Midterm Review Checklist

Answer Key

Are you comfortable with each type of problem listed below? If yes, complete the example and check off the box. If not, review your notes for that section, try the example and check your answer to make sure you are correct. Any topics that you are still unsure about, you should be sure to follow up in class.

Chapter 1: Expressions, Equations and Functions

□ I can evaluate a basic algebraic expression (1.1)

*Be sure to substitute first (use parenthesis) and follow PEMDAS

Ex: $4 + 2w$ when $w = -3$

$4 + 2(-3)$
$4 + -6$
-2

□ I can solve an order of operations problem (1.2)

*Mult./Div. in order Left to Right. Add/Sub. in order left to right

Ex: $4 - 2 + 3 \div 3 \cdot 4$

$4 - 2 + 1 \cdot 4$
$4 - 2 + 4$
$2 + 4$
6

□ I can translate verbal phrases into algebraic expressions, equations or inequalities (1.3/1.4)

*Underline key words/phrases one at a time to break it down.

Ex: 3 less than three times the sum of x and 7

$3(x + 7) - 3$

□ I can decide if a given number is a solution to an equation or inequality. (1.4)

*Plug it in and see if it works.

Ex: $2x + 1 \geq 9$ is 3 a solution?

$2(3) + 1 \geq 9$
$6 + 1 \geq 9$
$7 \geq 9$
No, 7 isn't greater than 9

□ I can decide if a relationship represents a function by analyzing input and output. I am also sure that my reasoning makes sense. (1.6)

*Each input can have only one output.

Ex: Does the following represent a function? Why or why not?

x	1	2	2	3
y	4	7	3	4

No, 2 has more than one output.

□ I can write a rule for a function using the $\Delta y/\Delta x$ method. (1.6)

*Find Δy and Δx. Set up a fraction with Δy on top
This number becomes the coefficient of x. Check to see if
The function works. If not adjust by adding or subtracting.
*Don't forget $y =$!!!

Ex: Write a rule for the function:

x	−3	0	3	6	9
y	1	3	5	7	9

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

Chapter 2: Properties of Real Numbers

□ I can perform operations with integers. (2.2,2.3,2.4,2.6)

*Review positive and negative rules

Ex: $-6 \cdot (-4) + 8$

32

□ I can apply the properties of absolute value and opposites. (2.1)

*Substitute first and remember that absolute value bars act
Like parenthesis (do inside first)

Ex: $-r + |3r|$ when $r = -4$

$-(-4) + |3 \cdot (-4)|$
$4 + |-12|$
16

□ I can perform operations involving fractions. (2.2/2.3)

*Change mixed to improper first then find LCD

Ex: $-2\frac{1}{3} + 4\frac{1}{5}$

$\frac{-7}{3} + \frac{21}{5}$

$\frac{-35}{15} + \frac{63}{15}$

$\frac{28}{15} = 1\frac{13}{15}$

□ I can combine like terms. (2.5)

*Pay attention to negative signs

Ex: $3 - 4x - 2 + 7x$

$1 + 3x$

□ I can apply the distributive property. (2.5)

*Hint: Rewrite subtraction as adding a negative!

Ex: $-4(2x - 5)$

$-8x + 20$

□ I can simplify division problems. (2.5)

*Both pieces on top are being *divided* by the denominator

Ex: $\frac{9x-6}{-3}$

$-3x + 2$

□ I can classify numbers as rational, irrational, integer or whole. (2.1)

Ex: a) $-3\frac{3}{4}$ b) $\sqrt{12}$

a) Rational – it is a fraction

b) Irrational – this would be a never ending and never repeating decimal which cannot be expressed as a fraction.

□ I can order real numbers. (2.7)

Ex: $-2.2, 2\frac{4}{5}, -\sqrt{12}, \sqrt{6}$

*Estimate square roots between two integers.

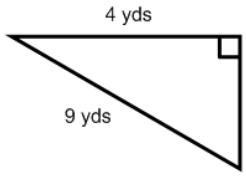
*the $\sqrt{6}$ is between 2 and 3, but closer to 2 since 6 is Closer to 4 than 9. $2\frac{4}{5}$ is closer to 3 than 2 because 4/5 is more than half.

$-\sqrt{12}, -2.2, \sqrt{6}, 2\frac{4}{5}$

Chapter 11: Simplifying Radicals and Pythagorean Theorem

□ I can find the missing side of a right triangle. (11.4)

Ex:



*Right triangle = Pythagorean theorem = $a^2 + b^2 = c^2$
*don't forget the hypotenuse is always opposite the right angle

$a^2 + b^2 = c^2$
$4^2 + b^2 = 9^2$
$16 + b^2 = 81$
$b^2 = 65$
$b = \sqrt{65}$

*Write answer in simplified radical form.

□ I can decide if three sides could possibly form a right triangle. (11.4)

Ex: 13, 12, 5

*Use the Pythagorean Theorem to decide.
*Don't forget the longest side is the hypotenuse.

$a^2 + b^2 = c^2$
$5^2 + 12^2 = 13^2$
$25 + 144 = 169$
$169 = 169$
Yes, the pythag. Th. works

□ I can simplify radicals. (11.2)

Ex: $3\sqrt{32}$

*find the biggest perfect square factor and split it up.

$3 \cdot \sqrt{16}\sqrt{2}$
$3 \cdot 4\sqrt{2}$
$12\sqrt{2}$

□ I can rationalize the denominator. (11.2)

Ex: $\sqrt{\frac{24}{7}}$

*Multiply top and bottom by the denominator to cancel out

$\frac{\sqrt{24}}{\sqrt{7}} = \frac{2\sqrt{6}}{\sqrt{7}} \cdot \frac{\sqrt{7}}{\sqrt{7}} = \frac{2\sqrt{42}}{7}$

□ I can perform operations with radicals. (11.2 continued)

*the number under the radical needs to be the same in order to add

Ex: a) $2\sqrt{7} + 3\sqrt{63}$

$2\sqrt{7} + 3\sqrt{9}\sqrt{7}$
$2\sqrt{7} + 9\sqrt{7}$
$11\sqrt{7}$

b) $\sqrt{3}(2 + \sqrt{12})$

$2\sqrt{3} + 6$

ACC only –

*FOIL

c) $(\sqrt{7} + \sqrt{2})(\sqrt{7} - 3\sqrt{2})$
$\sqrt{49} - 3\sqrt{14} + \sqrt{14} - 3\sqrt{4}$
$7 - 2\sqrt{14} - 6$
$1 - 2\sqrt{14}$

Chapter 3: Solve Linear Equations

□ I can solve a one-step equation. (3.1)

*Isolate the variable using inverse operations.

Ex: $4 - x = -9$

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

□ I can use reciprocals to solve one-step equations. (3.1)

*Multiply by the reciprocal.

Ex: $-\frac{3}{5}x = 12$

$-\frac{5}{3} \cdot -\frac{3}{5}x = 12 \cdot -\frac{5}{3}$
$x = -20$

□ I can solve two-step equations. (3.2)

*Use reverse PEMDAS to isolate the variable

Ex: $2x - 4 = 12$

$+4 \quad +4$
$2x = 16$
$x = 8$

□ I can solve multi-step equations. (3.3)

*Simplify before solving.

Ex: $4(x - 3) + 3 = 11$

$4x - 12 + 3 = 11$
$4x - 9 = 11$
$4x = 20$
$x = 5$

□ I can solve equations with variables on both sides and interpret answers appropriately. (3.4)

*Don't forget to move variable terms to one side of equation by Adding or subtracting.

Ex: a) $2(x + 6) = 3(x + 4)$
$2x + 12 = 3x + 12$
$-2x \quad -2x$
$12 = x + 12$
$-12 \quad -12$
$0 = x$

b) $4(x - 5) = 2(x + 3)$

$4x - 20 = 2x + 6$
$-2x \quad -2x$
$2x - 20 = 6$
$2x = 26$
$x = 13$

c) $6(3x + 6) = 9(2x + 4)$
$18x + 36 = 18x + 36$
$-18x \quad -18x$
$36 = 36$
All real numbers

d) $4(3x + 4) = 6(2x + 5)$
$12x + 16 = 12x + 30$
$-12x \quad -12x$
$16 = 30$
No Solution

□ I can solve a proportion (3.5/3.6)

Ex: $\frac{2}{2x+1} = \frac{4}{6x+1}$

$2(6x + 1) = 4(2x + 1)$
$12x + 2 = 8x + 4$
$-8x \quad -8x$
$4x + 2 = 4$
$-2 \quad -2$
$\frac{4x}{4} = \frac{2}{4}$
$x = ½$

□ I can solve a percent problem. (3.7)

*Use the percent proportion: $\frac{is}{of} = \frac{\%}{100}$

Ex: 30 is 45% of what number?

$\frac{30}{x} = \frac{45}{100}$

$x = 66\frac{2}{3}$

□ I can rewrite equations in function form. (3.8)
*Isolate y

Ex: $4x - 5y = 20$
$-4x \quad -4x$
$\frac{-5y}{-5} = \frac{20 - 4x}{-5}$
$y = -4 + \frac{4}{5}x$

Chapter 4: Graph Linear Equations and Functions

□ I can check if an ordered pair is a solution to a linear equation. (4.2)

*Plug into equation and see if it works. (x, y)

Ex: $2y - 5x = -11$ is (2, 3) a solution?

$2(3) - 5(2) = -11$

$6 - 10 = -11$

$-4 = -11$

No

□ I can graph by making a table. (4.2)

*Isolate y first, then choose the five most appropriate values for x

Since the coefficient of x is a fraction, choose multiples of denominator.

Ex: Graph $2x - 4y = 8$

$\underline{-2x \quad -2x}$

$\underline{-4y} = \underline{8 - 2x}$

$-4 \quad -4$

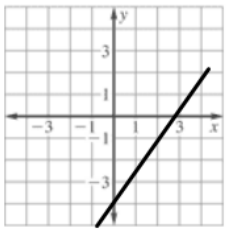
$y = -2 + \frac{1}{2}x$

x	−4	−2	0	2	4
y	−4	−3	−2	−1	0

□ I can identify x and y intercepts of a graphed line. (4.3)

*look to see where the line crosses each axis

Ex:



x-int: 3 y-int: −4

□ I can find x and y intercepts given an equation. (4.3)

*to find x and y intercepts, replace the opposite coordinate with 0

Ex: $2x - 5y = -10$

$\underline{x\text{-int}}$: $2x - 5(0) = -10$

$2x = -10$

$x = -5$

$\underline{y\text{-int}}$: $2(0) - 5y = -10$

$-5y = -10$

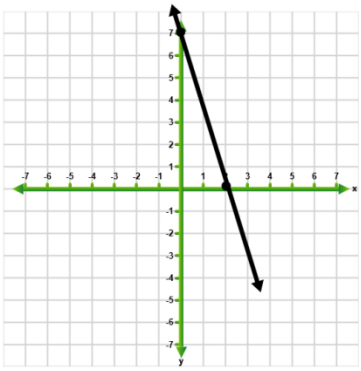
$y = 2$

□ I can graph using x and y intercepts. (4.3)

*After finding the intercepts be sure to graph them as two separate Points touching each axis.

Ex: Graph $7x + 2y = 14$

x: 2 y: 7



□ I can find slope given two points. (4.4)

Use the formula: $m = \frac{y_2 - y_1}{x_2 - x_1}$

*don't forget to reduce and follow sign rules

*if the zero is under the line its undefined.

Ex: a) (20, 5), (10, 1)

$m = \frac{2}{5}$

b) (−3, 2), (−3, 7)

Undefined.

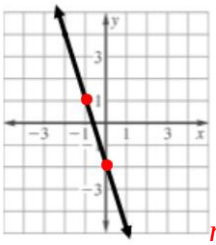
c) (4, 5), (8, 5)

$m = 0$

□ I can find slope of a graphed line. (4.4)

*Use the formula: $\frac{rise}{run}$

Ex:



$m = -3$

□ I can find rate of change (4.4) ACC only

*Find it using regular slope formula, but be sure to include units and make it into a unit rate

Ex: At 12:20 P.M. a parachutist is 6200 feet above the ground. At 12:27, the parachutist is 1100 feet above the ground. Find the average rate of change in feet per minute.

$$\frac{-5100\ feet}{7\ minutes} = -\frac{728.6\ feet}{minute}$$

□ I can identify the slope and *y*-intercept given an equation. (4.5)

*use $y = mx + b$

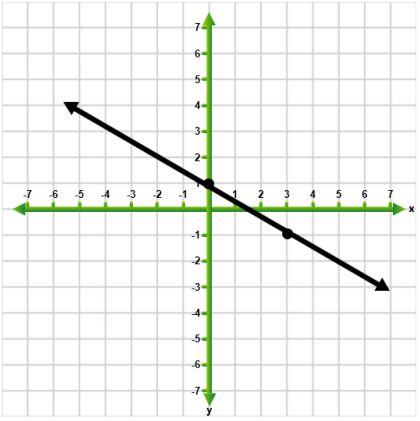
Ex: $y = 3x - 2$

$m = 3, b = -2$

□ I can graph using slope-intercept form. (4.5)

*Start at *b* and then go where *rise* and *run* tell you to.

Ex: Graph $y = -\frac{2}{3}x + 1$



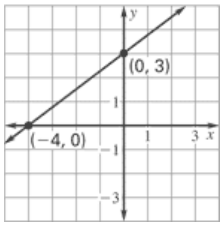
□ I can decide if an equation represents direct variation (4.6)

*isolate *y* and see if it is in the form $y = ax$

Ex: a) $y - 3x = 2$

$y = 2 + 3x$

No, *b* is 2 not 0

b) 

No, the graph doesn't pass through the origin so *b* is not 0

□ I can write a direct variation equation. (4.6)
*Use *x* and *y* to find *a* by plugging into *y* = *ax*. Then Plug only *a* back into *y* = *ax*.

Ex: *y* varies directly with *x* and passes through the point (4, 8). Write the direct variation equation relating *x* and *y*.

$y = ax$
$8 = a\,(4)$
$2 = a$

$y = 2x$

□ I can evaluate functions written in function notation. (4.7) ACC only
*Simplify replace *x* with the number given

Ex: a) If $f(x) = 2x - 3$, evaluate when $x = 4$.

$f(4) = 2(4) - 3$
$f(4) = 8 - 3$
$f(4) = 5$

*replace the entire $f(x)$ with the number given and find *x*

b) Find *x* when $f(x) = 6$ (use the same function above)

$6 = 2x - 3$
$9 = 2x$
$4.5 = x$

□ I can identify domain and range of a function (4.2/4.3)
*Domain = ALL inputs
*Range = ALL ouptuts

Ex: You are going to a concert. Tickets cost $50 each and it costs $20 to park. You have $320 to spend. Identify the domain and range.

$0 \le x \le 6$
$0 \le y \le 320$

Chapter 5: Write Linear Equations (ACC only)

□ I can write equations in slope-intercept form with a variety of information. (5.1/5.2)
*Find *m* and *b* and replace in *y* = *mx* + *b*

Ex: a) $m = 7$ $b = -3$

$y = 7x - 3$

b) Passes through (0, 5) and $m = 4$

$y = 4x + 5$

c) (6, 3) slope: –2

$y = -2x + 15$

d) (–2, 5) (2, –1)

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

□ I can write equations of parallel and perpendicular lines (in slope-intercept form). (5.5)

*Parallel lines have exact same slope

Ex: passes through (–3, –5) $\parallel$ to $y = 3x - 1$

$y = 3x + 4$

*Perpendicular lines have slopes that are opposite reciprocals

Ex: passes through (4, –2) $\perp$ $y - 4x = 2$

$y = -\frac{1}{4}x - 1$

□ I can decide if equations represent parallel or perpendicular lines. (5.5)

Ex: Line A: $y = -3x + 1$ **Line B:** $-x + 3y = 1$ **Line C:** $2x - 6y = 4$

$m = -3$ $m = \frac{1}{3}$ $m = \frac{1}{3}$

A is perpendicular to B, A is perpendicular to C, B is parallel to C

□ I can write equations in standard form with a variety of information. (5.6)

Ex: a) passes through (2, 2) (4, –2) b) $Ax + 3y = 2$, passes through (–1, 0)

$2x + y = 6$ $2x - 3y = -2$