# Maharashtra Board <br> Class IX Mathematics - Algebra <br> 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

$$
\begin{aligned}
& 3 \times 10=6 \times x \\
& x=5
\end{aligned}
$$

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

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

$$
\begin{aligned}
& (4 x+6)+(3 x-7) \\
& =4 x+6+3 x-7 \\
& =(4 x+3 x)+(6-7) \\
& =7 x-1
\end{aligned}
$$

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 $=4 x+2 y$
Number of heads $=x+y$
According to the given condition
$\Rightarrow 4 \mathrm{x}+2 \mathrm{y}=2(\mathrm{x}+\mathrm{y})+24$
$\Rightarrow 2 \mathrm{x}=24$
$\Rightarrow \mathrm{x}=12$
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 $C=R s .2 x$
A receives twice as much as $B=$ Rs. $6 x$

The total of amount received by A, B and C together is Rs. 8100.
$\Rightarrow 6 x+2 x+x=8100$
$\Rightarrow 9 x=8100$
$\Rightarrow \mathrm{x}=900$

The amount received by C = Rs. $\mathrm{x}=\mathrm{Rs} .900$.
The amount received by $\mathrm{B}=$ Rs. $2 \mathrm{x}=$ Rs. 1800.
The amount received by $\mathrm{B}=$ Rs. $6 \mathrm{x}=$ Rs. 5400.
vi. Mean $=\frac{\text { Sum of all observation }}{\text { Total number of observation }}$

$$
\begin{aligned}
& =\frac{23+45+46+12+34+87+78+12+65+33+19+34+55+67+81+12+56+98+11+49}{20} \\
& =\frac{917}{20}=45.85
\end{aligned}
$$

## 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 formula-
Sum of terms $=$ mean $\times$ number of terms
Sum of original 6 numbers $=20 \times 6=120$
Sum of remaining 5 numbers $=15 \times 5=75$
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 $3 y=6-2 x$

1. Now for point $(3,0)$

LHS $=3 y=3(0)=0$
RHS $=6-2(3)=0$
Since LHS $=$ RHS, the point $(3,0)$ lies $3 y=6-2 x$.
2. For point $(2,2)$

LHS $=3 y=3(2)=6$
RHS $=6-2(2)=2$
Since LHS $\neq$ RHS, the point $(2,2)$ does not lie on the line $3 y=6-2 x$.
3. For $(0,2)$

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

Since each banana costs Rs. 2 , x bananas cost Rs. 2 x .
Similarly, each orange cost Rs. 3y
Thus the total amount paid by Laxmi is Rs. ( $2 \mathrm{x}+3 \mathrm{y}$ ), which equals. Rs. 30.
Thus, we can express the given situation in the form of a linear equations as $2 \mathrm{x}+3 \mathrm{y}=$ 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 $2 x+3 y=30$, thereby reducing it to a linear equation in one variable.
We can then solve the equation to obtain the value.
$2 \mathrm{x}+3 \times 6=30$
$2 \mathrm{x}+18=30$
This is a linear equation in one variable.
$2 \mathrm{x}=30-18$
$2 \mathrm{x}=12$
$\mathrm{x}=6$
Laxmi purchased 6 bananas.
iv.
(a) $\mathrm{A}^{\prime}=\{1,2,3,4,8\}$
(b) $\mathrm{B}^{\prime}=\{2,3,5,6,7\}$
(c) $\mathrm{C}^{\prime}=\{2,4,6,8\}$
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.

## Cumulative Frequency Table

| Marks | Tally Marks | Frequency | Cumulative Frequency |
| :---: | :---: | :---: | :---: |
| 5-15 | 11 | 2 | 2 |
| 15-25 | \|\% | 5 | $(2+5)=7$ |
| 25-35 | In+ 11 | 7 | $(7+7)=14$ |
| 35-45 |  | 19 | $(14+19)=33$ |
| 45-55 |  | 10 | $(33+10)=43$ |
| 55-65 | N+1 | 5 | $(43+5)=48$ |
| 65-75 | II | 2 | $(48+2)=50$ |
| Total |  | 50 |  |

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 $(x+2) y e a r s ~ a n d ~(y+2) y e a r s$.
Then according to the condition given,
$x-2=5(y-2)$
$x-5 y=-8$
$x+2=3(y+2)+8$
$x-3 y=12$

Eliminating $x$ by subtracting equation 2 from 1 we get
$-5 y+3 y=-8-12$
$-2 y=-20$
$\mathrm{y}=10$
Put this value in (1), we get
$\mathrm{x}=-8+50=42$
Hence 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 $x+y=\sqrt{5}$ is a linear equation

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

$$
\begin{aligned}
& \frac{\sqrt{5}}{\sqrt{5}+1}+y=\sqrt{5} \\
& y=\sqrt{5}-\frac{\sqrt{5}}{\sqrt{5}+1} \\
& y=\frac{\sqrt{5}(\sqrt{5}+1)-\sqrt{5}}{\sqrt{5}+1} \\
& y=\frac{5+\sqrt{5}-\sqrt{5}}{\sqrt{5}+1} \\
& y=\frac{5}{\sqrt{5}+1} \\
& y=\frac{5(\sqrt{5}-1)}{4}
\end{aligned}
$$

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) $\mathrm{S}(4,0)$
(v) $\mathrm{T}(0,4)$
(vi) $P(2,3)$
(vii) $U(-4,3)$
(viii) $V(-2,2)$
(ix) $\quad Q(3,-5)$
iii. Let the cost of 1 chair be $x$ and 1 table be $y$.

According to the given condition
$3 x+2 y=700$
$5 x+3 y=1100$

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

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

Putting this value of $y=200$ in (1) we get

$$
\begin{equation*}
3 x+2 y=700 \tag{1}
\end{equation*}
$$

$3 x+400=700$
$\mathrm{x}=100$
Hence, cost of 2 chairs and 2 tables is $2(x+y)=200+400=$ Rs. 600.

