KENDRIYA VIDYALAYA GACHIBOWLI, GPRA CAMPUS HYD – 32
REVISION TEST - 02 FOR BOARD EXAM 2021
(SAMPLE ANSWERS)

Max. marks: 40 **Time Allowed: 1½ hr**

SECTION – A (1 MARK EACH)

1. If α, β are roots of $x^2 + 5x + a = 0$ and $2\alpha + 5\beta = -1$, then find the value of a.

Here $\alpha + \beta = -5$ ...(i)
and $2\alpha + 5\beta = -1$ ...(ii)
Multiplying (i) by 2, we get
$\Rightarrow 2\alpha + 2\beta = -10$ ...(iii)
Solving (ii) and (iii), we get $\alpha = -8$, $\beta = 3$
Now $\alpha\beta = \frac{a}{1} \Rightarrow a = -24$

2. If p – 1, p + 3, 3p – 1 are in AP, then find the value of p.

$\because$ p – 1, p + 3 and 3p – 1 are in AP.
$\therefore 2(p + 3) = p - 1 + 3p - 1$
$\Rightarrow 2p + 6 = 4p - 2.$
$\Rightarrow -2p = -8 \Rightarrow p = 4.$

3. The perimeter of two similar triangles ABC and LMN are 60 cm and 48 cm respectively. If LM = 8cm, then what is the length of AB?

given that ΔABC ~ ΔLMN

$$\therefore \frac{\text{Perimeter of } \Delta ABC}{\text{Perimeter of } \Delta LMN} = \frac{AB}{LM} = \frac{BC}{MN} = \frac{AC}{LN}$$

Let AB = x cm

$$\Rightarrow \frac{60}{48} = \frac{x}{8} \quad \Rightarrow \quad x = \frac{60}{48} \times 8 = 10 \text{ cm}$$

$\therefore$ AB = 10 cm

4. The lengths of the diagonals of a rhombus are 30 cm and 40 cm. Find the side of the rhombus.

In a rhombus, $(\text{Side})^2 = \left(\frac{1}{2}d_1\right)^2 + \left(\frac{1}{2}d_2\right)^2$ [$\because$ Diagonals of a rhombus bisect each other at right angle]

$= \left(\frac{1}{2} \times 30\right)^2 + \left(\frac{1}{2} \times 40\right)^2$

$\text{Side}^2 = 225 + 400 = 625 \Rightarrow \text{Side} = 25$ cm.

5. Find the 10th term of the AP 2, 7, 12, ...

Here $a = 2$; $d = 7 - 2 = 5$.
So, $a_{10} = a + 9d = 2 + 9 \times 5 = 47$

6. The pair of equations ax + 2y = 7 and 3x + by = 16 represent parallel lines, then find relation between 'a' and 'b'.

For parallel lines, $\frac{a}{3} = \frac{2}{b} \neq \frac{7}{16} \Rightarrow ab = 6$

SECTION – B (2 MARKS EACH)

7. Form a quadratic polynomial, one of whose zero is √5 and the product of the zeroes is –2√5.

One zero = $\sqrt{5}$, Product of zeroes, P = $-2\sqrt{5}$

∴ Other zero = $\frac{-2\sqrt{5}}{\sqrt{5}}$ –2

∴ Sum of zeroes, S = $-2 + \sqrt{5}$

Quadratic polynomial

$$p(x) = x^2 - (S)x + P$$
$$= x^2 - (-2 + \sqrt{5})x + (-2\sqrt{5})$$
$$= x^2 + (2 - \sqrt{5})x - 2\sqrt{5}$$

8. The sum of n terms of an AP is $5n^2 - 3n$. Find the AP and also its 10th term.

Sum of n terms of given AP, $S_n = 5n^2 - 3n$

∴ Sum of $(n - 1)$ terms of given AP,

$S_{n-1} = 5(n-1)^2 - 3(n-1)$

$\Rightarrow S_{n-1} = 5(n^2 - 2n + 1) - 3n + 3$

$= 5n^2 - 10n + 5 - 3n + 3 = 5n^2 - 13n + 8$

∴ nth term of AP = $a_n = S_n - S_{n-1} = (5n^2 - 3n) - (5n^2 - 13n + 8)$

$\Rightarrow a_n = 10n - 8$

∴ 1st term of AP = 10 ×1 – 8 = 2

2nd term of AP = 10 × 2 – 8 = 12 and 3rd term of AP = 10 × 3 – 8 = 22

∴ Required AP is 2, 12, 22, ...

∴ $a_{10} = 10 \times 10 - 8 = 92$

9. Two poles of height 7 m and 12 m stand on a plane ground. If the distance between their feet is12 m, find the distance between their tops.

Two poles AB = 12 m, CD = 7 m, BD = 12 m

Draw CE || BD

BDCE is a rectangle

⇒ EB = CD = 7 m

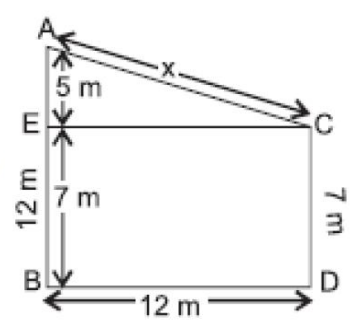
⇒ EC = BD = 12 m (opposite sides of a rectangle)

AE = AB – BE = 12 m – 7 m = 5 m and ΔAEC is a right triangle

$\Rightarrow AC^2 = AE^2 + EC^2$ (By Pythagoras theorem)

$\Rightarrow AC^2 = 5^2 + 12^2 = 25 + 144 = 169$

⇒ AC = 13 m = distance between their tops.



SECTION – C (3 MARKS EACH)

10. Find the HCF and LCM of 288, 360 and 384 by prime factorisation method.

Ans: Here $288 = 2^5 \times 3^2$

$360 = 2^3 \times 3^2 \times 5$ and

$384 = 2^7 \times 3$

The HCF of 288, 360 and 384 is the product of their common prime factor with least exponents.

HCF of (288, 360 and 384) = $2^3 \times 3 = 24$.

The LCM of 288, 360 and 384 is product of all prime factors with their highest exponents.

LCM of 288, 360 and 384 = $2^7 \times 3^2 \times 5 = 5760$

11. Find the zeroes of the quadratic polynomial $6x^2 - 3 - 7x$ and verify the relationship between the zeroes and the coefficients of the polynomial.

$p(x) = 6x^2 - 7x - 3 = 6x^2 - 9x + 2x - 3$
$= 3x(2x - 3) + 1(2x - 3)$
$= (3x + 1)(2x - 3)$
For $p(x) = 0$, $3x + 1 = 0$ or $2x - 3 = 0$
$\Rightarrow x = \frac{-1}{3}$ or $x = \frac{3}{2}$
$a = 6$, $b = -7$, $c = -3$
Sum of zeroes $= \frac{-1}{3} + \frac{3}{2} = \frac{7}{6}$
Also, $\frac{-b}{a} = \frac{-(-7)}{6} = \frac{7}{6}$
$\Rightarrow$ Sum of zeroes $= \frac{-b}{a}$
Now, product of zeroes $= \left(-\frac{1}{3}\right) \times \frac{3}{2} = \frac{-1}{2}$
Also, $\frac{c}{a} = \frac{-3}{6} = \frac{-1}{2}$.
$\Rightarrow$ Product of zeroes $= \frac{c}{a}$.

12. Solve the following pairs of equations for x and y: $\frac{15}{x-y} + \frac{22}{x+y} = 5$, $\frac{40}{x-y} + \frac{55}{x+y} = 13$, $x \neq y$, $x \neq -y$.

$\frac{15}{x-y} + \frac{22}{x+y} = 5$, $\frac{40}{x-y} + \frac{55}{x+y} = 13$
Let $\frac{1}{x-y} = u$, $\frac{1}{x+y} = v$
$15u + 22v = 5$ ...(i)
$40u + 55v = 13$ ...(ii)
Multiply equation (i) by 5 and (ii) by 2 and then subtract equation (ii) from (i).

$$\begin{array}{r} 75u + 110v = 25 \\ 80u + 110v = 26 \\ - \quad\; - \quad\;\; - \\ \hline -5u = -1 \end{array} \Rightarrow u = \frac{-1}{-5} \Rightarrow u = \frac{1}{5}$$

Putting value of u in equation (i), we get
$15\left(\frac{1}{5}\right) + 22v = 5 \Rightarrow 3 + 22v = 5 \Rightarrow 22v = 5 - 3$
$\Rightarrow 22v = 2 \Rightarrow v = \frac{2}{22} \Rightarrow v = \frac{1}{11}$
Since $\frac{1}{x-y} = u$ and $\frac{1}{x+y} = v$
$\Rightarrow \frac{1}{x-y} = \frac{1}{5}$ and $\frac{1}{x+y} = \frac{1}{11}$
$\therefore$ $x - y = 5$ ...(iii)
$x + y = 11$ ...(iv)
Adding equation (iii) and (iv), we get $2x = 16 \Rightarrow x = 8$
Putting value of x in equation (iii), we get $8 - y = 5 \Rightarrow -y = 5 - 8 \Rightarrow y = 3$
The solution is $x = 8$, $y = 3$.

13. Solve for x : $2\left(\frac{x-1}{x+3}\right)-7\left(\frac{x+3}{x-1}\right)=5$; given that x ≠ –3, x ≠ 1

$2\left(\frac{x-1}{x+3}\right)-7\left(\frac{x+3}{x-1}\right)=5$, Let $\frac{x-1}{x+3}=y$

∴ Given equation becomes

$2y - 7 \times \frac{1}{y} = \Rightarrow \frac{2y^2-7}{y}=5$

$\Rightarrow 2y^2 - 7 = 5y$

$\Rightarrow 2y^2 - 5y - 7 = 0$

$\Rightarrow 2y^2 - 7y + 2y - 7 = 0$

$\Rightarrow y(2y - 7) + 1\,(2y - 7) = 0$

$\Rightarrow (2y - 7)\,(y + 1) = 0$

$\Rightarrow y = \frac{7}{2}$ or $y = -1$

When $y = \frac{7}{2}$, then $\frac{x-1}{x+3} = \frac{7}{2}$

$\Rightarrow 2x - 2 = 7x + 21 \Rightarrow x = \frac{-23}{5}$

When $y = -1$, then $\frac{x-1}{x+3} = -1$

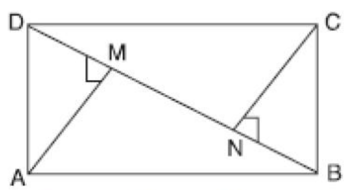
$\Rightarrow x - 1 = -x - 3 \Rightarrow x = -1$

14. ABCD is a rectangle. Points M and N are on BD, such that AM ⊥ BD and CN ⊥ BD. Prove that $BM^2 + BN^2 = DM^2 + DN^2$

In rt. ΔBMA, $BM^2 = AB^2 - AM^2$ ...(i)

In rt. ΔBNC, $BN^2 = BC^2 - CN^2$ ...(ii)

Adding (i) and (ii)



$BM^2 + BN^2 = AB^2 - AM^2 + BC^2 - CN^2$

ABCD is a rectangle,

i.e., AB = DC and AD = BC

$BM^2 + BN^2 = DC^2 - AM^2 + AD^2 - CN^2$

$= DC^2 - CN^2 + AD^2 - AM^2$

$= DN^2 + DM^2$. Hence proved.

SECTION – D (5 MARKS EACH)

15. Three sets of physics, chemistry and mathematics books have to be stacked in such a way that all the books are stored topic wise and the number of books in each stack is the same. The number of physics books is 192, the number of chemistry books is 240 and the number of mathematics books is 168. Determine the number of stacks of physics, chemistry and mathematics books.

Here, we have to find the HCF of 192, 240 and 168 because the HCF will be the largest number which divides 192, 240 and 168 exactly.

$192 = 2^6 \times 3$; $240 = 2^4 \times 3 \times 5$

$168 = 2^3 \times 3 \times 7$

Now, the HCF of 192, 240 and 168 is = $2^3 \times 3 = 24$
There must be 24 books in each stack.

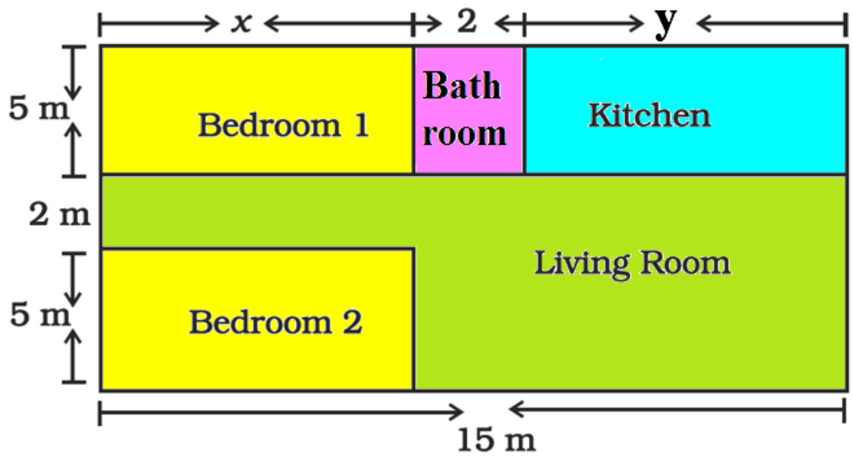
$\therefore$ Number of stacks of physics books = $\frac{192}{24} = 8$

Number of stacks of chemistry books = $\frac{240}{24} = 10$

Number of stacks of mathematics books = $\frac{168}{24} = 7$

CASE STUDY-BASED QUESTIONS (Each sub-question carries 1 mark)

16. In the below given layout, the design and measurements has been made such that area of two bedrooms and Kitchen together is 95 sq. m.



Based on the above information, answer the following questions: (Attempt any four)

(i) Form the pair of linear equations in two variables from this situation.

Area of two bedrooms = $10x$ sq.m
Area of kitchen = $5y$ sq. m
So, $10x + 5y = 95 \Rightarrow 2x + y = 19$
Also, $x + 2 + y = 15 \Rightarrow x + y = 13$

(ii) Find the length of the outer boundary of the layout.

Length of outer boundary = 12 + 15 + 12 + 15 = 54 m

(iii) Find the area of each bedroom and kitchen in the layout.

Solving $2x + y = 19$ and $x + y = 13$, we get $x = 6$ m and $y = 7$ m
Area of bedroom = 5 x 6 = 30 sq. m
Area of kitchen = 5 x 7 = 35 sq. m

(iv) Find the area of living room in the layout.

Area of living room = (15 x 7) – 30 = 105 – 30 =75 sq. m

(v) Find the cost of laying tiles in Kitchen at the rate of Rs. 50 per sq. m

Cost of $1m^2$ laying tiles in kitchen = Rs. 50
Total cost of laying tiles in kitchen = Rs. 50 x 35 = Rs. 1750

17. The production of TV sets in a factory increases uniformly by a fixed number every year. It produced 16000 sets in 6th year and 22600 in 9th year.

Based on the above information, answer the following questions: (Attempt any four)

Let the production during first year be a and let d be the increase in production every year. Then,

$a_6 = 16000 \Rightarrow a + 5d = 16000 \quad \ldots \text{(i)}$

and $a_9 = 22600 \Rightarrow a + 8d = 22600. \quad \ldots \text{(ii)}$

On subtracting (i) from (ii), we get

$3d = 6600 \Rightarrow d = 2200.$

Putting $d = 2200$ in (i), we get

$a + 5 \times 2200 = 16000 \Rightarrow a + 11000 = 16000$

$\Rightarrow \quad a = 16000 - 11000 = 5000.$

Thus, $a = 5000$ and $d = 2200$.

(i) Find the production during first year.
Production during first year, $a = 5000$.

(ii) Find the production during 8th year
Production during 8th year is given by
$a_8 = (a + 7d) = (5000 + 7(2200)) = (5000 + 15400) = 20400.$

(iii) Find the production during first 3 years.
$a_2 = (a + d) = (5000 + 2200) = 7200.$
$a_3 = (a_2 + d) = 7200 + 2200 = 9400.$
production during first 3 years = 5000 + 7200 + 9400 = 21600

(iv) In which year, the production is Rs. 29,200.
$a_n = 5000 + (n - 1)2200 = 29200$
$(n - 1)2200 = 29200 - 5000 = 24200 \Rightarrow n - 1 = 11 \Rightarrow n = 12$

(v) Find the difference of the production during 7^{th} year and 4^{th} year.
$a_4 = (a + 3d) = (5000 + 3(2200)) = 5000 + 6600 = 11600.$
$a_7 = (a_6 + d) = 16000 + 2200 = 18200.$
Difference = 18200 – 11600 = 6600