## 2017 Algebra 1 Midterm Sample of Practice Problems (Clearly show work for full credits)

1. **Know this vocabulary**: solve, equation, solution, inequality, simplify, evaluate, expression, factors, terms, like terms, constants, coefficient, degree, proportion, absolute value, function, verical line test, function notation, f(x), domain, range, input, output, integers, opposite, reciprocal; slope-intercept, point-slope, standard and function form of linear equations.

2. **Write the numbers in increasing order.**    $-\sqrt{28}, -7, -\dfrac{38}{5}, -6.5$

   *(annotations: $\approx -5$ above $-\sqrt{28}$; $-7\frac{3}{5}$ above $-\frac{38}{5}$)*

   $-\dfrac{38}{5}, -7, -6.5, -\sqrt{28}$  ← write answer using given numbers

3. **Find the quotient.**    $\dfrac{7}{15} \div \dfrac{1}{5} = \dfrac{7}{15_3} \cdot \dfrac{5^1}{1} = \boxed{\dfrac{7}{3}}$  ← Keep as simplified improper fraction

4. **Simplify and write in standard form.**    $5(3 - x) - 6 - x =$

   ← Variable term first & constant last

   $15 - 5x - 6 - x = \boxed{-6x + 9}$

5. The cost of a taxi ride is given by $C = rd + a$,
   where $r$ is the rate per mile,
   $d$ is the trip distance in terms of the number mile in the trip, and
   $a$ is an automatic charge created when the meter is started.
   **Solve the equation for the mileage rate r.**

   ISOLATE "r"

   $$C = rd + a$$
   $$\underline{-a \qquad\qquad -a}$$
   $$\dfrac{C - a}{d} = \dfrac{rd}{d}$$
   $$\boxed{r = \dfrac{C-a}{d}}$$

6. Ben bowls for 30 minutes and burns 75 calories.
   How many calories will Ben burn in 100 minutes of bowling?

   x = # of calories

   **Write a proportion to solve this problem.**

   $\dfrac{30\,\text{MIN}}{75\,\text{Cal}} = \dfrac{100}{x}$    $\boxed{x = 250 \text{ CALORIES}}$    Don't forget Units!

   Cross Multiply and divide

   $30\overline{)7500}$  = 250

   $\underline{-60}$
   $150$
   $\underline{150}$
   $00$

7. **Write an appropriate equation OR proportion; then solve.**

   What percent of 600 cars is 750 cars?

   **EQUATION**

   IS → =
   OF → mult

   $P \cdot 600 = 750$
   $\dfrac{P \cdot 600}{600} = \dfrac{750}{600}$

   $\boxed{P = 1.25}$
   $(125\%)$

   **PROPORTION**

   $\dfrac{IS}{OF} = \dfrac{\%}{100}$  →  $\dfrac{750}{600} = \dfrac{P}{100}$

   $\boxed{P = 125\%}$

   $600\overline{)75000}$ = 125
   $\underline{-600}$
   $1500$
   $\underline{-1200}$
   $3000$
   $\underline{-3000}$

8. *Write an appropriate equation __OR__ proportion; then solve.*

   What is 5% of 220 miles?

   EQ: $X = .05 \cdot 220$

   PROP: $\dfrac{X}{220} = \dfrac{5}{100}$

   $\boxed{X = 11 \text{ miles}}$

   $\begin{array}{r} 220 \\ \times\ 5 \\ \hline 1100 \end{array}$

   $100\overline{)1100}$ → $11$

9. **Solve**

   **Graph your solution.**

   $-6 \le 3x - 15 \le 12.$

   $\begin{array}{ccc} +15 & +15 & +15 \\ \hline \dfrac{9}{3} \le \dfrac{3x}{3} \le \dfrac{27}{3} \end{array}$

   → $\boxed{3 \le x \le 9}$

   (number line from 3 to 9, closed circles)

10. **Solve.**

    **Graph your solution.**

    $2x - 6 < -16 \quad \text{or} \quad -13x < 26$

    $\begin{array}{cc} +6 & +6 \\ \hline \dfrac{2x}{2} < \dfrac{-10}{2} \end{array} \qquad \begin{array}{cc} -13 & -13 \end{array}$

    DON'T FORGET TO FLIP

    $\boxed{X < -5 \text{ OR } X > -2}$  (number line open circles at -5, -2)

11. **Solve**   $15 - |x - 10| = 10$

    **Isolate abs value!**

    *Don't forget to check.*

    $\begin{array}{cc} -15 & -15 \\ \hline \dfrac{-|x-10|}{-1} = \dfrac{-5}{-1} \end{array}$

    $|x - 10| = 5$

    $\begin{array}{l} x - 10 = -5 \\ +10 \quad +10 \\ \hline \boxed{X = 5} \end{array} \qquad \begin{array}{l} x - 10 = 5 \\ +10 \quad +10 \\ \hline \boxed{X = 15} \end{array}$

12. **Write the slope-intercept linear equation.**

    **Through (3, 1), (-3, 5)**

    ① $m = \dfrac{\Delta y}{\Delta x} = \dfrac{1-5}{3-(-3)} = \dfrac{-4}{6}$

    $\boxed{m = -2/3}$

    ② P/S $y - 1 = -\dfrac{2}{3}(x - 3)$

    ③ S/I

    $y - 1 = -\dfrac{2}{3}x + 2$

    $\begin{array}{cc} +1 & +1 \end{array}$

    $\boxed{y = -\dfrac{2}{3}x + 3}$

13. Is the line $y = 7x + 6.$ parallel to the line $y = -\dfrac{1}{7}x - 6$?

    $m = 7$   $m = -1/7$

    *Explain why.*

    NOT // because the slopes are different $(7 \ne -1/7)$

14. **Write an equation of a line that is perpedicular**

    **to** $y = \dfrac{-2}{3}x + 6$ → $m = -2/3$ → $\perp m = 3/2$ (NEGATIVE RECIPROCAL)

    **and passes through (4, 10).**

    P/S $y - 10 = \dfrac{3}{2}(x - 4)$ OR

    $\begin{array}{l} y - 10 = \dfrac{3}{2}x_2 - 6 \\ +10 \qquad\qquad +10 \end{array}$

    S/I $\boxed{y = \dfrac{3}{2}x + 4}$

15. Evaluate the function $f(x) = -5x + 10$ for

f(-1)= $-5(-1) + 10$      f(0)= (10)      f(1)= $-5(1) + 10$

*Substitute*      = (15)      = (5)

16. Does the following data represent wind speed as a function of lift? Explain why.

*input (x)* →
*OUTPUT (Y)* →

| wind speed (mi/h) | 10 | 20 | 20 | 40 |
|---|---|---|---|---|
| lift (ft/s) | 4.6 | 22 | 40 | 32 |

NOT A FUNCTION BECAUSE THERE ARE REPEATING X (20) VALUES

17. For 1980 through 1990, Brentwood Middle School's enrollment, $y$, was related to the year, $t$, by the equation $y - 20t - 240 = 0$, where $t = 0$ represents 1980. Sketch the graph of this equation.



(11, 460)

400
300
200 (0, 240)
100

0 2  10  8  x

Number of Students

Years since 1980
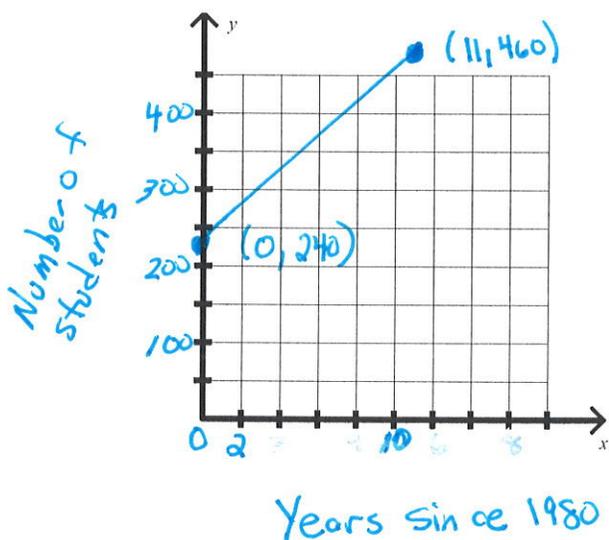
PUT INTO $Y = mx + b$

$Y - 20T - 240 = 0$
$+20T + 240 \qquad +20T + 240$

$Y = 20T + 240$

| t | Y |
|---|---|
| 1980→0 | 240 |
| 1989→10 | 440 |
| 1990→11 | 460 |

MUST
• label x and y
• clearly show scale
• draw a line segment to show Years 1980 – 1990.

18. Graph the function $y = \frac{-2}{3}x + 1$ with the domain $x = -3, 0,$ and $3$.
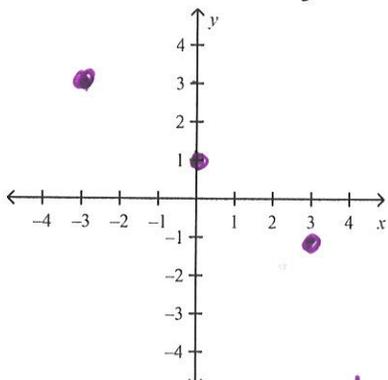


State the Range: _____ $y = -1, 1, 3$ _____

Since the Domain is specified, only plot the 3 points.

| X | Y |
|---|---|
| -3 | 3 |
| 0 | 1 |
| 3 | -1 |

19. Solve the system by graphing:

$3x - y = 4$    $x + y = 8$



$-3x \quad -3x$

$-y = -3x + 4$

$\dfrac{-y}{-1} = \dfrac{-3x}{-1} \dfrac{+4}{-1}$

$y = 3x - 4$

$C: 4 = 4 \checkmark$
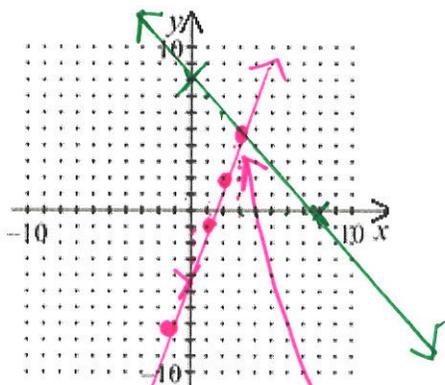
$-x \quad -x$

$y = -x + 8$

or

USE INTERCEPTS

$X: 8 \quad (8,0)$
$Y: 8 \quad (0,8)$

$C: 8 = 8 \checkmark$

SOLUTION $(3,5)$

20. **Sketch a graph of the inequality $2x - 3y \le 6$.** *Graph using X and Y intercepts. Label graph with X and Y*
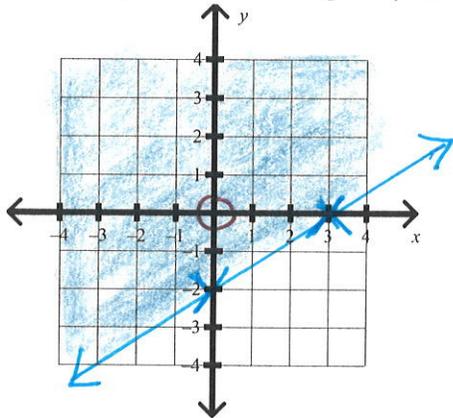


$X: \quad 2x = 6$

$\boxed{X = 3}$

$y: \quad -3y = 6$

$\boxed{y = -2}$

OR S/I

$2x - 3y \le 6$
$-2x \qquad -2x$

$\dfrac{-3y}{-3} \le \dfrac{-2x}{-3} \dfrac{+6}{-3}$

$y \ge \dfrac{2}{3}x - 2$

$T(0,0)$

$0 \le 6 \; \top$

DON'T FORGET DOTTED
LINE FOR $>, <$

21. Graph the system of linear inequalities.

$y \ge -2x + 3$ → $T(0,0) \; 0 \ge 3 \; F$
$y \le -3$



SOLUTION REGION

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