

Algebra II A
Midterm Exam Review

Name:
Hr:

Identify a pattern and find the next number in the pattern.

1. $-8, -5, -2, 1$ 4

$\begin{matrix} \vee & \vee & \vee \\ \times 3 & + 3 & + 3 \end{matrix}$

To which set of numbers does the number belong?

2. $\sqrt{43} = 6.6 \dots$

Irrational

Insert $<$, $>$, or $=$ to make the sentence true.

3. $-\frac{3}{10} \blacktriangleright -\frac{1}{2}$

$-0.3 > -0.5$

Name the property of real numbers illustrated by the equation.

4. $5 \cdot (\sqrt{8} \cdot 6) = (5 \cdot \sqrt{8}) \cdot 6$

Associative Prop. of Multiplication

Evaluate the expression for the given value of the variable(s).

5. $\frac{-4(3h - 4)}{3 + h}; h = -1$

$$\frac{-4(3(-1) - 4)}{3 + (-1)} = \frac{-4(-7)}{2} = \frac{28}{2} = \boxed{14}$$

6. $-x^2 + 5x - 5; x = 2$

$$-(2)^2 + 5(2) - 5 = -4 + 10 - 5 = \boxed{1}$$

Combine like terms. What is a simpler form of each expression?

7. $-3(-4y - 6) + 7y$

$$\boxed{12y + 18} + \boxed{7y}$$
$$\boxed{19y + 18}$$

What is the solution of the following one-step equation?

8. $x - 0.5 = 3$
 $+ .5 \quad + .5$

$$\boxed{x = 3.5}$$

Solve the equation.

9. $5y + 8 = 20 - 4y$
 $+4y \quad +4y$
 $\frac{9y + 8 = 20}{-8 \quad -8}$
 $\frac{9y = 12}{}$

$$\frac{9y}{9} = \frac{12}{9}$$

$$y = 4/3$$

OR $\boxed{y = 1\frac{1}{3}}$

Use an algebraic equation to solve the problem.

10. A rectangle is 6 times as long as it is wide. The perimeter is 80 cm. Find the dimensions of the rectangle. Round to the nearest tenth if necessary.



$$l = 6w$$
$$w = w$$

$$P = 2w + 2l$$
$$80 = 2w + 2(6w)$$
$$80 = 2w + 12w$$
$$\frac{80}{14} = \frac{14w}{14}$$

$$\boxed{5.7 = w}$$

$$l = 6(5.7) = \boxed{34.3}$$

Solve the equation or formula for the indicated variable.

11. $S = \frac{3r^3}{2r^3}$, for t

$$t = \frac{S}{3r^3}$$

What inequality represents the sentence?

12. 13 fewer than " x " a number is at least 15

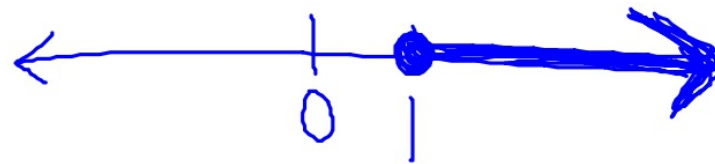
$$x - 13 \geq 15$$

Solve the inequality. Graph the solution set.

13. $6 + 4k \geq 10$

$$\frac{4k \geq 4}{4 \quad 4}$$

$$k \geq 1$$



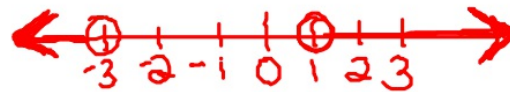
Solve the problem by writing an inequality.

14. A club decides to sell T-shirts for \$12 each as a fund-raiser. It costs \$20, plus \$7 per T-shirt to make the T-shirts. Write and solve an equation to find how many T-shirts the club needs to make and sell in order to profit at least \$100.

$$\begin{aligned}
 & 12x - (7x + 20) \geq 100 \\
 & 12x - 7x - 20 \geq 100 \\
 & 5x - 20 \geq 100 \\
 & \quad +20 \quad +20 \\
 & \hline
 & 5x \geq 120 \\
 & \quad \quad \quad \rightarrow \quad \frac{5x}{5} \geq \frac{120}{5} \\
 & \quad \quad \quad \boxed{x \geq 24 \text{ T-shirts}}
 \end{aligned}$$

Solve the compound inequality. Graph the solution.

$$\begin{aligned}
 15. \quad & 9x - 5 < -32 \text{ or } 4x + 9 > 13 \\
 & \quad +5 \quad +5 \quad \quad \quad -9 \quad -9 \\
 \hline
 & 9x < -27 \quad \quad \quad 4x > 4 \\
 & \quad \quad \quad \downarrow \quad \quad \quad \downarrow \\
 & \frac{9x}{9} < \frac{-27}{9} \quad \quad \quad \frac{4x}{4} > \frac{4}{4} \\
 & \boxed{x < -3 \text{ or } x > 1}
 \end{aligned}$$



Solve the absolute value equation. Graph the solution.

$$\begin{aligned}
 16. \quad & |x - 3| = 1 \\
 & \downarrow \quad \quad \quad \downarrow \\
 & x - 3 = 1 \quad \quad \quad x - 3 = -1 \\
 & \quad +3 \quad +3 \quad \quad \quad +3 \quad +3 \\
 \hline
 & \boxed{x = 4} \quad \quad \quad \boxed{x = 2}
 \end{aligned}$$

$$\begin{aligned}
 & |x| = 5 \\
 & (x = 5 / x = -5) \checkmark
 \end{aligned}$$

Solve the inequality. Graph the solution.

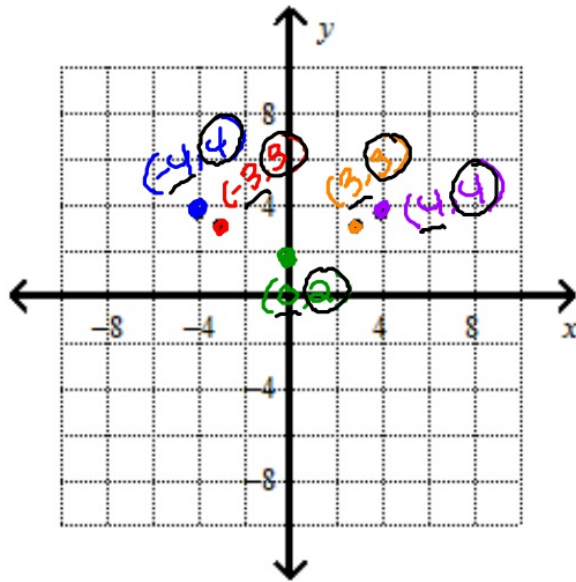
17. $|2x + 3| > 11$

$$\begin{array}{r} 2x + 3 > 11 \\ \hline -3 \quad -3 \\ \hline 2x > 8 \\ \hline \frac{2x}{2} > \frac{8}{2} \\ x > 4 \end{array} \qquad \begin{array}{r} 2x + 3 < -11 \\ \hline -3 \quad -3 \\ \hline 2x < -14 \\ \hline \frac{2x}{2} < \frac{-14}{2} \\ x < -7 \end{array}$$

$x < -7$ OR $x > 4$



18. Find the domain and range of the relation.



Domain = X-values $\rightarrow (-4, -3, 0, 4, 3)$
Range = y-values $\rightarrow (4, 3, 2)$

For each function, what is the output of the given input?

19. For $f(x) = -2x - 3$, find $f(3)$.

$$f(3) = -2(3) - 3$$

$$f(3) = -6 - 3$$

$$f(3) = -9$$

$y=kx$

Determine whether y varies directly with x . If so, find the constant of variation k and write the equation.

20.

x	y
3	12
18	72
108	432
648	2592

$\frac{12}{3} = 4 \checkmark$
 $\frac{72}{18} = 4 \checkmark$
 $\frac{432}{108} = 4 \checkmark$
 $\frac{2592}{648} = 4 \checkmark$

$\frac{y}{x} = k \checkmark$

$k = 4$

yes!

$y = 4x$

Find the value of y for a given value of x , if y varies directly with x . $y = kx \checkmark$

21. If $y = 3.78$ when $x = 5.4$, what is y when $x = 1.1$?

$k = \frac{y}{x} = \frac{3.78}{5.4} = .7$

$y = .7x$

$y = .7(1.1)$

$y = .77$

22. The distance traveled at a constant speed is directly proportional to the time of travel. If Olivia traveled 24 miles in 1.5 hours, how many miles will Olivia travel in 4.2 hours at the same constant speed?

$k = \frac{24}{1.5} = 16$

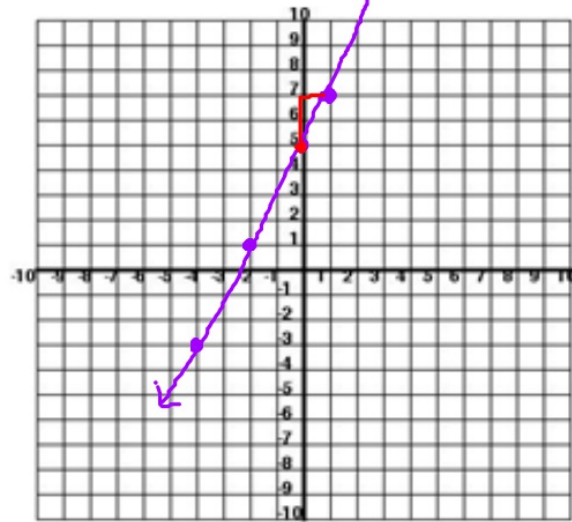
$y = 16x$

$y = 16(4.2)$

$y = 67.2 \text{ miles}$

Graph the set of data. Decide whether a linear model is reasonable. If so, draw a trend line and write its equation.

23. $\{(1, 7), (-2, 1), (3, 13), (-4, -3), (0, 5)\}$



$$y = mx + b$$

\uparrow \uparrow
 2 5

$$y = 2x + 5$$

$$y = 2.5x + 5$$

Find the function rule for $g(x)$.

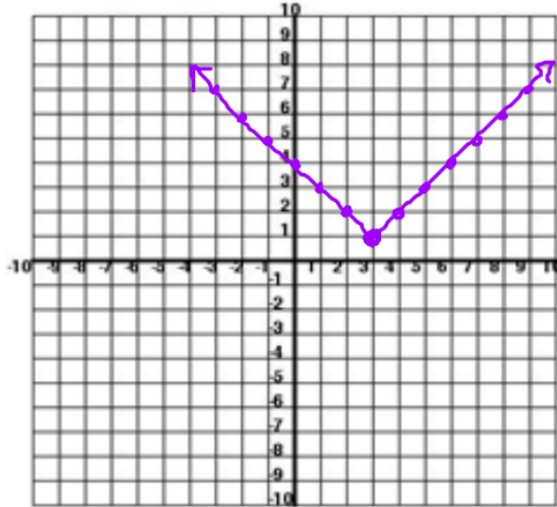
24. The function $f(x) = x^2$. The graph of $g(x)$ is $f(x)$ translated to the left 2 units and down 4 units. What is the function rule for $g(x)$?

$+2$ -4

$$g(x) = (x+2)^2 - 4$$

What is the graph of the absolute value equation?

25. $y = |x - 3| + 1$ (3,1)



(h,k)?

26. Describe the following translation of $y = |x|$ to $y = |x + 7| - 2$?

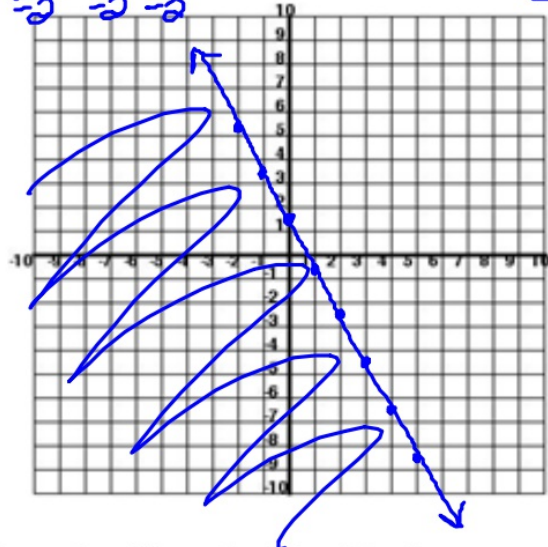
left 7 Down 2

What is the graph of each inequality?

27. $-2y \geq 4x - 3$
 $\div 2 \quad \div 2 \quad \div 2$

$$y \leq -2x + 1.5$$

$$0 \leq 1.5r$$



28. A doctor's office schedules 15-minute appointments and half-hour appointments for weekdays. The doctor limits these appointments to, at most, 30 hours per week. Write an inequality to represent the number of 15-minute appointments x and the number of half-hour appointments y the doctor may have in a week.

30 hours

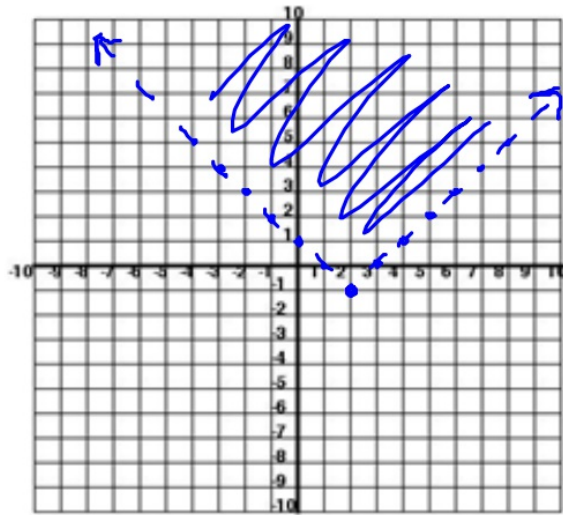
$$= 30 \times 60 = 1800 \text{ min.}$$

$$15x + 30y \leq 1800$$

What is the graph of each absolute value inequality?

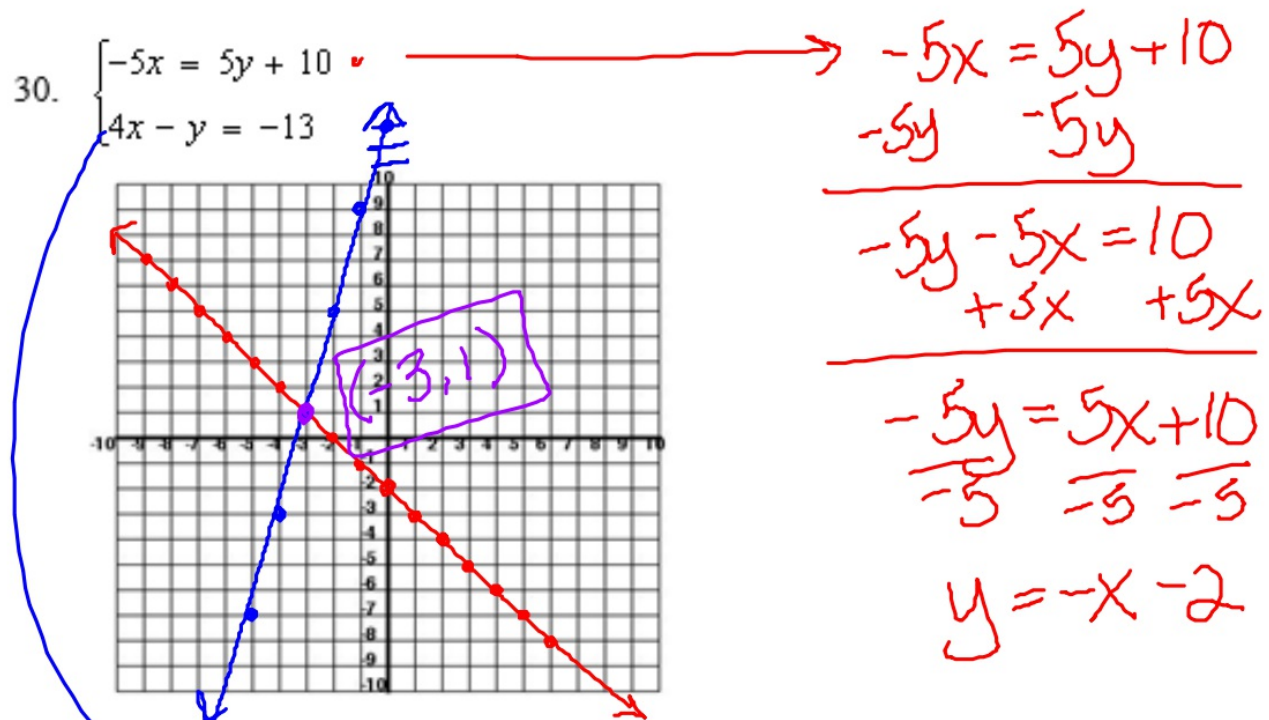
29. $y > |x - 2| - 1$

$(2, -1)$



$0 > |0 - 2| - 1$
 $0 > |-2| - 1$
 $0 > 2 - 1$
 $0 \ngtr 1 ?$

Solve the system by graphing.



$4x - y = -13$
 $-4x \quad -4x$

 $-y = -4x - 13$
 $\frac{-1}{-1} \quad \frac{-4}{-1} \quad \frac{-13}{-1}$
 $y = 4x + 13$

Solve the system using elimination.

$$31. \begin{cases} -x + 5y = -14 \\ x - 4y = 12 \end{cases}$$

$$y = -2 \checkmark$$

$$\begin{array}{r} x - 4(2) = 12 \\ x + 8 = 12 \\ \hline -8 \quad -8 \\ \hline x = 4 \end{array}$$

$$(4, 2)$$

What are the solutions of the following systems?

$$32. \begin{cases} -3x + y = -5 \\ -6x + 2y = -2 \end{cases} \rightarrow \begin{array}{r} 6x - 2y = 10 \\ -6x + 2y = -2 \\ \hline 0 \neq 8 \quad \text{"} \end{array}$$

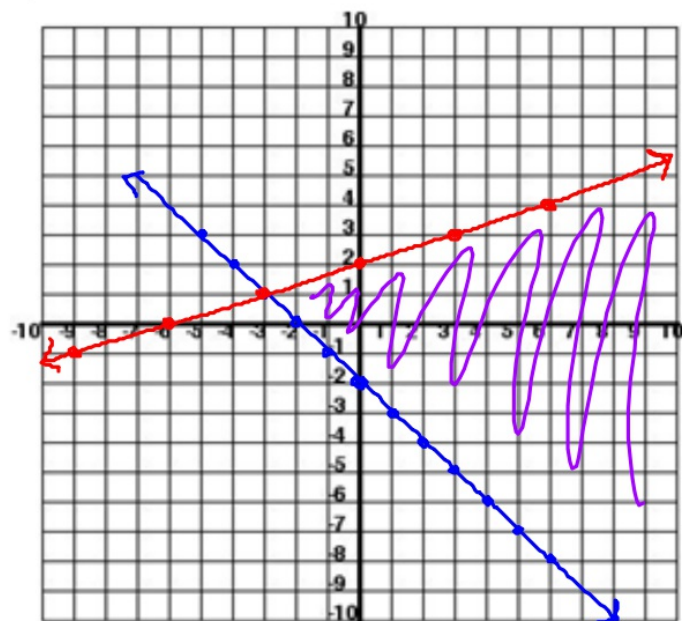
No Solution

$$33. \begin{cases} 3x - 3y = 12 \\ -6x + 6y = -24 \end{cases} \rightarrow \begin{array}{l} 6x - 6y = 24 \\ -6x + 6y = -24 \\ \hline 0 = 0 \checkmark \end{array}$$

Many Solutions

Solve the system of inequalities by graphing.

$$34. \begin{cases} y \geq -x - 2 \\ y \leq \frac{1}{3}x + 2 \end{cases}$$



Given the system of constraints, name all vertices. Then find the maximum value of the given objective.

35.
$$\begin{cases} x \geq 0 \\ y \geq 0 \\ y \leq \frac{1}{2}x + 2 \\ 5 \geq y + x \end{cases}$$

$y \leq -x + 5$

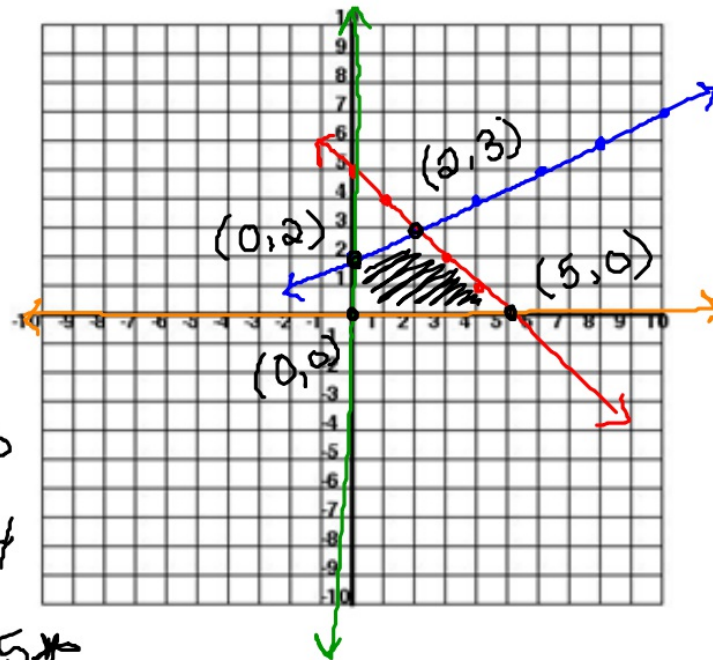
Objective function: $C = 5x - 2y$

$(0,0) \quad C = 5(0) - 2(0) = 0$

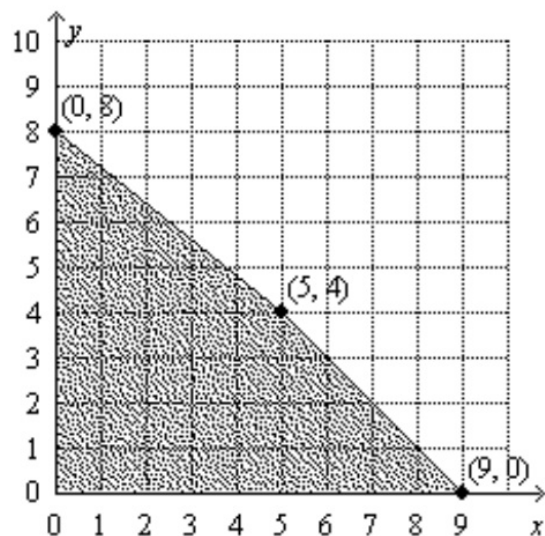
$(2,3) \quad C = 5(2) - 2(3) = 4$

$(5,0) \quad C = 5(5) - 2(0) = 25$

$(0,2) \quad C = 5(0) - 2(2) = -4$



36. Find the values of x and y that maximize the objective function $P = 3x + 2y$ for the graph. What is the maximum value?



$$(0,8) \quad P = 3(0) + 2(8) = 16$$

$$(5,4) \quad P = 3(5) + 2(4) = 23$$

$$\boxed{(9,0)} \quad P = 3(9) + 2(0) = 27 \neq$$

max!

What is the solution of the system of equations?

$$37. \begin{cases} 3x + 3y + 5z = 3 \\ 5x + y + 3z = 1 \\ 2x + 5y + 4z = -5 \end{cases}$$

$$\boxed{(-1, -3, 3)}$$

plug in to test!