given line and that passes through the given point.

26. $y = \frac{9}{8}x + \frac{37}{8}; (-5, -1)$
 slope $\rightarrow \frac{8}{9}$

a. $y = \frac{8}{9}x + \frac{37}{8}$

b. $y = \frac{8}{9}x + \frac{37}{8}$

c. ~~$y = \frac{8}{9}x + \frac{31}{9}$~~

d. $y = \frac{8}{9}x + \frac{31}{9}$

$y = \frac{8}{9}x + b$

$-1 = \frac{8}{9}(-5) + b$

$-1 = -\frac{40}{9} + b$

$\frac{+40}{9} + \frac{40}{9}$

$\frac{31}{9} = b$

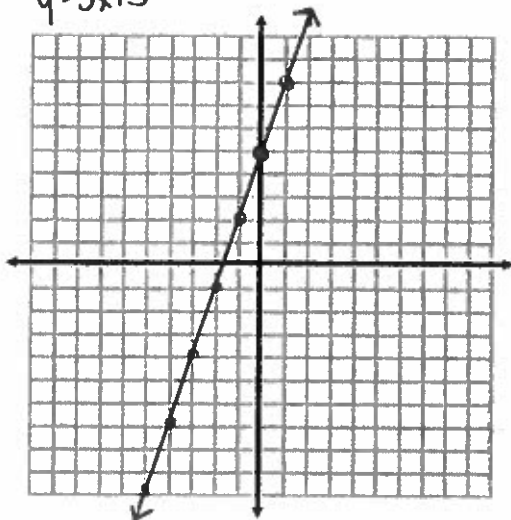
What is the solution of the system?

27. $y = 3x + 5$

$y - 5 = 3x$

$y = 3x + 5$

infinitely many



What is the solution of the system?

28. $4x - 2y = 18$

$y = 2x - 9$

$-2(4x - y = 3)$

$y = 4x - 3$

$4x - 2y = 18$
 $-4x + y = -3$

$-y = 15$

$y = -15$

$4x - (-15) = 3$

$4x + 15 = 3$

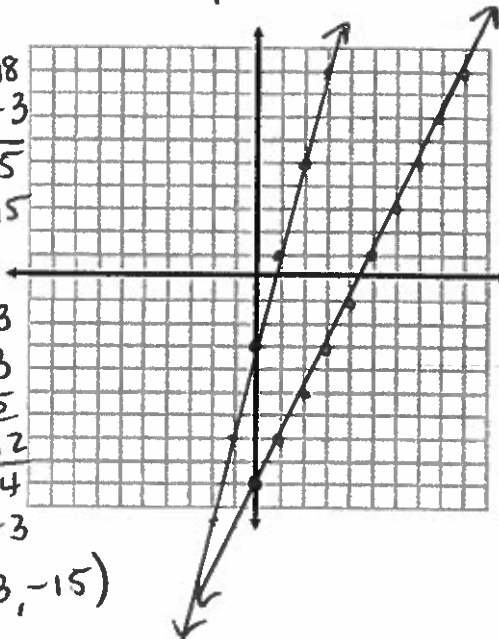
$-15 - 15$

$4x = -12$

$4 \quad 4$

$x = -3$

$(-3, -15)$



29. Mike and Kim invest \$17,000 in equipment to print yearbooks for schools. Each yearbook costs \$5 to print and sells for \$25. How many yearbooks must they sell before their business breaks even?

a. 680 yearbooks

b. 850 yearbooks

c. 3400 yearbooks

d. 1,225 yearbooks

$5x + 17000 = 25x$
 $-5x \quad -5x$

$\frac{17000}{20} = \frac{20x}{20}$

$850 = x$

