Path Builder –
– Study Guide –
~ Mastery check study Guide ~

1) $\frac{0}{7}$

– Solution –

$\frac{0}{\text{any \#}} = 0$, therefore $\frac{0}{7} = 0$

2) Write the fraction in lowest terms

$\frac{35}{40}$

– Solution –

Any # that ends with 0 or 5 is divisible by 5.

$\frac{35}{40} = \frac{7}{8}$

3) Divide and simplify.

$\frac{5}{9} \div \frac{30}{7}$

– Solution –

Set up the problem as:

$\frac{\frac{5}{9}}{\frac{30}{7}} = \frac{5 \times 7}{9 \times 30} = \frac{35}{270}$ Reduce by dividing both sides by 5 $\frac{7}{54}$

4, Subtract the following fractions.

$$\frac{5}{8} - \frac{11}{20}$$

- Solution -

L.C.D. is 40.

Make $\frac{5}{8}$ as $\frac{5}{8} \cdot \frac{5}{5} = \frac{25}{40}$.

Make $\frac{11}{20}$ as $\frac{11}{20} \cdot \frac{2}{2} = \frac{22}{40}$

Now $\frac{25}{40} - \frac{22}{40} = \frac{3}{40}$ ✓

5, find $\sqrt{\frac{4}{9}}$

- Solution -

$\sqrt{4} = 2$

$\sqrt{9} = 3$

Answer is $\frac{2}{3}$

6, Write the decimal number that has the specific place Value

8 thousandths, 2 hundredths, 7 ones,

9 ten-thousandth, 6 tenth.

- Solution -

ones	10^{th}	100^{th}	1000^{th}	$10,000^{th}$	$100,000^{th}$
7	6	2	8	9	

7.6289 ✓

7, Divide. $\frac{3.1}{0.006}$ Round to nearest hundredth

- Solution -

By using the calculator, you get

516.666667 = 516.67 ✓

8, Write as a fraction: 0.02

- Solution -

$0.02 = \frac{2}{100} = \frac{1}{50}$ ✓

9, Arrange from smallest to largest:

0.36, 0.6001, $\frac{2}{5}$, $\frac{3}{5}$

- Solution -

$\frac{2}{5} = 0.4$ (divide 2 by 5).

$\frac{3}{5} = 0.6$ (divide 3 by 5)

Answer: 0.36, $\frac{2}{5}$, $\frac{3}{5}$, 0.6001 ✓

10, Subtract the following.

$-3 - (-6)$

- Solution -

$-3 + 6 = 3$ ✓

11, Find the value of the following expression:

$-7x - y$ for $x = 4$ and $y = -3$

- Solution -

Replace x with 4 and y with -3

$-7(4) - (-3) = -28 + 3 = -25$ ✓

12, Add the following.

$8\frac{4}{9} + (-9\frac{1}{3})$

- Solution -

Rewrite as improper fractions

$8\frac{4}{9} = \frac{8 \times 9 + 4}{9} = \frac{76}{9}$

$9\frac{1}{3} = \frac{9 \times 3 + 1}{3} = \frac{28}{3}$

$\frac{76}{9} - \frac{28}{3} = \frac{76}{9} - \frac{3}{3} \cdot \frac{28}{3}$

$= \frac{76}{9} - \frac{84}{9} = \frac{-8}{9}$ ✓

13, Simplify by combining like terms.

$1 + 6 + 8rs$

- Solution -

$1 + 6 + 8rs = 7 + 8rs$

14, Solve for n

$$\frac{n}{30} = \frac{12}{72}$$

- Solution -

Cross multiply.

$72n = 360$

Divide both sides by 72.

$n = 6$

15, Set up the percent proportion.

In a tree planting project, 650 of the 830 trees planted were still living one year later. What percent of the trees were still living?

- Solution -

$$\frac{650}{830} = \frac{n}{100}$$

16, 125 employees is 5% of what number of employees?

— Solution —

$$\frac{125}{0.05} = 25000 \checkmark$$

17, During a sale, a dress decreased in Price from $60 to $57 What was the percent of decrease.

— Solution —

$$60 - 57 = 3$$

$$\text{Percent decrease} = \frac{3}{60} \times 100 = \frac{300}{60} = 5\% \checkmark$$

18, Convert each measurement by multiplying or dividing

a, 420 sec = ____ min

$420 \div 60 = 7$ min ✓

b, 6 hrs = ____ min

6 hrs x 60 = 360 min ✓

19, Choose the most reasonable metric length unit

Frank's truck is 7 ___ long

Answer is: 7 m ✓

20, Simplify the expression: $4 + 2(5 - 4t)$

— Solution —

$4 + 2(5 - 4t)$

$= 4 + 2 \cdot 5 - 8t$ ✓

21, Solve the equation:

$7x - (6x + 7) = -4$

— Solution —

$7x - 6x - 7 = -4$

$x - 7 = -4$ Add 7 to both sides

$x = -4 + 7 = 3$ ✓

22, Solve for a:

$P = a + 2b + 4c$

— Solution —

$a = P - 2b - 4c$ ✓

23, Solve for x.

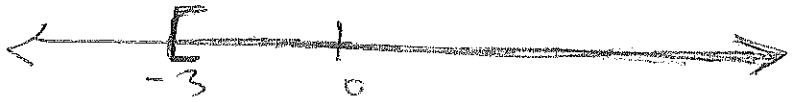
$$-x \leq 3$$

– Solution –

Take opposite of both sides.

$$x \geq -3$$ ✓

Graph:



24, Find the intercepts for the graph.

$$6x - 3y = 6$$

– Solution –

x-intercept: $y = 0$

$$6x - 3(0) = 6$$

$$6x = 6 \Longrightarrow x = 1$$

$$(1, 0)$$ ✓

y-intercept: $x = 0$

$$6(0) - 3y = 6$$

$$-3y = 6 \Longrightarrow y = -2$$

$$(0, -2)$$ ✓

25, find the slope

$(-7, 2), \quad (-8, 9)$

— Solution —

$\underset{x_1}{(-7}, \underset{y_1}{2}), \quad \underset{x_2}{(-8}, \underset{y_2}{9})$

$$\text{slope} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{9 - 2}{-8 - 7} = \frac{7}{-1} = -7$$

26, find the equation of the line:

$\underset{x_1}{(1}, \underset{y_1}{2}), \quad \underset{x_2}{(3}, \underset{y_2}{3})$

— Solution —

$$\text{slope} = m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{3 - 2}{3 - 1} = \frac{1}{2}$$

Equation of the line is:

$$y - y_1 = m(x - x_1)$$

$$y - 2 = \frac{1}{2}(x - 1)$$

$$y - 2 = \frac{1}{2}x - \frac{1}{2}$$ Add 2 to both sides

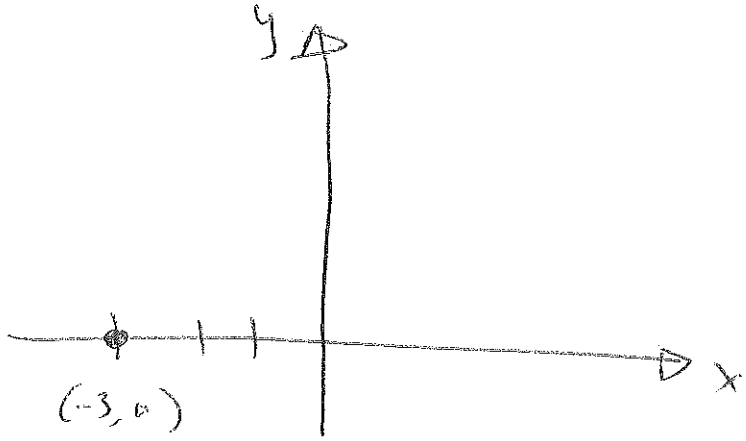
$$y = \frac{1}{2}x - \frac{1}{2} + 2$$

$$y = \frac{1}{2}x + 1\frac{1}{2} = \frac{1}{2}x + \frac{3}{2}$$

27, Graph. The line through $(-3, 0)$ with slope $= \frac{2}{3}$

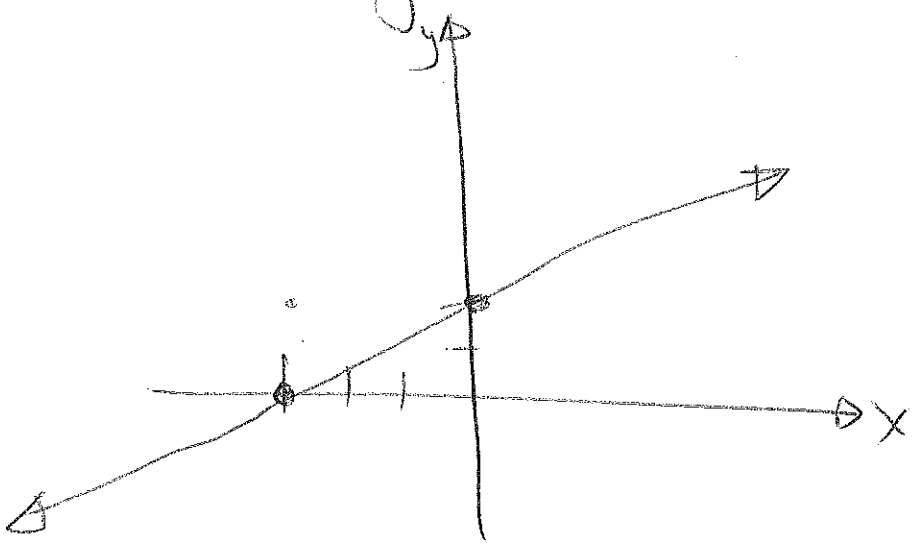
— Solution —

Click on  and plot $(-3, 0)$



$\text{Slope} = \frac{2}{3} \leftarrow \text{Rise}$ / $\leftarrow \text{Run}$

from $(-3, 0)$ go up 2 and to the right 3.



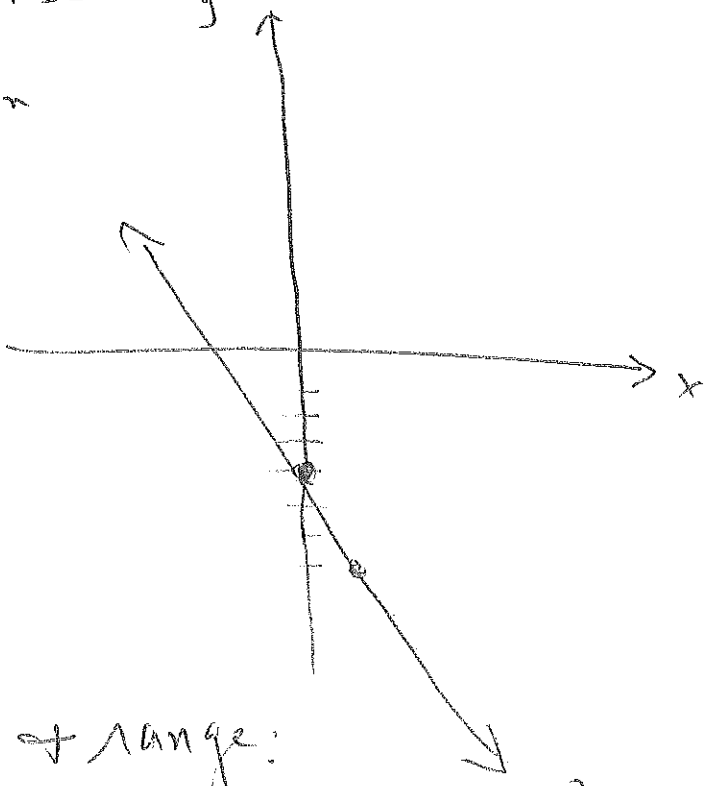
28, Graph $y = -3x - 4$

– Solution –

Start with the point $(0, -4)$

Slope $= \frac{-3}{1}$ ← Rise / ← Run

From $(0, -4)$ go down 3 and 1 to the right.



29, Find the domain & range:

$\{(10, 2), (-3, -3), (2, -1), (5, -8)\}$

– Solution –

Domain are the x-values:

$\{10, -3, 2, 5\}$

Range are the y-values

$\{2, -3, -1, -8\}$

Is this a function? yes

since the x values are not repeated.

30, $f(x) = 3x - 6$

a, $f(9) = ?$

$f(9) = 3(9) - 6 = 27 - 6 = 21$ ✓

b, $f(x+6) = 3(x+6) - 6$

$= 3x + 18 - 6 = 3x + 12$ ✓

c, $f(-x) = 3(-x) - 6 = -3x - 6$ ✓

31, Subtract: $(5x^3 - 4x^2 + 8x) - (7x^2 + 3x + 7)$

- Solution -

$5x^3 - 4x^2 + 8x - 7x^2 - 3x - 7$. Combine like terms:

$= 5x^3 - 11x^2 + 5x - 7$ ✓

32, Use the rules of exponents:

$(x^2)^3 (x^4)^4$

- Solution -

$x^6 \; x^{16} = x^{22}$ ✓

33, Multiply.

$(4x-3)(5x-5)$

— Solution —

$4x(5x-5) = 20x^2 - 20x$

$-3(5x-5) = -15x + 15$

Combine the results.

$20x^2 - 20x - 15x + 15$

$= 20x^2 - 35x + 15$ ✓

34, Write the equation in the form

$ax^2 + bx + c = 0$.

Identify a, b, and c

$6x^2 = 7x + 10$

— Solution —

$6x^2 - 7x - 10 = 0$

$a = 6, \quad b = -7, \quad c = -10$ ✓

35. Use the Quadratic formula to solve "round to the nearest 100th"

$$x^2 + 5x = 2$$

- Solution -

$$x^2 + 5x - 2 = 0 \quad \Rightarrow a = 1, b = 5, c = -2.$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \frac{-5 \pm \sqrt{25 - 4(1)(-2)}}{2(1)}$$

$$= \frac{-5 \pm \sqrt{25+8}}{2} = \frac{-5 \pm \sqrt{33}}{2} = \frac{-5 + 5.74}{2}$$

$x_1 = 0.37, \quad x_2 = -5.37$ ✓

36. Given the function $f(x) = x^2 - x + 2$

a. $f(4) = (4)^2 - 4 + 2 = 16 - 4 + 2 = 14$ ✓

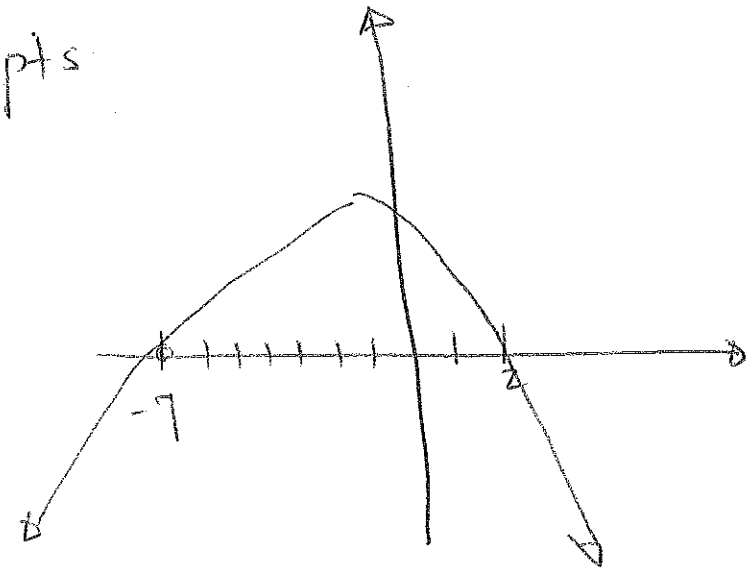
b. $f(-3) = (-3)^2 - (-3) + 2 = 9 + 3 + 2 = 14$ ✓

c. $f(0) = (0)^2 - 0 + 2 = 2$ ✓

37. Find the x-intercepts

- solution -

$(-7, 0), \quad (2, 0)$



38, In the Olympics, country B ended up with the most total medals, but country A won the most gold medals. This created a contraversy over which country had the best overall performance. One way to objectively settle this issue is to score the medals much like a high school or college track meet - that is, award 5 points for gold, 3 points for silver, and 1 point for bronze. Determine a score for each country based on this point system. According to these scores, which country "won" the olympics?

	Gold	Silver	Bronze
Country A	55	18	28
Country B	37	35	32
Country C	23	18	27

Solution -

Score of country A = $55 \times 5 + 18 \times 3 + 28 \times 1$
$= 275 + 54 + 28 = 357$ ✓

Score of country B = $37 \times 5 + 35 \times 3 + 32 \times 1$
$= 185 + 105 + 32 = 322$ ✓

Score of country C
$= 23 \times 5 + 18 \times 3 + 27 \times 1$
$= 115 + 54 + 27 = 196$ ✓

Country A had the most points.

Study Guides for
- Fractions & Mixed Numbers -

1, Write the fraction in lowest terms

$$\frac{48}{56}$$

- Solution -

Divide both sides by 8

$$\frac{6}{7}$$ ✓

2, Write the fractions as equivalent fractions with the L.C.D.

$\frac{11}{15}$ and $\frac{5}{12}$

- Solution -

L.C.D is 60

$\frac{11}{15}$ becomes $\frac{4}{4} \cdot \frac{11}{15} = \frac{44}{60}$.

$\frac{5}{12}$ becomes $\frac{5}{5} \cdot \frac{5}{12} = \frac{25}{60}$.

Answer is $\frac{44}{60}, \frac{25}{60}$

3, Divide. Write the answer in mixed fraction.

$$\frac{\frac{13}{12}}{\frac{7}{6}}$$

- Solution -

$$\frac{\frac{13}{12}}{\frac{7}{6}} = \frac{13 \times 6}{12 \times 7} = \frac{78}{84} = \frac{13}{14}$$ ✓

↑ Divide by 6 (both sides)

4, Sam must inspect $\frac{9}{20}$ of a mile of high Voltage line. He has already inspected $\frac{7}{20}$ of a mile. How much additional line must he inspect?

– Solution –

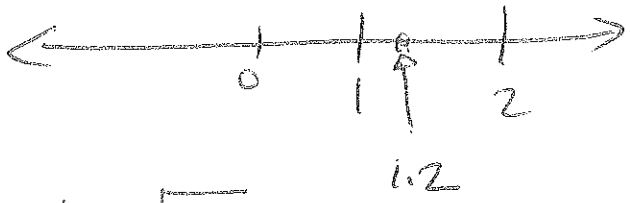
$$\frac{9}{20} - \frac{7}{20} = \frac{2}{20} = \frac{1}{10}$$

↑ Divide both sides by 2.

5, Plot the number on the number line $\frac{6}{5}$

– Solution –

Divide 6 by 5, you get 1.2



6, Find $\sqrt{\frac{16}{49}}$

– Solution –

$\sqrt{16} = 4$, $\sqrt{49} = 7$

Answer is $\frac{4}{7}$

7, Use the order of operations to simplify.

$$\left(\frac{4}{9}\right)^2 - \left(\frac{1}{3} - \frac{1}{12}\right) + \frac{9}{4}$$

- Solution -

$$\left(\frac{4}{9}\right)^2 = \frac{4}{9} \cdot \frac{4}{9} = \frac{16}{81}$$

$$\frac{1}{3} - \frac{1}{12} = \frac{4}{4} \cdot \frac{1}{3} - \frac{1}{12} = \frac{4}{12} - \frac{1}{12} = \frac{3}{12} = \frac{1}{4}$$

- Replace in the problem -

$$\frac{16}{81} - \frac{1}{4} + \frac{9}{4} = \frac{16}{81} - 2 = \frac{16}{81} - 2 \cdot \frac{81}{81}$$

$$= \frac{16}{81} - \frac{162}{81} = -\frac{146}{81}$$ ✓

8, A wheel made 287 revolutions at $39\frac{3}{5}$ revolution per minute. How many minutes did it rotate?

- Solution -

$$287 \div 39\frac{3}{5} = \frac{287}{1} \div \frac{198}{5}$$

$$= \frac{287}{1} \times \frac{5}{198} = \frac{1435}{198} = 7\frac{49}{198}$$ ✓

9, Insert $>$ or $<$ or $=$

$$\frac{5}{6} \qquad \frac{10}{12}$$

- Solution -

Cross multiply $60 = 60$. They are $=$.

10) Use the order of operations to simplify:

$$\frac{3}{4} \cdot \left(\frac{1}{8} + \frac{1}{2}\right) \cdot \frac{32}{3}$$

- Solution -

$$\frac{1}{8} + \frac{1}{2} = \frac{1}{8} + \frac{4}{4} \cdot \frac{1}{2} = \frac{1}{8} + \frac{4}{8} = \frac{5}{8}$$

$$\frac{3}{4} \cdot \frac{5}{8} \cdot \frac{32}{3} = \frac{\cancel{3}^{1}}{\cancel{4}_{1}} \cdot \frac{5}{\cancel{8}_{1}} \cdot \frac{\cancel{32}^{4}}{\cancel{3}_{1}}$$

$= 5$ ✓

11) of 56 cars making up a freight train, 31 are box cars. What fraction of the cars are not box cars?

- Solution -

$56 - 31 = 25$

Answer is $\frac{25}{56}$ ✓

12) Write the prime factorization of

a) 140

- Solution -

$140 = 2 \times 70 = 2 \times 2 \times 35 = 2 \times 2 \times 5 \times 7$ ✓

b) 700

- Solution -

$7 \times 100 = 7 \times 10 \times 10 = 7 \times 2 \times 5 \times 2 \times 5$ ✓

c, Write the fraction in lowest term.

$$\frac{2 \times 2 \times 5 \times 7}{7 \times 2 \times 5 \times 2 \times 5} = \frac{1}{5} \checkmark$$

13. Use order of operations to simplify:

$$36. \left(\frac{4}{9}\right)^2 \cdot \left(\frac{1}{4}\right)^3$$

— Solution —

$$\left(\frac{4}{9}\right)^2 = \frac{16}{81}$$

$$\left(\frac{1}{4}\right)^3 = \frac{1}{4} \times \frac{1}{4} \times \frac{1}{4} = \frac{1}{64}$$

$$\cancel{9}\cancel{36}. \frac{\cancel{16}^{1}}{\cancel{81}_{9}} \cdot \frac{1}{\frac{\cancel{64}^{4}}{1}} = \frac{1}{9} \checkmark$$

14. Find the missing numerator.

$$\frac{6}{7} = \frac{?}{28}$$

— Solution —

$$28/7 = 4 \longrightarrow \frac{6}{7} \cdot \frac{4}{4} = \frac{24}{28} \checkmark$$

15, a, Estimate:

$30\frac{5}{9} - 9\frac{13}{15}$.

$30\frac{5}{9}$ is estimated as 31 since $\frac{5}{9}$ is larger than $\frac{1}{2}$.

$9\frac{13}{15}$ is estimated as 10 since $\frac{13}{15}$ is larger than $\frac{1}{2}$.

$31 - 10 = 21$ ✓

b, find the exact answer.

- Solution -

$30\frac{5}{9} - 9\frac{13}{15}$

$= \frac{30 \times 9 + 5}{9} - \frac{9 \times 15 + 13}{15}$

$= \frac{275}{9} - \frac{148}{15}$. L.C.D is 45.

$\frac{5}{5} \cdot \frac{275}{9} - \frac{3}{3} \cdot \frac{148}{15}$

$= \frac{1375}{45} - \frac{444}{45} = \frac{931}{45} = 20\frac{31}{45}$ ✓

16, Simplify.

$$\left(\frac{4}{9}\right)^2 - \left(\frac{1}{3} - \frac{1}{12}\right) \div \frac{9}{4}$$

— Solution —

$$\left(\frac{4}{9}\right)^2 = \frac{16}{81}$$

$$\frac{1}{3} - \frac{1}{12} = \frac{4}{4}\cdot\frac{1}{3} - \frac{1}{12} = \frac{3}{12} = \frac{1}{4}$$ ✓

Substitute the answers back in the problem:

$$\frac{16}{81} - \frac{1}{4} \div \frac{9}{4}$$ (Do division 1st)

$$\frac{16}{81} - \frac{\frac{1}{4}}{\frac{9}{4}} = \frac{16}{81} - \frac{4}{36} = \frac{16}{81} - \frac{1}{9}$$

$$= \frac{16}{81} - \frac{9}{9}\cdot\frac{1}{9} = \frac{16}{81} - \frac{9}{81} = \frac{7}{81}$$ ✓

17, a, Write the prime factorization of $\frac{140}{700}$.

— Solution —

$140 = 14 \times 10 = 2 \times 7 \times 2 \times 5$ ✓

$700 = 7 \times 100 = 7 \times 10 \times 10 = 7 \times 2 \times 5 \times 2 \times 5$ ✓

b, Write $\frac{140}{700}$ in lowest term.

$$\frac{2 \times 7 \times 2 \times 5}{7 \times 2 \times 5 \times 2 \times 5} = \frac{1}{5}$$ ✓

18, The weight of water is $62\frac{1}{2}$ lb/cu feet. What is the weight of $28\frac{1}{8}$ cubic feet of water?

- Solution -

$$62\tfrac{1}{2} \times 28\tfrac{1}{8}$$

$$= \frac{62\times 2+1}{2} \times \frac{28\times 8+1}{8} =$$

$$\frac{125}{2} \times \frac{225}{8} = \frac{28125}{16} = 1757\tfrac{13}{16}$$ ✓

19, Multiply. $\frac{21}{25} \cdot \frac{10}{117} \cdot \frac{27}{14}$

- Solution -

$$\frac{\cancel{21}^{3}}{\cancel{25}_{5}} \cdot \frac{\cancel{10}^{1}}{117} \cdot \frac{\cancel{27}^{3}}{\cancel{14}_{1}} = \frac{81}{585} = \frac{9}{65}$$

↑ divide both sides by 9.

20, Janet wants to make some new clothes. She purchases three pieces of fabric to make a dress, a jacket and a pair of pants. The first piece is $4\frac{3}{4}$ yd long. Another piece is $2\frac{1}{4}$ yd long. And the last piece is 1 yd long. Find the total number of yards of fabric that Janet purchased.

- Solution -

$$4\tfrac{3}{4} + 2\tfrac{1}{4} + 1 = 4.75 + 2.25 + 1 = 8$$ ✓

21, Write the fraction in lowest term:

$$\frac{40}{72}$$

- Solution -

Divide both sides by 8

$$= \frac{5}{9} \checkmark$$

22, Divide. $\frac{6}{7} \div \frac{6}{49}$

- Solution -

$$\frac{\frac{6}{7}}{\frac{6}{49}} = \frac{6 \times 49}{6 \times 7} = 7 \checkmark$$

23, A family has an annual income of $36000. of this, $\frac{1}{4}$ is spent for food, $\frac{1}{5}$ for housing, $\frac{1}{10}$ for clothing, $\frac{1}{9}$ for savings, $\frac{1}{4}$ for taxes, and the rest for other expenses. How much is spent for food?

- Solution -

$$\frac{1}{4} \times 36000 = \frac{36000}{4} = 9000 \checkmark$$

24, Decide whether $\frac{8}{40}$ and $\frac{4}{20}$ are equivalent

- Solution -

$$\frac{8}{40} \stackrel{?}{=} \frac{4}{20}$$ Cross multiply

$$8 \times 20 \stackrel{?}{=} 4 \times 40 \Rightarrow 160 = 160 \checkmark$$ yes

25 a, Estimate $5\frac{1}{2} \div 3\frac{3}{7}$

- Solution -

$5\frac{1}{2}$ becomes 6

$3\frac{3}{7}$ stays 3 since $\frac{3}{7}$ is smaller than $\frac{1}{2}$.

$6 \div 3 = 2$ ✓

b, Exact answer = ?

- Solution -

$$5\frac{1}{2} \div 3\frac{3}{7} = \frac{5\times2+1}{2} \div \frac{3\times7+3}{7}$$

$$= \frac{\frac{11}{2}}{\frac{24}{7}} = \frac{11\times7}{2\times24} = \frac{77}{48} = 1\frac{29}{48}$$ ✓

26, A wheel needs a piece of half-inch pipe $11\frac{3}{4}$ in. She has a piece that is $22\frac{1}{8}$ in long. How much must she cut off from the longer piece?

- Solution -

$$22\frac{1}{8} - 11\frac{3}{8} = \frac{22\times8+1}{8} - \frac{11\times8+3}{8}$$

$$= \frac{177}{8} - \frac{91}{8} = \frac{86}{8} = 10\frac{3}{4}$$ ✓

27. Add and simplify:

$$\frac{20}{62} + \frac{1}{62} + \frac{9}{62}$$

- Solution -

$$\frac{20}{62} + \frac{1}{62} + \frac{9}{62} = \frac{30}{62}$$

Divide both sides by 2

$$\frac{15}{31} \checkmark$$

28. Convert to a mixed number.

$$\frac{680}{7}$$

- Solution -

Divide 680 by 7

$$\begin{array}{r} 97 \\ 7\overline{)\,680} \\ -63 \\ \hline 50 \\ -49 \\ \hline 1 \end{array}$$

$$= 97\frac{1}{7} \checkmark$$

~ Ratio, Proportion & Percent ~

1) Write the rate as a fraction
$28 for 6 minutes

- Solution -

$\frac{28}{6}$. Reduce by dividing both sides by 2.

$= \frac{14}{3}$ ✓

2) The nutrition information on the cereal box says that a $\frac{1}{3}$ cup serving provides 120 calories and 6 grams of dietary fiber. At that rate, find how many calories and grams of fiber are in $\frac{1}{2}$ cup saving?

- Solution -

$\frac{\frac{1}{3}\text{ Cup}}{120\text{ Cal}} = \frac{\frac{1}{2}\text{ Cup}}{x}$. Cross multiply.

$\frac{1}{3}x = 120 \cdot \frac{1}{2} \rightarrow \frac{1}{3}x = 60$.

Cross multiply again: $x = 180$ Cal ✓

$\frac{\frac{1}{3}\text{ Cup}}{6\text{ grams}} = \frac{\frac{1}{2}\text{ Cup}}{x}$. Cross multiply.

$\frac{1}{3}x = 6 \times \frac{1}{2} \rightarrow \frac{1}{3}x = 3$

Cross multiply again: $x = 9$ grams ✓

3, Sharon needs 64 credits to graduate from her Community College. So far she has earned 8 credits. What percent of the required credits does she have?

— Solution —

$$\text{Percent} = \frac{\text{Part}}{\text{Whole}} \times 100$$

$$= \frac{8}{64} \times 100 = \frac{800}{64} = 12.5\% \checkmark$$

4, Write 2.8 as percent

— Solution —

$2.8 \times 100 = 280\%$ ✓

5, What percent of \$210 is \$336?

— Solution —

$\frac{336}{210} \times 100 = 160\%$ ✓

6, Find the decimal notation of 0.5%.

— Solution —

$0.5 \div 100 = 0.005$ ✓

7, Solve for x: $\frac{x}{0.22} = \frac{0.75}{0.55}$

- Solution -

Cross multiply:

$0.55x = 0.165$. Divide by 0.55

$x = 0.3$ ✓

8, A production company spent $38\frac{1}{2}$ days filming its first movie. The company's second movie was filmed in $6\frac{3}{4}$ weeks. Find the ratio of the first movie's filming time to the second movie's filming time.

- Solution -

Convert $38\frac{1}{2}$ days to weeks 1st:

$38.5 \div 7 = 5.5$ weeks.

Now Divide $\frac{5.5 \text{ weeks}}{6.75 \text{ weeks}} = \frac{550}{675}$

Reduce by dividing both sides by 25.

$\frac{22}{27}$ ✓

9, Write As a ratio: 584 days to 392 days

- Solution -

$\frac{584}{392}$. Reduce by dividing by 2 first.

$= \frac{292}{196}$. Divide by 2 again: $\frac{146}{98}$.

Divide by 2 again: $\frac{73}{49}$ ✓

10, The sales tax is $31.80 on the purchase of a dining room set for $795. Find the sales tax rate

- Solution -

$$\text{Sales tax rate} = \frac{31.80}{795} \times 100 = 4\%$$

11, A friend lent $18000 to Dawn W. Monroe, the owner of a comic book store. She repaid the loan at the end of 9 months at $3\frac{1}{2}\%$ simple interest. What total amount did Dawn pay her friend?

- Solution -

$$\text{interest} = 3\frac{1}{2}\% = 0.035$$

$$9 \text{ months} = 9 \div 12 = 0.75 \text{ years.}$$

$$\text{interest} = 18000 \times 0.035 \times 0.75 = \$472.50$$

$$\text{Total due} = 18000 + 472.50 = 18472.50$$

12, Write the decimal as a percent.

$$4.1$$

- Solution -

$$4.1 \times 100 = 410\%$$

13, Write the percent as a fraction or mixed number in lowest terms.

$17\frac{7}{9}\%$

- Solution -

$17\frac{7}{9} \div 100$

$= \frac{17 \times 9 + 7}{9} \cdot \frac{1}{100}$

$= \frac{160}{9} \cdot \frac{1}{100} = \frac{160}{900} = \frac{16}{90} = \frac{8}{45}$ ✓

14, Write As a ratio: 237 days to 21 days

- Solution -

$\frac{237}{21}$ Divide both sides by 3.

$= \frac{79}{7}$ ✓

15, Price per share of U.S. Toys stock fell from $36.95 to $27.86. find the percent of decrease.

- Solution

$\text{Percent decrease} = \frac{(\text{final} - \text{original})}{\text{original}} \times 100$

$= \frac{(27.86 - 36.95)}{36.95} \times 100 = 24.6\%$ ✓

16, If 16 pounds of grass seed cover 467 square feet, how many pounds are needed for 8406 square feet?

- Solution -

$$\frac{467 \text{ sq. feet}}{16 \text{ pounds}} = \frac{8406 \text{ sq. feet}}{X}$$

Cross multiply. $467X = 134496$.

Divide both sides by 467

$X = 288$ pounds ✓

17, 6% of 580 is what amount?

- Solution -

$$\frac{6}{100} \times 580 = \frac{6 \times 580}{100} = 34.80$$ ✓

18, Find the Best Buy:

16-oz size : $4.09

26-oz size : $4.49

32-oz size : $5.89

- Solution -

The cheapest price / oz is the best buy:

$16\overline{)4.09} = 0.255$

$26\overline{)4.49} = 0.172$

$32\overline{)5.89} = 0.184$

Therefore the 26-oz is the best buy.

19) Complete the chart:

Fractional Notation	Decimal	Percent
	0.95	

to Convert 0.95 to percent, multiply by 100 $\Rightarrow$ $0.95 \times 100 = 95\%$ ✓

to Convert to fraction: $\frac{95}{100}$. Divide the numerator + denominator by 5.

$= \frac{19}{20}$ ✓

20) 12 is what percent of 250?

Set up the proportion.

— Solution —

$\frac{x}{100} = \frac{12}{250}$ ✓

21) A real estate agent sells a house for $237790. A sales commission of 8% is charged. The agent gets 63% of this Commission. How much does the agent get?

— Solution —

8% of $237790 = \frac{8}{100} \times 237790 = 19023.20$

63% of $19023.20 = \frac{63}{100} \times 19023.20 = 11984.62$ ✓

22, Solve: $\frac{X}{0.16} = \frac{0.6}{0.24}$

— Solution —

Cross multiply: $0.24X = 0.096$

divide both sides by 0.24

$X = 0.4$ ✓

23, A stereo normally priced at $819 is on sale for 30% off. find the

a, Discount:

— Solution —

Discount = $0.30 \times 819 = \$245.70$

b, Sale Price = $\$819 - \$245.70 =$

$\$573.30$ ✓

24, A long-distance telephone Company Charges a rate of 7 cents per minute on a 60 cent minimum charge per completed call, whichever is greater. find the cost, in cents per minute for a 8-minute call?

— Solution —

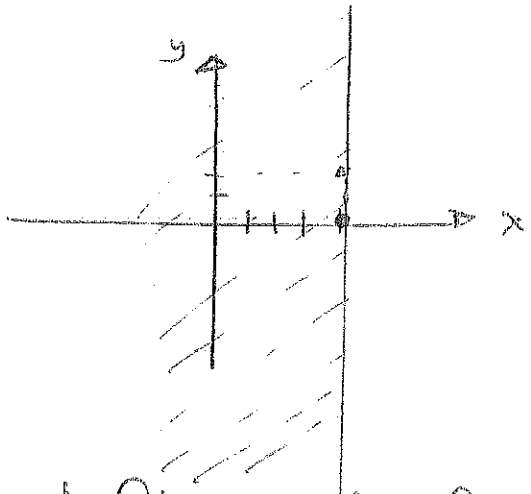
$\frac{8560}{} = 7.5¢$ ✓

_ Introduction To Graphing _

1) Graph. $x \leq 4$

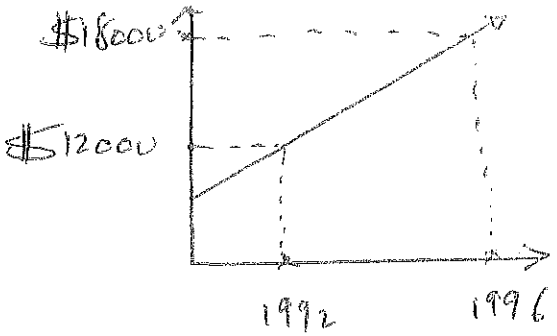
_ Solution _

plot the points (4, 0) and (4, 2)



Shade the left side of the line

2, Using the graph, find the rate of change of the tuition and fees at private 4-year colleges



- Solution -

(1992, 12000)
(1996, 18000)

Rate of change = slope $= \frac{18000 - 12000}{1996 - 1992}$

$= \$1500$ / year.

3, Write an equation of the line containing the given point and perpendicular to $3x + y = 7$.

point (3, 9)

- Solution -

Find the slope to $3x + y = 7$ first.

$y = -3x + 7$ slope $= -3$

Since the lines are perpendicular, the product of their slopes $= -1$.

$-3 \times$ slope of the other line $= -1$

Therefore, the slope $= \frac{-1}{-3} = \frac{1}{3}$

Now the equation of any line is

$y = mx + b$. Since $m = \frac{1}{3}$

$y = \frac{1}{3}x + b$. To find "b" use the given point $(3, 9)$

$9 = \frac{1}{3}(3) + b$

$9 = 1 + b \longrightarrow b = 8$

$y = \frac{1}{3}x + 8$ ✓

4) find the slope and the y-intercept of $3y + 2x = 3$, then graph the line.

- Solution -

$3y + 2x = 3$

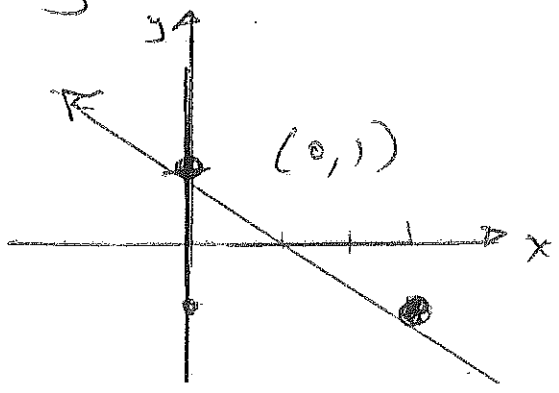
Solve for y first: divide by 3

$3y = -2x + 3$

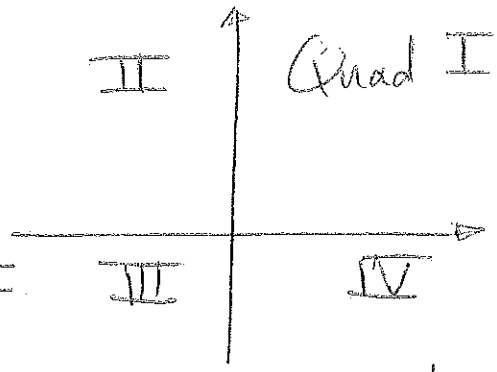
$\frac{3y}{3} = \frac{-2}{3}x + \frac{3}{3}$

$y = \frac{-2}{3}x + 1$ $\quad m = -\frac{2}{3}, \; b = 1$

Graph: →



5, a, In which quadrant $(-1, 5)$ is located?



- Solution -

$(-1, 5)$ is in Quadrant II

b, In which quadrant $(0, 3)$ is located?

- Solution -

None.

6, The number of gallons of bottled water N consumed by a person in 1 year is approximated by:

$$N = 0.733t + 8.398$$

where t is the number of years since 1971.

a, Predict the number of gallons consumed by a person in 1979

- Solution -

If $1971 = 0 \Longrightarrow 1979 = 8$

Replace t with 8.

$$N = 0.733 \times 8 + 8.398 = 14$$

↑ round to the nearest integer.

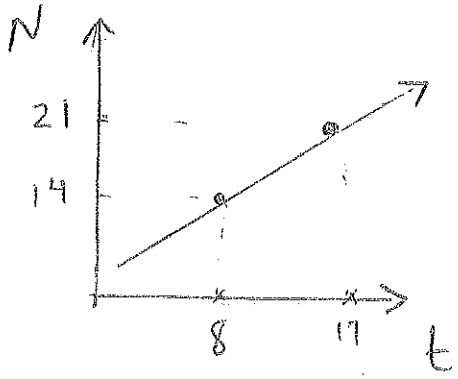
b. $N = ?$ in 1988.

$t = 1988 - 1971 = 17$ years.

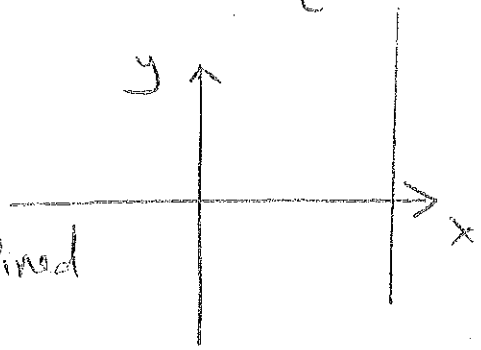
$N = 0.733 \times 17 + 8.398 = 21$

c. Graph the 2 data

(8, 14), (17, 21)



7. Find the slope



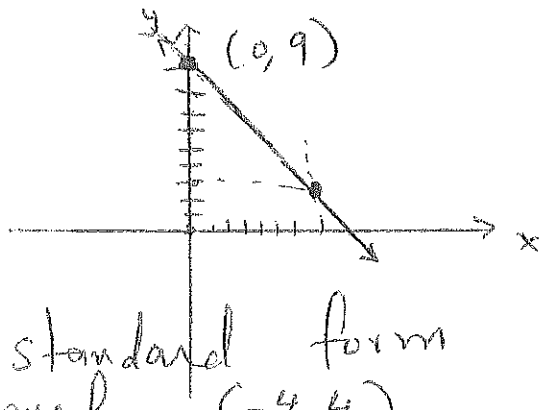
- Solution -

Vertical lines have undefined slope.

8, Draw a line that has a slope of $-6/7$ and y-intercept $(0, 9)$.

— Solution —

Start with plotting $(0, 9)$ and from that point go vertically down 6 points and horizontally 7 points



9, Write an equation in standard form $m = 18/13$ going through $(-4, 4)$

— Solution —

Equation of the line in point intercept form:

$$y - y_1 = m(x - x_1)$$

Replace x with -4 and y with 4

$$y - 4 = \frac{18}{13}(x - -4)$$

$$y - 4 = \frac{18}{13}(x + 4)$$

Multiply by 13.

$$13y - 52 = 18(x + 4)$$ Distribute

$$13y - 52 = 18x + 72$$

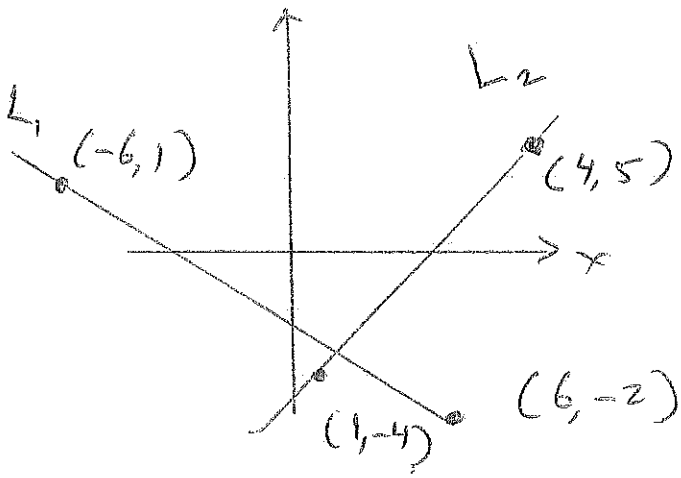
Make the equation in the form: $Ax + By = C$.

$$13y - 18x = 72 + 52$$

$$13y - 18x = 124$$

$$18x - 13y = -124$$ ✓ ; but coefficient of x can not be (−).

10, Are the lines perpendicular?



— Solution —

The points on line L_1.

$(-6, 1)$, $(6, -2)$

x_1, y_1 x_2, y_2

find the slope of $L_1 = \frac{-2-1}{6-6} = \frac{-3}{12} = \frac{-1}{4}$.

The points on line L_2

$(4, 5)$, $(1, -4)$

x_1, y_1 x_2, y_2

find the slope of $L_2 = \frac{-4-5}{1-4} = \frac{-9}{-3} = 3$

The lines are perpendicular, if the product of their slopes $= -1$.

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

$\frac{-3}{4} \neq -1$ (Not perpendicular

11) a) Complete the table for $2x-3y=6$

x	y
0	
	0
6	
	4

- Solution -

for $x=0$ $\Rightarrow$ Replace x with 0 in

$2x-3y=6$

$2(0)-3y=6$

$-3y=6 \Rightarrow y=-2$ ✓

for $y=0$ $\Rightarrow$ Replace y with 0 in

$2x-3y=6$

$2x-3(0)=6$

$2x=6 \Rightarrow x=3$ ✓

for $x=6$ $\Rightarrow$ Replace $x=6$ in

$2x-3y=6$

$2(6)-3y=6$

$12-3y=6$

$-3y=-6 \Rightarrow y=2$ ✓

for $y=4$ $\Rightarrow$ Replace $y=4$ in

$2x-3y=6$

$2x-3(4)=6$

$2x-12=6$

$2x=18 \Rightarrow x=9$ ✓

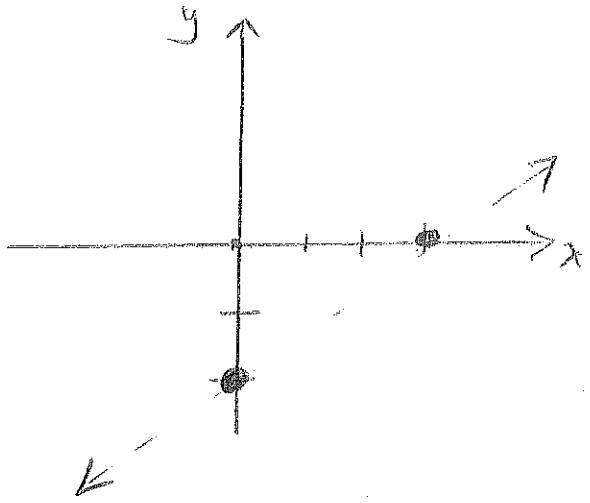
The table should look like:

x	y
0	-2
3	0
6	2
9	4

b, Graph the line.

- Solution -

plot the points (0, -2) and (3, 0)



12, Find the slope & the y-intercept of

$$y = \frac{8}{9}x - 3$$

— Solution —

Equation of any line is: $y = mx + b$.

$m = 8/9$ & $b = (0, -3)$

13, Give the slope of each line and determine whether the lines are parallel, perpendicular or neither.

$$-4x + 3y = 3$$
$$-12x + 9y = 0$$

— Solution —

Solve for y for each equation:

$-4x + 3y = 3$. Add $4x$ to both sides.

$3y = 4x + 3$ divide by 3.

$y = 4/3\,x + 1 \implies$ slope $= 4/3$.

Do the same thing for: $-12x + 9y = 0$

$9y = 12x$ divide by 9

$y = \frac{12}{9}x$ Reduce the fraction.

$y = \frac{4}{3}x$; $m = 4/3$

Since the slopes are the same

the lines are parallel.

14, Complete the table

$x - 2y = 10$

x	y
-4	
	-4
-2	
	5

- Solution -

Replace x with -4 in $x - 2y = 10$

$-4 - 2y = 10$ Add 4

$-2y = 14 \Longrightarrow y = -7$ ✓

Replace y with -4 in $x - 2y = 10$

$x - 2(-4) = 10$

$x + 8 = 10 \longrightarrow x = 2$ ✓

Replace x with -2 in $x - 2y = 10$

$-2 - 2y = 10$

$-2y = 12 \Longrightarrow y = -6$ ✓

Replace y with -5 in $x - 2y = 10$

$$x - 2(-5) = 10$$

$$x + 10 = 10 \longrightarrow x = 0 \checkmark$$

The table should look like:

x	y
-4	-7
2	-4
-2	-6
0	-5

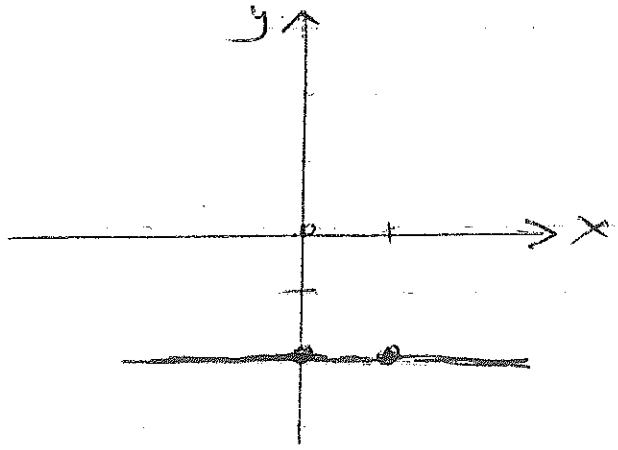
15, Graph: $-4y = 8$

— Solution —

Solve for y first by dividing both sides by -4.

$$y = -2$$

Now plot: $(0, -2)$, $(1, -2)$



16, Find the slope: $(-17, -2)$, $(-20, -14)$

— Solution —

$(-17, -2)$, $(-20, -14)$

x_1 y_1 x_2 y_2

$$\text{slope} = m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-14 - -2}{-20 - -17} = \frac{-14+2}{-20+1}$$

$$m = \frac{-12}{-3} = 4 \checkmark$$

17, Write the equation in slope-intercept form $m = -\frac{1}{3}$, $b = \frac{2}{7}$

— Solution —

Equation of any line

$$y = mx + b$$

$$y = -\frac{1}{3}x + \frac{2}{7} \checkmark$$

18, Graph $3x + 5y = -15$

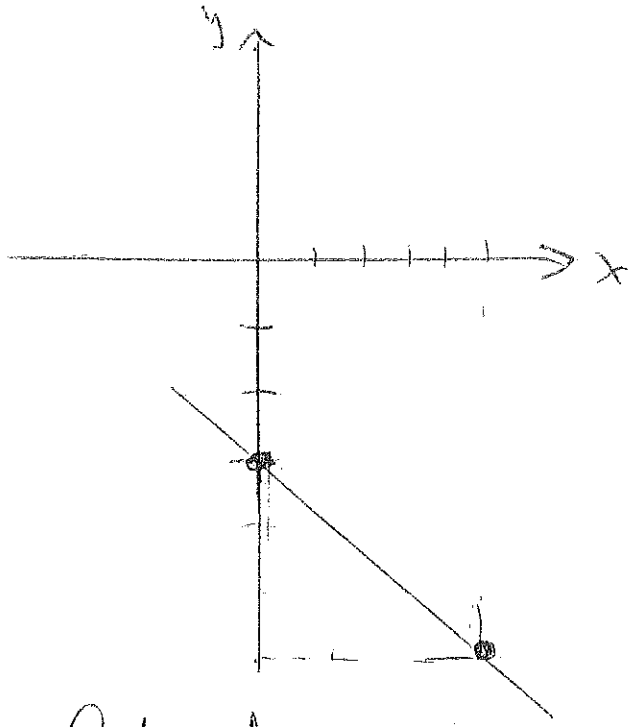
— Solution —

Solve for y: $5y = -3x - 15$

divide by 5:

$$y = \frac{-3}{5}x - 3 \qquad m = -\frac{3}{5}, \; b = -3$$

Graph by starting with point $(0, -3)$ and then from that point go down 3 units and move 5 units to the right



19, a Suppose that it costs ₦15 to place a classified advertisement in the newspaper plus ₦5 for each line. Then the cost to place an ad x lines long is given by dollars. $y = 5x + 15$.

a, Express as an ordered pair the fact that a 10 line ad costs ₦65.

– Solution –

(10, 65)

b, Express as an ordered pair an ad costing ₦100 is 17 lines long.

– Solution –

(17, 100)

20, Find the coordinates of the other mid point.

Mid point $(12, -4)$ End point: $(16, -8)$

- Solution -

$$x_{\text{Mid pt}} = \frac{x_1 + x_2}{2}$$

$$12 = \frac{16 + x_2}{2}$$. Cross multiply.

$$24 = 16 + x_2$$. Subtract 16 from both sides

$$8 = x_2$$ ✓

$$y_{\text{Mid pt}} = \frac{y_1 + y_2}{2}$$

$$-4 = \frac{-8 + y_2}{2}$$ Cross multiply.

$$-8 = -8 + y_2$$. Add 8 to both sides

$$y_2 = 0$$ ✓

other Mid pt coordinates:

$(8, 0)$ ✓

21, Decide whether the given lines are parallel, perpendicular or neither.

$$2x - y = 4$$
$$x - 2y = -3$$

– Solution –

Solve for y for each equation:

$$2x - y = 4$$
$$-y = -2x + 4 \quad \text{Divide by } -1$$
$$y = 2x - 4 \Rightarrow m = 2 \checkmark$$

For $x - 2y = -3$

move x to the other side.

$$-2y = -x - 3 \quad \text{Divide by } -2.$$

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

$$y = \frac{x}{2} + \frac{3}{2}, \quad m = \frac{1}{2} \checkmark$$

Since the slopes are not the same, and their product is not -1. the lines are neither.

22. Graph. $5x + 10 > -2y$

– Solution –

Reverse the inequality.

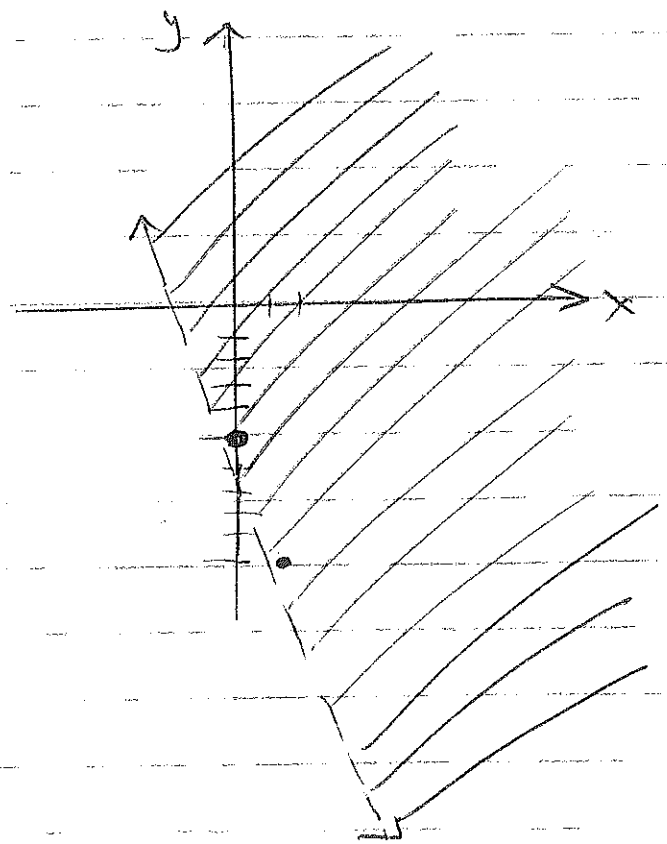
$-2y < 5x + 10$ Divide by -2.

$y > \frac{-5}{2}x - 5$

$m = \frac{-5}{2}$ ← Rise / Run

y-intercept $= -5$.

Draw the line and make it dotted and shade the top part of the line.



23. a) Find PQ to the nearest tenth.

$P(-1, -5)$, $Q(4, -2)$

- Solution -

$(\underset{x_1}{-1}, \underset{y_1}{-5})$, $(\underset{x_2}{4}, \underset{y_2}{-2})$

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$= \sqrt{(4 - -1)^2 + (-2 - -5)^2}$$

$$= \sqrt{5^2 + 3^2} = \sqrt{25 + 9}$$

$= \sqrt{34}$. Find $\sqrt{34}$ from the calculator and round to the nearest 10th. 5.8 ✓

b) Find the coordinates of the midpoint.

- Solution -

$P(\underset{x_1}{-1}, \underset{y_1}{-5})$, $Q(\underset{x_2}{4}, \underset{y_2}{-2})$

$$x_{Midpt} = \frac{x_1 + x_2}{2} = \frac{-1 + 4}{2} = 3/2$$ ✓

$$y_{Midpt} = \frac{y_1 + y_2}{2} = \frac{-5 + -2}{2} = -7/2$$

Midpt $(3/2, -7/2)$ ✓

24. Find the equation of the line through $(-5, -7)$ and $(-3, -8)$.

— Solution —

$(\underset{x_1}{-5}, \underset{y_1}{-7})$, $(\underset{x_2}{-3}, \underset{y_2}{-8})$

Find m first $= \frac{y_2 - y_1}{x_2 - x_1} = \frac{-8-7}{-3-5} = \frac{-8+7}{-3+5}$

$= -\frac{1}{2}$ ✓

Equation of any line is:

$y = mx + b$

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

To find b, replace x with -5 & y with -7.

$-7 = -\frac{1}{2}(-5) + b$

$-7 = \frac{5}{2} + b$

$-7 = 2.5 + b \rightarrow b = -9.5$

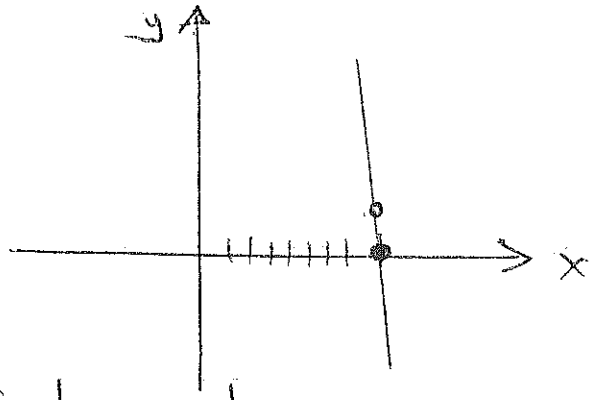
or $-9\frac{1}{2}$ or $-19/2$

Answer is: $y = -\frac{1}{2}x - \frac{19}{2}$ ✓

25, Graph $x = 8$

– Solution –

plot (8, 0) and (8, 1)



26, Kara's Custom tees experienced fixed costs of $200 and variable costs of $5 per shirt. Write an equation that can be used to determine the total expenses, find the cost, C, of producing 20 shirts, and graph the equation. Let

x = total number of shirts.

– Solution –

$C = 200 + 5x$

b, Cost of producing 20 shirts.

replace x with 20.

$C = 200 + 5(20) = \$300$

c, Graph the data.

y-intercept = 200
and the other point is (20, 300)