

29/8/20 29/8/30 Sunday

Math Homework #2

Algebraic Expression

Q1) Tayyaba visited a book store; she purchased 3 books and 8 pens for Rs 4350, while the cost of 2 books and 5 pens is 2800 Rs. Find the cost of 1 book and 1 pen.

Let Books be $= x$, 3 books $= 3x$; 2 books $= 2x$
Let Pens be $= y$, 8 pens $= 8y$; 5 pens $= 5y$

$$\begin{array}{rcl} 3x + 8y = 4350 & - (1) \times 2 & \\ 2x + 5y = 2800 & - (2) \times 3 & \end{array} \left. \begin{array}{l} \text{to balance} \\ \text{them, we} \\ \text{will use} \\ \text{elimination} \end{array} \right\}$$

$$\begin{array}{rcl} 6x + 16y = 8700 & - (3) & \\ -6x + 15y = -8400 & - (4) & \\ \hline & & y = 8700 - 8400 \\ & & y = \underline{300}, \text{ cost of a pen} \end{array}$$

Put in equation (2).

$$2x + 5(300) = 2800$$

$$2x + 1500 = 2800$$

$$2x = 1300$$

$$\checkmark x = \underline{650}, \text{ cost of a book}$$

- 1 book costs = 650 Rupees.
- 1 pen costs = 300 Rupees

Q2) Zahid left a property worth Rs. 1,750,000. His family had to pay off a debt of Rs. 150,000. The rest of the money was distributed between a son and a daughter. How much did each child receive if the share of a son was double that of a daughter?

Property value = Rs. 1,750,000

Debt on family = Rs. 150,000

Money left with family after debt payment = $1,750,000 - 150,000$ Rs
 $= 1,600,000$ Rs

Share of sister = x
Share of brother = $2x$

$$2x + x = 1,600,000$$

$$3x = 1,600,000$$

$$x = 1,600,000 / 3$$

$x = 533,333.33$ Rupees, daughter's share

$533,333.33 \times 2 = 1,066,666.67$ Rupees, brother's share

- Brother's share = Rs. 1,066,666.67
- Sister's share = Rs. 533,333.33

Q3) The sum of two numbers is 18 and their product is 56. What are the numbers?

Let first number be $= x$

Let second number be $= y$

$$x + y = 18 \quad (1)$$

$$(x)(y) = 56 \quad (2)$$

To find y , $x + y = 18$
 $y = 18 - x$

We'll place this in equation (2)

$$(x)(y) = 56$$

$$(x)(18 - x) = 56$$

$$18x - x^2 = 56$$

$$x^2 - 18x + 56 = 0$$

$$(a) \quad (b) \quad (c)$$

Now we'll apply the quadratic formula

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

$$x = \frac{-(-18) \pm \sqrt{(-18)^2 - 4(1)(56)}}{2(1)}$$

$$x = \frac{18 \pm \sqrt{324 - 224}}{2}$$

Day/Date

$$x = \frac{18 \pm \sqrt{100}}{2}$$

$$x = \frac{18 + 10}{2}$$

$$x = \frac{18 - 10}{2}$$

$$x = 28/2$$

$$x = 8/2$$

$$x = 14$$

$$x = 4$$

Proving answers

$$\begin{aligned} x + y &= 18 \\ 14 + 4 &= 18 \end{aligned}$$

$$\begin{aligned} (x)(y) &= 56 \\ 14 \times 4 &= 56 \end{aligned}$$

The two numbers are 4 and 14

Q In a farm, a farmer counted 78 legs and 35 heads consisting of cows and hens. How many hens does the farmer have?

Let cows be $= x$
Let hens be $= y$

$$x + y = 35 \quad \text{--- (1)}$$

$$4x + 2y = 78 \quad \text{--- (2)}$$

Heads

Legs, 4 for cows, 2 for hens

Galaxy

- Now equation ① will be multiplied by -2 to balance them both.

$$(x + y = 35) \times -2$$

$$-2x - 2y = -70$$

$$4x + 2y = 78$$

$$2x = 8$$

$$x = 4$$

, number of cows, we'll insert this into equation ①

$$x + y = 35$$

$$4 + y = 35$$

$$y = 35 - 4$$

$$y = 31$$

- The farmer has 31 hens.

good answers overall!!!!

Q. Ayesha is 4 years older than Asif. Five years ago, the sum of their ages was 48. Their present ages are?

$$\left. \begin{array}{l} \text{Asif} = x \\ \text{Ayesha} = x + 4 \end{array} \right\} \text{Present Ages}$$

5 years ago

$$(x - 5) + (x + 4 - 5) = 48$$

$$x - 5 + x + 4 - 5 = 48$$

$$2x - 6 = 48$$

$$2x = 54$$

$$x = 27 \text{ years, Asif's age}$$

$$\begin{aligned} \text{Ayesha} &= x + 4 && (\text{place Asif's age here}) \\ &= 27 + 4 \\ &= 31 \text{ years} \end{aligned}$$

Presently, Ayesha is 31 years old, while Asif is 27 years old.

Q. A father is three times as old as his son, and his daughter is 3 years younger than his son, if the sum of all 3 ages 3 years ago was 63, find the present age of the father.

Let present Ages of the 3 people be:

Father = $3x$ ①, Son = x ②, Daughter = $x - 3$ ③

Number of years = 3 years ago

Father's age + Son's Age + Daughter's Age 3 years ago = 63

$$(3x - 3) + (x - 3) + (x - 3 - 3) = 63$$

$$(3x - 3) + (x - 3) + (x - 3 - 3) = 63$$

$$3x - 3 + x - 3 + x - 3 - 3 = 63$$

$$5x - 12 = 63$$

$$5x = 63 + 12$$

$$x = 75 / 5$$

$x = 15$, this is the son's age, which will be placed in equation ②

$$\text{Father's age} = 3x$$

$$= 3(15)$$

= 45 years old presently.

The father's present age is 45 years.

Q. A man is 24 years older than his son. In two years, his age will be twice the age of his son. The present age of his son is?

Let son's current age be $= x$

Let Man's current age be $= x + 24$

In 2 years,

Son's age $= x + 2$

Man's age $= x + 24 + 2 = x + 26$

So in 2 years $\Rightarrow$ Man's age will be twice that of son's age

$$(x + 26) = 2(x + 2)$$

$$x + 26 = 2x + 4$$

$$x - 2x = 4 - 26$$

$$-x = -22$$

$$x = 22$$

The son's age is 22 years.

Q. Rashid is 7 years older than Sajid and the ratio b/w the ages of Sajid and Rashid is 7:9. Find the age of Rashid.

Sajid's age = x ①, Rashid's age = $x+7$ ②

Ratio of their ages = 7:9

$$\frac{x}{x+7} = \frac{7}{9}$$

$$9x = 7x + 49$$

$$9x - 7x = 49$$

$$2x = 49$$

$x = 24.5$, this is Sajid's age, this will be placed in equation ②

$$\begin{aligned} \text{Rashid's age} &= x+7 \\ &= 24.5 + 7 \\ &= 31.5 \text{ years.} \end{aligned}$$

Rashid's age is 31.5 years.

Q. The Sum of ages of 5 children born at the interval of 3 years is 50 years. What is the age of the youngest child?

Let Youngest / 5th child be = x years
Let 4th child be = $x+3$ years
Let 3rd child be = $x+6$ years
Let 2nd child be = $x+9$ years
Let 1st child be = $x+12$ years

$$(x) + (x+3) + (x+6) + (x+9) + (x+12) = 50$$

$$5x + 30 = 50$$

$$5x = 20$$

$$x = 4$$

The youngest child is 4 years old.

Q. A is now 34 years old, B is 4 years old. In how many years will A be twice as old as B.

Presently A is 34 years, B is 4 years old.

Let's assume in x years A will be twice B's age
 $34+x$; $4+x$

$$34+x = 2(4+x)$$

$$34+x = 8+2x$$

$$34-8 = 2x-x$$

$$26 = x$$

In 26 years, A will be twice as old as B.

Q. The Sum of the ages of John and Mary is 32. Four years ago, John was twice as old as Mary. Find the present age of each.

Presently John's Age = $2x$, Mary's Age = x

4 years ago John's Age = $2x$

4 years ago Mary's Age = x

Currently John's Age is = $2x + 4$

Currently Mary's Age is = $x + 4$

Sum of their ages $\rightarrow (2x + 4) + (x + 4) = 32$

$$3x + 8 = 32$$

$$x = 24 / 3$$

$$x = 8$$

Mary's age 4 years ago = 8

John's age 4 years ago = $2(8)$
= 16

Adding 4 years to both ages results in Mary's present age being 12, while John is currently 20 years old (their current ages also add up to 32 as stated in the question).

- Q. Sara's mother is 6 times old than Sara, where as her brother Ali is twice as old as Sara. In three years' time the sum of their age will be 72. How old are they?

Their current Ages:

$$\text{Sara} = x, \text{ Sara's Mother} = 6x, \text{ Sara's Brother Ali} = 2x$$

In 3 years time the sum of their ages = 72

$$(x+3) + (6x+3) + (2x+3) = 72$$

$$9x + 9 = 72$$

$$9x = 63$$

$$x = 7$$

, this is Sara's age, which can be used to determine the others.

$$\text{Mother} = 6x$$

$$= 6(7)$$

$$= 42 \text{ years}$$

$$\text{Ali} = 2x$$

$$= 2(7)$$

$$= 14 \text{ years}$$

Sara is 7 years old, Sara's Mother is 42 years old and Ali is 14 years old.

- Q. Present Ages of Sami and Ali are in the ratio of 5:4 respectively. 3 years hence, the ratio of their ages will become 11:9. Present ages of both?

$$\text{Present Ages: Sami : Ali} \\ 5 : 4$$

$$\text{, In 3 years, Sami : Ali} \\ 11 : 9$$

Let Sami's current age be $= 5x$
 Let Ali's current age be $= 4x$

In 3 years Sami will be $= 5x + 3$

In 3 years Ali will be $= 4x + 3$

$$\frac{5x+3}{4x+3} = \frac{11}{9}$$

$$45x + 27 = 44x + 33$$

$$x = 33 - 27$$

$$x = 6$$

Sam's present age $= 5x$
 $= 5(6)$
 $= 30 \text{ years}$

Ali's present age $= 4x$
 $= 4(6)$
 $= 24 \text{ years}$

Sam is 30 years old and Ali is 24 years old.