

Math 80
Midterm 1 Solutions

1. (15 pts.) Solve the following.

(a) (5 pts.) Solve $r + 9 + 8r = 4(6 + r)$.

Simplifying each side: $9r + 9 = 24 + 4r$

Putting r terms on one side and constants on the other: $5r = 15$

Dividing each side by 5: $r = 3$

(b) (5 pts.) Solve $A = \frac{1}{2}(b + B)h$ for the variable b .

Multiplying each side by 2: $2A = (b + B)h$

Dividing by h : $\frac{2A}{h} = b + B$

Subtracting B from both sides: $b = \frac{2A}{h} - B$

(c) (5 pts.) What is the slope of the line between the points $(-1,4)$ and $(8,-2)$?

Let $(x_1, y_1) = (-1, 4)$ and $(x_2, y_2) = (8, -2)$.

Then slope = $\frac{y_2 - y_1}{x_2 - x_1} = \frac{-2 - 4}{8 - (-1)} = \frac{-6}{9} = \frac{-2}{3}$

2. (30 pts.) Consider the linear equation $-6x + 3y = 15$.

(a) (3 pts.) Is $(-1, 2)$ a solution to the equation?

Plug in $x = -1$ and $y = 2 \Rightarrow -6(-1) + 3(2) = 6 + 6 = 12 \neq 15$

So, $(-1, 2)$ is not a solution.

(b) (5 pts.) Solve the equation for the variable y .

Add $6x$ to both sides: $3y = 6x + 15$

Divide both sides by 3: $y = \frac{1}{3}(6x + 15) = 2x + 5$

(c) (3 pts.) What is the slope of the line described by this equation?

The slope is 2 (the coefficient on x).

(d) (8 pts.) Complete the following table of ordered pairs for the equation.

x	y
-4	-3
-3	-1
-1	3
0	5

For the first ordered pair, plug in $x = -4$ and solve for y . $\Rightarrow y = -3$

For the second, plug in $y = -1$ and solve for x . $\Rightarrow x = -3$

For the third, plug in $x = -1$ and solve for y . $\Rightarrow y = 3$

For the fourth, plug in $x = 0$ and solve for y . $\Rightarrow y = 5$

- (e) (5 pts.) Given the information in the table in part f, graph the line for the equation $-6x+3y=15$.

Plot any two of the following points: $(-4,-3)$, $(-3,-1)$, $(-1,3)$, $(0,5)$

The line that goes through these points is the graph for the equation.

- (f) (6 pts.) What is the slope of a line parallel to $-6x+3y=15$?

Since the slope of the line for $-6x+3y=15$ is 2, the slope of a line parallel is also 2.

What is the slope of a line perpendicular to the $-6x+3y=15$?

The slope of a line perpendicular is $-\frac{1}{2}$ (the negative reciprocal).

3. (15 pts.) Susie is driving 1540 miles from Colorado to visit her grandpa in Washington. Her grandpa decides to drive along the same route to meet her somewhere in between WA and CO. Susie drive a constant 70 mph* and they meet after 14 hours. Assuming her grandpa drives at a constant speed*, how fast is he driving?

Let x = Susie's grandpa's speed in mph.

	Speed (rate)	Time	Distance Travelled
Susie	70 mph	14 hours	$70 \times 14 = 980$
Susie's Grandpa	x	14 hours	$14x$

Combined, Susie and her grandpa drive 1540 miles, so $980 + 14x = 1540$

Solving for x , we have $14x = 560 \Rightarrow x = 40$ mph.

So, Susie's grandpa drives at 40 mph.

*For the sake of nice math, we assume that Susie and her grandpa never need to stop for food, rest, or gas.

4. (15 pts.) Back in WA, Susie's grandpa sells handmade pink-frosted and chocolate-covered donuts*. He sells the pink-frosted donuts for \$1.25 each and the chocolate-covered ones for \$1.50 each. On his best selling day, his total revenue was \$525.00. His sales of pink-frosted donuts were 80% of his sales of chocolate-covered donuts. How many of each type of donut did he sell on that day?

Let x = the number of chocolate-covered donuts sold.

Then since the sales of pink-frosted donuts are 80% of the sales of chocolate-covered donuts, the number of pink-donuts sold = 80% of x = $.8x$.

	Number sold	Price per donut	Total Sales
Pink	$.8x$	\$1.25	$(1.25)(.8x) = x$
Chocolate	x	\$1.50	$1.5x$

Since the total sales of pink-frosted donuts and total sales of chocolate-covered donuts make up the total sales, we have that $x + 1.5x = 525$.

Solving for x , we have $2.5x = 525 \Rightarrow x = 210$.

So, Susie's grandpa sold 210 chocolate-covered donuts and $.8(210)=168$ pink-frosted donuts that day.

*Mmmmmmmmm donuts.