

Value Based Questions

Que 1. Some people collected money to be donated in some orphanages. A part of the donation is fixed and remaining depends on the number of children in the orphanage. If they donated ₹ 9,500 in the orphanage having 50 children and ₹ 13,250 with 75 children, find the fixed part of the donation and the amount donated for each child.

What values do these people posses?

Sol. Let the fixed donation be ₹ x and amount donated for each child be ₹ y .

$$\text{Then} \quad x + 50y = 9500 \quad \dots(i)$$

$$x + 75y = 13250 \quad \dots(ii)$$

Subtracting (i) from (ii), we get

$$25y = 3750 \text{ or } y = 150$$

$$\text{From (i),} \quad x = 9500 - 50y = 9500 - 50 \times 150 = 2000$$

\therefore Fixed amount donated = ₹ 2,000.

Amount donated for each child = ₹ 150.

Helpfulness, cooperation, happiness, caring.

Que 2. The fraction of people in a society using CNG in their vehicles becomes $\frac{9}{11}$, if 2 is added to both its numerator and denominator. If 3 is added to both its numerator and denominator, it becomes $\frac{5}{6}$. Find the fraction. What does this fraction show?

Sol. Let the fraction be $\frac{x}{y}$.

$$\frac{x+2}{y+2} = \frac{9}{11} \quad \Rightarrow \quad 11x - 9y = -4$$

$$\frac{x+3}{y+3} = \frac{5}{6} \quad \Rightarrow \quad 6x - 5y = -3$$

Solving for x and y gives $x = 7$ and $y = 9$

$$\therefore \text{ Fraction} = \frac{x}{y} = \frac{7}{9}$$

More people are becoming aware about scarcity of petrol, so they are switching on to alternative resources.

Que 3. Reading book in a library has a fixed charge for the first three days and an additional charge for each day thereafter. Shristi paid ₹ 27 for a book kept for seven days. While Bunty paid ₹ 21 for the book kept for five days.

(i) Find the fixed charge.

(ii) Find how much additional charge Shristi and Bunty paid.

(iii) Which mathematical concept is used in this problem?

(iv) Which value does it depict?

Sol. Let fix charge for reading book be ₹ x and additional charge for each day be ₹ y.

Then, $x + 4y = 27$... (i)

On subtraction $\frac{x + 2y = 21}{2y = 6}$ (ii)

$$Y = 3$$

Putting value of y in equation (i) we get

$$x + 4 \times 3 = 27 \quad \Rightarrow \quad x + 12 = 27 \quad \Rightarrow \quad x = 15$$

- (i) Fixed charge on the book is ₹ 15.
- (ii) Bunty paid additional ₹ 6 and Shristi paid ₹ 12.
- (iii) Pair of linear equation in two variables.
- (iv) Reading is a good habit.

Que 4. An honest person invested some amount at the rate of 12% simple interest and some other amount at the rate of 10% simple interest. He received yearly interest of ₹ 130. But if he had interchanged amount invested, he would have received ₹ 4 more as interest.

- (i) How much amount did he invest at different rates?
- (ii) Which mathematical concept is used in this problem?
- (iii) Which value is being emphasized here?

Sol. (i) Let the person invest ₹ x at rate of 12% simple interest and ₹ y at the rate of 10% simple interest. Then,

$$\text{Yearly interest} = \frac{12x}{100} + \frac{10y}{100}$$

$$\therefore \frac{12x}{100} + \frac{10y}{100} = 130 \Rightarrow 12x + 10y = 13000 \quad \dots (i)$$

If the invested amounts are interchanged, then yearly interest increases by ₹ 4.

$$\frac{10x}{100} + \frac{12y}{100} = 134 \Rightarrow 10x + 12y = 13400 \quad \dots (ii)$$

Adding eqn. (i) and (ii) we get

$$\begin{aligned} 22x + 22y &= 26400 \\ x + y &= 1200 \end{aligned} \quad \dots (iii)$$

Subtracting (ii) from (i) we get

$$\begin{aligned} 2x - 2y &= -400 \\ x - y &= -200 \end{aligned} \quad \dots (iv)$$

Solving (iii) and (iv), we get

$$x = 500, y = 700$$

Thus, person invested ₹ 500 at 12% per annum and ₹ 700 at 10% per annum.

- (ii) Pair of linear equation in two variables.
- (iii) Honesty is the best policy.

Que 5. If the price of petrol is increased by ₹ 2 per litre, a person will have to buy 1 litre less petrol for ₹ 1740. Find the original price of petrol at that time.

(a) Why do you think the price of petrol is increasing day-by-day?

(b) What should we do to save petrol?

Sol. Let the original price of the petrol be ₹ x per litre.

Then, amount of petrol that can be purchased = $\frac{1740}{x}$

According to question

$$\frac{1740}{x} - \frac{1740}{x+2} = 1 \quad \Rightarrow \quad 1740(x+2-x) = x(x+2)$$

$$\Rightarrow \quad x^2 + 2x - 3480 = 0 \quad \Rightarrow \quad x^2 + 60x - 58x - 3480 = 0$$

$$\Rightarrow \quad (x+60)(x-58) = 0 \quad \Rightarrow \quad x = 58, -60 \text{ (rejected)}$$

\therefore Original cost of petrol was ₹ 58 per litre.

(a) Petrol is a natural resource which is depleting day-by-day. So, due to more demand and less supply, its price is increasing.

(b) We should use more of public, transport and substitute petrol with CNG or other renewable resource.

Que 6. One fourth of a group of people claim they are creative, twice the square root of the group claim to be caring and the remaining 15 claim they are optimistic. Find the total number of people in the group.

(a) How many persons in the group are creative?

(b) According to you, which one of the above three values is more important for development of a society?

Sol. Let x be the total

Then, number of creative persons = $\frac{x}{4}$

Number of caring persons = $2\sqrt{x}$

and number of optimistic persons = 15

Thus, total number of persons = $\frac{x}{4} + 2\sqrt{x} + 15$

Now, by hypothesis, we have

$$\frac{x}{4} + 2\sqrt{x} + 15 = x \quad \Rightarrow \quad 3x - 8\sqrt{x} - 60 = 0$$

Let $\sqrt{x} = y$, then $x = y^2$

$$\Rightarrow \quad 3y^2 - 8y - 60 = 0 \quad \Rightarrow \quad 3y^2 - 18y + 10y - 60 = 0$$

$$\Rightarrow \quad 3y(y-6) + 10(y-6) = 0 \quad \Rightarrow \quad (3y+10)(y-6) = 0$$

$$\Rightarrow \quad y = 6 \text{ or } y = -\frac{10}{3}$$

$$\text{Now, } y = -\frac{10}{3} \quad \Rightarrow \quad x = \left(-\frac{10}{3}\right)^2 = \frac{100}{9} (\because x = y^2)$$

But, the number of persons cannot be a fraction.

$$\therefore y = 6 \quad \Rightarrow \quad x = 6^2 = 36$$

Hence, the number of people in the group = 36

(a) 9 persons

(b) All of these values have their own importance. A person having these values will certainly contribute to the development of society. However, the level of importance given to each of them depends upon a person's own attitude. Hence, any value with justification is correct. (Do yourself)

Que 7. In the centre of a rectangular plot of land of dimensions $120\text{ m} \times 100\text{ m}$, a rectangular portion is to be covered with trees so that the area of the remaining part of the plot is 10500 m^2 . Find the dimensions of the area to be planted. Which social act is being discussed here? Give its advantages.

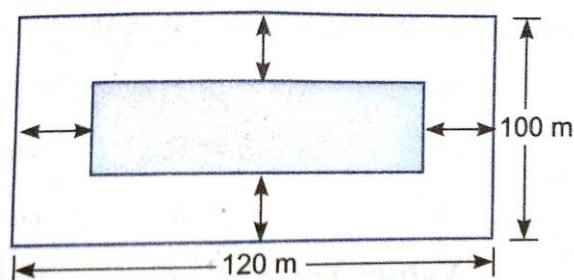


Fig. 1

Sol. Let the width of the unplanted area be $x\text{ m}$

Then, dimension of area to be planted = $(120 - 2x)$ and $(100 - 2x)$

$$\therefore (120 - 2x)(100 - 2x) = 120 \times 100 - 10500$$

$$\Rightarrow 12000 - 440x + 4x^2 = 1500 \text{ or } x^2 - 110x + 2625 = 0$$

$$\Rightarrow (x - 75)(x - 35) = 0 \text{ or } x = 75, 35$$

But $x = 75$ is not possible

$$\therefore x = 35$$

Thus, dimension of area to be planted = $(120 - 70)$ and $(100 - 70)$ i.e., 50 m and 30 m .

Afforestation is being discussed here. Planting more trees helps in reducing air pollution and make the environment clean and green.

Que 8. Mr. Ahuja has to square plots of land which he utilises for two different purposes—one for providing free education to the children below the age of 14 years and the other to provide free medical services for the needy villagers.

The sum of the areas of two square plots is 15425 m^2 . If the difference of their perimeter is 60 m , find the sides of the two squares.

Which qualities of Mr. Ahuja are being depicted in the question?

Sol. Let x be the length of the side of first square and y be the length of side of the second square.

Then, $x^2 + y^2 = 15425$... (i)

Let x be the length of the side of the bigger square.

$$4x - 4y = 60$$

$$\Rightarrow x - y = 15 \text{ or } x = y + 15 \text{ ... (ii)}$$

Putting the value of x in terms of y from equation (ii), in equation (i), we get

$$(y + 15)^2 + y^2 = 15425 \Rightarrow 2y^2 + 30y - 15200 = 0$$

$$\text{or } y^2 + 15y - 7600 = 0 \quad \text{or } (y + 95)(y - 80) = 0 \quad \Rightarrow y =$$

−95,80

But, sides cannot be negative, so $y = 80$

Therefore, $x = 80 + 15 = 95$

Hence, sides of two squares are 80 m and 95 m.

Value: Caring, King, Social and generous.

Que 9. A takes 3 days longer than B to finish a work. But if they work together, then work is completed in 2 days. How long would each take to do it separately. Can you say cooperation helps to get more efficiency?

Sol. Let B finish a work in x days

then A finish a work in $x + 3$ days

According to question

$$\frac{1}{x} + \frac{1}{x+3} = \frac{1}{2} \quad \Rightarrow \quad \frac{(x+3)+x}{x(x+3)} = \frac{1}{2}$$

$$\Rightarrow \quad 2x + 6 + 2x = x^2 + 3x \quad \Rightarrow \quad x^2 + 3x - 2x - 6 - 2x = 0$$

$$\Rightarrow \quad x^2 - x - 6 = 0$$

Solving the equation

$$x^2 - (3 - 2)x - 6 = 0 \quad \Rightarrow \quad x^2 - 3x + 2x - 6 = 0$$

$$\Rightarrow \quad x(x - 3) + 2(x - 3) = 0 \quad \Rightarrow \quad (x - 3)(x + 2) = 0$$

$$\Rightarrow \quad x - 3 = 0 \quad \text{or} \quad x + 2 = 0$$

$$\Rightarrow \quad x = 3 \quad \text{or} \quad x = -2 \text{ (Days cannot be negative)}$$

Value: Yes, Cooperation helps in improving work efficiency.

Que 10. In a class of 48 students, the number of regular students is more than the number of irregular students. Had two irregular students been regular, the product of the number of two types of students would be 380. Find the number of each type of students.

(a) Why is regularity essential in life?

(b) Write values other than regularity that a student must possess.

Sol. Let the number of regular students be x

Then, the number of irregular students = $48 - x$

According to the question,

$$(x + 2)(48 - x - 2) = 380$$

$$\Rightarrow -x^2 + 44x + 92 - 380 = 0 \text{ or } x^2 - 44x + 288 = 0$$

$$\Rightarrow (x - 36)(x - 8) = 0 \text{ or } x = 36, 8$$

But $x > 48 - x$ (given)

$$\therefore x = 36$$

i.e., The number of regular students = 36

and the number of irregular students = $48 - 36 = 12$

(a) Regularity in any sphere gives confidence which, in turn, leads to the development of an individual and the society as well.

(b) Honesty, Creativity, Confidence, Punctuality. (you may add more to this list)

Que 11. In a school, students decided to plant trees in and around the school to reduce air pollution. It was decided that the number of trees, that each section of each class will plant, will be double of the class in which they are

studying. If there are 1 to 12 classes in the school and each class has two sections, find how many trees were planted by the students. Which value is shown in this question?

Sol. Number of plants planted by class 1 = 2 (class 1 \times 2 sections) = $2 \times 1 \times 2 = 4$ trees
Similarly, number of plants planted by class 2 = 2 (class 2 \times 2 sections)
 $= 2 \times 2 \times 2 = 8$ trees

We now know, $a = 4$ and $d = 4$

Number of classes $n = 12$

Total number of plants planted = Sum of AP = S_{12}

$$S_n = \frac{n}{2}[2a + (n - 1)d]$$

$$S_{12} = \frac{12}{2}[2 \times 4 + (12 - 1)4]$$

$$S_{12} = 6[8 + 44] = 6 \times 52 = 312 \text{ trees}$$

Values shown by the students:

- (i) Environmental friendly
- (ii) Social awareness
- (iii) Sense of responsibility towards the society.

Que 12. A sum of ₹ 3150 is to be used to give six cash prizes to students of a school for overall academic performance, punctuality, regularity, cleanliness, confidence and creativity. If each prize is ₹ 50 less than its preceding prize, find the value of each of the prizes.

(a) Which value according to you should be awarded with the maximum amount? Justify your answer.

(b) Can you add more values to the above ones which should be awarded?

Sol. Let the six prizes (1st, 2nd, 3rd6th) be $a, a - 50, a - 100, a - 150, a - 200, a - 250$ respectively

Then $a + (a - 50) + (a - 100) + (a - 150) + (a - 200) + (a - 250) = 3150$

$$\Rightarrow 6a - 750 = 3150 \text{ or } a = \frac{3900}{6} = 650$$

\therefore The value of the 1st, 2nd, 3rd6th Prizes are 650, 600, 550, 500, 450, 400 respectively.

(a) Any value with justification is correct.

(b) Many more can be added like, honesty, good habits, friendship, respect for elders, loving youngsters,..... etc.

Que 13. A person donates money to a trust working for education of children and women in some village. If the person donates ₹ 5,000 in the first year and his donation increases by ₹ 250 every year, find the amount donated by him in the eighth year and the total amount donated in eight years.

(a) Which mathematical concept is being used here?

(b) Write any two values the person mentioned here possess.

(c) Why do you think education of women is necessary for the development of a society?

Sol. The amount donated by the person each year forms an AP.

Here, $a = 5,000$, $d = 250$

We have to find a_8 and S_8

$$a_8 = a + 7d = 5,000 + 7 \times 250 = ₹ 6,750$$

$$S_8 = \frac{8}{2} [2a + 7d] = 4(2 \times 5,000 + 7 \times 250) = 4 \times 11,750 = ₹ 47,000$$

(a) Arithmetic progression.

(b) Socially aware and responsible citizen.

(c) Educating a woman means educating the whole family and an educated family makes development in society.

Que 14. A passenger, while boarding the plane, slipped from the stairs and got hurt. The pilot took the passenger in the emergency clinic at the airport for treatment. Due to this, the plane got delayed by half an hour. To reach the destination 1500 km away in time, so that the passengers could catch the connecting flight, the speed of the plane was increased by 250 km/h than the usual speed. Find the usual speed of the plane.

What value is depicted in this question?

Sol. Let the usual speed of plane be x km/h.

$$\therefore \frac{1500}{x} - \frac{1500}{x+250} = \frac{1}{2}$$

$$\Rightarrow [1500(x + 250) - 1500x] 2 = x(x + 250)$$

$$\Rightarrow x^2 + 250x - 750000 = 0$$

$$\Rightarrow (x + 1000)(x - 750) = 0 \Rightarrow x = 750 \text{ or } x = -1000 \text{ (Which is neglected)}$$

\therefore Using speed of plane = 750 km/h

Values: Helping others

Que 15. Reshma wanted to save at least ₹ 6,500 for sending her daughter to school next year (after 12 months). She saved ₹ 450 in the first month and raised her savings by ₹ 20 every next month. How much will she be able to save in next 12 months? Will she be able to send her daughter to the school next year?

What value is reflected in this question?

Sol. Here $a = ₹ 450$, $d = ₹ 20$, $n = 12$

$$S_n = \frac{n}{2} [2a + (n - 1)d]$$

$$S_{12} = \frac{12}{2} [2 \times 450 + 11 \times 20] = 6[1120] = 6720 > 6500$$

\therefore Reshma will be able to send her daughter to school

Value: Encouraging efforts for girl education.