Introduction To Algebra & The Real Numbers

1) -7 blank 5

- Solution -

Negative numbers are smaller than positive numbers.

$$-7 < 5 \checkmark$$

2, Simplify the expression and Combine like terms.

$$-3(3y-5) + 2(2y+5)$$

- Solution -

$$-3(3y-5) + 2(2y+5)$$

Distribute first:

$$-9y + 15 + 4y + 10$$

Combine like terms:

$$-9y + 4y + 15 + 10$$

$$= -5y + 25 \checkmark$$

3, Name the rational numbers from the list below:

$-10,\ 0.98,\ 4.65,\ \sqrt{8},\ \sqrt{4},\ 4\frac{1}{3},\ \frac{-15}{49}$

$1.27227727772.$

— Solution —

Rational numbers are all the top numbers except $\sqrt{8}$ and 1.27227727772.

$\sqrt{4}$ is rational because it is $= 2$.

4, Simplify: $9 - (-4) - 10 + 6$

— Solution —

$9 - (-4) - 10 + 6$

Work from left to right.

$9 + 4 - 10 + 6$

$= 13 - 10 + 6 = 3 + 6 = 9$ ✓

5, Find the Value of: $|-13| - |-5|$.

— Solution —

$|-13| = 13$

$|-5| = 5$

Therefore $13 - 5 = 8$ ✓

6, J. D. Patin enjoys playing Triominoes every Wednesday night. His scores were: -7, 8, -13 and 19.
What is his final score?

– Solution –

Add the whole results:

$$-7 + 8 + {}^{-}13 + 19$$

$$= 1 + {}^{-}13 + 19$$

$$= -12 + 19 = 7$$ ✓

7. Evaluate the expressions:

$$mp + p^3 \quad , \quad m = \frac{-5}{3}, \; p = \frac{1}{3}.$$

– Solution –

Replace m with $\frac{-5}{3}$ and p with $\frac{1}{3}$.

$$\left(-\frac{5}{3}\right)\left(\frac{1}{3}\right) + \left(\frac{1}{3}\right)^3$$

$$= \frac{-5}{9} + \frac{1}{3} \times \frac{1}{3} \times \frac{1}{3} = \frac{-5}{9} + \frac{1}{27}.$$

Rewrite $\frac{-5}{9}$ as $\frac{3}{3} \times \frac{-5}{9} = \frac{-15}{27}$.

$$\frac{-15}{27} + \frac{1}{27} = \frac{-14}{27}$$ ✓

8) Simplify: $-3(5)^2 - (-4)(-7)$

— Solution —

$-3(5)^2 - (-4)(-7)$

Use order of operations.

Parenthesis should be done first:

$-3(25) - (-4)(-7)$

Do multiplication next:

$-75 - 28 = -103$ ✓

9) Perform the indicated operations

$$\frac{6(2^3 - 3) - 5(-3^3 + 14)}{4[2 - (-3)]}$$

— Solution —

Do parenthesis first:

$(2^3 - 3) = 2 \times 2 \times 2 - 3 = 5$ ✓

$(-3^3 + 14) = -27 + 14 = -13$ ✓

$[2 - (-3)] = 2 + 3 = 5$

Replace those values back in the problem:

$$\frac{6(5) - 5(-13)}{4[5]} = \frac{30 + 65}{20} = \frac{95}{20}$$

Divide both sides by 5.

$\frac{19}{4}$ ✓

10, Convert the following phrase into a mathematical expression.

A number multiplied by -8, Subtracted from the Sum of 9 and 6 times the number.

- Solution -

$(9 + 6x) - (-8x)$ ✓

11, Determine whether 9 is a solution of the equation.

$$2z + 7(z - 3) = 60$$

- Solution -

Replace z with 9 in the equation.

$$2(9) + 7(9 - 3) \stackrel{?}{=} 60$$
$$18 + 7(6) \stackrel{?}{=} 60$$
$$18 + 42 \stackrel{?}{=} 60$$
$$60 = 60 ✓$$

Therefore 9 is a solution to the equation.

12, Add the following: $5\frac{3}{4} + (-6\frac{1}{2})$

- Solution -

$5\frac{3}{4} - 6\frac{1}{2}$.

Convert to improper fractions:

$5\frac{3}{4}$ becomes $\frac{5\times4+3}{4} = \frac{23}{4}$.

$6\frac{1}{2}$ becomes $\frac{6\times2+1}{2} = \frac{13}{2}$

$\frac{23}{4} - \frac{13}{2}$. Rewrite $\frac{13}{2}$ as $\frac{2}{2} \times \frac{13}{2} = \frac{26}{4}$.

$$\frac{23}{4} - \frac{26}{4} = \frac{-3}{4}$$ ✓

13, Use an inequality symbol to write the statement 3x is between −3 and 6 including −3 and excluding 6.

-Solution-

$$-3 \leq 3x < 6$$

14, Simplify by using the distributive property.

$$-7(2u - 4v + 3w)$$

-Solution-

$$-7(2u - 4v + 3w)$$

Distribute by multiplying −7 by each term inside the parenthesis.

$$= -14u + 28v - 21w$$ ✓

15. In August, Alison Romike began with a checking account of \$871.47. Her checks and deposits for August are:

Checks	Deposits
\$35.68	\$83.55
\$23.26	\$120.95
\$5.91	

\- Solution -

Add all the deposits to the checking account and Subtract the checks from the deposits:

$$871.47 + 83.55 + 120.95 - 35.68 - 23.26 - 5.91 = \$1011.12$$

16, Use the indicated property to write a new expression that is equal to the given expression

$(w + 8) + (-4)$, Associative.

- Solution -

Associative property for addition keeps the same terms in order and the only thing that changes is the parenthesis.

Answer is: $w + [8 + (-4)]$

To simplify the expression, just combine like terms.

$w + 4$ ✓

17, The table shows the change in Consumer price indexes.

Commodity	Change from 95 to 96	Change from 96 to 97
Apparel	-0.9	0.2
Audio/Video Equipment	-2.5	-2.2

Which one has a greater absolute value, the change in apparel from 95 to 96 or 96 to 97 ?

— Solution —

Change in apparel from 95 to 96 $= |-0.9| = 0.9$.

change in apparel from 96 to 97 $= |0.2| = 0.2$

0.9 is greater than 0.2.

Therefore, the change in apparel from 95 to 96 is greater.

18. Simplify the expression:

$$-5 - (2 - 3p)$$

– Solution –

$$-5 - (2 - 3p)$$

Change all the signs that follow the subtraction sign:

$$-5 - 2 + 3p$$

Combine like terms.

$$-7 + 3p$$

19. Average hourly earnings of production workers at Nassbaum steel from 1996 to 2002 are approximated by:

$$y = 0.499x - 974.9$$

Where x represents the year and y represents the hourly earnings.

Approximate the average hourly earnings in 2000?

– Solution –

$$y = 0.499x - 974.9$$

Replace x with 2000.

$$y = 0.499(2000) - 974.9$$

$$= \$23.10$$

20, What is the matching equation for:
Sixteen minus eleven- fourth of a number is 5.

- Solution -

$$16 - \frac{11}{4}x = 5$$

21, Simplify the expression:

$$4y^2 - 2y^3 - 7y^2 + 4y^3$$

- Solution -

Combine like terms:

$$4y^2 - 7y^2 - 2y^3 + 4y^3$$

$$= -3y^2 + 2y^3$$

22, Write in algebraic terms (in inequalities).

a, S is between 141 and 155 inclusive

- Solution -

$$141 \leq S \leq 155$$

b, X is between 14 and 19 inclusive.

- Solution -

$$14 \leq x \leq 19$$

c, X is over 19

- Solution -

$$x > 19$$

~ Whole Numbers ~

1, State the digit for the given place in the number

8, 839, 306, 215

ones

Tens

hundreds

ten thousands

Thousands

and so on.

2,

Option	Cost
7-passenger Seating	\$417
Anti lock brakes	\$589
Rear Window defoster	\$175

A car dealer offers an option value package of 7-passenger seating, anti lock brakes, and a rear-window defoster for \$1061. How much would a customer save by buying the value package?

– Solution –

Round: 417 to the nearest 100's = \$400

589 " " " " = \$600

175 " " " " = \$200

Total = 400 + 600 + 200 = 1200.

\$1061 is rounded to 1100

Estimated Savings = 1200 − 1100 = 100

Exact Saving.

$417 + 589 + 175 = 1181$

$1181 - 1061 = \$120$

3, Estimate by front end rounding.
$4050 + 75 + 801 + 3878$

– Solution –

4050 becomes 4000
75 becomes 100
801 becomes 800
3878 becomes 4000
Add the numbers $4000 + 100 + 800 + 4000$
$= 8900$

4, Round 8,882,100,395 to the nearest billion.

– Solution –

882,100,395 will be rounded up

Answer is 9,000,000,000

5, Use the order of operation to Simplify:

$$2+13-2\sqrt{9}+4\sqrt{25}-6\cdot 2$$

— Solution —

$\sqrt{9} = 3$; $\sqrt{25} = 5$.

Replace the answers in the given problem.

$$2+13-2\times 3+4\times 5-6\cdot 2$$

Do multiplication first:

$$2+13-6+20-12$$

$$= 15-6+20-12$$

$$= 9+20-12 = 17$$ ✓

6, Simplify: $6\cdot 2^2 + \frac{0}{2}$

— Solution —

$\frac{0}{2} = 0$

$6\cdot 2^2 = 6\cdot 4 = 24$ ✓

7, Find the $\sqrt{841}$

- Solution -

Use a calculator. Answer is 29✓

8, Find the GCF of

60, 14, 35

- Solution -

Write each number as a prime factor and look for common numbers, then multiply them.

$60 = 2 \times 3 \times 2 \times 5$

$14 = 2 \times 7$

$35 = 5 \times 7$

Since there is not a single number in common, the answer is 1.

9, a, Round 19,537 to the nearest ten

- Solution -

37 becomes 40 $\Rightarrow$ 19540

b, nearest 100: 537 becomes 500

answer is 19500

c, Nearest 1000: 19537 becomes 20,000

10, The Standard form of a number is 8.

a, Factors of repeated multiplication is?

-Solution-

$8 = 2 \times 2 \times 2$ ✓

b, Write 8 in exponential form:

$8 = 2^3$ ✓

11, Identify the base + the exponent of

11^3

-Solution-

Base is 11 ✓

Exponent is 3 ✓

The expression simplified is:

$11 \times 11 \times 11 = 1331$ ✓

12, Last month a nurse worked thirteen 10 hour shifts and three 12-hour shifts. At \$23 per hour, what was the nurse's total hourly income before deductions.

-Solution-

Total hours worked $= 13 \times 10 + 3 \times 12 = 166$ hours

Total income $= 166 \times 23 =$ \$3818 ✓

13) Find the Quotient using short division. Identify the dividend, the divisor and the Quotient. $5\overline{)190}$

Solution -

$$5\overline{)190}^{\;38}$$

Divident is 190

Divisor is 5

Quotient is 38

14) Find the Prime factorization of 2200 using exponents when repeated factors appear.

- Solution -

$$\begin{aligned} 2200 &= 22 \times 100 \\ &= 2 \times 11 \times 10 \times 10 \\ &= 2 \times 11 \times 2 \times 5 \times 2 \times 5 \\ &= 2^3 \times 5^2 \times 11 \end{aligned}$$

15, Identify the number as prime, Composite or neither. If the number is Composite, write it as the product of prime factors.

1155

— Solution —

Since 1155 ends with 5, you can divide it by 5.

$= 5 \times 231$

Now 231 is divisible by 3.

$5 \times 3 \times 77$

Now 77 is divisible by 11.

$5 \times 3 \times 11 \times 7$ ✓

16, A surgical technologist made \$40128 last year. He is paid twice a month. What is the gross total amount of each of his paychecks?

— Solution —

twice a month ⟶ it means he gets paid $2 \times 12 = 24$ times a year.

$24 \overline{)40128} = \$1672$ ✓

17, Find the GCF of 24 and 56.

- Solution -

Write 24 as prime factors: $2 \times 2 \times 2 \times 3$
Write 56 as prime factors: $2 \times 2 \times 2 \times 7$
There are three 2's that are common.
Multiply them: $2 \times 2 \times 2 = 8$ ✓

18, Estimate 320, 657 to the nearest 100, 000 and 6527 to the nearest 1000. and then multiply.

- Solution -

320, 657 is rounded to 300, 000.
6527 is rounded to 7000
$300,000 \times 7000 = 21,00000000$ ✓

19, Divide by using long division

$$28\,\overline{)\,67344}$$

find the Quotient and the remainder.

— Solution —

by dividing 67344 by 28 by using the Calculator, you get 2405.142

Keep 2405 and discard .142

$$\begin{array}{r} 2405 \\ 28\,\overline{)\,67344} \end{array}$$

Multiply 2405 by 28 you get 67340

$$\begin{array}{r} 2405 \\ 28\,\overline{)\,67344} \\ -67340 \\ \hline 4 \end{array}$$

Quotient = 2405 ✓

Remainder = 4 ✓

20) A masonary contractor is preparing an estimate for building a stone wall and a gate. He estimates that the job will take a 40- hour work week. He plans to have 3 laborers at \$15 per hour and 6 masons at \$24 per hour. He'll need \$3243 worth of materials and wishes to make a profit of \$600. Write a mathematical statement that will give the estimated cost of the job. Then calculate this total.

-Solution-

$3 \times 15 \times 40 + 6 \times 24 \times 40 + 3243 + 600$

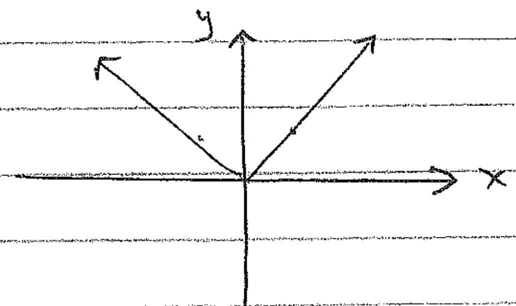
$= 11403$ ✓

~ Introduction To functions ~

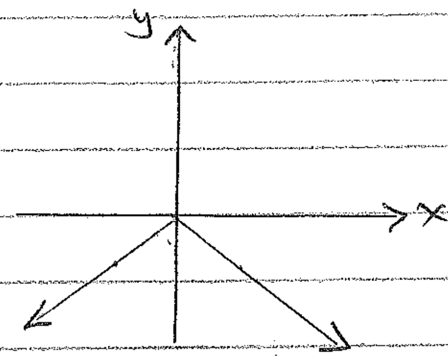
Graph: $f(x) = -|x+3| - 6$

- Solution -

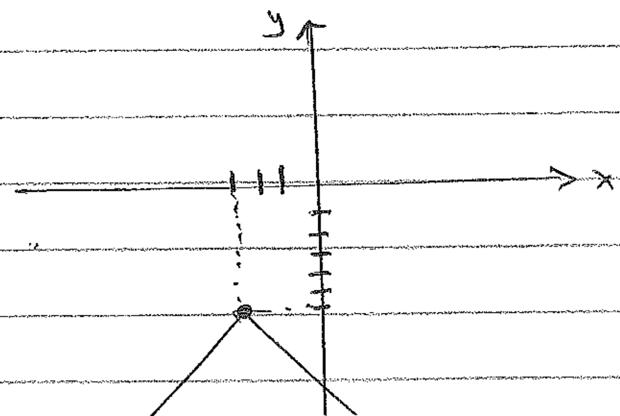
The graph of $f(x) = |x|$ looks like



& the graph of $f(x) = -|x|$ looks like



To graph $f(x) = -|x+3| - 6$,
Move the vertex 3 units to the left and 6 units down.



2, Inequalities with $\geq$ or $\leq$
Use a solid line.
And inequalities $<$ or $>$ symbols,
use a dashed line.

3, $f(x) = |x + 6|$

Find: a, $f(6)$

-Solution-

Replace x with 6 in $f(x)$

$= |6 + 6| = |12| = 12$ ✓

b, $f(-10) = ?$

-Solution-

Replace x with -10 in $f(x)$

$= |-10 + 6| = |-4| = 4$ ✓

c, $f(0) = ?$

-Solution-

Replace x with 0 in $f(x)$

$= |0 + 6| = |6| = 6$ ✓

4,

x	y
-1	-3
0	-2
1	-1
2	0

a, What is the slope?

Solution –

Pick any 2 points from the given table and label them as follows:

$$(\underset{x_1}{-1}, \underset{y_1}{-3}) \quad , \quad (\underset{x_2}{0}, \underset{y_2}{-2})$$

$$m = \text{slope} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-2 - -3}{0 - -1}$$

$$= \frac{-2+3}{0+1} = \frac{1}{1} = 1$$

b, What is the equation of the line written in the form $y = mx + b$

Solution –

We already found m to be 1.
The value of b is the value of y when x = 0 which is -2.

$$y = x - 2$$

5, x is called the independent
y is called the dependent

6, Find the domain: $f(x) = \dfrac{8}{|6x-7|}$

- Solution -

The domain is all values of x except the ones that make the denominator $= 0$.

Set $6x - 7 = 0$ and solve for x.

$$\begin{aligned} 6x - 7 &= 0 \\ +7 &\quad +7 \\ \hline 6x &= 7 \end{aligned} \Rightarrow x = 7/6.$$

Answer is: $(-\infty, 7/6) \cup (7/6, \infty)$ ✓

7,

Fixed Cost	Variable Cost	Price of the item
\$1944	\$395	\$314

a, find the cost function.

-Solution-

$C(x) = 1944 + 395x$ ✓

b, find the Revenue function:

-Solution-

$R(x) = 314x$

c, Find the Profit function.

-Solution-

$P(x) = R(x) - C(x)$

$= 314x - 1944 - 395x = -81x - 1944$ ✓

d, find the break even point.

-Solution-

Break even $\Longrightarrow$ Profit = 0. or $P(x) = 0$

$-81x - 1944 = 0$

$+1944 \quad +1944$

$-81x = 1944 \Longrightarrow x = -24$ units.

e, The restriction on Sale is 29 units.

Make the right decision

Should the company produce?

– Solution –

Since the # of units is negative, the answer is "No"

8, $f(x) = |x - 8| + 7$

Find the intercepts.

~ Solution ~

X-intercepts: Replace y or f(x) with 0 and solve for x.

$$0 = |x - 8| + 7$$

Subtract 7

$-7 = |x - 8|$, since absolute value of a number can not be (–), there is no x-intercept.

y-intercept: Replace x with 0 in f(x).

$$f(x) = y = |0 - 8| + 7$$
$$= |-8| + 7 = 8 + 7 = 15.$$

(0, 15) ✓

9, a, Determine whether the following relation represents a function.

$$\{(7,5),\ (-2,6),\ (1,1),\ (6,6)\}$$

Solution –

Since the x Value is not repeated, it is a function ✓

b What is the domain?

Solution –

Domain is the Values of x.

$$\{7,\ -2,\ 1,\ 6\}$$

c, What is the range?

Solution –

Range is the Values of y

(Do not duplicate the answers)

$$\{5,\ 6,\ 1\}$$

10. A company that manufactures bicycles has a fixed cost of \$2000. It costs \$200 to produce each bicycle. The total cost for the company is the sum of its fixed cost and variable costs.

a. find the cost function.

\- Solution -

$$C(x) = 2000 + 200x$$

b. find $C(30)$.

\- Solution -

Replace x with 30 in $C(x)$

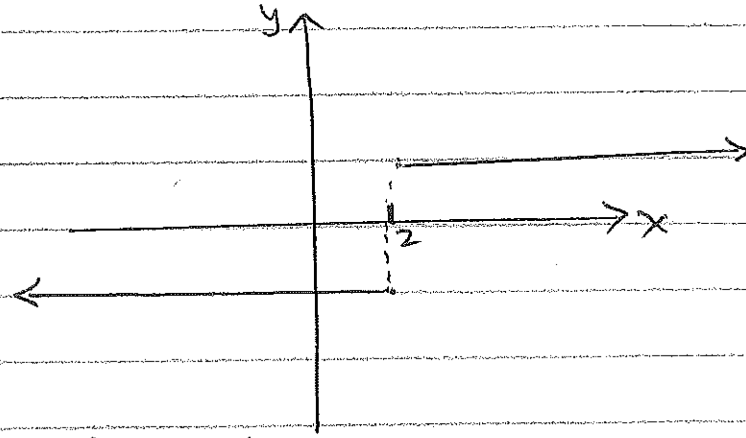
$= 2000 + 200(30)$

$= 2000 + 6000 = \$8000$

11, Sketch the graph.

a, $f(x) = \dfrac{|x-2|}{x-2}$

Solution



b, What is the domain?

Solution

$(-\infty, 2) \cup (2, \infty)$

c, What is the range?

Solution

$\{-1, 1\}$

d, Which statement best describes the function?

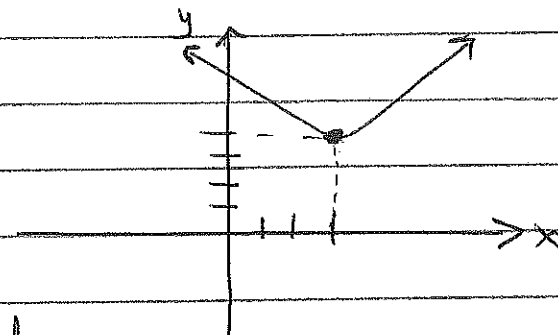
Solution

It is constant over the intervals. $(-\infty, 2)$ and $(2, \infty)$

12) a, Graph: $f(x) = |x - 3| + 4$.

- Solution -

The Vertex Coordinates is $(3, 4)$.



b) Find the domain.

- Solution -

$(-\infty, \infty)$.

c, Find the range.

- Solution -

$[4, \infty)$

13) Which graph illustrates a one-to-one function.

- Solution -

One to one function $\Rightarrow$ you can not have the same range for 2 different domains. straight lines are examples of one-to-one functions.

14. Evaluate the function $f(x) = 5x + 5$ at the given values of the independent variable + simplify.

a, $f(-6) = ?$

— Solution —

Replace x with -6 in $f(x)$

$= 5(-6) + 5 = -30 + 5 = -25$ ✓

b, find $f(x+2)$

— Solution —

Replace x with $x+2$ in $f(x)$.

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

$= 5x + 15$ ✓

c, find $f(-x)$.

— Solution —

Replace x with $-x$ in $f(x)$

$= 5(-x) + 5$

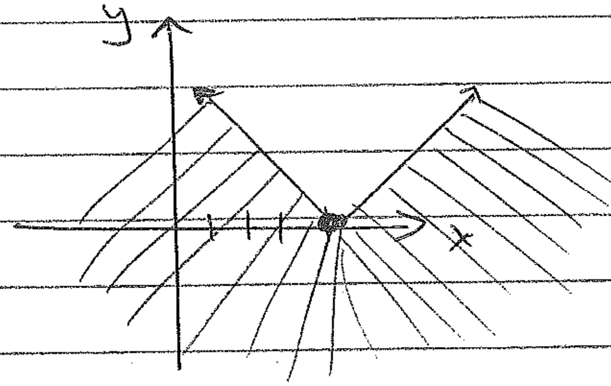
$= -5x + 5$ ✓

15) Graph: $y \leq |x-4|$

~ Solution ~

First graph $y = |x-4|$
Vertex is $(4, 0)$.

Then $\leq \longrightarrow$ solid lines and the shades have to be under the graph.

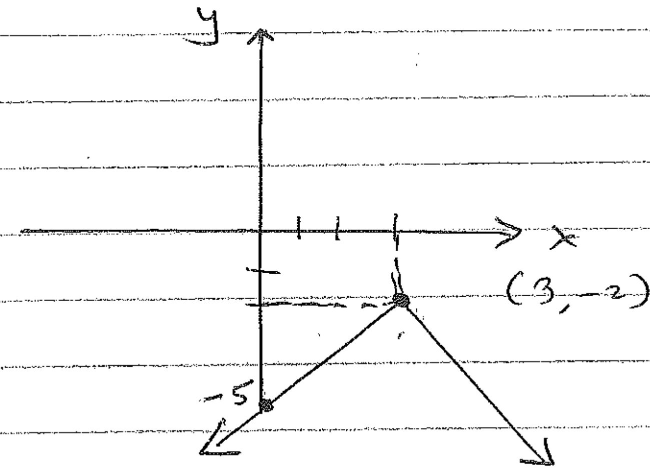


16) Which of the following is the correct way to write a linear function?

_ Solution _

$f(x) = mx + b$ ✓

17.



a. What is the function's domain?

- Solution -

$(-\infty, \infty)$

b. What is the function's range?

- Solution -

$(-\infty, -2]$

c. Find the x-intercepts.

- Solution -

Since the graph does not cross the x-axis, there is no x-intercept.

d. Find the y-intercept.

- Solution -

It crosses the y-axis at $(0, -5)$

e. find $f(0)$

- Solution -

When $x = 0$, $y = -5$. (read from graph)

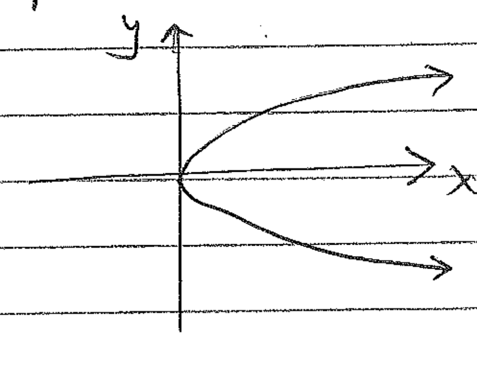
18, In 1997, 69 % of students at a local College regularly used the library for their internet services. This percentage has decreased at an average rate of approximately 1.1 each year since then.

Find a linear function in slope-intercept form that models the percentage of students, P(x), who regularly used the library for internet service x years after 1997.

— Solution —

$P(x) = 69 - 1.1x$

19, Determine whether the graph is that of a function.



— Solution —

If you draw a vertical line on the graph, it will cross the graph in 2 points and not one. Therefore, it is NOT a function.

20) Determine whether the following equation defines y as a function of x.

$$x + y = 18$$

— Solution —

Since it is a linear function, the answer is "yes" "y" is a function of x.

21) Sketch the graph of the linear function, then give its domain and range.

$$f(x) = \frac{1}{4}x + 3$$

— Solution —

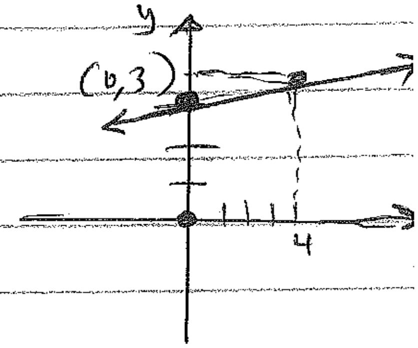
y-intercept is $(0, 3)$.

$$\text{Slope} = \frac{1 \leftarrow \text{Rise}}{4 \leftarrow \text{Run}}$$

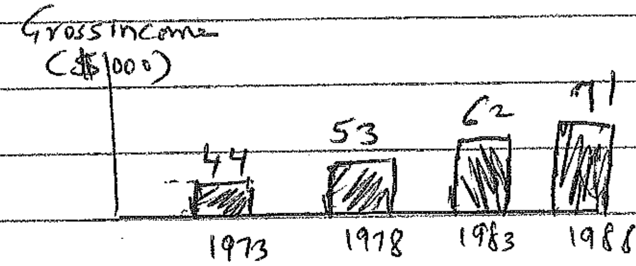
Start by plotting $(0,3)$ and from that point go up 1 and move horizontally 4 units to the right.

Domain: $(-\infty, \infty)$

Range: $(-\infty, \infty)$



22. Write the information on the chart as a set of ordered pairs and determine if the set defines a function.



— Solution —

Order pairs are:

$$\{(1973, 44), (1978, 53), (1983, 62), (1988, 71)\}$$

It does represent a function because the x values are not duplicated.

Linear Equations +
~ Inequalities ~

1/ Solve the absolute value inequality & graph the solution set:

$$|-4x+12| \le 3$$

– Solution –

$$-3 \le -4x+12 \le 3$$

$$\underline{-12 \qquad\quad -12 \qquad\quad -12}$$

$$-15 \le -4x \le -9$$

Divide each term by -4.

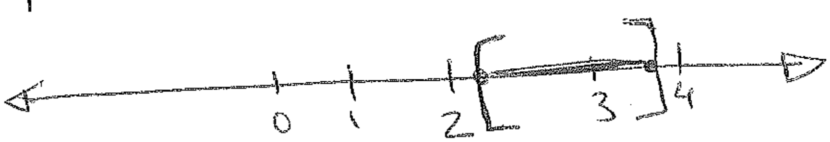
$$\frac{-15}{-4} \le \frac{-4x}{-4} \le \frac{-9}{-4}$$

$$\frac{15}{4} \le x \le \frac{9}{4}$$

Swap the numbers.

$$\frac{9}{4} \le x \le \frac{15}{4}$$

Graph. $9/4$ is 2.25 & $15/4$ is 3.75.



2. <u>Solve</u>: $\left| \frac{2x-6}{4} \right| > 8$

– Solution –

<u>Rewrite</u>: $\frac{2x-6}{4} > \frac{8}{1}$ cross multiply:

$2x-6 > 32$

$\underline{\quad +6 \quad +6}$

$2x > 38 \implies x > 19$

<u>Now set</u> $\frac{2x-6}{4} < -\frac{8}{1}$ Cross multiply

$2x-6 < -32$ Add 6 to both sides.

$2x < -26$

$x < -13$

Writing both answers in interval form

$(-\infty, -13) \cup (19, \infty)$

3, Solve the inequality.

$$7(5g-8)-10g < 25g+7$$

\- Solution -

Distribute first:

$$35g-56-10g < 25g+7$$

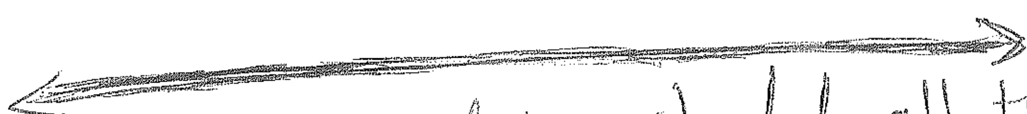
Combine like terms.

$$25g-56 < 25g+7.$$

Subtract $25g$ from both side.

$$-56 < 7 \qquad \text{(True)}.$$

Answer is all real numbers: $(-\infty, \infty)$



The graph is shaded all the way.

4, Solve. $11(t-3)+4t = 5(3t+3)-9$

\- Solution -

Distribute first:

$$11t-33+4t = 15t+15-9$$

Combine like terms.

$$15t-33 = 15t+6$$

Subtract $15t$ from both sides.

$$-33 = 6 \qquad \text{(Not true)}$$

NO Solution.

5. **Solve:** $2x - 2 > -14$

or

$3x + 1 \leq 19$

– Solution –

$2x - 2 > -14$ Add 2 to both sides

$2x > -12 \implies x > -6$ ✓

Solve for x in:

$$\begin{array}{r} 3x + 1 \leq 19 \\ -1 \quad -1 \\ \hline 3x \leq 18 \end{array} \implies x \leq 6 \ ✓$$

Answer is all real numbers

$(-\infty, \infty)$

shaded all the way

6. **Solve.** $6x - 8 < -20$ and $-3x + 1 > -8$

– Solution –

$6x - 8 < -20$ Add 8 to both sides

$6x < -12 \implies x < -2$ ✓

$-3x + 1 > -8$ Subtract 1 from both sides

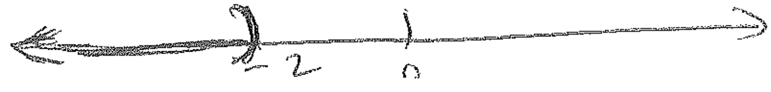
$-3x > -9$ Divide by -3

$x < 3$ ✓

Answers: $x < -2$ and $x < 3$

Take the common solution which is

$x < -2$



7, Translate the words into an equation:
Twice a number is equal to 8 more than 5 times the number.

\- Solution -

$$2x = 8 + 5x$$ ✓

8, A race car driver won a 500 mile race with a speed of 169.2 miles per hour. Find the driver's time & round to the nearest thousandth

\- Solution -

$$t = \frac{d}{s} = \frac{500}{169.2} \approx 2.955$$ ✓

9, <u>Solve</u>. $0.4(x+3) - 0.7(x+3) = -0.3x - 0.9$

\- Solution -

<u>Distribute first:</u>

$$0.4x + 1.2 - 0.7x - 2.1 = -0.3x - 0.9$$

Combine like terms:

$$-0.3x - 0.9 = -0.3x - 0.9$$

Since the left side of the equation is the same as the right side, then the Solution is "All real numbers"

10, Solve for y:

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

— Solution —

Cross multiply:

$xy = 3y - x$ Move 3y to the left side of the equation.

$xy - 3y = -x$. Take "y" as a common factor.

$y(x-3) = -x$

Therefore $y = \dfrac{-x}{x-3}$

11, If planet I is 32.7 miles (million) farther from the Sun
that planet II, then planet III is 24.2 miles (million) When the
farther from the Sun than planet I
total distances for these 3 planets from the
Sun is 191.6 million miles. How far away
from the Sun is planet II?

— Solution —

$x + x + 32.7 + x + 32.7 + 24.2 = 191.6$

$3x + 89.6 = 191.6$

$3x = 102$ $\Rightarrow x = 34$

12. Solve: $\frac{3x}{2} - x = \frac{x}{6} - \frac{2}{3}$

Solution

Multiply each term by 6.

$$6 \cdot \frac{3x}{2} - 6 \cdot x = 6 \cdot \frac{x}{6} - 6 \cdot \frac{2}{3}$$

$$9x - 6x = x - 4$$

$$3x = x - 4$$

$$2x = -4 \Longrightarrow x = -2$$

13. The body mass index I is used to determine an individual risk for heart disease. An index less than 25 indicates a low risk. The body mass index is given by the formula on model.

$$I = \frac{700W}{H^2}$$

Where W = weight in pounds, and H = height in inches. Jerome is 76 inches tall. What weights will keep his body mass index between 25 and 33.

Solution

for $I = 25$ & $H = 76$

$$25 = \frac{700W}{76^2}$$

or

$$\frac{25}{1} = \frac{700W}{5776}$$

Cross multiply:

$700\,W = 144400 \implies W = 206.$

for $I = 33$ & $H = 76.$

$$\frac{33}{1} = \frac{700\,W}{76^2} = \frac{700\,W}{5776}$$

Cross multiply: $700\,W = 190608$

$W = 272$

$206 < W < 272$ ✓

14. Solve & graph: $12x + 2 > 2(4x+1) - x + 9$

- Solution -

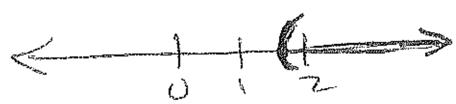
Distribute first:

$12x + 2 > 8x + 2 - x + 9.$ Combine like terms:

$12x + 2 > 7x + 11.$ Subtract $7x$ from both sides

$5x + 2 > 11 \implies 5x > 9$

& $x > 9/5$



15, The recommended daily intake (RDI) of a nutritional supplement for a certain age group is 500 mg/day. Actually, supplement needs vary from person to person. Write an absolute value inequality to express the RDI plus or minus 90 mg and solve it.

\- Solution -

$$|x-500| \leq 90$$

$$-90 \leq x-500 \leq 90$$

$$+500 \qquad +500 \qquad +500$$

$$410 \leq x \leq 590$$

16, Solve. $|7n+3| + 11 = 4$

\- Solution -

$$|7n+3| + 11 = 4$$

$$-11 \qquad -11$$

$$|7n+3| = -7$$

since absolute value of a number can not be negative. $\Rightarrow$ Solution is empty set ϕ

"No solution"

17, Chris can be paid in 1 of 2 ways.
plan A is a salary of \$460 /month plus a commission of 7% of sales. plan B is a salary of \$682 per month plus a commission of 4% of sales. For what amounts of sales is Chris better of selecting plan A?

– Solution –

$$460 + 0.07x > 682 + 0.04x$$

Subtract 0.04x from both sides

$$460 + 0.03x > 682$$

Subtract 460 from both sides.

$$0.03x > 222$$

$$\forall x > 7400$$

18, The Value of an uncirculated "Mint-State-65" 1950 Jefferson Nickel minted in Denver is $\frac{7}{4}$ the Value of a 1945 nickel minted in philadelphia in Similar Condition. Together the total Value of the 2 coins is \$77.

– Solution –

Let 1945 nickel price $= x$

$\therefore$ 1950 nickel price $= \frac{7}{4}x$

$x + \frac{7}{4}x = 77$ Multiply each term by 4.

$4x + 4 \cdot \frac{7}{4}x = 4(77)$

$4x + 7x = 308 \implies 11x = 308$

$x = 28$ ✓

1950 nickel $= \frac{7}{4}x = \frac{7}{4} \times 28 = \$49$ ✓

19. Solve. $-3(7p+6) - 4 + 40p = 27 + 18p$

– Solution –

Distribute first:

$-21p - 18 - 4 + 40p = 27 + 18p$

Combine like terms:

$19p - 22 = 27 + 18p$

subtract $18p$ from both sides

$p - 22 = 27 \implies p = 49$ ✓

20, Simplify the expression:

$-6.7(3S+6)-1.8(2S-5)$

– Solution –

Distribute 1st:

$-20.1S-40.2-3.6S+9$

Combine like terms:

$-23.7S-31.2$

21, The product of 4 and 7 more than a number. "Write an algebraic expression".

– Solution –

$4(x+7)$

22, Solve $|2y-3|=|27-3y|$

– Solution –

Drop the absolute value bars:

$2y-3=27-3y$ Add $3y$ to both sides

$5y-3=27$

$\Longrightarrow 5y=30$ & $y=6$

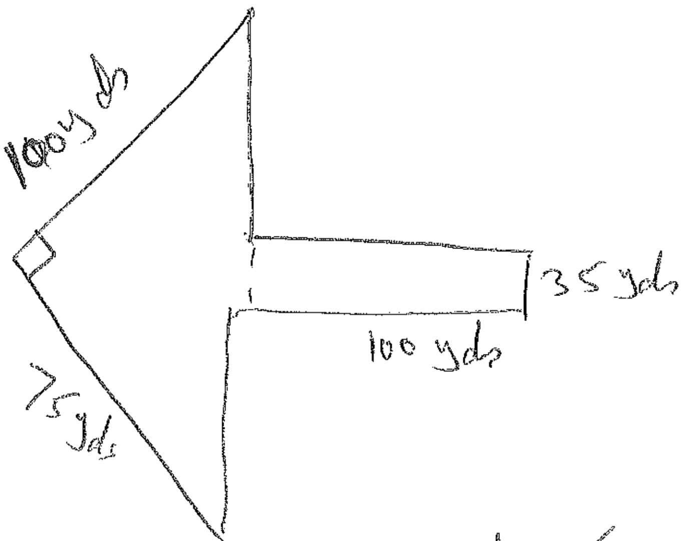
Drop the bars now and change the signs of $27-3y$

$2y - 3 = -27 + 3y$ Subtract 3y from both sides

$-y - 3 = -27 \implies -y = 24 \implies y = -24$

Answer is 6, -24

23.



Distance around the streets

$= 100yd + 75yd = 175$ yds

Area of the lot = Area of the triangle + Area of the rectangle.

Area of the triangle $= \frac{100 \times 75}{2} = 3750\ yd^2$.

Area of the rectangle $= 100 \times 35 = 3500\ yd^2$.

Total area $= 3750 + 3500$

$= 7250\ yd^2$

~ Exponents and Polynomials ~

1) The total imports of Petroleum (in millions of barrels per day) in a given year is approximated by:

$$38x^3 - 523x^2 + 2087x + 6058,$$

Where x represents the number of years since 1975. The corresponding total of exports of Petroleum is:

$$-x^3 + 10x^2 + 27x + 18$$

Write a Polynomial that represents how many more barrels per day were imported than exported in a given year.

– Solution –

Imported – Exported =

$(38x^3 - 523x^2 + 2087x + 6058) -$

$(-x^3 + 10x^2 + 27x + 18)$.

change all the signs of the terms that follow the subtraction sign:

$38x^3 - 523x^2 + 2087x + 6058 + x^3 - 10x^2 - 27x - 18$.

Now Combine like terms:

$39x^3 - 533x^2 + 2060x + 5873$ ✓

3, Use the exponent rule to simplify the expression:

$$\frac{(m^8 n)^{-4}}{m^{-17} n^5}$$

- Solution -

Rule is: $(a^b)^c = a^{b \times c}$

$(m^8 n)^{-4} = m^{8 \times -4} n^{1 \times -4} = m^{-32} n^{-4}$.

Replace the answer in the given problem:

$$\frac{m^{-32} n^{-4}}{m^{-17} n^5}.$$

Rule: $\frac{x^a}{x^b} = x^{a-b}$.

$m^{-32 - -17} n^{-4-5} = m^{-32+17} n^{-9}$

$= m^{-15} n^{-9}$

Rule: $x^{-a} = \frac{1}{x^a}$.

Therefore, the answer is

$$\frac{1}{m^{15} n^9}$$

3) Convert the number 15250000000 to scientific notation.

— Solution —

A number is in scientific notation if it is between 1 and 10; could equal 1, but not 10.

1.525×10^{10} since we have to move the decimal from right to left 10 places.

4) Find the product:

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

— Solution —

Multiply $(3x-5)(x+5)$ first:

$$= 3x^2 + 15x - 5x - 25$$

$$= 3x^2 + 10x - 25$$

Now, multiply the result by x:

$$x(3x^2 + 10x - 25)$$

$$= 3x^3 + 10x^2 - 25x$$

5. Find the product:

$$6x^3(3x^2 - 6x + 3)$$

– Solution –

Rule: $x^a \cdot x^b = x^{a+b}$.

Distribute:

$$6x^3(3x^2 - 6x + 3)$$

$$= 18x^5 - 36x^4 + 18x^3$$ ✓

6. Divide: $\dfrac{21x^9 - 21x^7 + 35x^2}{-7x^2}$

– Solution –

Rule: $\dfrac{x^a}{x^b} = x^{a-b}$.

Divide each numerator by $-7x^2$.

$$\frac{21x^9}{-7x^2} - \frac{21x^7}{-7x^2} + \frac{35x^2}{-7x^2}$$

$$= -3x^7 + 3x^5 - 5$$ ✓

7, a, Classify the polynomial.

$$x^2 - 20x + 100$$

-Solution-

Since it has 3 terms, it is a trinomial ✓

b, What is the degree?

-Solution-

Since the largest exponent is 2 (x^2), the degree is 2 ✓

8, Evaluate the polynomial for $x = -1$.

$$-3x^3 + 7x^2 - 4x - 2$$

-Solution-

Replace x with -1.

$$-3(-1)^3 + 7(-1)^2 - 4(-1) - 2$$

$$= -3(-1)(-1)(-1) + 7(1) + 4 - 2$$

$$= 3 + 7 + 4 - 2 = 12 ✓$$

9, Use the distributive property to find the Product.

$$(y-7)(-4y^2+6y+3)$$

– Solution –

$$(y-7)(-4y^2+6y+3)$$

Multiply y by $(-4y^2+6y+3)$ first:

$$= -4y^3+6y^2+3y$$

Now multiply -7 by $(-4y^2+6y+3)$

$$= 28y^2-42y-21$$

Combine both results:

$$-4y^3+6y^2+3y+28y^2-42y-21$$

Combine like terms:

$$-4y^3+34y^2-39y-21$$

10, Divide :

$$\frac{4x^4 - 22x^3 + 11x^2 - 7x + 10}{x - 5}$$

- Solution -

$$
\begin{array}{r|l}
 & 4x^3 - 2x^2 + x - 2 \\
\hline
x-5 & 4x^4 - 22x^3 + 11x^2 - 7x + 10 \\
 & -4x^4 \pm 20x^3 \\
\hline
 & -2x^3 + 11x^2 \\
 & \pm 2x^3 \mp 10x^2 \\
\hline
 & x^2 - 7x \\
 & -x^2 \pm 5x \\
\hline
 & -2x + 10 \\
 & \pm 2x \mp 10 \\
\hline
 & 0 \leftarrow \text{Remainder}
\end{array}
$$

Answer is

$$4x^3 - 2x^2 + x - 2$$

11) Simplify:

$$(5x^4y^2z)^3 \cdot (x^5y)^4$$

– Solution –

<u>Rule:</u> $(x^a)^b = x^{a \times b}$

$$(5x^4y^2z)^3 = 5^3x^{12}y^6z^3.$$

$$(x^5y)^4 = x^{20}y^4.$$

Multiply both results:

$$5^3x^{12}y^6z^3 \cdot x^{20}y^4.$$

<u>Rule:</u> $x^a \cdot x^b = x^{a+b}.$

$$= 125x^{32}y^{10}z^3$$

12. Simplify: $\dfrac{(3u^{2}v^{2})^{-4}(4u^{-2}v^{3})^{3}}{(3u^{2}v^{-3})^{-2}}$

- Solution -

Rule: $(x^{a})^{b} = x^{a \times b}$.

multiply the exponents inside the Parenthesis by the outside ones.

$$\frac{3^{-4}\, u^{-8}\, v^{-8} \cdot 4^{3}\, u^{-6}\, v^{9}}{3^{-2}\, u^{-4}\, v^{6}}$$

Rule: $\dfrac{x^{a}}{x^{b}} = x^{a-b}$.

$$\frac{3^{-4}}{3^{-2}} = 3^{-4-(-2)} = 3^{-2} \checkmark$$

$$\frac{u^{-8} \cdot u^{-6}}{u^{-4}} = \frac{u^{-14}}{u^{-4}} = u^{-14-(-4)} = u^{-10} \checkmark$$

$$\frac{v^{-8} \cdot v^{9}}{v^{6}} = \frac{v}{v^{6}} = v^{1-6} = v^{-5}$$

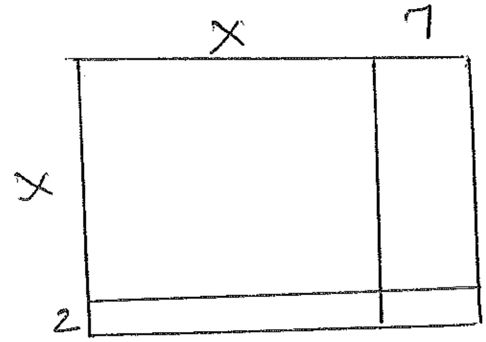
$4^{3} = 4 \times 4 \times 4 = 64$.

$3^{-2} \cdot u^{-10} \cdot v^{-5} \cdot 64$

Rule: $x^{-a} = \dfrac{1}{x^{a}}$

$$\frac{64}{3^{2}\, u^{10}\, v^{5}} = \frac{64}{9u^{10}v^{5}} \checkmark$$

13 Find the area of the figure:



— Solution —

length $= x+7$

width $= x+2$

Area $= l \times w = (x+7)(x+2)$

$= x^2+2x+7x+14$

$= x^2+9x+14$

14, Multiply: $(-3x^6)(-4x^3)$

— Solution —

Multiply the numbers first:

$(-3)(-4) = 12$

$x^6 \cdot x^3 = x^9$

answer is $12x^9$

15, Find the product:

$$\left(4e + \frac{1}{5}f\right)^2$$

– Solution –

Rule is: $(a+b)^2 = a^2 + 2ab + b^2$.

$(4e)^2 = 16e^2$.

$2(4e)(\frac{1}{5}f) = \frac{8}{5}f$.

$(\frac{1}{5}f)^2 = \frac{1}{25}f^2$.

Answer is: $16e^2 + \frac{8}{5}f + \frac{1}{25}f^2$ ✓

16, If $f(x) = (5x - 3)$ and $g(x) = (x - 5)$

find $(fg)(x)$

– Solution –

Multiply both functions by each other.

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

$= 5x^2 - 3x - 25x + 15$

Combine like terms:

$5x^2 - 28x + 15$ ✓

17, Multiply:

$$(3t^2 - t)(3t^2 + 3t - 1)$$

- Solution -

First multiply $3t^2(3t^2 + 3t - 1)$

$$= 9t^4 + 9t^3 - 3t^2$$

Now multiply $-t(3t^2 + 3t - 1)$

$$= -3t^3 - 3t^2 + t$$

Combine the results:

$$9t^4 + 9t^3 - 3t^2 - 3t^3 - 3t^2 + t$$

$$= 9t^4 + 6t^3 - 6t^2 + t$$

18, $f(x) = 4x^2 + 7x - 5$

$g(x) = -6x^2 + 3x - 20$

a, find $(f+g)(x)$

- Solution -

Add both functions:

$$4x^2 + 7x - 5 - 6x^2 + 3x - 20$$

Combine like terms:

$$-2x^2 + 10x - 25$$

b, find $(f-g)(x)$.

- Solution -

$$(4x^2 + 7x - 5) - (-6x^2 + 3x - 20)$$

Change all the signs that follow the subtraction.

$$4x^2 + 7x - 5 + 6x^2 - 3x + 20$$

$$= 10x^2 + 4x + 15$$

19, **Evaluate:** $-3^0 + 3^0$

- Solution -

Rule: $x^0 = 1$.

any number raised to the power $0 = 1$.

$-3^0 + 3^0 = -1 + 1 = 0$ ✓

20, Perform the indicated operations. Give the answer in scientific notation.

$$\frac{6.4 \times 10^{-4} \times 4.0 \times 10^{-3}}{2 \times 10^{4} \times 3.2 \times 10^{-2}}$$

- Solution -

First work on the numerator:

$6.4 \times 10^{-4} \times 4.0 \times 10^{-3} = 25.6 \times 10^{-7}$.

Now work on the denominator:

$2 \times 10^{4} \times 3.2 \times 10^{-2} = 6.4 \times 10^{2}$.

Now divide the numerator by the denominator:

$$\frac{25.6 \times 10^{-7}}{6.4 \times 10^{2}} = 4 \times 10^{-9}$$

(remember the rule: $\frac{x^a}{x^b} = x^{a-b}$)

21, Combine like terms:

$6 + 2a - (3a + 8) - (4a + 5)$

- Solution -

Change the signs of all the terms that follow subtraction.

$6 + 2a - 3a - 8 - 4a - 5.$

Combine like terms:

$= -7 - 5a$ ✓

22, Perform the operation:

$(-2m^2 + 6n^2 - 10n) - [(6m^2 - 10m + 7) + (-6m^2 + 4n^2)]$

- Solution -

Change all the signs of the terms that follow [

$-2m^2 + 6n^2 - 10n - 6m^2 + 10m - 7 + 6m^2 - 4n^2.$

Combine like terms:

$= -2m^2 + 2n^2 - 10n + 10m - 7$ ✓

23, Perform the indicated operations and give the answer in scientific notation.

$$\frac{6.4 \times 10^{-1} \times 4.5 \times 10^{-2}}{2 \times 10^{2} \times 3.6 \times 10^{-4}}$$

– Solution –

Work on the numerator first:

$6.4 \times 10^{-1} \times 4.5 \times 10^{-2} \Longrightarrow$

multiply 6.4×4.5, you get $= 28.8$

multiply $10^{-1} \times 10^{-3}$, you get 10^{-4}

Therefore the numerator result is: $\boxed{28.8 \times 10^{-4}}$

Work on the denominator:

$2 \times 10^{2} \times 3.6 \times 10^{-4}$

multiply $2 \times 3.6 = 7.2$

and $10^{2} \times 10^{-4} = 10^{-2}$,

therefore, the denominator result is:

$\boxed{7.2 \times 10^{-2}}$.

Now divide the numerator result by the denominator result:

$$\frac{28.8 \times 10^{-4}}{7.2 \times 10^{-2}}$$

Divide 28.8 by 7.2, you get 4.

Divide 10^{-4} by 10^{-2}, you get 10^{-2}

Answer is 4×10^{-2}

24, What polynomial, when divided by $8y^2$, yields $3y^2 - 9y + 3$ as a Quotient?

– Solution –

multiply $8y^2$ by $(3y^2 - 9y + 3)$.

$8y^2(3y^2 - 9y + 3)$. Distribute.

$24y^4 - 72y^3 + 24y^2$ ✓

25, Simplify: $(4x^3y^3Z)^3 \cdot (x^3y)^5$.

– Solution –

Rule: $(X^a)^b = X^{a \cdot b}$

So $(4x^3y^3Z)^3 = 4^3x^9y^9Z^3 = 64x^9y^9Z^3$.

& $(x^3y)^5 = X^{15}y^5$.

Now multiply the terms by each other.

(Rule $\cdot$ $X^a \cdot X^b = X^{a+b}$)

$64X^9y^9Z^3 \cdot X^{15}y^5$

$= 64X^{24}y^{14}Z^3$ ✓

26, $(2g - h)^3 =$

\- Solution -

Formula is $(a-b)^3 = a^3 - 3a^2b + 3ab^2 - b^3$

$(2g-h)^3$; $a = 2g$

$b = h$

Replace a with "2g" and b with "h"

$= (2g)^3 - 3(2g)^2(h) + 3(2g)(h)^2 - (h)^3$

$= 8g^3 - 3(4g^2)h + 6gh^2 - h^3$

$= 8g^3 - 12g^2h + 6gh^2 - h^3$ ✓

27, Multiply: $(2x+3)(2x-8)$

– Solution –

$(2x+3)(2x-8) =$

Multiply $2x$ by $(2x-8)$ first.

$2x(2x-8) = \underline{4x^2 - 16x}$.

Now multiply

$+3$ by $(2x-8)$

$+3(2x-8) = \underline{+6x - 24}$

Combine both results:

$4x^2 - 16x + 6x - 24$.

Combine like terms:

$4x^2 - 10x - 24$

28, In 2005, the total waste generated in a certain country was 8.523×10^{11} pounds. Also in 2005, the country's population was 4.23×10^8 people. Determine the garbage per capita (per person) in that country in the year 2005.

– Solution –

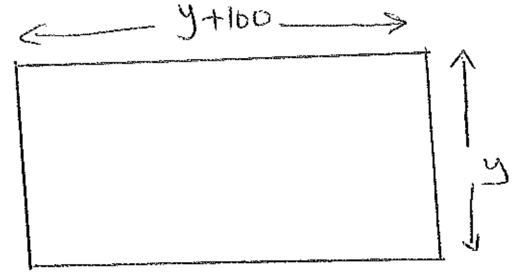
Divide 8.523×10^{11} by 4.23×10^8.

Divide 8.523 by 4.23 first, you get 2.01

Now, Divide 10^{11} by 10^8, you get 10^3.

answer is 2.01×10^3

29, The length and width of the rectangle in the figure differ by 100 mm. Find the area of the rectangle in terms of y without using Parenthesis.



- Solution -

$y(y+100)$. Distribute

$y^2 + 100y$

~ Factoring Polynomials ~

1) Solve the equation.

$$y^3 - 13y^2 + 30y = 0$$

\- Solution -

$y^3 - 13y^2 + 30y = 0$

Take y as a common factor.

$y(y^2 - 13y + 30) = 0$

Now factor $y^2 - 13y + 30 = (y-10)(y-3)$

$y(y-10)(y-3) = 0$

Set each factor to 0 and solve for y.

$y = 0$ ✓

$y - 10 = 0 \implies y = 10$ ✓

$y - 3 = 0 \implies y = 3$ ✓

2) If a trinomial has a negative coeficient for the squared term, it's usually easier to factor by first factoring out the common factor -1. Use this method to factor:

$$-5a^2 - 26ab - 5b^2$$

$$= -1(5a^2 + 26ab + 5b^2)$$

$$= -1(5a + b)(a + 5b)$$ ✓

3, Factor the trinomial by grouping.

$$15m^2 - 7m - 4$$

— Solution —

multiply 15 by -4, you get -60

Now think of 2 numbers the product $= -60$, and the sum $= -7$, the numbers are:

$-12, +5$

$(15m - 12)(15m + 5)$

Divide $15m - 12$ by 3

$(5m - 4)$.

Divide $(15m + 5)$ by 5

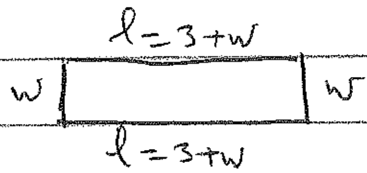
$(3m + 1)$.

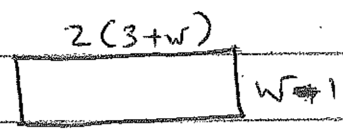
Answer is $(5m - 4)(3m + 1)$

4, The dimensions of a rectangle are such that its length is 3 inches more than its width. If the length were doubled and if the width were decreased by 1 in the area would be increased by $50\ in^2$. What are the length and width of the rectangle?

— Solution —

Area $= (3+w)w = 3w + w^2$





Area $= 2(3+w)(w-1)$

$A = 2(3+w)(w-1)$

$= 2(w^2+2w-3)$

$= 2w^2+4w-6 = 3w+w^2+50.$

Make the equation $= 0.$

$2w^2+4w-6-3w-w^2-50=0.$

Combine like terms.

$w^2+w-56=0$

Factor:

$(w+8)(w-7)=0$

$\Rightarrow w=-8$ x $\quad w=7$ ✓

$l = 3+w = 3+7 = 10$ ✓

5, Factor by grouping.

$$1 - f + fw - w$$

Solution -

$$(1-f) + (fw - w)$$

$$= (1-f) + w(f-1)$$

$$= (f-1)(-1+w)$$

6, Factor: $125r^3 + 1$.

Solution -

Formula: $a^3 + b^3 = (a+b)(a^2 - ab + b^2)$.

$$125r^3 + 1 = (5r)^3 + (1)^3$$

$a = 5r$ and $b = 1$. Substitute.

$$(5r+1)(25r^2 - 5r + 1)$$

7, Factor the trinomial:

$$c^2f^2 + 12cf + 27$$

Solution -

Product = 27

Sum = +12 $\Longrightarrow$ numbers are +9, +3.

$$(cf+9)(cf+3)$$

8, Solve: $c^2 = -24 - 11c$

\- Solution -

Make the equation $= 0$.

$c^2 + 11c + 24 = 0$. Factor it:

$(c+8)(c+3) = 0$

Set each factor to 0 and solve for c.

$c = -8, \quad c = -3$.

9, Factor the following trinomial:

$$t^2 + \frac{1}{4}t + \frac{1}{64}$$

\- Solution -

Product $= \frac{1}{64}$, Sum $= \frac{1}{4}$

numbers are $\frac{1}{8}$, $\frac{1}{8}$

$\left(t + \frac{1}{8}\right)^2$ ✓

10, Solve: $3w^2 = 9w$

\- Solution -

Make the equation $= 0$.

$3w^2 - 9w = 0$. Factor:

$3w(w-3) = 0 \Rightarrow w = 0$ ✓

$w = 3$ ✓

11) Decide which is the correct factored form of the given polynomial.

$$7x^2 - 19x - 6$$

A, $(7x+2)(x-3)$
B, $(7x-2)(x+3)$

- Solution -

Try choice "A"

$$(7x+2)(x-3)$$
$$= 7x^2 + 2x - 21x - 6$$
$$= 7x^2 - 19x - 6$$ ✓

12, Factor out the greatest common factor.

$$(8z-3)(z+7) - (8z-3)(z-6)$$

- Solution -

$$(8z-3)(z+7) - (8z-3)(z-6)$$

$$= (8z-3)\big(z+7-(z-6)\big)$$
$$= (8z-3)(z+7-z+6)$$
$$= (8z-3)(13)$$ ✓

13, The Sum of the squares of 2 Consecutive odd positive integers is 130. Find the integers.

\- Solution -

Let the 1st positive integer = x

2nd Consecutive odd positive integer = $x+2$.

$$x^2 + (x+2)^2 = 130$$

$$= x^2 + x^2+4x+4 = 130$$

$$= 2x^2 + 4x + 4 = 130.$$ Make the equation = 0.

$$= 2x^2 + 4x + 4 - 130 = 0$$

$$= 2x^2 + 4x - 126 = 0$$ Divide by 2.

$$= x^2 + 2x - 63 = 0$$

Factor it.

$$(x+9)(x-7) = 0$$

$x = -9$ ✗ & $x = 7$ ✓

Integers are 7 & 9.

14. Factor the trinomial:

$$r^2 + 6rg - 27g^2$$

– Solution –

Product = −27 ; Sum = +6

The numbers are +9, −3

$(r+9g)(r-3g)$ ✓

15. Factor: $7S^2 - 49S + 84$

– Solution –

Take "7" as a common factor:

$7(S^2 - 7S + 12)$. Product = 12, Sum = −7

$7(S-4)(S-3)$ ✓

16. Factor by grouping: $21x^3 - 15x^2 + 56x - 40$

– Solution –

$(21x^3 - 15x^2) + (56x - 40)$

Take a common factor of each group.

$3x^2(7x-5) + 8(7x-5)$.

Take $(7x-5)$ as a common factor.

$(7x-5)(3x^2+8)$ ✓

17. Factor the trinomial completely

$$6w^2 - 28w + 16$$

— Solution —

$6w^2 - 28w + 16$. Take 2 as a common factor.

$2(3w^2 - 14w + 8)$

Now, factor $3w^2 - 14w + 8$

Multiply 3 by 8 = 24 ; Product = 24, Sum = −14

numbers are −12 & −2

$= (3w - 12)(3w - 2)$ Divide the 1st term by 3.

$= (w - 4)(3w - 2)$

Answer is : $2(w-4)(3w-2)$

18. Factor: $6x^6y^4 + 48x^4y^3 + 18xy$

— Solution —

$$6x^6y^4 + 48x^4y^3 + 18xy$$

$6xy$ is the common factor.

$$6xy\,(x^5y^3 + 8x^3y^2 + 3)$$

19 Solve the equation:

$$3b^2 - 10b = 8$$

– Solution –

Make the equation $= 0$

$3b^2 - 10b - 8 = 0$ factor it:

$3(-8) = -24 \longrightarrow$ product $= -24$, Sum $= -10$

Numbers are -12 and $+2$

$= (3b - 12)(3b + 2)$. Divide the 1st term by 3.

$= (b - 4)(3b + 2) = 0$ Set each factor to 0.

$b - 4 = 0 \Rightarrow b = 4$; $3b + 2 = 0 \longrightarrow b = -2/3$ ✓

20 Factor the Polynomial twice:

$$-2x^5 + 8x^4 - 10x$$

– Solution –

Take -1 as a common factor.

$-1(2x^5 - 8x^4 + 10x)$

Now factor $2x^5 - 8x^4 + 10x$.

The common factor is $2x$

$2x(x^4 - 4x^3 + 5)$.

Answer is: $-2x(x^4 - 4x^3 + 5)$ ✓

21. Factor:

$$3(x+7)^2 + 20(x+7) + 25$$

– Solution –

Let $x+7 = u \implies 3u^2 + 20u + 25$.

Product $= 3(25) = 75$, Sum $= 20$.

Numbers are: $+15$, $+5$

$(3u+15)(3u+5)$. Divide the 1st term by 3

$(u+5)(3u+5)$. Replace u with $x+7$.

$(x+7+5)(3(x+7)+5) = (x+12)(3x+21+5)$

$= (x+12)(3x+26)$ ✓

22. Solve: $c(9c+2) = 7$

– Solution –

$c(9c+2) = 7$.

Distribute, $9c^2 + 2c = 7$.

Make the equation $= 0$.

$9c^2 + 2c - 7 = 0$

Product $= 9(-7) = -63$; Sum $= +2$.

Numbers are: $+9$, -7

$(9c+9)(9c-7) = 0$. Divide the 1st term by 9.

$(c+1)(9c-7) = 0$. Set each factor to 0.

$c+1 = 0 \implies c = -1$ ✓

$9c - 7 = 0$

$+7 \quad +7$

$9c = 7 \implies c = 7/9$ ✓

23. Solve the equation:

$$(4x+7)(x-3) = 12x+21$$

Solution -

$$(4x+7)(x-3) = 12x+21$$

$$= 4x^2 + 7x - 12x - 21 = 12x + 21.$$

Make it $= 0$.

$$4x^2 + 7x - 12x - 21 - 12x - 21 = 0$$

Combine like terms.

$$4x^2 - 17x - 42 = 0$$ Factor it:

$$(4x+7)(x-6) = 0$$ $\longrightarrow$ Set each factor to 0

$4x+7=0 \Rightarrow x = -7/4$ ✓, $x-6=0 \Rightarrow x = 6$ ✓

24. Factor: $400b^2 - 361$

- Solution -

$400b^2 - 361$; it's a difference of 2 squares

$\sqrt{400b^2} = 20b$, $\sqrt{361} = 19$

Answer is $(20b+19)(20b-19)$ ✓

25. Factor: $125 - 216w^3$

- Solution -

$125 - 216w^3$ (Difference of 2 cubes)

$$a^3 - b^3 = (a-b)(a^2+ab+b^2)$$

$125 - 216w^3 = (5)^3 - (6w)^3$; $a=5$, $b=6w$.

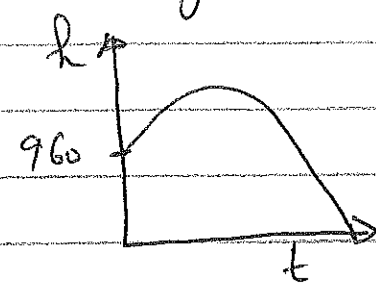
Replace $a=5$ + $b=6w$ in the formula:

$$(5-6w)(25+30w+36w^2)$$ ✓

26, $h = -16t^2 + 64t + 960$

a, find the number of seconds until it returns to the ground.

b, find the number of seconds until the projectile is 880 ft above the ground.



Solution –

a, when it returns to the ground, $h = 0$.

$0 = -16t^2 + 64t + 960$.

Divide by -16

$0 = t^2 - 4t - 60$. Factor.

$0 = (t-10)(t+6) = 0 \Rightarrow t = 10$ sec

b, $h = 880$

$880 = -16t^2 + 64t + 960$. Make it $= 0$

$-16t^2 + 64t + 960 - 880 = 0$. Combine like terms

$-16t^2 + 64t + 80 = 0$. Divide by -16.

$t^2 - 4t - 5 = 0$ Factor it.

$(t-5)(t+1) = 0 \Rightarrow t = 5$

27. factor:

$$(a+b)x^2 + (a+b)x - 20(a+b)$$

— Solution —

Take $(a+b)$ as a common factor:

$(a+b)(x^2+x-20)$.

Now factor x^2+x-20

Product $= -20$, Sum $= +1$

$(a+b)(x+5)(x-4)$ ✓

28. Find the greatest common factor:

$110x^5, 70x^6, 60x^7$

Solution

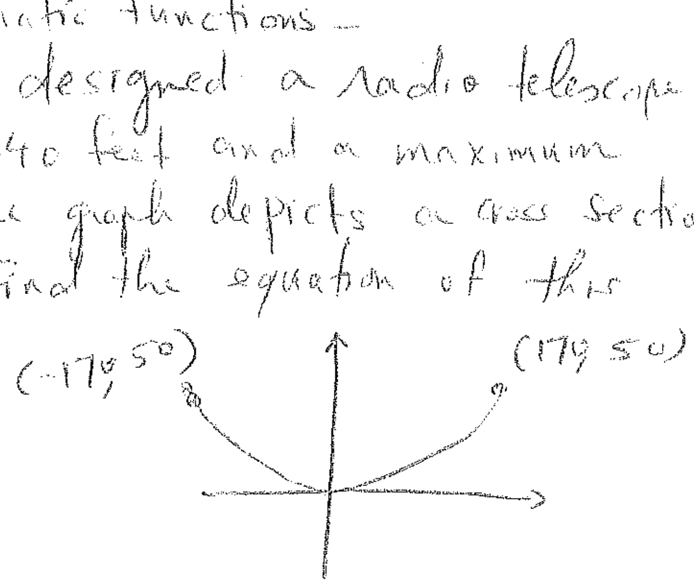
The greatest Common factor of 110, 70, 60 is 10.

The greatest Common factor of x^5, x^6, x^7 is x^5.

Answer is $10x^5$ ✓

— Quadratic Functions —

1, A Laboratory designed a radio telescope with a diameter of 340 feet and a maximum depth of 50 feet. The graph depicts a cross section of this telescope. Find the equation of this Parabola.



— Solution —

$$y = ax^2$$

$$50 = a(170)^2 \longrightarrow a = \frac{5\cancel{0}}{170 \times 17\cancel{0}}$$

$$= \frac{5}{170 \times 17} = \frac{1}{34 \times 17} = \frac{1}{578}$$

dividing both side by 5

$$y = \frac{1}{578} x^2$$

2, Let $g(x) = -x^2 + 5x + 2$ Find $g(\frac{1}{2})$

— Solution —

Replace x with $\frac{1}{2}$

$$-\left(\frac{1}{2}\right)^2 + 5\left(\frac{1}{2}\right) + 2$$

$$= -0.25 + 2.5 + 2 = 4.25 = 4\frac{1}{4}$$

$$= \frac{4 \times 4 + 1}{4} = \frac{17}{4}$$

3. a) What is the maximum product whose Sum = -12

— Solution —

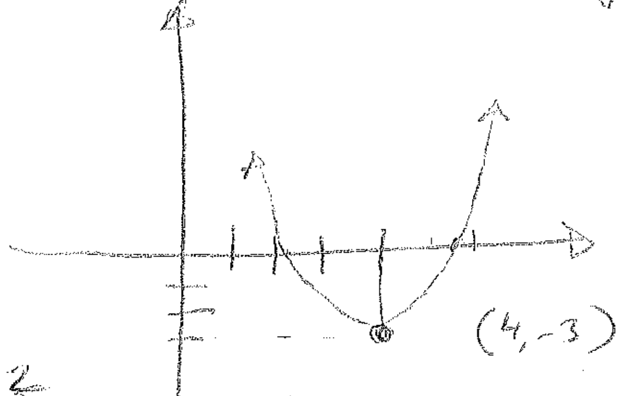
$$-12/2 = -6$$

$$(-6)(-6) = 36$$

b. What numbers yield this product?

$-6, -6$.

4. The graph of the Quadratic function is



$$f(x) = (x-4)^2 - 3$$

5. Sales of SUV for the year 1990 – 1999 can be modeled by:

$$f(x) = .016x^2 + .124x + .787$$

$x = 0$ represents 1990.

Use the model to approximate the sales in 1994

— Solution —

$X = 0 \Longrightarrow 1990$

$1994 \Longrightarrow X = 4$

Replace $X = 4$ in

$.016x^2 + .124x + .787$

$.016(4)^2 + .124(4) + .787$

$= .016 \times 16 + .496 + .787 =$

$.256 + .496 + .787 = 1.539$

rounded to nearest $10^{th} = 1.5$

6, For the following quadratic function, tell whether the graph opens upward or downward and whether the graph is wider, narrower, or the same as $f(x) = x^2$

$$f(x) = -0.5x^2$$

— Solution —

a, downward

b, Wider.

7, In the following exercise, find the coordinates of the vertex for the parabola

$$f(x) = -x^2 + 10x + 7$$

— Solution —

$a = -1, \quad b = 10, \quad c = 7.$

$$X_{Vertex} = \frac{-b}{2a} = \frac{-10}{2(-1)} = \frac{-10}{-2} = 5$$

$$y_{Vertex} = -(5)^2 + 10(5) + 7$$

$= -25 + 50 + 7 = 32.$

Vertex $(5, 32)$ ✓

8, Let $f(x) = x^2 - x + 3$

$g(x) = 8x - 2$

Find: a, $g(3)$

– Solution –

Replace x with 3 in $g(x) = 8x - 2$

$8(3) - 2 = 24 - 2 = 22$ ✓

b, $f(g(3))$

– Solution –

Replace x with 22 in

$f(x) = x^2 - x + 3$

$= (22)^2 - 22 + 3$

$= 484 - 22 + 3 = 465$ ✓

12, If a baseball is projected upward from ground level with an initial velocity of 32 ft/sec, then its height is a function of time, given by $S = -16t^2 + 32t$

What is the maximum height reached by the ball?

- Solution -

$$S = -16t^2 + 32t$$

Maximum height is the vertex of the parabola.

$a = -16$, $b = 32$.

$$X_{vertex} = t = \frac{-b}{2a} = \frac{-32}{2(-16)} = \frac{-32}{-32} = 1$$

Replace $t = 1$ in S

$$S = -16(1)^2 + 32(1)$$

$$= -16 + 32 = 16 \text{ ft}$$

13, The highest or lowest point of a parabola is called:

- Solution -

It is called the vertex

9, Functions of the form $f(x) = ax^2 + bx + c$ are called ___

— Solution —

They are called Quadratic functions

10, Use the equation $Price = 0.01125x^2 + 0.1575x + 1.50$ to find the price of a 14-inch pizza, where x is the pizza size.

Find the price of the 14-in pizza.

— Solution —

Replace x with 14 in the formula.

$0.01125 \times 14^2 + 0.1575 \times 14 + 1.50$

$= 0.01125 \times 196 + 2.205 + 1.50$

$= 2.205 + 2.205 + 1.50 = \$5.91$ ✓

11, Given the function $f(x) = x^2 - x + 1$, find:

a, $f(2)$

— Solution —

Replace x with 2

$= (2)^2 - 2 + 1$

$= 4 - 2 + 1 = 3$ ✓

b, $f(-7)$

— Solution —

Replace x with -7.

$(-7)^2 - (-7) + 1 = 49 + 7 + 1 = 57$ ✓

c, $f(0)$

— Solution —

Replace x with 0 $\Rightarrow (0)^2 - 0 + 1 = 1$ ✓

~ Using the Quadratic Formula ~

1) Use the quadratic formula to solve

$5x^2 = 3 + 3x$

Round to the nearest 10^{th}

— Solution —

$5x^2 = 3 + 3x$. Make it in the form.

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

$$\underset{a}{\underset{\uparrow}{5x^2}} \underset{b}{\underset{\uparrow}{-3x}} \underset{c}{\underset{\uparrow}{-3}} = 0 \implies a = 5,\ b = -3,\ c = -3$$

find $b^2 - 4ac$ first.

$$(^-3)^2 - 4(5)(^-3)$$

$$= 9 - (^-60) = 9 + 60 = 69.$$

The Quadratic formula is:

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{^-{-3} \pm \sqrt{69}}{2 \times 5} = \frac{3 \pm \sqrt{69}}{10}$$

But $\sqrt{69} = 8.306$ (by calculator)

$$x_1 = \frac{3 + 8.306}{10} = \frac{11.306}{10} = 1.1$$ (Rounded to nearest 10^{th}).

$$x_2 = \frac{3 - 8.306}{10} = \frac{-5.306}{10}$$

$= -0.5$ (rounded to nearest 10^{th}).

2, Write the equation in standard form.

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

$$(x-6)(x+7) = 0$$

find a, b, and c.

— Solution —

Multiply. $(x-6)(x+7)$ first:

$$= x^2 - 6x + 7x - 42$$

$$= \underset{a}{\uparrow}x^2 + \underset{b}{\uparrow}x - \underset{c}{\uparrow}42$$

$$\Longrightarrow a = 1, \quad b = 1, \quad c = -42$$

3, Use the Quadratic formula to solve the equation

$$\frac{2}{3}x^2 - x + \frac{13}{9} = 0$$

— Solution —

Multiply $\frac{2}{3}x^2 - x + \frac{13}{9} = 0$ by the L.C.D which is 9

$$9 \cdot \frac{2}{3}x^2 - 9 \cdot x + 9 \cdot \frac{13}{9} = 0$$

$$= \frac{18}{3}x^2 - 9x + 13 = 0$$

$$= 6x^2 - 9x + 13 = 0$$

find the discriminant $\Delta = b^2 - 4ac$ first.

$$a = 6, \quad b = -9, \quad c = 13$$

$$= (-9)^2 - 4(6)(13)$$

$$= 81 - 312 = -231$$

Since Δ is negative $\Longrightarrow$ No real solutions.

4, Use the quadratic formula to solve.

$$5x^2 - 2x + 13 = 18x + 1$$

– Solution –

Make it $= 0$.

$$5x^2 - 2x + 13 - 18x - 1 = 0$$

$$5x^2 - 20x + 12 = 0$$

$a = 5$, $b = -20$, $c = 12$.

$$b^2 - 4ac = (-20)^2 - 4(5)(12)$$
$$= 400 - 240 = 160$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{20 \pm \sqrt{160}}{10} = \frac{20 \pm \sqrt{16 \times 10}}{10}$$

$$= \frac{20 \pm 4\sqrt{10}}{10}.$$ Divide each # by 2.

$$= \frac{10 \pm 2\sqrt{10}}{5}$$

5. A rule for estimating the number of board feet of lumber that can be cut from a log depends on the diameter of the log. Solve for d.

$$\left(\frac{d-4}{4}\right)^2 = 49$$

– Solution –

$$\left(\frac{d-4}{4}\right)^2 = 49$$

Square root both sides.

$$\frac{d-4}{4} = \pm 7$$ use +7 first.

$$\frac{d-4}{4} = \frac{7}{1}$$ cross multiply.

$$d-4 = 28 \longrightarrow d = 32 \checkmark$$

use −7.

$$\frac{d-4}{4} = \frac{-7}{1}$$ cross multiply.

$$d-4 = -28 \quad d = -24 \checkmark$$

Are both answers reasonable?

NO, since "d" can not be negative.

6) Write the equation in standard form $ax^2 + bx + c = 0$.

$$4x^2 = -12x$$

— Solution —

Make it $= 0$.

$$4x^2 + 12x = 0$$

$$a = 4, \quad b = 12, \quad c = 0.$$

7) Use the Quadratic formula to solve

$$0.5x^2 = 2x + 0.5$$

use radicals as answers.

— Solution —

Make it $= 0$.

$$0.5x^2 - 2x - 0.5 = 0$$

multiply by 2.

$$x^2 - 4x - 1 = 0.$$

$$a = 1, \quad b = -4, \quad c = -1$$

$$b^2 - 4ac = (-4)^2 - 4(1)(-1)$$
$$= 16 + 4 = 20.$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \frac{4 \pm \sqrt{20}}{2} = \frac{4 \pm \sqrt{5 \times 4}}{2}$$

$$= \frac{4 \pm 2\sqrt{5}}{2} = 2 \pm \sqrt{5}$$

8. Use the quadratic formula to solve

$$9x^2 - 7x - 5 = 0$$ (radicals)

— Solution —

$a = 9, \quad b = -7, \quad c = -5$

$$b^2 - 4ac = (-7)^2 - 4(9)(-5)$$
$$= 49 + 180 = 229$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{7 \pm \sqrt{229}}{18}$$

9. Solve by using the formula.

$$7p^2 = -33p - 20$$

— Solution —

Make it $= 0$

$$7p^2 + 33p + 20 = 0$$

$a = 7, \quad b = 33, \quad c = 20.$

$$b^2 - 4ac = (33)^2 - 4(7)(20)$$
$$= 529$$

$$p = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \frac{-33 \pm \sqrt{529}}{14}$$

$$p_1 = \frac{-33 + 23}{14} = \frac{-10}{14} = -5/7 \qquad p_2 = \frac{-33 - 23}{14} = -4$$

10, When the sum of 8 and twice a positive number is subtracted from the square of the number, 0 results. Find the number

\- Solution -

$$x^2 - (2x+8) = 0$$ (Translated to algebra from the problem)

$$x^2 - 2x - 8 = 0$$

$\uparrow a \quad \uparrow b \quad \uparrow c$

$a = 1, \quad b = -2, \quad c = -8$

Since the number is positive, use the following formula.

$$x = \frac{-b + \sqrt{b^2 - 4ac}}{2a}$$

Now $b^2 - 4ac = (-2)^2 - 4(1)(-8$

$= 4 - (-32) = 4 + 32$

$= 36.$

$$x = \frac{-^{-}2 + \sqrt{36}}{2(1)} = \frac{2 + \sqrt{36}}{2}$$

But $\sqrt{36} = 6 \implies$

$$x = \frac{2+6}{2} = \frac{8}{2} = 4$$

11, If $b^2 - 4ac > 0$, there is ___?___ solutions

\- Solution -

If $b^2 - 4ac > 0 \Rightarrow$ 2 real solutions
If $b^2 - 4ac = 0 \Rightarrow$ 1 real solution.
If $b^2 - 4ac < 0 \Rightarrow$ no real solutions

12, If the discriminant of a quadratic equation $= 0$, then the equation has ___

\- Solution -

1 real solution

13, Which of the following is a quadratic equation written in standard form?

\- Solution -

It should be of the form.

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

Example: $8x^2 - 10x = 0$

14, The ——— states that if $ax^2+bx+c=0$, where a, b, c are real numbers and $a \neq 0$ then $x = \dfrac{-b \pm \sqrt{b^2-4ac}}{2a}$

- Solution -

It is called the quadratic formula.

15, A frog is sitting on a stump 24 feet above the ground. It hops off the stump and lands on the ground 8 feet away. During its leap, its height h is given by the equation $h = -0.5x^2 + x + 24$ where x is the distance from the base of the stump, and h is the height in feet. How far was the frog from the base of the stump when it was 18.38 feet above the ground

- Solution -

Replace h with 18.38

$18.38 = -0.5x^2 + x + 24$

Subtract 18.38 from both sides

$0 = -0.5x^2 + x + 5.62$ Multiply by -1.

$0 = 0.5x^2 - x - 5.62$

$a = 0.5, \quad b = -1, \quad c = -5.62$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{-(-1) \pm \sqrt{(-1)^2 - 4(0.5)(-5.62)}}{2(0.5)}$$

$$= \frac{1 \pm \sqrt{1 + 2 \times 5.62}}{1}$$

$$= 1 \pm \sqrt{1 + 11.24} = 1 \pm \sqrt{12.24}$$

Now $\sqrt{12.24} = 3.498$

$= 1 \pm 3.498$ (Take the positive answer only)

$= 1 + 3.498$

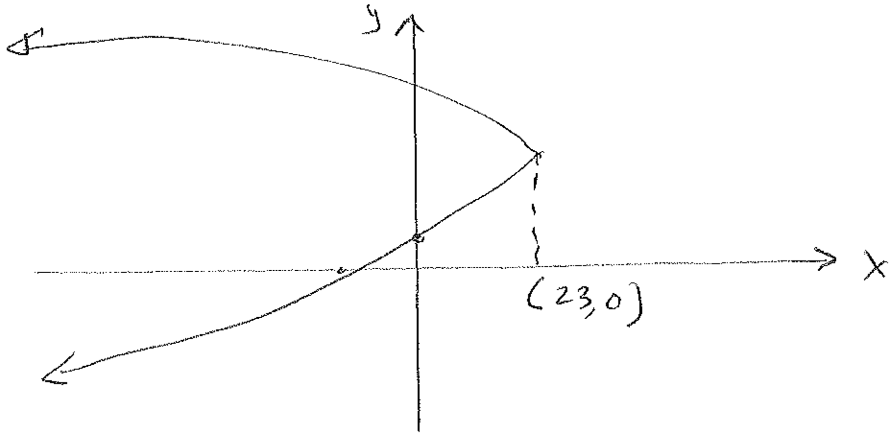
$= 4.498$ round to nearest 10th

$= 4.5$

Graphs of Quadratic Functions

1) Graph the parabola, and give the domain and range. $x = -(y-5)^2 + 23$

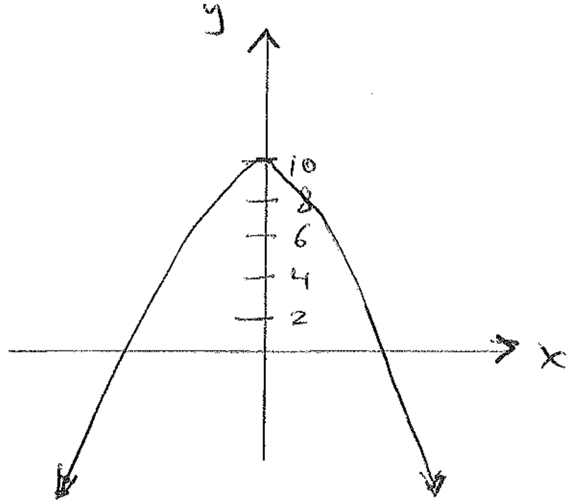
~ Solution ~



b. Domain: $(-\infty, 23]$

c. Range: $(-\infty, \infty)$

2) Find the domain and range.



~ Solution ~

Domain: $(-\infty, \infty)$

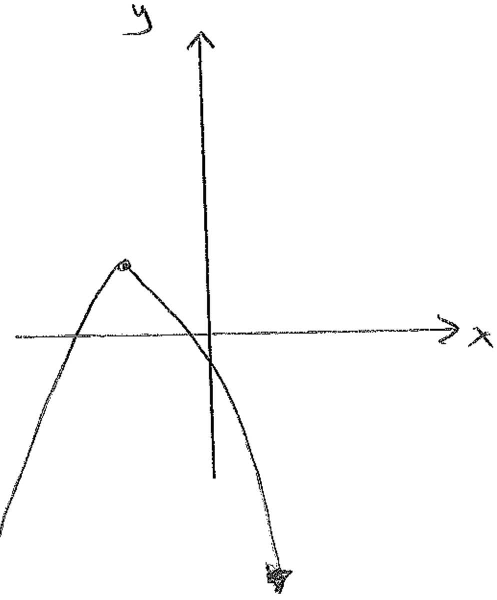
Range: $(-\infty, 10]$

3, Match the following equation with its graph.

$$y = \frac{-1}{2}x^2 - 3x - 4$$

– Solution –

Since the coefficient of x^2 is negative, the graph opens downward.



4, Use the graph of the Quadratic function

$$f(x) = a(x-h)^2 + K$$

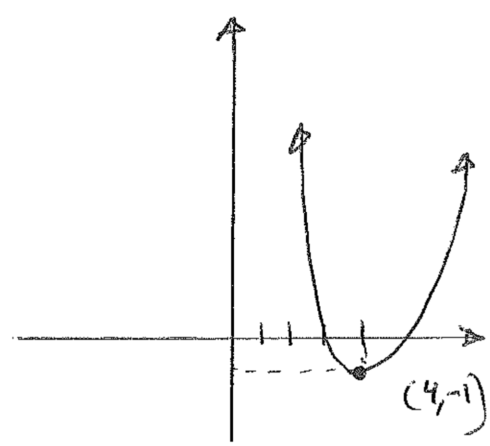
to find the Vertex, axis of symmetry and the minimum or maximum Value of the function.

– Solution –

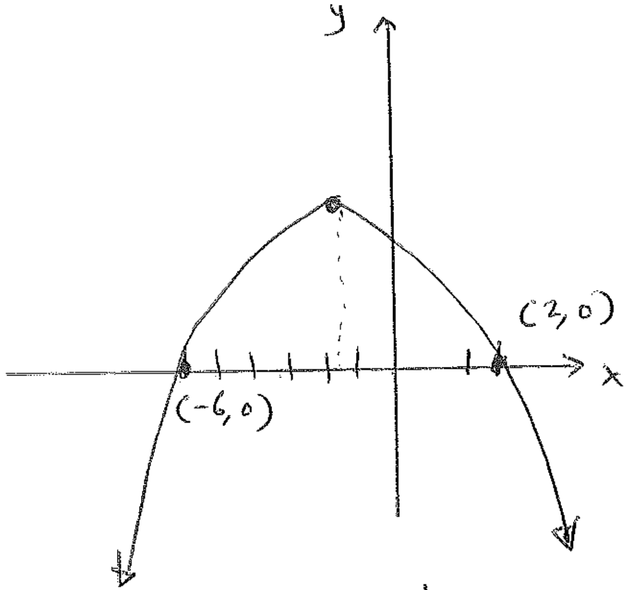
Vertex: $(4, -1)$

Range: $[-1, \infty)$

Minimum: -1



5. Find the x-intercepts of:



- Solution -

x-intercepts $\Longrightarrow$ where the graph crosses the x-axis.

It crosses the x-axis at: $(2,0)$ and $(-6,0)$

6. Give the coordinates of the vertex and sketch the graph: $y = x^2 - 4$.

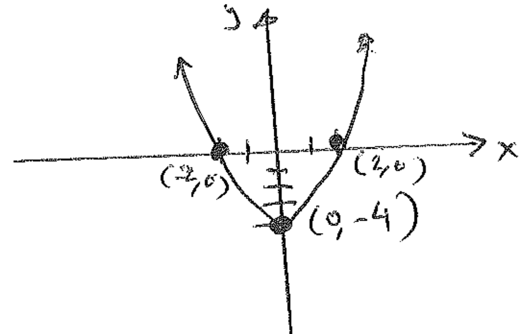
- Solution -

Coordinates of the vertex: $(0,-4)$.

for x-intercepts $\Longrightarrow$ $y = 0$

$0 = x^2 - 4 \Longrightarrow x^2 = 4$

$x = \pm 2$, therefore it crosses the x-axis at $(2,0)$, $(-2,0)$.



7) Graph the function and find the x-intercepts.

$$y = x^2 + 6x - 27$$

– Solution –

$$y = \underset{a}{\uparrow}x^2 + \underset{b}{\overset{}{6}}x - \underset{c}{27}$$

$a = 1, \quad b = 6$

$$x_{\text{value}} \text{ of the Vertex} = \frac{-b}{2a} = \frac{-6}{2(1)} = \frac{-6}{2} = -3.$$

To find the y-Value of the Vertex, replace $x = -3$ in $y = x^2 + 6x - 27$

$$y = (-3)^2 + 6(-3) - 27$$
$$= 9 - 18 - 27 = -36$$

Vertex: $(-3, -36)$.

X-intercepts: Replace y with 0.

$$0 = x^2 + 6x - 27. \quad \text{Factor:}$$

$$0 = (x+9)(x-3)$$

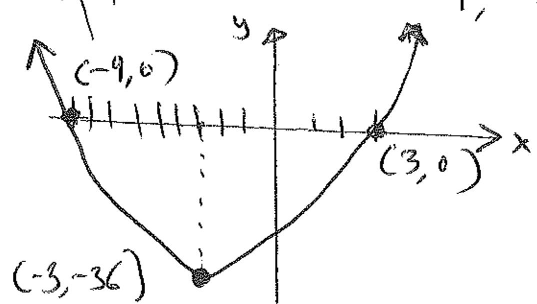
Set each factor to 0 and solve for x.

$$\begin{aligned} x + 9 &= 0 \\ -9 \quad & -9 \end{aligned} \implies x = -9$$

$$\begin{aligned} x - 3 &= 0 \\ +3 \quad & +3 \end{aligned} \implies x = 3$$

X- Intercepts are $-9, 3$

Graph is:



8) Find the Vertex, axis of symmetry, domain, and range for the parabola.

$$y = 2x^2 - 12x + 1$$

— Solution —

$$y = \underset{\substack{\uparrow \\ a}}{2}x^2 \quad \underset{\substack{\uparrow \\ b}}{-12}x + 1$$

$a = 2, \quad b = -12.$

$$x_{\text{Vertex}} = \frac{-b}{2a} = \frac{-12}{2(2)} = \frac{12}{4} = 3.$$

To find the y-Value of the Vertex, replace $x = 3$ in:

$$y = 2x^2 - 12x + 1$$
$$y = 2(3)^2 - 12(3) + 1$$
$$= 2(9) - 36 + 1$$
$$= 18 - 36 + 1 = -17$$

Vertex: $(3, -17)$.

Axis of symmetry: Is the x-Value of the Vertex.

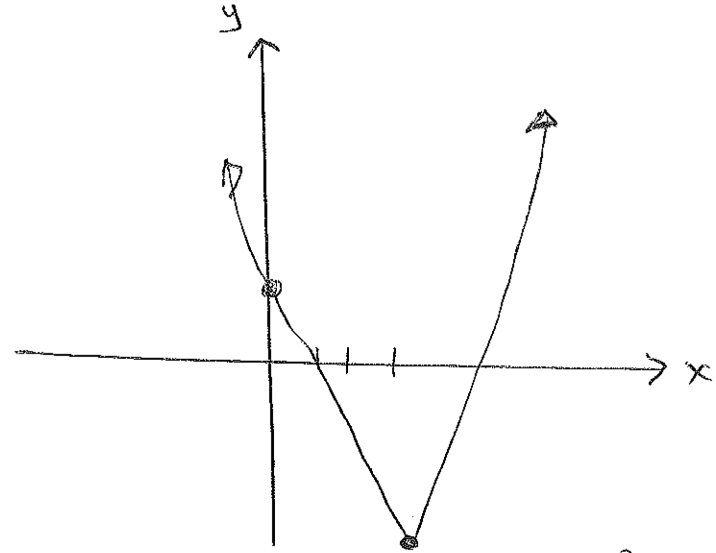
$$x = 3$$

Domain: $(-\infty, \infty)$.

Range: From the "y" value of the Vertex to ∞

Range: $[-17, \infty)$

Graph :



9, Use the Vertex and y-intercepts to graph. $y-1=(x-2)^2$.

- Solution -

$y-1=(x-2)^2$

Solve for y by adding 1 to both sides of the equation.

$y=(x-2)^2+1$

Vertex: (2, 1).

Now find the y-intercept by replacing x with 0 in

$y=(x-2)^2+1$

$y=(0-2)^2+1=4+1=5.$

Therefore y-intercept is (0, 5).

Now plot the vertex (2, 1)
and the y-intercept (0, 5) to
graph the parabola.