### Instructions to the Students

- Write only question numbers clearly outside the margin (1, 2, 3.i, 5.b, 4.c.ii, etc.).
- Do not write questions or any titles. (For ex. - Do not write **II. Answer the following**).
- After every answer, give a one-line space.
- For Multiple choice Questions - Both Option and Answer should be written.
- Bullet points & Sub-points should be written inside the margin.
- Do not fold / staple the paper.

Section A

Multiple Choice Questions: **(20 x 1 = 20)**

1.   LCM(P, 375, 225) = $3^3 \times 5^3$

HCF(P, 375, 225) = 3×5

Which of the following could be the value of P?

a) 15   b) 135

c) 670   d) (P cannot be uniquely determined)

Answer ☞

b) 135   (1)

2.   The co-ordinate of the point dividing the line segment joining the points A(1,3) and B(4, 6) in the ratio 2 : 1 is ....

a) (5, 3)   b) (3, 5)   c) (4, 6)   d) (6, 4)

Answer ☞

b) (3, 5)   (1)

3.   The pair of equations x + y = 2 and 2x + 2y = 5 has:

a) No solution   b) One solution   c) Infinite solutions   d) Two solutions

Answer ☞

a) No solution   (1)

4.   In the given figure, AB and AC are tangents to the circle with centre 'O' such that ∠BAC = 40°. Then calculate ∠BOC.
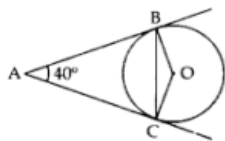
a) 140°   b) 40°   c) 180°   d) 90°

Answer ☞

a) 140°   (1)

5.   If sin θ +cos θ = $\sqrt{2}$, then tanθ +cot θ =

a) 4   b) 3   c) 2   d) 1

Answer ☞

c) 2   (1)

6.	If one zero of a quadratic polynomial $(kx^2 + 3x + k)$ is 2, then the value of k is

a) $\dfrac{5}{6}$ b) $-\dfrac{5}{6}$ c) $\dfrac{6}{5}$ d) $-\dfrac{6}{5}$

Answer ☞

d) $-\dfrac{6}{5}$

(1)

7.	In making 1000 revolutions a wheel covers 88 km, the diameter of the wheel in metres is

a) 14 m   b) 24 m   c) 28 m   d) 40 m

Answer ☞

c) 28 m

(1)

8.	Two dice are thrown simultaneously and the product of the numbers appearing on the tops is noted. The probability of the product to be less than 6 is :

a) $\dfrac{1}{6}$ b) $\dfrac{1}{4}$ c) $\dfrac{5}{18}$ d) $\dfrac{7}{18}$

Answer ☞

c) $\dfrac{5}{18}$

(1)

9.	If 3 tanα = 4 then, evaluate $\dfrac{3 \sin \alpha + 2 \cos \alpha}{3 \sin \alpha - 2 \cos \alpha}$

a) 3   b) 4   c) 12   d) 11

Answer ☞

a) 3

(1)

10.	Which of the following cannot be the unit digit of 8^n where n is a natural number?

a) 4   b) 2   c) 0   d) 6

Answer ☞

c) 0

(1)

11.	A solid piece of iron in the form of a cuboid of dimensions 49 cm × 33 cm × 24 cm, is moulded to form a solid sphere. The radius of the sphere is

a) 21 cm
b) 23 cm
c) 25 cm
d) 19 cm

Answer ☞

a) 21 cm

(1)

12.	If –2 and 3 are the zeros of the quadratic polynomial $x^2 + (a+1)x + b = 0$ then a & b = ?

a) a ,b = -2 ,6   b) a ,b = 2, -6   c) a ,b = -2, -6   d) a, b = 2,6
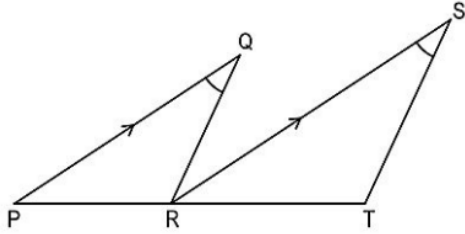
Answer ☞

c) a ,b = -2, -6

(1)

13.	In a circle of radius 14 cm, an arc subtends an angle of 30° at the centre, the length of the arc is

a) 44 cm   b) 28 cm   c) 11 cm   d) $\dfrac{22}{3}$ cm

Answer ☞

d) $\dfrac{22}{3}$ cm

(1)

14. In the given figure, PT is a line segment, R is a point on PT, PQ is parallel to RS and ∠PQR = ∠RST.

Which of the following criteria can be used to prove that ΔPQR and ΔRST are similar?
a) Side-Side-Side similarity criterion
b) Side-Angle-Side similarity criterion
c) Angle-Angle-Angle similarity criterion
d) (None of these, as ΔPQR and ΔRST are not similar)

Answer ☞

c) Angle-Angle-Angle similarity criterion

(1)

15. The table below shows all the possible outcomes when two dice are thrown together.

1, 1	1, 2	1, 3	1, 4	1, 5	1, 6
2, 1	2, 2	2, 3	2, 4	2, 5	2, 6
3, 1	3, 2	3, 3	3, 4	3, 5	3, 6
4, 1	4, 2	4, 3	4, 4	4, 5	4, 6
5, 1	5, 2	5, 3	5, 4	5, 5	5, 6
6, 1	6, 2	6, 3	6, 4	6, 5	6, 6

Study the table and answer the following question.
What is the probability of getting 6 as the sum of the two numbers that turn up?
a) $\dfrac{7}{36}$ b) $\dfrac{6}{36}$ c) $\dfrac{5}{36}$ d) $\dfrac{4}{36}$

Answer ☞

c) $\dfrac{5}{36}$

(1)

16. The line segment joining P(3, -4) and S(1, 2) is trisected by the point R($\dfrac{5}{3}$, k). What is the value of k?
a) -2   b) 0   c) $\dfrac{8}{3}$ d) 8

Answer ☞

b) 0

(1)

17. The mean of 10 observations is 25. If one observation 40 is replaced by 50, the new mean is:
a) 26   b) 25.5   c) 27   d) 24

Answer ☞

a) 26

(1)

18. The area of a sector of a circle of radius 14 cm is 154 cm². Find the angle of the sector.
a) 90°   b) 160°   c) 140°   d) 150°

Answer ☞

a) 90°

(1)

19.

Assertion (A): If $\sin A = \frac{1}{3}$, ($0° < A < 90°$) , then the value of $\cos A$ is $\frac{2\sqrt{2}}{3}$.

Reason (R): For every angle θ, $\sin^2\theta + \cos^2\theta = 1$

a) Both A and R are true and R is the correct explanation of A.
b) Both A and R are true but R is not the correct explanation of A.
c) A is true but R is false.
d) A is false but R is true

Answer ☞

a) Both A and R are true and R is the correct explanation of A.   (1)

20.

Assetion (A) : $\frac{13}{3125}$ is a terminationg decimal fraction.

Reason (R) : If $q = 2^m 5^n$ where m n, are non-negative integers, then $\frac{p}{q}$ is a terminating decimal fraction.

a) Both (A) and (R) are true and (R) is the correct explanation of (A)
b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
c) (A) is correct but (R) is wrong
d) (A) is wrong but (R) is correct

Answer ☞

a) Both (A) and (R) are true and (R) is the correct explanation of (A)   (1)

Section B

Very Short Answer Type Questions: (5 x 2 = 10)

21.a. The 4th term of an AP is zero. Prove that the 25th term of the AP is three times its 11th term.

Answer ☞

1) 25th term of an A.P. $= a_{25}$ (0.5)

2) $= a + (25 - 1)d = 21d$ (0.5)

3) $= 3 \times 7d = 21d$ (0.5)

4) $\therefore a_{25} = 3a_{11}$ (0.5)

(OR)

21.b. Find the 9th term from the end (towards the first term) of the A. P. 5, 9, 13, ………….., 185.

Answer ☞

1) $d = -4,\ a = 185$ (0.5)

2) $a_9 = a + (n - 1)d$ (0.5)

3) $185 + (9 - 1)(-4)$ (0.5)

4) The 9th term from the end is $= 153$ (0.5)

5) Any valid response   (2)

22.

Prove that $\dfrac{1}{\sec A - 1} + \dfrac{1}{\sec A + 1} = 2\ \text{cosec}\ A \cdot \cot A$

Answer ☞

1) $\dfrac{\text{sen } A + 1 + \sec A - 1}{(\sec A - 1)(\sec A + 1)}$ (0.5)

2) $= \dfrac{2\sec A}{\sec^2 A - 1} = \dfrac{2\sec A}{\tan^2 A} = \dfrac{2\cos A}{\sin^2 A}$ (0.5)

3) $= 2\dfrac{\cos A}{\sin A} \cdot \dfrac{1}{\sin A}$ (0.5)

4) $= 2\ \text{cosec}\ A \cdot \cot A = RHS$ (0.5)

5) Any Valid Response   (2)

23. Prove that tangents from an external point to circle are equal in length

Answer ✑

1) $\therefore \angle OPT = \angle OQT = 90°$ (0.5)

2) $In \triangle OPT and \triangle OQT, \ OT = OT \dots (Common), \ OP = OQ \dots (Radius \ of \ the \ circle)$ (0.5)

3) $\therefore \triangle OPT \cong \triangle OQT \dots (RHS \ congruence \ criterion)$ (0.5)

4) $TP = TQ \dots (CPCT)$ (0.5)

24.a. A piece of wire 22cm long is bent into the form of an arc of a circle subtending an angle of 60° at its centre.Find the radius of the circle.
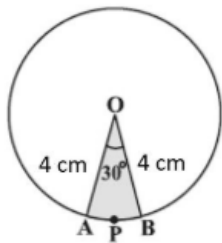
Answer ✑

1) $22 = \dfrac{60}{360} \times 2 \times \dfrac{22}{7} \times r$ (1)

2) $r = \dfrac{7 \times 6}{2} = 21cm$ (1)

3) $r = 21$ cm   (1)

(OR)

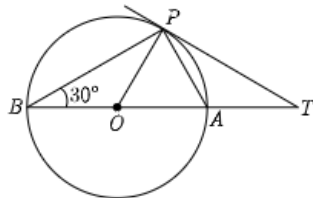**24.b.** Find the area of the sector of a circle with radius 4 cm and of angle 30°.

Answer ✑

1) Area of the sector $= \dfrac{\theta}{360} \times \pi r^2$ (0.5)

2) $= \dfrac{30}{360} \times 3.14 \times 4 \times 4 \ \text{cm}^2$ (0.5)

3) $= \dfrac{12.56}{3} \ \text{cm}^2$ (0.5)

4) $= 4.19 \ \text{cm}^2$ (approx.)   (0.5)

25. In the given figure, BOA is a diameter of a circle and the tangent at a point P meets BA when produced at T . If ∠ PBO =30º , what is the measure of ∠ PTA?

Answer ✑

1) $\angle POT = \angle POA = \angle OBP + \angle OPB = 30^0 + 30^0 = 60^0$ (0.5)

2) $= Since O P is radius and PT is tangent at P, OP \perp PT, \angle OPT = 90^0$ (0.5)

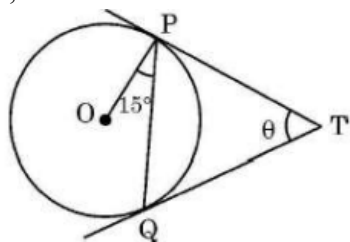3) $\angle PTO = 180° - (\angle OPT + \angle POT)$ (0.5)

4) $Thus \angle PTA = \angle PTO = 30°$ (0.5)

Section C

Short Answer Type Questions: (6 x 3 = 18)

26. In the adjoining figure, TP and TQ are tangents drawn to a circle with centre O. If ∠OPQ = 15°and ∠PTQ = θ, then find the value of sin 2θ.

> **Answer** ☞
>
> 1) ∠QPT = 75° (0.5)
>
> 2) ∠PQT = 75° (0.5)
>
> 3) θ = 30° (1)
>
> 4) $\sin 2\theta = \sin 2\,(30°)$ (0.5)
>
> 5) $= \sin 60° = \dfrac{\sqrt{3}}{2}$ (0.5)

27. Two tankers contain 850 liters and 680 liters of petrol. Find the maximum capacity of a container which can measure the petrol of each tanker in the exact number of times.

> **Answer** ☞
>
> 1) $Maximum\ capacity\ of\ a\ container\ =\ HCF(850, 680)$ (1)
>
> 2) $850\ =\ 2 \times 5^2 \times 17$ (0.5)
>
> 3) $680\ =\ 2^3 \times 5 \times 17$ (0.5)
>
> 4) $HCF\ =\ 2 \times 5 \times 17 = 170$ (1)

28. Zeroes of the quadratic polynomial $p(x) = (a^2 + 10)x^2 – 74x + 7a$ are reciprocal of each other and they are rational. Find the value of 'a'.

> **Answer** ☞
>
> 1) $Since\ zeroes\ are\ reciprocal\ of\ each\ other.\ \therefore\ \dfrac{7a}{a^2 + 10}\ =\ 1$ (1)
>
> 2) $\Rightarrow a^2 - 7a + 10\ =\ 0$ (1)
>
> 3) $\Rightarrow (a - 2)(a - 5)\ =\ 0$ (0.5)
>
> 4) $\Rightarrow a\ =\ 2, 5$ (0.5)

29.a. Find the value of sin30º cos 60º+cos 30º sin 60º is it equal to sin 90º or cos 90º ?

> **Answer** ☞
>
> 1) $\sin 30° \cos 60° + \cos 30° \sin 60°\ =\ \dfrac{1}{2} \times \dfrac{1}{2} + \dfrac{\sqrt{3}}{2} \times \dfrac{\sqrt{3}}{2}$ (0.5)
>
> 2) $=\ \dfrac{1}{4} + \dfrac{3}{4}$ (0.5)
>
> 3) $=\ \dfrac{4}{4}$ (0.5)
>
> 4) $=\ 1$ (0.5)
>
> 5) $It\ is\ equal\ to\ \sin 90°\ =\ 1\ but\ not\ equal\ to\ \cos 90°\,as \cos 90° = 0$ (1)

(OR)

29.b.

Prove that $\dfrac{\cos^2 \theta}{1 - \tan \theta} + \dfrac{\sin^2 \theta}{1 - \cot \theta} = 1 + \sin \theta \cos \theta$

Answer ☞

1) $= \dfrac{\cos^3 \theta}{\cos \theta - \sin \theta} - \dfrac{\sin^3 \theta}{\cos \theta - \sin \theta}$ (1)

2) $= \dfrac{\cos^3 \theta - \sin^3 \theta}{\cos \theta - \sin \theta}$ (0.5)

3) $= \dfrac{(\cos \theta - \sin \theta)\left(\sin^2 \theta + \cos^2 \theta + \sin \theta \cos \theta\right)}{\cos \theta - \sin \theta}$ (1)

4) $= 1 + \sin \theta \cos \theta$ (0.5)

30. Cards marked with numbers 2 to 101 are placed in a box and mixed. One card is drawn at random, find the probability that the number is

a) an even number

b) a number less than 14

c) a number which is a perfect square

Answer ☞

1) $a)P(even\,number) = \dfrac{50}{100} = \dfrac{1}{2}$ (1)

2) $b)p(less\,than\,14) = \dfrac{12}{100} = \dfrac{3}{25}$ (1)

3) $c)P(Perfect\,square) = \dfrac{9}{100}.$ (1)

31.a. Solve the following pair of linear equations :

8x+5y=9

3x+2y=4

Answer ☞

1) $x = \dfrac{4 - 2y}{3}$ (0.5)

2) $8\left(\dfrac{4 - 2y}{3}\right) + 5y = 9$ (0.5)

3) $32 - 16y + 15y = 27$ (0.5)

4) $y = 5$ (0.5)

5) $x = \dfrac{4 - 2(5)}{3}$ (0.5)

6) $= \dfrac{4 - 10}{3} = -2$ (0.5)

(OR)

31.b. Find whether the following pair of linear equations has a unique solutions. If yes, find the solution
: 7x-4y=49,5x-6y=57

Answer ☞

1) $Since, \dfrac{a_1}{a_2} = \dfrac{7}{5} \; and \; \dfrac{b_1}{b_2} = \dfrac{4}{6}$ (0.5)

2) $= \dfrac{a_1}{a_2} \neq \dfrac{b_1}{b_2}$,So, system has a unique solution (0.5)

3) $35x - 20y = 245$, $35x - 42y = 399$ (0.5)

4) $y = -7$ (0.5)

5) $5x - 6(-7) = 57$ (0.5)

6) $x = 3$ (0.5)

Section D

Long Answer Type Questions: **(4 x 5 = 20)**

32. Find the zeroes of the quadratic polynomial $7y^2 - \dfrac{11}{3}y - \dfrac{2}{3}$ and verify the relationship between the zeroes and the coefficients.

Answer ☞

1) $21y^2 - 11y - 2 = 0$ (0.5)

2) (3y - 2)(7y + 1) (0.5)

3) $p(y) = \dfrac{2}{3} \; and - \dfrac{1}{7}$ (1)

4) $\therefore$ Sum of zeroes $\alpha + \beta = \dfrac{2}{3} - \dfrac{1}{7} \Rightarrow \dfrac{11}{21}$ (0.5)

5) $\dfrac{-(\text{coefficient of } y)}{\text{coefficient of } y^2} = -\left(\dfrac{-11}{3 \times 7}\right) \Rightarrow \dfrac{11}{21}$ (1)

6) $Product \; of \; zeroes \; \alpha\beta = \left(\dfrac{2}{3}\right)\left(-\dfrac{1}{7}\right) \Rightarrow -\dfrac{2}{21}$ (0.5)

7) $\dfrac{\text{constant term}}{\text{coefficient of } y^2} = \dfrac{-2}{3 \times 7} \Rightarrow -\dfrac{2}{21}$ (1)

8) Alternative method. (5)

33. If AD and PM are medians of triangles ΔABC and $\Delta PQR,$ respectively where $\Delta ABC \sim \Delta PQR,$ prove that $\dfrac{AB}{PQ} = \dfrac{AD}{PM}$

Answer ☞

1) $\triangle ABC \sim \triangle PQR \Rightarrow \dfrac{AB}{PQ} = \dfrac{BC}{QR} = \dfrac{AC}{PR} \ldots \ldots (1)$ (1)

2) $Also \; , \; \angle A = \angle P, \angle B = \angle Q, \angle C = \angle R \ldots (2)$ (0.5)

3) BD $= \dfrac{BC}{2} \; and \; QM = \dfrac{QR}{2} \; \ldots \ldots (3)$ (0.5)

4) $From \, (1) \; and \; (3) \, , \dfrac{AB}{PQ} = \dfrac{BD}{QM} \ldots . (4)$ (1)

5) $In \; \Delta ABD \; and \; \Delta PQM, \; \dfrac{AB}{PQ} = \dfrac{BD}{QM} \ldots .. [\text{ from (4) }]$ (1)

6) $Hence \; by \; SAS \; Similarity \; criterion \; , \triangle ABD \sim \triangle PQM$ (0.5)

7) $\dfrac{AB}{PQ} = \dfrac{AD}{PM} \; (\sin ce \; corresponding \; sides \; of \; similar \; triangles \; are \; proportional)$ (0.5)

34.a. A Gulab jamun, contains sugar syrup up to about 30% of its volume. Find approximately how much syrup would be found in 45 Gulab jamuns, each shaped like cylinder with two hemispherical ends with Length 5 cm and diameter 2.8 cm.
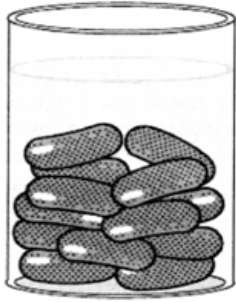
Answer ⚷

1) $radius\,of\,cylinder\ =\ 2.8 \div 2 = 1.4\,\text{cm}$ (0.5)

2) $Height\ of\ cylinder\ =\ 5 - 2.8 = 2.2\,\text{cm}$ (0.5)

3) $=\ \pi r^2\,h + 2 \times \dfrac{2}{3}\,\pi r^3$ (0.5)

4) $=\ \dfrac{22}{7}\,(1.4)^2 \times 2.2 + 2 \times \dfrac{2}{3} \times \dfrac{22}{7} \times (1.4)^3$ (0.5)

5) $=\ 25.05\ \text{cm}^3$ (0.5)

6) $Volume\ of\ 45\ Gulabjamun\ =\ 45 \times 25.05$ (0.5)

7) $Syrup\ in\ 45\ Gulabjamun\ =\ 30\% \times 45 \times 25.05$ (0.5)

8) $=\ \dfrac{30}{100} \times 45 \times 25.05$ (0.5)

9) $=\ 338.175\ \text{cm}^3\ (or)\ \approx 338\ \text{cm}^3$ (1)

10) Alternative method (5)

(OR)

34.b. A medicine capsule is in the shape of a cylinder with two hemispheres stuck at each of its ends. The length of the entire capsule is 14 mm and the diameter of the capsule is 5 mm. Find its surface area.
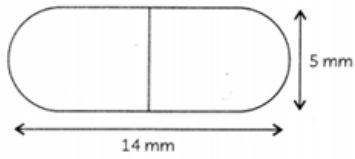
Answer ⚷

1) $Height\,of\,cylinder = 14 - 5 = 9\,\text{mm}$ (0.5)

2) CSA of cylinder $= 2\pi rh$ (0.5)

3) $= 2 \times \dfrac{22}{7} \times 2.5 \times 9$ (0.5)

4) $= \dfrac{990}{7}\,\text{mm}^2$ (0.5)

5) $CSA\,of\,hemispheres = 2\pi r^2$ (0.5)

6) $= 2 \times \dfrac{22}{7} \times (2.5)^2$ (0.5)

7) $= \dfrac{275}{7}\,\text{mm}^2$ (0.5)

8) $CSA\,of\,2\,hemispheres = \dfrac{550}{7}\,\text{mm}^2$ (0.5)

9) $Total\,area\,of\,capsule = \dfrac{1540}{7}$ (0.5)

10) $= 220\,\text{mm}^2$ (0.5)

11) Another method   (5)

35.a. The median of 80 observations given in the following table is 138. Find the values of 'a' and 'b'.

Class Interval	Frequency
65 – 85	5
85 – 105	a
105 – 125	13
125 – 145	20
145 – 165	b
165 – 185	10
185 – 205	7

Answer ☞

C.I.	f_i	u_i
65 – 85	5	5
85 – 105	a	5 + a
105 – 125	13	18 + a
125 – 145	20	38 + a
145 – 165	b	38 + a + b
165 – 185	10	48 + a + b
185 – 205	7	55 + a + b

$\therefore 55 + a + b = 80$

$\Longrightarrow a + b = 25$

Median class is 125 – 145

Median = 138

$\therefore 125 + \left(\dfrac{\frac{80}{2} - (18+a)}{20}\right) \times 20 = 138$

$\Longrightarrow a = 9$

and b = 16

Table   (1)

$55 + a + b = 80 \Longrightarrow a + b = 25$ (1)

Median class is 125 – 145, Median = 138   (0.5)

$125 + (80/2 - (18+a)/20) \times 20 = 138$ (1)

a=9   (1)

b=16   (0.5)

(OR)

35.b. A survey regarding heights (in cm) of 51 girls of class X of a school was conducted and the following data was obtained:

Heights (in cm)	Number of girls
less than 140	04
less than 145	11
less than 150	29
less than 155	40
less than 160	46
less than 165	51

Find the median height of girls. If mode of the above distribution is 148.05, find the mean using empirical formula.

Answer ☞

Heights (in cm)	Number of girls	Class Interval	Frequency
less than 140	04	135 – 140	4
less than 145	11	140-145	7
less than 150	29	145-150	18
less than 155	40	150-155	11
less than 160	46	155-160	6
less than 165	51	160-165	5

$$\text{Median} = l + \left(\frac{\frac{N}{2} - cf}{f}\right) \times h \qquad (1)$$

$$= 145 + \left(\frac{\frac{51}{2} - 11}{18}\right) \times 5$$

Median height = 149.03   (1)

3 × Median = Mode + 2 × Mean

3 × 149.03 = 148.05 + 2 × Mean   (1)

Mean = 149.52   (1)

Table	(1)
Median formula	(1)
Median height = 149.03	(1)
3 × 149.03 = 148.05 + 2 × Mean	(1)
Mean = 149.52	(1)

Section E

Case Based Questions: (3 x 4 = 12)

36. Manpreet Kaur is the national record holder for women in the shot-put discipline. Her throw of 18.86m at the Asian Grand Prix in 2017 is the maximum distance for an Indian female athlete. Keeping her as a role model, Sanjitha is determined to earn gold in Olympics one day. Initially her throw reached 7.56m only. Being an athlete in school, she regularly practiced both in the mornings and in the evenings and was able to improve the distance by 9cm every week. During the special camp for 15 days, she started with 40 throws and every day kept increasing the number of throws by 12 to achieve this remarkable progress.

36.i. How many throws Sanjitha praccticed on 11th day of the camp? [1]

Answer ☞
160 throws (1)

36.ii. How many throws did she do during the entire camp of 15 days? [1]

Answer ☞
1860 throws (1)

36.iii.a. When will she be able to achieve a throw of 11.16 m? [2]

Answer ☞
1) $t_n = a + (n - 1) d$ (0.5)
2) $3.6 = (n - 1) \times 0.09$ (0.5)
3) $n = 41$ weeks (1)

(OR)

36.iii.b. What would be Sanjitha's throw distance at the end of 6 weeks? [2]
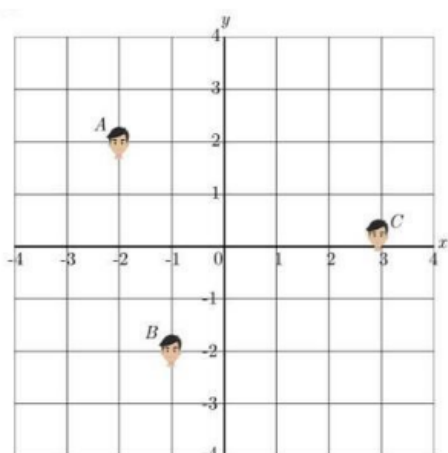
Answer ☞
1) $t_n = a + 6d$ (0.5)
2) $7.56 + 0.54$ (0.5)
3) 8.1m (1)

37. Aditya, Ritesh and Damodar are fast friends since childhood. They always want to sit in a row in the classroom . But teacher doesn't allow them and rotate the seats row- wise everyday. Ritesh is very good in maths and he does distance calculation everyday. He consider the centre of class as origin and marks their position on a paper in a co-ordinate system. One day Ritesh make the following diagram of their seating position marked Aditya as A, Ritesh as B and Damodar as C.

37.i. What is the distance between A and B? [1]

Answer ☞
$\sqrt{17}$ (1)

37.ii. What is the distance between B and C? [1]

Answer ☞

1) $BC = \sqrt{(-1-3)^2 + (-2-2)^2}$ (0.5)

2) $\sqrt{20}$ or $2\sqrt{5}$ (0.5)

37.iii.a. A point D lies on the line segment between points A and B such that AD :DB= 4 :3. What are the the coordinates of point D? [2]

Answer ☞

$D = \left(\dfrac{-10}{7}, \dfrac{-2}{7}\right)$ (2)

(OR)

37.iii.b. If the point P(k, 0) divides the line segment joining the points A(2, -2) and B(-7, 4) in the ratio 1: 2, then find the value of k. [2]

Answer ☞

k = -1 (2)

38. One evening, Kaushik was in a park. Children were playing cricket. Birds were singing on a nearby tree of height 80m. He observed a bird on the tree at an angle of elevation of 45°. When a sixer was hit, a ball flew through the tree frightening the bird to fly away. In 2 seconds, he observed the bird flying at the same height at an angle of elevation of 30° and the ball flying towards him at the same height at an angle of elevation of 60°.
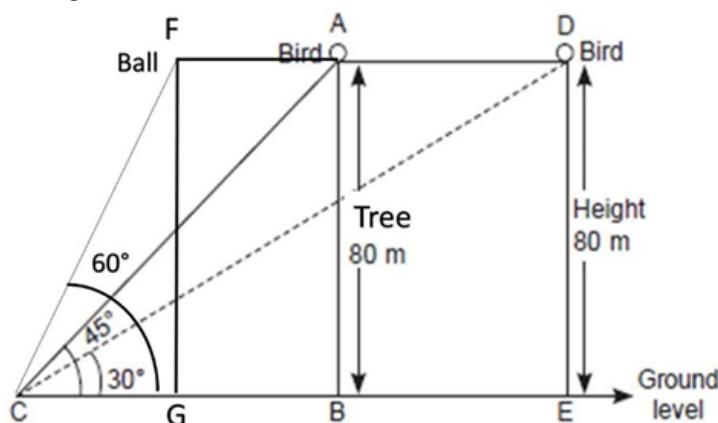
38.i. At what distance from the foot of the tree was he observing the bird sitting on the tree? [1]

Answer ☞

BC = 80m (1)

38.ii. What is the speed of the bird in m/min if it had flown 20($\sqrt{3}$ + 1) m? [1]

Answer ☞

$600\left(\sqrt{3}+1\right)$ m/min (1)

38.iii.a. After hitting the tree, how far did the ball travel in the sky when Kaushik saw the ball? [2]

Answer ☞

1) $\dfrac{80\sqrt{3}}{3} = \dfrac{80}{\sqrt{3}}$ (1)

2) $80\left(1 - \dfrac{1}{\sqrt{3}}\right) m$ (1)

(OR)

38.iii.b. How far did the bird fly in the mentioned time? [2]

Answer ☞

1) $CE = 80\sqrt{3}\, m$ (2)

2) $80\left(\sqrt{3}-1\right) m$ (1)