

## MAHARASHTRA BOARD CLASS 9 MATHS PART 1 ANSWERS

### Answers and Explanations

1(A)

1.

Ans. D

Intersection of P & Q

2.

Ans. A

A rational number can be obtained by taking the average of the two numbers.

Therefore, the answer is (a)  $\frac{\sqrt{5} + \sqrt{6}}{2}$

3.

Ans. C

$$\text{Since, } \frac{z}{6} = \frac{25}{3}$$

$$\Rightarrow z = \frac{25 \times 6}{3}$$

$$\Rightarrow z = 25 \times 2$$

$$\Rightarrow z = 50$$

Therefore, the answer is (c) i.e. 50

4.

Ans. B

The highest degree we can see in this polynomial is 12.

Therefore, the answer is (b) i.e. 12

5.

Ans. B

The equation is:  $4y - 1 = 3z + 4$

a)  $y = 1, z = 2$

$$\therefore 4 \times 1 - 1 = 3 \times 2 + 4$$

$$\Rightarrow 3 - 1 = 6 + 4$$

$$\Rightarrow 2 \neq 10$$

Here, L.H.S  $\neq$  R.H.S, (1, 2) is not the solution

b)  $y = 2, z = 1$

$$\therefore 4 \times 2 - 1 = 3 \times 1 + 4$$

$$\Rightarrow 8 - 1 = 3 + 4$$

$$\Rightarrow 7 = 7$$

Here, L.H.S = R.H.S, therefore (2, 1) is the answer

### 1B

1.

Ans. As given in the question,

$$X = \{1, 2, 3, 5, 7, 11, 13, 17, 19, 23\}$$

$$Y = \{6, 8, 9, 10, 12, 14, 15, 16, 18\}$$

$$\therefore X \cap Y = \{\emptyset\} \text{ (As there is nothing common in both the sets)}$$

$$\text{Also, } X \cup Y = \{1, 2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 23\}$$

2.

Ans. Here  $p = 3 + \sqrt{5}$

$$\therefore p - \frac{1}{p} = 3 + \sqrt{5} - \frac{1}{3 + \sqrt{5}}$$

$$\Rightarrow p - \frac{1}{p} = \frac{(3 + \sqrt{5})(3 + \sqrt{5}) - 1}{3 + \sqrt{5}}$$

$$\Rightarrow p - \frac{1}{p} = \frac{(9 + 6\sqrt{5} + 5 - 1)}{3 + \sqrt{5}} \quad \text{(Using the formula } (a + b)^2 = a^2 + b^2 + 2ab)$$

$$\Rightarrow p - \frac{1}{p} = \frac{13 + 6\sqrt{5}}{3 + \sqrt{5}}$$

Therefore, the answer is  $p - \frac{1}{p} = \frac{13 + 6\sqrt{5}}{3 + \sqrt{5}}$

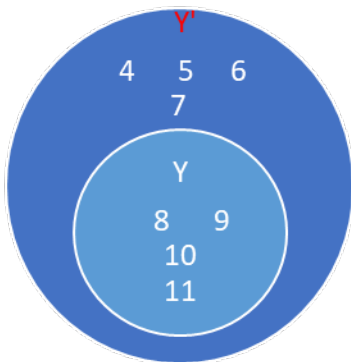
3.

Ans. Here,  $Z = \{4, 5, 6, 7, 8, 9, 10, 11\}$

$$Y = \{8, 9, 10, 11, 12, 13\}$$

$$\therefore Y' = \{4, 5, 6, 7\}$$

Below is the Venn diagram: Z



Here Z is the universal set.

4.

Ans. Here,  $y^3 - 2y^2z + 5yz^2 - 10z^3$

Taking  $y^2$  and  $z^2$  as common respectively

$$\therefore y^2(y - 2z) + 5z^2(y - 2z)$$

As,  $(y - 2z)$  is common in both

$$\Rightarrow (y^2 + 5z^2)(y - 2z)$$

This is the answer.

5.

Ans. Here, the equation is  $3p - 2q + 5 = 0$

So, to satisfy the linear equation, we must prove L.H.S = R.H.S using (5, 10)

Putting the values of  $p = 5$  and  $q = 10$  in the given equation, we get

$$3 \times 5 - 2 \times 10 + 5 = 0$$

$$\Rightarrow 15 - 20 + 5 = 0$$

$$\Rightarrow -5 + 5 = 0$$

$$\Rightarrow 0 = 0$$

L.H.S = R.H.S

Hence, proved.

6.

Ans. As we know the relationship in median, mean and mode is given by the formula,

$$(\text{Mean} - \text{Mode}) = 3(\text{Mean} - \text{Median})$$

Given:

$$\text{Mean} = 25$$

$$\text{Median} = 17$$

$$\therefore 25 - \text{Mode} = 3(25 - 17)$$

$$\Rightarrow 25 - \text{Mode} = 3 \times 8$$

$$\Rightarrow 25 - \text{Mode} = 24$$

$$\Rightarrow \text{Mode} = 25 - 24$$

$$\Rightarrow \text{Mode} = 1$$

## Question 2 : Solve the following questions.

1.

Ans. A set is collection of distinct objects or numbers which are considered as one entity.

For example: A, B, C are three different alphabets but when written in a set like  $X = \{A, B, C, D, E\}$ , it is considered as a single set of size 5.

a)  $\{1, 8, 27, 64, 125, 216\}$

In set builder form, this will be written as:

$$X = \{x : x = n^3 \text{ and } 1 \leq n \leq 6\}$$

b)  $\{8, 16, 24, 32, 40, 48, 56\}$

In set builder form, this will be written as:

$$X = \{x : x = 8n \text{ and } 1 \leq n \leq 7\}$$

2.

Ans. Let the cost price of watch be  $x$

If the cost price of watch is 100, then selling price would be 82

( $\because$  Loss is 18%)

$\therefore$  If the cost price is  $x$ , then S.P. will be 82% of  $x$ .

If she has sold for 100 more, her profit would be 7%, which means

In this case S.P. will 107% of  $x$ .

As, profit = S.P. – C.P.

$$100 = (107\% \text{ of } x - 82\% \text{ of } x)$$

$$\Rightarrow 25\% \text{ of } x = 100$$

$$\Rightarrow x = 4 \times 100 = 400$$

Hence, the cost price of watch is Rs. 400

3.

Ans.  $y^2 + z^2 + yz = (y+z)^2 - 2yz + yz \quad (\because a^2 + b^2 = (a+b)^2 - 2ab)$

$$\Rightarrow y^2 + z^2 + yz = (y+z)^2 - yz$$

$$\Rightarrow y^2 + z^2 + yz = \left(\frac{3+\sqrt{7}}{3-\sqrt{7}} + \frac{3-\sqrt{7}}{3+\sqrt{7}}\right)^2 - \left(\frac{3+\sqrt{7}}{3-\sqrt{7}}\right) \times \left(\frac{3-\sqrt{7}}{3+\sqrt{7}}\right)$$

$$\Rightarrow y^2 + z^2 + yz = \frac{(3+\sqrt{7})^2 + (3-\sqrt{7})^2}{(3-\sqrt{7}) \times (3+\sqrt{7})} - 1$$

$$\Rightarrow y^2 + z^2 + yz = \frac{9+7+6\sqrt{7}+9+7-6\sqrt{7}}{9-7} - 1$$

$[\because (a-b)^2 = (a^2 + b^2 - 2ab), (a+b)^2 = (a^2 + b^2 + 2ab) \text{ and } (a^2 - b^2) = (a+b)(a-b)]$

$$\Rightarrow y^2 + z^2 + yz = \frac{32}{2} - 1 = 16 - 1 = 15$$

Hence, the answer is 15.

4.

Ans. Suppose Brenda have taken  $z$  number of classes in total.

As the relationship is directly proportional, we have:

$$\frac{z}{7} = \frac{24}{6}$$

$$\Rightarrow z = \frac{24 \times 7}{6}$$

$$\Rightarrow z = 28$$

Brenda have taken total 28 classes in 7 weeks.

5.

Ans. Since,  $a + 2y = 15$

Let's try a) The first solution is (7, 4)

$$\Rightarrow 7 + (2 \times 4) = 15 \quad (\text{It is a solution})$$

b) The second solution is (11, 2)

$$\Rightarrow 11 + (2 \times 2) = 15 \quad (\text{It is a solution})$$

a) The third solution is (5, 5)

$$\Rightarrow 5 + (2 \times 5) = 15 \quad (\text{It is a solution})$$

b) The fourth solution is (3, 6)

$$\Rightarrow 3 + (2 \times 6) = 15 \quad (\text{It is a solution})$$

6.

Ans. The mean is defined as  $Mean = \frac{\text{Sum of all observations}}{\text{Number of observations}}$

$$\text{Therefore, mean} = \frac{40+55+34+56+49+75+63+48+57}{9}$$

$$\text{Mean} = \frac{477}{9}$$

$$\text{Mean} = 53$$

For the median, let's arrange the observations in ascending order first,

34, 40, 48, 49, 55, 56, 57, 63, 75

To determine median for odd number of observations,

The formula is median =  $\left(\frac{n+1}{2}\right)^{\text{th}}$  term

Therefore, our median is =  $\left(\frac{9+1}{2}\right)^{\text{th}}$  term

Median is 5<sup>th</sup> term i.e. 55

### Question 3: Solve any 5 of the following questions

1.

Ans. For rationalizing the denominator, we do

$$\begin{aligned} & \frac{5\sqrt{3} + 7\sqrt{2}}{\sqrt{48} - \sqrt{18}} \times \frac{\sqrt{48} + \sqrt{18}}{\sqrt{48} + \sqrt{18}} \\ \Rightarrow & \frac{5\sqrt{3}(\sqrt{48} + \sqrt{18}) + 7\sqrt{2}(\sqrt{48} + \sqrt{18})}{\sqrt{48}^2 - \sqrt{18}^2} \\ \Rightarrow & \frac{5\sqrt{3}(\sqrt{48} + \sqrt{18}) + 7\sqrt{2}(\sqrt{48} + \sqrt{18})}{48 - 18} \\ \Rightarrow & \frac{5\sqrt{3}(4\sqrt{3} + 3\sqrt{2}) + 7\sqrt{2}(4\sqrt{3} + 3\sqrt{2})}{30} \\ \Rightarrow & \frac{60 + 15\sqrt{6} + 28\sqrt{6} + 42}{30} \\ \Rightarrow & \frac{102 + 43\sqrt{6}}{30} \end{aligned}$$

This is the simplified answer.

2.

Ans. Let the equations be named as (i), (ii) and (iii) respectively, then

$$p + q = 24; \quad \text{-----(i)}$$

$$q + r = 18; \quad \text{-----(ii)}$$

$$r + p = 22; \quad \text{-----(iii)}$$

Subtracting equation (ii) from equation (i), we get

$$p - r = 6 \quad \text{-----(iv)}$$

Also, adding equation (iv) and equation (iii), we get

$$p - r + p + r = 22 + 6$$

$$\Rightarrow 2p = 28$$

$$\Rightarrow p = 14$$

Putting the value of p in equation (i), we get

$$14 + q = 24$$

$$\text{Therefore, } q = 10$$

Similarly, putting the value of q in equation (ii), we get

$$10 + r = 18$$

Therefore,  $r = 8$

Hence, the answer is  $p = 14, q = 10, r = 8$

3.

Ans.

(i) Let the number of days be  $x$  and number of books be  $y$

Since  $x$  and  $y$  vary directly

$$\therefore \frac{x}{y} = p$$

(Where  $p$  is a constant)

$$x = py$$

$$x = 10, y = 1$$

$$\therefore p = \frac{10}{1} = 10$$

$$\text{if, } y = 3$$

$$\text{then } x = 10 \times 3$$

$$x = 30$$

$$\text{if, } y = 8$$

$$\text{Then } x = 10 \times 8$$

$$x = 80$$

$$\text{if, } y = 13$$

$$\text{Then } x = 10 \times 13$$

$$x = 130$$

Number of books (y)	1	3	8	13
Number of days (x)	10	30	80	130

4.

Ans. Let  $X = 6z^2 - 15z + 24$

$$\text{Here, } z = (1 + \sqrt{3} + \sqrt{5})$$

$$\Rightarrow X = 6(1 + \sqrt{3} + \sqrt{5})^2 - 15(1 + \sqrt{3} + \sqrt{5}) + 24$$

$$\Rightarrow X =$$

$$6[1 + 3 + 5 + (2 \times 1 \times \sqrt{3}) + (2 \times \sqrt{3} \times \sqrt{5}) + (2 \times 1 \times \sqrt{5})] - 15 - 15\sqrt{3} - 15\sqrt{5} + 24$$

$$\text{(Since } (a + b + c)^2 = a^2 + b^2 + c^2 + 2ab + 2bc + 2ca)$$

$$\Rightarrow X = 6(9 + 2\sqrt{3} + 2\sqrt{15} + 2\sqrt{5}) - 15\sqrt{3} - 15\sqrt{5} + 9$$

$$\Rightarrow X = 54 + 12\sqrt{3} + 12\sqrt{15} + 12\sqrt{5} - 15\sqrt{3} - 15\sqrt{5} + 9$$

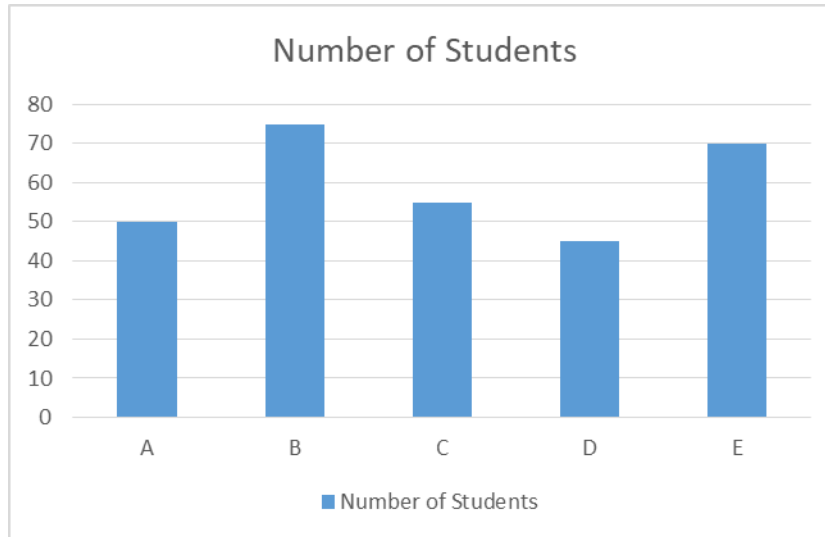
$$\Rightarrow X = 63 - 3\sqrt{3} + 12\sqrt{15} - 3\sqrt{5}$$

$$\Rightarrow X = 3(21 - \sqrt{3} + 4\sqrt{15} - \sqrt{5})$$

This is the answer.

5.

Ans.



6.

Ans. Below is the frequency distribution table for the given data:

Marks obtained	No. of students (frequency)
50 – 60	2
60 – 70	5
70 – 80	6
80 – 90	7
90 - 100	5

**Question 4 : Solve any three of the following questions:**

1.

Ans.  $P = \{1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25\}$

$U = \{9, 21, 11, 17, 15\}$

$V = \{1, 5, 9, 11\}$

$W = \{5, 13, 19, 23, 25\}$

Let's find out the compliments of each set first:

$$U' = \{1, 3, 5, 7, 13, 19, 23, 25\}$$

$$V' = \{3, 7, 13, 15, 17, 19, 21, 23, 25\}$$

$$W' = \{1, 3, 7, 9, 11, 15, 17, 21\}$$

$$(i) \quad U' \cap V = \{1, 3, 5, 7, 13, 19, 23, 25\} \cap \{1, 5, 9, 11\}$$

$$U' \cap V = \{1, 5\}$$

$$(ii) \quad V \cup W = \{1, 5, 9, 11\} \cup \{5, 13, 19, 23, 25\}$$

$$V \cup W = \{1, 5, 9, 11, 13, 19, 23, 25\}$$

$$(iii) \quad W' \cap V' = \{1, 3, 7, 9, 11, 15, 17, 21\} \cap \{3, 7, 13, 15, 17, 19, 21, 23, 25\}$$

$$W' \cap V' = \{3, 7, 15, 17, 21\}$$

$$(i) \quad U' \cup W = \{1, 3, 5, 7, 13, 19, 23, 25\} \cup \{5, 13, 19, 23, 25\}$$

$$U' \cup W = \{1, 3, 5, 7, 13, 19, 23, 25\}$$

2.

Ans. The ratio given is:  $\frac{p+5}{p+15} = \frac{p-1}{p+6}$

Solving the above ratio, we get

$$\Rightarrow (p+5)(p+6) = (p-1)(p+15)$$

$$\Rightarrow p^2 + 5p + 6p + 30 = p^2 - p + 15p - 1$$

Cancelling  $p^2$  on both the sides, we get

$$\Rightarrow 5p + 6p + 30 = -p + 15p - 1$$

$$\Rightarrow 11p + 30 = 14p - 1$$

$$\Rightarrow 14p - 11p = 30 + 1$$

$$\Rightarrow 3p = 45$$

$$\Rightarrow p = 15$$

3.

Ans. Let the cost of dining table be Rs  $x$

And the cost of oven be Rs  $y$

Then as per the given condition  $5x = 7y$  -----(i)

Also given,  $x = 9000 + y$  -----(ii)

Putting the value of  $x$  from equation (ii) into equation (i), we get

$$5(9000 + y) = 7y$$

$$\Rightarrow 45000 = 7y - 5y$$

$$\Rightarrow 2y = 45000$$

$$\Rightarrow y = 22500$$

Therefore, the cost of the oven is Rs. 22500

4.



Ans. Let the numerator be  $m$  and denominator be  $n$ ,

According to the given condition:

$$\frac{m}{n-3} = 2$$

$$\Rightarrow m = 2n - 6$$

$$\Rightarrow 2n = m + 6$$

Hence, our linear equation is  $2n - m - 6 = 0$

For the graph,

(i) For  $m = 0$ , the value of  $n$  is ( $2n = 0 + 6$ )

Therefore, for  $m = 0$ ,  $n = 3$

(ii) For  $m = 2$ , the value of  $n$  is ( $2n = 2 + 6$ )

Therefore, for  $m = 2$ ,  $n = 4$

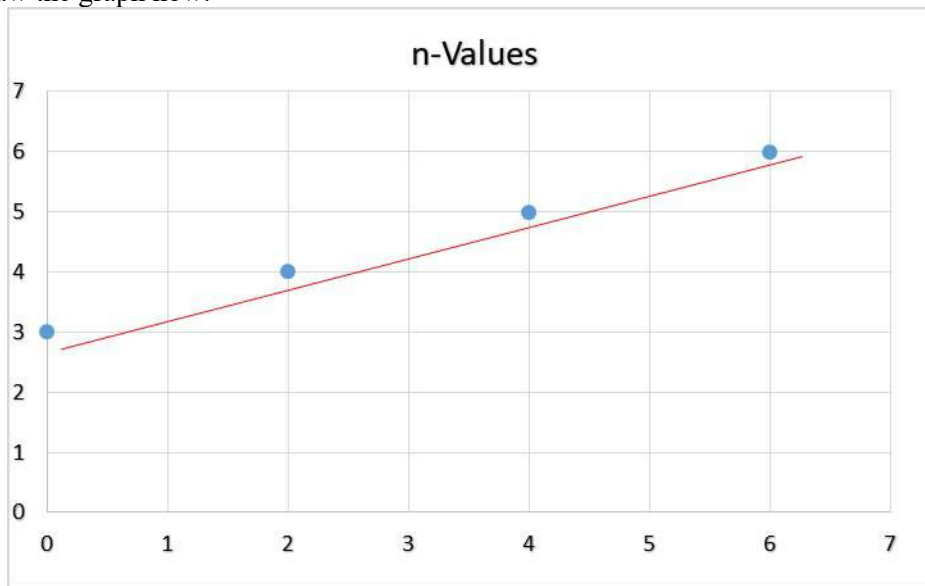
(iii) For  $m = 4$ , the value of  $n$  is ( $2n = 4 + 6$ )

Therefore, for  $m = 4$ ,  $n = 5$

(iv) For  $m = 6$ , the value of  $n$  is ( $2n = 6 + 6$ )

Therefore, for  $m = 6$ ,  $n = 6$

Let's draw the graph now.



**Question 5: Solve any two of the following:**

1.

Ans. Let the numbers be  $x$  and  $13 - x$  respectively.

According to the given condition:

$$8x = 5(13 - x)$$

$$\Rightarrow 8x = 65 - 5x$$

$$\Rightarrow 8x + 5x = 65$$

$$\Rightarrow 13x = 65$$

$$\Rightarrow x = 5$$

$$\Rightarrow 13 - x = 13 - 5 = 8$$

Answer: Both the numbers are 5 and 8.

2.

Ans. Let the time be 't' years.

The formula for simple interest is:  $S.I. = \frac{P \times R \times T}{100}$

As given, P = Rs 4000, R = 10.5%, T = 4 years

Therefore,  $S.I. = \frac{4000 \times 10.5 \times 4}{100}$

$$\Rightarrow S.I. = \frac{168000}{100}$$

$$\Rightarrow S.I. = \text{Rs. } 1680$$

According to the given condition:

$$\Rightarrow \frac{3500 \times 9 \times t}{100} = 1680$$

$$\Rightarrow 315t = 1680$$

$$\Rightarrow t = 5.33 \text{ years.}$$

3.

Ans. Let the present age of son be  $x$  years

Then, the present age of mother will be  $2x$  years

As stated in the question 16 years ago,

Age of son was  $(x - 16)$  years

Age of mother was  $(2x - 16)$  years

According to the condition:

$$2x - 16 = 3(x - 16)$$

$$\Rightarrow 2x - 16 = 3x - 48$$

$$\Rightarrow 3x - 2x = 48 - 16$$

$$\Rightarrow x = 32$$

$\therefore$  The present age of son is 32 years and, the present age of mother is  $2x = 2 \times 32 = 64$  years.

