

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, vertical 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 , $-\frac{38}{5}$, -6.5
- $-\frac{38}{5}$, -7 , -6.5 , $-\sqrt{28}$ ← write answer using given numbers
3. Find the quotient. $\frac{7}{15} \div \frac{1}{5} = \frac{7}{15} \cdot \frac{5}{1} = \frac{7}{3}$ ← keep as simplified improper fraction
4. Simplify and write in standard form. $5(3 - x) - 6 - x = 15 - 5x - 6 - x = -6x + 9$
- Variable term first + constant last

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"

$$\begin{aligned} C &= rd + a \\ -a & \quad -a \\ \hline C - a &= rd \\ \frac{C - a}{d} &= \frac{rd}{d} \\ r &= \frac{C - a}{d} \end{aligned}$$

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.

$$\frac{30 \text{ min}}{75 \text{ Cal}} = \frac{100}{x}$$

$x = 250 \text{ CALORIES}$

Don't forget units!

Cross multiply and divide

$$\begin{array}{r} 30 \overline{) 7500} \\ \underline{2100} \\ 3000 \\ \underline{2100} \\ 900 \\ \underline{600} \\ 300 \\ \underline{300} \\ 0 \end{array}$$

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

What percent of 600 cars is 750 cars?

EQUATION

IS $\rightarrow$ =
OF $\rightarrow$ mult

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

$P = 1.25$
 (125%)

PROPORTION

$$\frac{\text{IS}}{\text{OF}} = \frac{\%}{100} \Rightarrow$$

$$\frac{750}{600} = \frac{P}{100}$$

$P = 125\%$

$$\begin{array}{r} 600 \overline{) 75000} \\ \underline{60000} \\ 15000 \\ \underline{12000} \\ 3000 \\ \underline{3000} \\ 0 \end{array}$$

8. Write an appropriate equation OR proportion; then solve.

What is 5% of 220 miles?

$$EQ: X = .05 \cdot 220$$

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

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

ID: A

$$\begin{array}{r} 1 \\ 220 \\ \times 5 \\ \hline 1100 \\ 11 \end{array}$$

9. Solve

Graph your solution.

$$\begin{array}{r} -6 \leq 3x - 15 \leq 12 \\ +15 \quad +15 \quad +15 \\ \hline \frac{9}{3} \leq \frac{3x}{3} \leq \frac{27}{3} \\ \frac{9}{3} \leq x \leq \frac{27}{3} \end{array} \rightarrow \boxed{3 \leq x \leq 9}$$

10. Solve.

Graph your solution.

$$\begin{array}{r} 2x - 6 < -16 \text{ or } -13x < 26 \\ +6 \quad +6 \quad \quad \quad -13 \quad -13 \\ \hline 2x < -10 \quad \quad \quad -13x < 26 \\ \frac{2x}{2} < \frac{-10}{2} \quad \quad \quad \frac{-13x}{-13} < \frac{26}{-13} \\ x < -5 \text{ or } x > -2 \end{array}$$

Don't Forget to Flip

11. Solve

Isolate abs value!

Don't forget to check.

$$\begin{array}{r} 15 - |x - 10| = 10 \\ -15 \quad -15 \\ \hline -|x - 10| = -5 \\ \frac{-|x - 10|}{-1} = \frac{-5}{-1} \\ |x - 10| = 5 \end{array}$$

$$\begin{array}{r} x - 10 = -5 \\ +10 \quad +10 \\ \hline x = 5 \end{array}$$

$$\begin{array}{r} x - 10 = 5 \\ +10 \quad +10 \\ \hline x = 15 \end{array}$$

12. Write the slope-intercept linear equation.

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

$$\textcircled{1} m = \frac{\Delta y}{\Delta x} = \frac{1 - 5}{3 - (-3)} = \frac{-4}{6} = -\frac{2}{3}$$

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

$\textcircled{3} S/I$

$$\begin{array}{r} y - 1 = -\frac{2}{3}x + 2 \\ +1 \quad +1 \\ \hline y = -\frac{2}{3}x + 3 \end{array}$$

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

$$m = 7$$

$$m = -1/7$$

Explain why.

Not // because the slopes are different ($7 \neq -1/7$)

14. Write an equation of a line that is perpendicular

$$\text{to } y = \frac{-2}{3}x + 6$$

and passes through (4, 10).

$$m = -2/3 \rightarrow \perp m = 3/2 \text{ (NEGATIVE RECIPROCAL)}$$

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

$$\begin{array}{r} y - 10 = \frac{3}{2}x - 6 \\ +10 \quad +10 \\ \hline y = \frac{3}{2}x + 4 \end{array}$$

S/I

$$\boxed{y = \frac{3}{2}x + 4}$$

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

$$f(-1) = -5(-1) + 10 = 15$$

$$f(0) = 10$$

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

Substitute

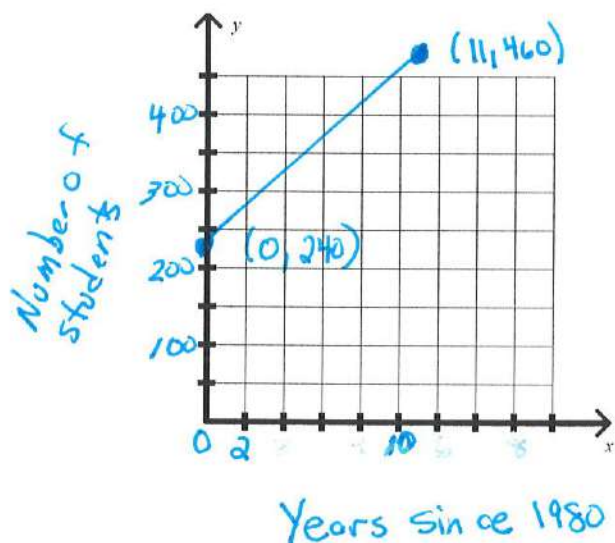
16. Does the following data represent wind speed as a function of lift? Explain why.

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.

Put into $y = mx + b$

$$y - 20t - 240 = 0$$

$$+ 20t \quad + 240 \quad + 20t + 240$$

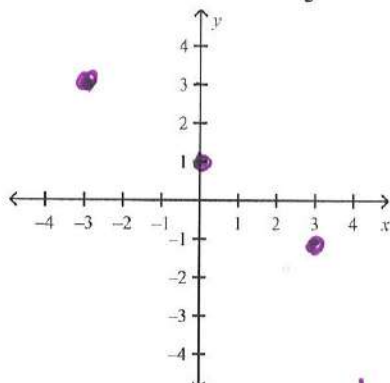
$$y = 20t + 240$$

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
- $x = -3, 0, \text{ and } 3$
- .



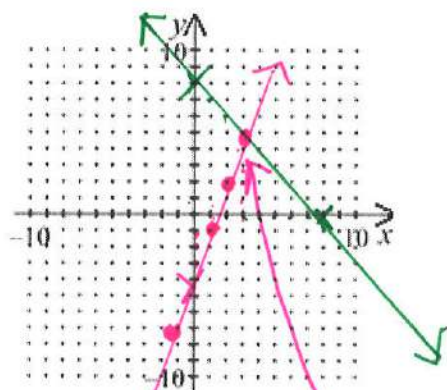
State the Range:

$$y = -1, 1, 3$$

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

x	y
-3	3
0	1
3	-1

19. Solve the system by graphing:

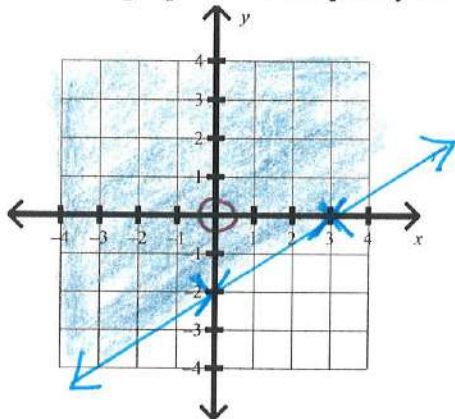


$$\begin{aligned}
 3x - y &= 4 \\
 -3x &\quad -3x \\
 \hline
 \cancel{3x} - y &= -3x + 4 \\
 \cancel{3x} - y &= -1 - 1 \\
 y &= 3x - 4 \\
 C: 4 &= 4 \checkmark
 \end{aligned}$$

$$\begin{aligned}
 x + y &= 8 \\
 -x &\quad -x \\
 \hline
 y &= -x + 8 \\
 \text{or} \\
 \text{USE INTERCEPTS} \\
 x: 8 &\quad (8, 0) \\
 y: 8 &\quad (0, 8) \\
 C: 8 &= 8 \checkmark
 \end{aligned}$$

Solution
(3, 5)

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



$$\begin{aligned}
 X: 2x &= 6 \\
 x &= 3
 \end{aligned}$$

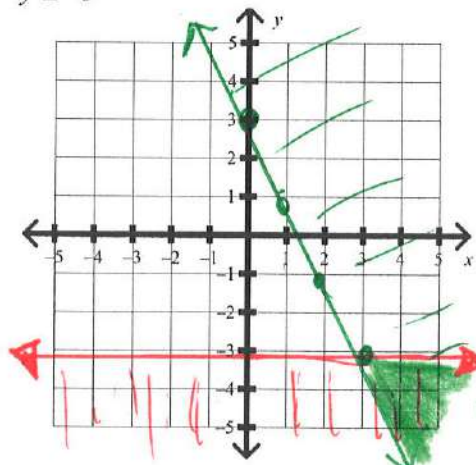
$$\begin{aligned}
 y: -3y &= 6 \\
 y &= -2
 \end{aligned}$$

$$\begin{aligned}
 \text{OR S/I} \\
 2x - 3y &\leq 6 \\
 -2x &\quad -2x \\
 \hline
 -3y &\leq -2x + 6 \\
 \cancel{-3y} &\leq \frac{-2x + 6}{-3} \\
 y &\geq \frac{2}{3}x - 2
 \end{aligned}$$

$$\begin{aligned}
 T(0, 0) \\
 0 &\leq 6 \checkmark
 \end{aligned}$$

21. Graph the system of linear inequalities.

$$\begin{aligned}
 y &\geq -2x + 3 \rightarrow T(0, 0) 0 \geq 3 \text{ F} \\
 y &\leq -3
 \end{aligned}$$



Solution
REGION

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