

## Midterm Review

① Solve for  $v \rightarrow K = \frac{mv^2}{2}$

Use PEMDAS backwards  $2 \cdot K = \frac{mv^2}{2} \cdot 2$

$$\frac{2K}{m} = \frac{mv^2}{m}$$

$$\frac{2K}{m} = v^2$$

$$\sqrt{\frac{2K}{m}} = \sqrt{v^2}$$

$$\boxed{\sqrt{\frac{2K}{m}} = v}$$

② Find distance between  $(-6, 2)$  and  $(6, 1)$

Use Pythagorean Theorem

-Find  $a$ :  $y_1 - y_2 \rightarrow 2 - 1 = 1$

-Find  $b$ :  $x_1 - x_2 \rightarrow -6 - 6 = -12$

Pythagorean  $\rightarrow a^2 + b^2 = c^2$   
 $1^2 + (-12)^2 = c^2$   
 $1 + 144 = c^2$   
 $145 = c^2$   
 $\sqrt{145} = \sqrt{c^2}$   
 $\boxed{\sqrt{145} = c}$

- ③ Length of room is 5 feet less than triple its width. Perimeter is 54 feet. What is length?

$$\text{Perimeter} = 2L + 2W$$

$$W = \text{width} \quad 3W - 5 = \text{length}$$

$$54 = 2(3W - 5) + 2W$$

$$54 = 6W - 10 + 2W$$

$$54 = 8W - 10$$

$$64 = 8W$$

$$8 = W$$

$$\Rightarrow \text{Length } 3(8) - 5 = 24 - 5 = \boxed{19}$$

- ④ Find equation parallel to  $y = -\frac{1}{3}x + 11$  and passes through the point (3, 4)

Parallel lines have same slope  $m = -\frac{1}{3}$

Use coordinate and slope to find the new equation

$$y = mx + b$$

$$4 = \left(-\frac{1}{3}\right)(3) + b$$

$$4 = -1 + b$$

$$\begin{array}{r} +1 \quad +1 \\ 5 = \quad b \end{array}$$

$$\boxed{y = -\frac{1}{3}x + 5}$$

- ⑤ Two functions  $f(x) = -3x + 6$   $g(x) = 2x - 9$   
Find value when  $f(x) = g(x)$ .

Set equations equal to each other.

$$\begin{array}{r|l} -3x+6 & = 2x-9 \\ -2x & \quad -2x \\ \hline -5x+6 & = -9 \\ -6 & \quad -6 \\ \hline -5x & = -15 \\ -5 & \quad -5 \\ \hline \end{array}$$

$$\boxed{x = 3}$$

- ⑥ Find the solution  $3 - (x+1) = 5x + 6 - 7x$

Solve for x

- Combine  
- Like  
- Terms

$$\begin{array}{r|l} 3 - (x+1) & = 5x + 6 - 7x \\ 3 - x - 1 & = 5x + 6 - 7x \\ 2 - x & = -2x + 6 \\ +2x & \quad +2x \\ \hline 2 + x & = 6 \\ -2 & \quad -2 \\ \hline \end{array}$$

$$\boxed{x = 4}$$

- ⑦ Find solution  $\frac{-5x+3}{4} > -8$

- Multiply both sides to rid denominator

$$\cancel{4} \cdot \frac{-5x+3}{\cancel{4}} > -8 \cdot 4$$

$$-5x+3 > -32$$

- When divide by negative number  $\rightarrow$  change symbol

$$\frac{-5x}{-5} > \frac{-35}{-5} = \boxed{x < 7}$$

- ⑧ Function  $f(x) = 4x - 2$  what is the range of  $f(x)$  for the domain  $\{-2, 0, 3\}$

Substitute each domain into the function

$$x = -2$$

$$4(-2) - 2$$

$$-8 - 2$$

$$-10$$

$$x = 0$$

$$4(0) - 2$$

$$0 - 2$$

$$-2$$

$$x = 3$$

$$4(3) - 2$$

$$12 - 2$$

$$10$$

$$\text{Range} = \{-10, -2, 10\}$$

- ⑨ Sequence  $A(n) = 6 + 0.5(n-1)$  Choose the table that best fits the sequence.

Choice A is the answer

$$\text{When } n = 1$$

$$A(n) = 6 + 0.5(1-1)$$

$$= 6 + 0.5(0)$$

$$= 6$$

checks out ✓

- ⑩ Sequence 128, 64, 32, 16, ... Write a recursive formula for the sequence.

We really didn't go over NEXT = NOW statements

You should notice that  $\frac{1}{2}$  is the common difference

$$\boxed{\text{NEXT} = \frac{1}{2} \cdot \text{NOW}}$$

- ⑪ Roberto game piece  $(-13, 14)$  Maya game piece  $(-3, -10)$  What are coordinates of the point midway between?

$$M = \left( \frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$$

$$M = \left( \frac{-13 - 3}{2}, \frac{14 - 10}{2} \right)$$

$$M = \left( \frac{-16}{2}, \frac{4}{2} \right)$$

$$M = (-8, 2)$$

- ⑫ Range is the y-axis value of car goes from 0 to 24,000

$$\text{Range } 0 < y \leq 24000$$

- ⑬ Charges \$13 plus \$3 per hour to rent boat. What is maximum number of hours to rent? Can spend no more than \$20 each

$$3x + 13 < 40$$

$$3x < 27$$

$$x < 9$$

- 14) Pass through points (2,3) and (5,9) Write equation of the function

Find slope first  $m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{9 - 3}{5 - 2} = \frac{6}{3} = 2$

Find y-intercept  $y = mx + b$

$$3 = (2)(2) + b$$

$$3 = 4 + b$$

$$-1 = b$$

Equation  $y = 2x - 1$

- 15) Store charges \$2 for pen \$3 for marker She spends \$10 on both. Which graph represents situation?

$$2x + 3y = 10$$

$$\frac{3y}{3} = \frac{-2x + 10}{3}$$

$$y = -\frac{2}{3}x + \frac{10}{3}$$

Put in slope intercept form

y-intercept  $\frac{10}{3}$

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

Choice B

- (16) Mackenzie has 19 coins either dimes or quarters total \$3.40, how many are quarters?

$d$  = dimes  
 $q$  = quarters

$$\begin{aligned} d + q &= 19 \\ 0.10d + 0.25q &= 3.40 \end{aligned}$$

$$-0.15q = -1.5$$

$$\boxed{q = 10}$$

10 quarters!

- (17) Sequence 8, 19, 30, 41, 52 Write a formula

$$a_n = a_1 + d(n-1)$$

$$8 + 11(n-1)$$

$$8 + 11n - 11$$

$$\boxed{a_n = 11n - 3}$$

11 is  $d$  (difference)

8 is  $a_1$  (first term)

- (18) Describe the line  $y = \frac{1}{2}x + 8$

"Goes up to the right and crosses y-axis at (0, 8)"

- (19) Formula  $V = \frac{1}{3}\pi r^2 h$  Solve for  $h$

Use PEMDAS backwards

$$3 \cdot V = \frac{1}{3} \pi r^2 h \cdot \cancel{3}$$

$$\frac{3V}{\pi r^2} = \frac{\pi r^2 h}{\pi r^2}$$

$$\boxed{\frac{3V}{\pi r^2} = h}$$

26) Find average rate of change from day 2 to day 4

day 2 \$98.66

day 4 \$107.33

Find the slope

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{107.33 - 98.66}{4 - 2}$$

$$= \frac{8.67}{2}$$

$$\boxed{\text{ROC} = 4.335}$$

21) Point M is midpoint of  $\overline{AB}$  with coordinates  $(2, 8)$  coordinates of A  $(10, 12)$  what are coordinates of B?

Find the endpoint

Formula:

$$2 = \frac{10 + x_2}{2} \cdot 2$$

$$4 = 10 + x_2$$

$$-6 = x_2$$

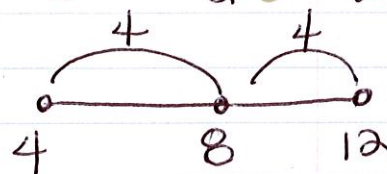
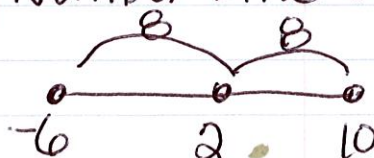
$$2 \cdot 8 = \frac{12 + y_2}{2} \cdot 2$$

$$16 = 12 + y_2$$

$$4 = y_2$$

OR

Number Line:



$(-6, 4)$  Endpoint



22) Write an equation that is perpendicular to

$$6x + y = 12$$

$$y = -6x + 12$$

Write in slope intercept form

perpendicular lines have opposite reciprocal slopes

$$\text{old slope} = m = -6$$

$$\text{new slope} = m = \frac{1}{6}$$

$$\text{New equation } \boxed{y = \frac{1}{6}x + 5}$$

remember we can pick y-int

23) Write equation parallel to line that passes through points (8,0) and (13,2)

Find slope first

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{2 - 0}{13 - 8} = \frac{2}{5}$$

Find y-intercept

$$y = mx + b$$

$$0 = \left(\frac{2}{5}\right)(8) + b$$

$$0 = \frac{16}{5} + b$$

$$-\frac{16}{5} = b$$

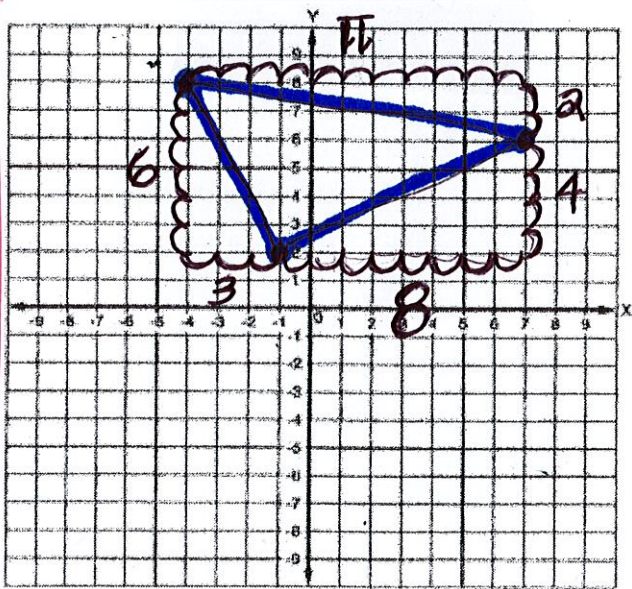
$$\text{Equation } y = \frac{2}{5}x - \frac{16}{5}$$

An equation parallel to it  $y = \frac{2}{5}x + 1$

Parallel Lines have same slopes

- (24) Triangle ABC has points  $A(-4, 8)$   $B(-1, 2)$   $C(7, 6)$   
Find the perimeter

Find all distances then find perimeter



$$\begin{aligned} 6^2 + 3^2 &= c^2 \\ 36 + 9 &= c^2 \\ \sqrt{45} &= \sqrt{c^2} \\ \sqrt{45} &= c \\ 6.708 &= c \end{aligned}$$

$$\begin{aligned} 8^2 + 4^2 &= c^2 \\ 64 + 16 &= c^2 \\ \sqrt{80} &= \sqrt{c^2} \\ \sqrt{80} &= c \\ 8.94 &= c \end{aligned}$$

$$\begin{aligned} 11^2 + 2^2 &= c^2 \\ 121 + 4 &= c^2 \\ \sqrt{125} &= \sqrt{c^2} \\ \sqrt{125} &= c \\ 11.18 &= c \end{aligned}$$

Add together  $6.708 + 8.94 + 11.18 = \boxed{26.83}$

- (25) Write an equation parallel to equation whose  $2x - 3y = 9$

Put in slope intercept form  $y = \frac{2}{3}x - 3$

Parallel lines have same slope  $\boxed{y = \frac{2}{3}x + 5}$

\* Remember you can put any number for y-int

(26) Graph  $-x - 2y > 8$  Explain how you arrived at the answer

Put equation in slope intercept form

$$y < -\frac{1}{2}x - 4$$

make sure you change sign when you divide by negative

Graph will be dash line, shade below (LESS THAN)  
Graph y-int first  $(0, -4)$ , then from there rise 1 run left 2 for the slope

