# Maharashtra Board Class IX Mathematics - Algebra Sample Paper – 2 Solution

## **Time: 2 hours**

**Total Marks: 40** 

Note: - (1) All questions are compulsory. (2) Use of calculator is not allowed.

#### 1.

- i. Mode is the value that occurs most often. Here, 18 is the mode.
- ii. Product of extremes = product of means  $3 \times 10 = 6 \times x$ x = 5
- iii. The set of integers is an infinite set as there are infinite numbers of integers.

iv. To prove: 
$$a + (b + c) = (a + b) + c$$

LHS = a + (b + c) = 
$$\frac{2}{3} + \left(\frac{4}{3} + \frac{1}{3}\right) = \frac{2}{3} + \frac{5}{3} = \frac{7}{3}$$

RHS = (a + b) + c = 
$$\left(\frac{2}{3} + \frac{4}{3}\right) + \frac{1}{3} = \frac{6}{3} + \frac{1}{3} = \frac{7}{3}$$

Thus LHS = RHS, verified.

v. First four even numbers are 2, 4, 6, 8.

Their mean = 
$$\frac{2+4+6+8}{4} = \frac{20}{4} = 5$$

vi. We have to find: (4x + 6) + (3x - 7) =4x + 6 + 3x - 7 =(4x + 3x) + (6-7)=7x - 1

- 2.
- i. Middle term = Sum of 15 observations (Sum of first 7 observations + Sum of last 7 observations)= $15 \times 14 (7 \times 12 + 7 \times 16) = 14$
- ii. Let x be the number of goats and y be the number of hens Number of legs = 4x + 2yNumber of heads = x + yAccording to the given condition  $\Rightarrow 4x + 2y = 2(x + y) + 24$   $\Rightarrow 2x = 24$   $\Rightarrow x = 12$ So there are 12 goats in the group.
- iii. Let the required number of hours be y. Then, less the men, more the hours (Indirect Proportion)  $\Rightarrow 16: 24: 28: y$   $(16 \times y) = (24 \times 28)$   $y = \frac{24 \times 28}{16} = 42$  Hours Hence, 16 men will do it in 42 hours.
- iv.  $A \cup B = \{1, 2, 3, 6, 8\}$
- v. Let C receives Rs. x.

B receives twice as much as C = Rs. 2x A receives twice as much as B = Rs. 6x

The total of amount received by A, B and C together is Rs. 8100.

$$\Rightarrow 6x+2x+x = 8100$$
$$\Rightarrow 9x = 8100$$
$$\Rightarrow x = 900$$

The amount received by C = Rs. x = Rs.900. The amount received by B = Rs. 2x = Rs. 1800. The amount received by B = Rs. 6x = Rs. 5400.

vi. 
$$Mean = \frac{Sum \text{ of all observation}}{Total \text{ number of observation}}$$
$$= \frac{23 + 45 + 46 + 12 + 34 + 87 + 78 + 12 + 65 + 33 + 19 + 34 + 55 + 67 + 81 + 12 + 56 + 98 + 11 + 49}{20}$$
$$= \frac{917}{20} = 45.85$$

3.

i. The removed number could be obtained by difference between the sum of original 6 numbers and the sum of remaining 5 numbers i.e. = sum of original 6 numbers - sum of remaining 5 numbers
Using the formulaSum of terms = mean × number of terms
Sum of original 6 numbers = 20 × 6 = 120
Sum of remaining 5 numbers = 15 × 5 = 75
Number removed = sum of original 6 numbers - sum of remaining 5 numbers
= 120 - 75 = 45

The number removed is 45.

- ii. Any point (x, y) will be on the line if it satisfies the equation of the line 3y = 6 2x
  - Now for point (3, 0)
     LHS = 3y = 3(0)=0
     RHS= 6- 2(3)=0
     Since LHS =RHS, the point (3, 0) lies 3y = 6 2x.
  - 2. For point (2, 2) LHS = 3y = 3(2) = 6 RHS= 6- 2(2)=2 Since LHS + BHS the point (2, 2) does no

Since LHS  $\neq$ RHS, the point (2, 2) does not lie on the line 3y = 6 - 2x.

- 3. For (0, 2) LHS = 3y = 3(2)=6 RHS= 6- 2(0)=0 = 6 Since LHS =RHS, the point (0, 2) lies 3y = 6 - 2x.
- iii. Let us assume that Laxmi purchased x bananas and y oranges.

Since each banana costs Rs. 2, x bananas cost Rs. 2x.

Similarly, each orange cost Rs. 3y

Thus the total amount paid by Laxmi is Rs. (2x + 3y), which equals. Rs. 30.

Thus, we can express the given situation in the form of a linear equations as 2x + 3y = 30

Now, we know that Laxmi purchased 6 oranges i.e. the value of y is 6.

Substitute this value of y in them equation 2x + 3y = 30, thereby reducing it to a linear equation in one variable.

We can then solve the equation to obtain the value.

 $2x + 3 \times 6 = 30$  2x + 18 = 30This is a linear equation in one variable. 2x = 30 - 18 2x = 12 x = 6Laxmi purchased 6 bananas.

iv.

(a)A' = {1, 2, 3, 4, 8}
(b) B' = {2, 3, 5, 6, 7}
(c) C' = {2, 4, 6, 8}

#### v.

- a. Number of boys who liked the white colour = 25 Number of girls who liked the white colour = 45 - 25 = 20
- b. Number of boys and girls checked for their favourite colour
   = 30 + 20 + 32 + 45 = 127
- c. Since the blue section is the longest for the white colour, the boys liked the white colour the most.

## 4.

i.

1) Range of marks

Highest observation= 71

Lowest observation = 7

Range = 71 - 7 = 64

Let the width of the class should be divided such that the highest and the lowest observation are included in the end classes.

Marks	Tally Marks	Frequency	Cumulative Frequency
5 - 15	II	2	2
15 - 25	Ж	5	(2 + 5) = 7
25 - 35	II JHÍ	7	(7 + 7) = 14
35 - 45	JANÍ JANÍ JANÍ IIII	19	(14 + 19) = 33
45 - 55	ોમ ોમાં	10	(33 + 10) = 43
55 - 65	Ж	5	(43 + 5) = 48
65 - 75	II	2	(48 + 2) = 50
Total		50	

### **Cumulative Frequency Table**

- 2) From cumulative frequency, we find that 14 students scored less than 35. Thus, 50 14 = 36 students, i.e. 72% students scored more than 35 marks.
- ii. Let the age of father be x years and his son's age be y years. Two years ago their ages were (x - 2)years and (y - 2)years. Two years later their ages were (x + 2)years and (y + 2)years. Then according to the condition given, x - 2 = 5(y - 2)x - 5y = -8 (1)

x + 2 = 3(y + 2) + 8x - 3y = 12 (2)

Eliminating x by subtracting equation 2 from 1 we get

-5y + 3y = -8 - 12 -2y = -20 y = 10Put this value in (1), we get x = -8 + 50 = 42Hence the father's present age 42 years. And the son's present age is 10 years.

iii. Simplifying the equation  $\sqrt{x^2} + \sqrt{y^2} = \sqrt{5}$  we get

$$\sqrt{x^{2}} + \sqrt{y^{2}} = \sqrt{5}$$

$$\sqrt{x \times x} + \sqrt{y \times y} = \sqrt{5}$$

$$x + y = \sqrt{5}$$
Thus,  $y + y = \sqrt{5}$  is a linear.

Thus  $x + y = \sqrt{5}$  is a linear equation

Substituting 
$$x = \frac{\sqrt{5}}{\sqrt{5} + 1}$$
 in the linear equation we get  $x + y = \sqrt{5}$ 

$$\frac{\sqrt{5}}{\sqrt{5}+1} + y = \sqrt{5}$$

$$y = \sqrt{5} - \frac{\sqrt{5}}{\sqrt{5}+1}$$

$$y = \frac{\sqrt{5}(\sqrt{5}+1) - \sqrt{5}}{\sqrt{5}+1}$$

$$y = \frac{5 + \sqrt{5} - \sqrt{5}}{\sqrt{5}+1}$$

$$y = \frac{5}{\sqrt{5}+1}$$

$$y = \frac{5}{\sqrt{5}+1}$$

5.

i. Since the given frequency distribution table is not continuous, we have to convert it into a continuous one.

Age group	Number of literate females
9.5-17.5	300
17.5-25.5	980
25.5-33.5	740
33.5-41.5	580
41.5-49.5	260
49.5-57.5	120
Total	2980



ii.

(i) Abscissa of P is 2
(ii) Ordinate of Q is - 5
(iii) V (-2,2)
(iv) S (4,0)
(v) T (0,4)
(vi) P (2,3)
(vii) U (-4,3)
(viii) V (-2,2)
(ix) Q (3,-5)

iii. Let the cost of 1 chair be x and 1 table be y. According to the given condition 3x + 2y = 700 ...(1) 5x + 3y = 1100 ...(2)

Multiply equation (1) by 5 and (2) by 3. 15x + 10y = 3500.....(3) 15x + 9y = 3300.....(4)

Subtract equation (4) from equation (3). 15x + 10y = 3500 15x + 9y = 3300y=200

Putting this value of y = 200 in (1) we get 3x + 2y = 700 ...(1) 3x + 400 = 700 x = 100Hence, cost of 2 chairs and 2 tables is 2(x + y) = 200 + 400 = Rs. 600.