Marking Scheme
Strictly Confidential
(For Internal and Restricted use only)
Secondary School Examination, 2024
SUBJECT NAME MATHEMATICS (BASIC) (Q.P. CODE 430/3/3)

General Instructions: -	
1	You are aware that evaluation is the most important process in the actual and correct assessment of the candidates. A small mistake in evaluation may lead to serious problems which may affect the future of the candidates, education system and teaching profession. To avoid mistakes, it is requested that before starting evaluation, you must read and understand the spot evaluation guidelines carefully.
2	**"Evaluation policy is a confidential policy as it is related to the confidentiality of the examinations conducted, evaluation done and several other aspects. Its leakage to public in any manner could lead to derailment of the examination system and affect the life and future of millions of candidates. Sharing this policy/document to anyone, publishing in any magazine and printing in News Paper/Website etc. may invite action under various rules of the Board and IPC."**
3	Evaluation is to be done as per instructions provided in the Marking Scheme. It should not be done according to one's own interpretation or any other consideration. Marking Scheme should be strictly adhered to and religiously followed. **However, while evaluating, answers which are based on latest information or knowledge and/or are innovative, they may be assessed for their correctness otherwise and due marks be awarded to them. In class-X, while evaluating two competency-based questions, please try to understand given answer and even if reply is not from marking scheme but correct competency is enumerated by the candidate, due marks should be awarded.**
4	The Marking scheme carries only suggested value points for the answers. These are in the nature of Guidelines only and do not constitute the complete answer. The students can have their own expression and if the expression is correct, the due marks should be awarded accordingly.
5	The Head-Examiner must go through the first five answer books evaluated by each evaluator on the first day, to ensure that evaluation has been carried out as per the instructions given in the Marking Scheme. If there is any variation, the same should be zero after deliberation and discussion. The remaining answer books meant for evaluation shall be given only after ensuring that there is no significant variation in the marking of individual evaluators.
6	Evaluators will mark(✓) wherever answer is correct. For wrong answer CROSS 'X" be marked. Evaluators will not put right (✓)while evaluating which gives an impression that answer is correct and no marks are awarded. **This is most common mistake which evaluators are committing.**
7	If a question has parts, please award marks on the right-hand side for each part. Marks awarded for different parts of the question should then be totaled up and written in the left-hand margin and encircled. This may be followed strictly.
8	If a question does not have any parts, marks must be awarded in the left-hand margin and encircled. This may also be followed strictly.
9	If a student has attempted an extra question, answer of the question deserving more marks should be retained and the other answer scored out with a note **"Extra Question"**.
10	No marks to be deducted for the cumulative effect of an error. It should be penalized only

	once.
11	A full scale of marks (0-80) (example 0 to 80/70/60/50/40/30 marks as given in Question Paper) has to be used. Please do not hesitate to award full marks if the answer deserves it.
12	Every examiner has to necessarily do evaluation work for full working hours i.e., 8 hours every day and evaluate 20 answer books per day in main subjects and 25 answer books per day in other subjects (Details are given in Spot Guidelines).This is in view of the reduced syllabus and number of questions in question paper.
13	Ensure that you do not make the following common types of errors committed by the Examiner in the past:- ● Leaving answer or part thereof unassessed in an answer book. ● Giving more marks for an answer than assigned to it. ● Wrong totaling of marks awarded on an answer. ● Wrong transfer of marks from the inside pages of the answer book to the title page. ● Wrong question wise totaling on the title page. ● Wrong totaling of marks of the two columns on the title page. ● Wrong grand total. ● Marks in words and figures not tallying/not same. ● Wrong transfer of marks from the answer book to online award list. ● Answers marked as correct, but marks not awarded. (Ensure that the right tick mark is correctly and clearly indicated. It should merely be a line. Same is with the X for incorrect answer.) ● Half or a part of answer marked correct and the rest as wrong, but no marks awarded.
14	While evaluating the answer books if the answer is found to be totally incorrect, it should be marked as cross (X) and awarded zero (0)Marks.
15	Any unassessed portion, non-carrying over of marks to the title page, or totaling error detected by the candidate shall damage the prestige of all the personnel engaged in the evaluation work as also of the Board. Hence, in order to uphold the prestige of all concerned, it is again reiterated that the instructions be followed meticulously and judiciously.
16	The Examiners should acquaint themselves with the guidelines given in the "**Guidelines for spot Evaluation**" before starting the actual evaluation.
17	Every Examiner shall also ensure that all the answers are evaluated, marks carried over to the title page, correctly totaled and written in figures and words.
18	The candidates are entitled to obtain photocopy of the Answer Book on request on payment of the prescribed processing fee. All Examiners/Additional Head Examiners/Head Examiners are once again reminded that they must ensure that evaluation is carried out strictly as per value points for each answer as given in the Marking Scheme.

Set 430/3/3

MARKING SCHEME
MATHEMATICS (BASIC)

SECTION A

20×1=20

1. From an external point P, a tangent PA is drawn to a circle. The number of tangents through P parallel to PA is :

(A) 2 (B) more than 2

(C) 1 (D) 0

Ans. (D) 0 *1*

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2. If the volume of a sphere is $\frac{11}{21}$ cm^3, then the radius of the sphere is :

(A) 2 cm (B) 4 cm

(C) $\frac{1}{2}$ cm (D) $\frac{1}{4}$ cm

Ans.. (C) $\frac{1}{2}$ cm *1*

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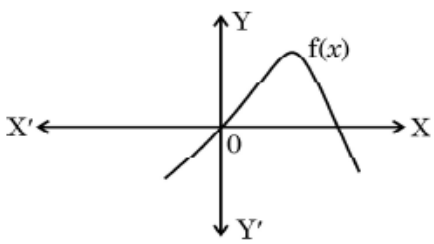
3. In the given figure, graph of a polynomial f(x) is shown. The number of zeroes of polynomial f(x) is



(A) 3 (B) 1

(C) 0 (D) 2

Ans. (D) 2 *1*

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4. If for a distribution, $\sum_{1}^{n} f_i x_i = 132 + 5p$, $\sum_{1}^{n} f_i = 20$ and the mean of the distribution is 8.1, then the value of p is :

(A) 3 (B) 6

(C) 4 (D) 5

Ans. (B) 6 *1*

---

5. If in an A.P., a = 2 and $S_{10} = 335$, then its 10^{th} term is :

(A) 55 (B) 65

(C) 68 (D) 58

Ans. (B) 65 *1*

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6. From a solid cube of side 14 cm, a sphere of maximum diameter is carved out. The radius of sphere is :

(A) 7 cm (B) 14 cm

(C) $\frac{7}{2}$ cm (D) $\sqrt{14}$ cm

Ans. (A) 7 cm *1*

---

7. If the two zeroes of a quadratic polynomial are $\pm \sqrt{5}$, then the quadratic polynomial is :

(A) $x^2 + 5$ (B) $(x + \sqrt{5})^2$

(C) $4(x^2 - 5)$ (D) $x^2 - \sqrt{5}$

Ans. (C) $4(x^2 - 5)$ *1*

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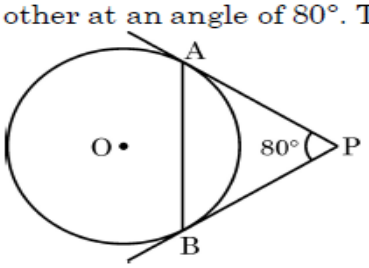
8. In the given figure, tangents PA and PB drawn from P to circle are inclined to each other at an angle of 80°. The measure of ∠PAB is



(A) 80° (B) 60°

(C) 50° (D) 40°

Ans. (C) 50° *1*

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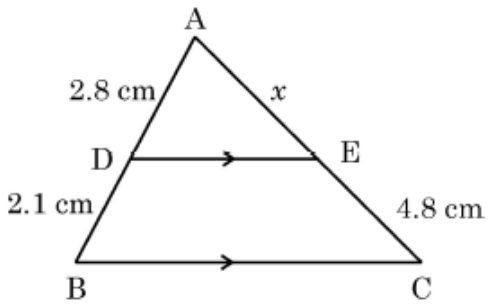
9. If in the given figure, DE || BC. If AD = 2.8 cm, DB = 2.1 cm and EC = 4.8 cm, then the value of x is :



(A) 3.6 cm (B) 2.4 cm
(C) 6.4 cm (D) 4.8 cm

Ans. (C) 6.4 cm *1*

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10. In a right-angled triangle ABC, $\angle A = 90°$ and AB = AC. The value of sin C is :

(A) 0 (B) $\frac{\sqrt{3}}{2}$

(C) $\frac{1}{2}$ (D) $\frac{1}{\sqrt{2}}$

Ans. (D) $\frac{1}{\sqrt{2}}$ *1*

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11. Two fair coins are tossed together. The probability of getting 2 heads, is :

(A) $\frac{1}{2}$ (B) $\frac{3}{4}$

(C) $\frac{1}{4}$ (D) $\frac{3}{8}$

Ans. (C) $\frac{1}{4}$ *1*

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12. If the mean and median of a data are 10 and 11 respectively, then mode of the data is :

(A) 12 (B) 8
(C) 20 (D) 13

Ans. (D) 13 *1*

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13. If the distances of the point P(x, y) from (1, 0) and (0, 1) are equal, then which of the following is true ?

(A) $x + y = 0$ (B) $x = y + 1$

(C) $y = x + 1$ (D) $x = y$

Ans. (D) $x = y$ *1*

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14. The value(s) of k for which the quadratic equation $5x^2 - 9kx + 5 = 0$ has real and equal roots, is/are :

(A) $\frac{-10}{9}$ (B) $\pm \frac{9}{10}$

(C) $\frac{10}{9}$ (D) $\pm \frac{10}{9}$

Ans. (D) $\pm \frac{10}{9}$ *1*

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15. The lines represented by linear equations $x = a$ and $y = b$ $(a \neq b)$ are

(A) intersecting at (a, b). (B) intersecting at (b, a).

(C) parallel. (D) coincident.

Ans. (A) intersecting at (a, b) *1*

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16. If $\cos \theta = \frac{1}{\sqrt{2}}$ then $\tan \theta$ is equal to

(A) $\frac{1}{\sqrt{2}}$ (B) 0

(C) 1 (D) $\sqrt{2} + 1$

Ans. (C) 1 *1*

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17. A die is thrown once. The probability of getting a number less than 6, is :

(A) 0 (B) $\frac{5}{6}$

(C) $\frac{1}{6}$ (D) 1

Ans. (B) $\frac{5}{6}$ *1*

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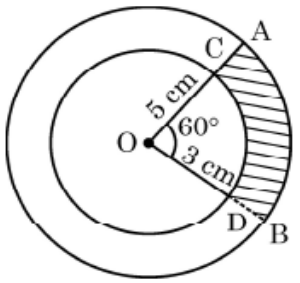
18. In the given figure, two concentric circles of radii 5 cm and 3 cm have their centre O. OAB is a sector of outer circle making an angle of 60° at the centre while OCD is the sector of smaller circle. The area of the shaded region is :



(A) $\frac{7\pi}{2}$ cm^2 (B) $\frac{8\pi}{3}$ cm^2

(C) $\frac{25\pi}{6}$ cm^2 (D) $\frac{3\pi}{2}$ cm^2

Ans. (B) $\frac{8\pi}{3}$ cm^2 *1*

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19. **Assertion (A) :** The distance of P(a, b) from origin is $a^2 + b^2$.

Reason (R) : The distance between two points A(x_1, y_1) and B(x_2, y_2) is $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$.

Ans. (D) Assertion (A) is false, but Reason (R) is true. *1*

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20. **Assertion (A) :** $\sqrt{2}\,(5 - \sqrt{2}\,)$ is an irrational number.

Reason (R) : Product of two irrational numbers is always irrational.

Ans. (C) Assertion (A) is true, but Reason (R) is false. *1*

SECTION B

21. Evaluate : $5 \sin^2 45° - \sec 60° \cot^2 30°$

Solution. Given expression $= 5 \times \frac{1}{2} - 2 \times 3$ *1*$\frac{1}{2}$

$= \frac{-7}{2}$ or -3.5 $\frac{1}{2}$

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22. Point P(x, y) divides the line segment joining the points A(–1, 3) and B(9, 8) such that AP : PB = k : 1. If the co-ordinates of P are such that x = y, then find the value of k.

Solution. Co-ordinates of point P are $\left(\frac{9k-1}{k+1}, \frac{8k+3}{k+1}\right)$ *1*

A. T. Q. $\frac{9k-1}{k+1} = \frac{8k+3}{k+1}$

$\Rightarrow k = 4$ *1*

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23. (a) If Q(0, 2) is equidistant from P(5, –3) and R(x, 7), find the value(s) of x.

OR

(b) If A(1, 1) and B(7, 9) are the end points of a diameter of a circle, then find the co-ordinates of the centre of the circle.

Solution: (a) $(0-5)^2 + (2+3)^2 = (0-x)^2 + (2-7)^2$ *1*

$\Rightarrow 25 + 25 = x^2 + 25$

$\Rightarrow x = \pm 5$ *1*

OR

(b) Coordinates of centre are $\left(\frac{7+1}{2}, \frac{1+9}{2}\right)$ *1*

i.e., (4, 5) *1*

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24. There are 80 cards numbered from 1 to 80. One card is drawn at random from them. Find the probability that the number on the selected card is not divisible by 8.

Solution: Numbers divisible by 8 are 8, 16, 24, 32, 40, 48, . . . , 80

$\therefore$ P(selected number is divisible by 8) = $\frac{10}{80}$ or $\frac{1}{8}$ *1*

$\therefore$ P(selected number is not divisible by 8) = $1 - \frac{1}{8} = \frac{7}{8}$ *1*

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25. (a) Prove that $-7 - 2\sqrt{3}$ is an irrational number, given that $\sqrt{3}$ is an irrational number.

OR

(b) Explain why $(7 \times 11 \times 13 + 2 \times 11)$ is not a prime number.

Solution: (a) Let us assume that $x = -7 - 2\sqrt{3}$ is a rational number

$\Rightarrow \sqrt{3} = \frac{-7-x}{2}$ *1*

Now RHS is rational but LHS is irrational *1*

$\therefore$ Our assumption is wrong

Hence $-7-2\sqrt{3}$ is irrational.

OR

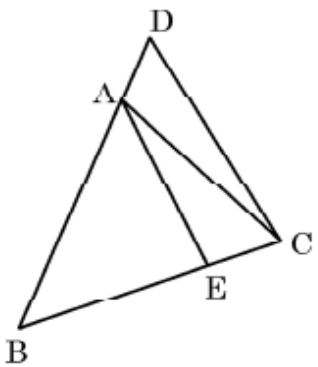
(b) $7 \times 11 \times 13 + 2 \times 11 = 11 \times (7 \times 13 + 2)$ *1*

$\therefore$ the given number has more than two factors *1*

Hence, it is not a prime number.

SECTION C

26. In the given figure, $\angle ABC = \angle ACB$ and $\frac{BC}{BE} = \frac{BD}{AC}$.



Show that $\Delta ABE \sim \Delta DBC$ and AE || DC.

Solution: It is given that $\frac{BC}{BE} = \frac{BD}{AC}$

$\Rightarrow \frac{BE}{BC} = \frac{AB}{DB}$ ($\because \angle ABC = \angle ACB \Rightarrow AC = AB$) *1*

Also $\angle B$ is common

$\therefore \Delta ABE \sim \Delta DBC$ (SAS similarity) *1*

$\Rightarrow \angle BAE = \angle BDC$ *1/2*

But these are corresponding angles $\therefore$ AE // DC. *1/2*

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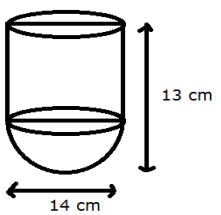
27. (a) A vessel is in the form of a hollow hemisphere surmounted by a hollow cylinder. The diameter of the hemisphere is 14 cm and the total height of the vessel is 13 cm. Find the inner surface area of the vessel.

OR

(b) A solid toy is in the form of a hemisphere surmounted by a right circular cone. The height of the cone is 2 cm and the diameter of the base is 4 cm. Determine the volume of the toy.

Solution: (a) Radius of the vessel is 7 cm



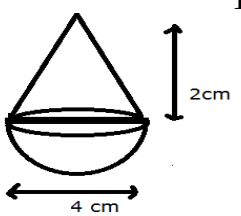
Height of the cylinder = 13 – 7 = 6 cm $\frac{1}{2}$

Inner SA = $2 \times \frac{22}{7} \times 7 \times 6 + 2 \times \frac{22}{7} \times 7 \times 7$ *1+1*

$= 572 \text{ cm}^2$ $\frac{1}{2}$

OR

(b)



Radius of the base = 2 cm $\frac{1}{2}$

Volume of the toy = $\frac{1}{3} \times \frac{22}{7} \times 4 \times 2 + \frac{2}{3} \times \frac{22}{7} \times 8$ *1+1*

$= \frac{176}{7} \text{ cm}^3$ or 25.14 cm^3 $\frac{1}{2}$

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28. (a) Prove that $(\sin\theta + \text{cosec}\,\theta)^2 + (\cos\theta + \sec\theta)^2 = 7 + \tan^2\theta + \cot^2\theta$.

OR

(b) If $\cos A = \frac{5}{13}$, then verify that $\frac{\cos A}{1-\tan A} + \frac{\sin A}{1-\cot A} = \cos A + \sin A$.

Solution: (a)

$\text{LHS} = \sin^2\theta + \text{cosec}^2\theta + 2\sin\theta.\text{cosec}\theta + \cos^2\theta + \sec^2\theta + 2\cos\theta.\sec\theta$ *1*

$= (\sin^2\theta + \cos^2\theta) + (\text{cosec}^2\theta + \sec^2\theta) + 2\sin\theta \times \frac{1}{\sin\theta} + 2\cos\theta \times \frac{1}{\cos\theta}$ $\frac{1}{2}$

$= 1 + 1 + \cot^2\theta + 1 + \tan^2\theta + 2 + 2$ *1*

$= 7 + \tan^2\theta + \cot^2\theta = \text{RHS}$ $\frac{1}{2}$

OR

(b) $\cos A = \frac{5}{13} \Rightarrow \sin A = \frac{12}{13}$, $\tan A = \frac{12}{5}$ and $\cot A = \frac{5}{12}$ $\frac{1}{2}+\frac{1}{2}+\frac{1}{2}$

$$\text{LHS} = \frac{\frac{5}{13}}{1-\frac{12}{5}} + \frac{\frac{12}{13}}{1-\frac{5}{12}} = \frac{25}{-91} + \frac{144}{91}$$

$$= \frac{119}{91} = \frac{17}{13}$$ 1

$\text{RHS} = \frac{5}{13} + \frac{12}{13} = \frac{17}{13}$ $\frac{1}{2}$

$\therefore$ LHS = RHS

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29. The altitude of a right-angled triangle is 7 cm less than its base. If its hypotenuse is 17 cm long, then

(a) represent the above information in the form of a quadratic equation;

(b) find the length of the sides of the triangle.

Solution: (a) Let base of the right triangle be x cm.

$\therefore$ altitude of the right triangle is (x – 7) cm $\frac{1}{2}$

Using Pythagoras theorem: $(17)^2 = x^2 + (x-7)^2$ $\frac{1}{2}$

$\Rightarrow 2x^2 - 14x - 240 = 0$ or $x^2 - 7x - 120 = 0$ $\frac{1}{2}$

(b) $x^2 - 7x - 120 = 0 \Rightarrow (x-15)(x+8) = 0$ $\frac{1}{2}$

$\therefore x = 15$ (as $x \neq -8$) $\frac{1}{2}$

$\therefore$ sides of the triangle other than hypotenuse are 15 cm, 8 cm $\frac{1}{2}$

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30. Find the HCF and LCM of 260 and 910 by prime-factorisation method.

Solution. $260 = 13 \times 2^2 \times 5$ 1

$910 = 13 \times 7 \times 2 \times 5$ 1

HCF = $13 \times 2 \times 5 = 130$ $\frac{1}{2}$

LCM = $13 \times 4 \times 7 \times 5 = 1820$ $\frac{1}{2}$

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31. If one zero of the polynomial $x^2 - 8x + k$ exceeds the other by 2, then find the zeroes and the value of k.

Solution. Let the two zeroes of $x^2 - 8x + k$ be α, $\alpha + 2$ $\frac{1}{2}$

$\therefore 2\alpha + 2 = 8$ *1*

$\Rightarrow \alpha = 3$, other zero is 5 *1*

$\therefore k = 15$ $\frac{1}{2}$

SECTION D

32. (a) Using graphical method, solve the following pair of equations :

$x + 2y = 8$ and $3x - 2y = 12$

OR

(b) The sum of the digits of a 2-digit number is 9. Also, nine times this number is twice the number obtained by reversing the order of the digits. Find the number.

Solution: (a)

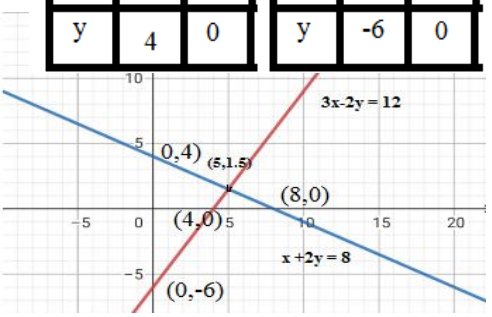
$x + 2y = 8$

x	0	8
y	4	0

$3x - 2y = 12$

x	0	4
y	-6	0

Correct Table for each equation *1+1*



Correct graph for each equation *1+1*

Correct solution x = 5, y = 1.5

OR

(b) Let the digit at ones place be x and tens place be y

$\therefore x + y = 9$ *1*

$9(10y + x) = 2(10x + y)$ *1*

$\Rightarrow x = 8y$ *1*

Solving equations to get x = 8 and y = 1 *1*

$\therefore$ required number is 18 *1*

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33. The marks obtained by 45 students of a class in a test are given below :

Marks	40 – 45	45 – 50	50 – 55	55 – 60	60 – 65	65 – 70
No. of Students	8	9	10	9	5	4

Find the mean and median marks.

Solution.

Marks	x	f	$u = \frac{x - 52.5}{5}$	fu	cf
40 – 45	42·5	8	– 2	– 16	8
45 – 50	47·5	9	– 1	– 9	17
50 – 55	52·5	10	0	0	27
55 – 60	57·5	9	1	9	36
60 – 65	62·5	5	2	10	41
65 – 70	67·5	4	3	12	45
		45		6	

For correct table: $2\frac{1}{2}$

Mean = $52.5 + 5 \times \frac{6}{45} = 53.2$ (approx.) $1\frac{1}{2}$

Median = $50 + \frac{5}{10}(22.5 - 17)$

$= 52.75$ *1*

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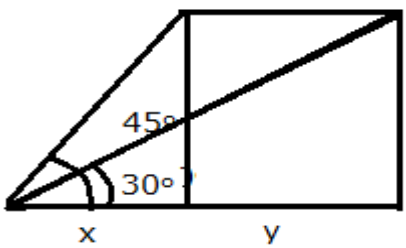
34. The angle of elevation of a helicopter in air from a point A on the ground is 45°. After a flight of 25 seconds, the angle of elevation changes to 30°. If the helicopter is flying at a constant height of 2500 m, find the speed of the helicopter. (Use $\sqrt{3} = 1.73$)

Solution. Let the helicopter flies a distance y m in 25 sec.



For correct fig.: 1 mark

$\tan 30° = \frac{2500}{x + y} \Rightarrow x + y = 2500\sqrt{3}$ $1+\frac{1}{2}$

$\tan 45° = \frac{2500}{x} \Rightarrow x = 2500$ *1*

By solving, we get $y = 2500 \times 0.73 = 1825$ m $\frac{1}{2}$

Speed of helicopter $= \frac{1825}{25} = 73$ m/sec *1*

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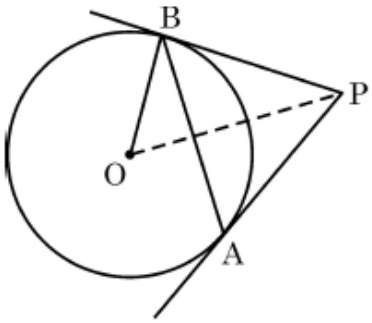
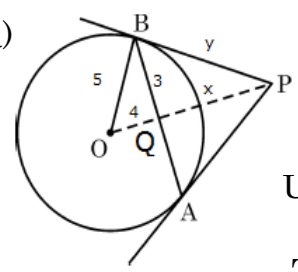
35. (a) In the given figure, AB is chord of length 6 cm of a circle of radius 5 cm. The tangents at A and B intersect at a point P. Find the length of PB.



OR

(b) Prove that the parallelogram circumscribing a circle is a rhombus. Also, find area of the rhombus, if radius of circle is 3 cm and length of one side of the rhombus is 10 cm.

Solution: (a)



Since OP ⊥ AB and bisects it

$\therefore$ BQ = QA = 3 cm *1*

Using Pythagoras Theorem in Δ OQB, OQ = 4 cm $\frac{1}{2}$

Taking PQ = x cm and PB = y cm,

Using Pythagoras Theorem in Δ OBP and Δ PQB

$x^2 + 9 = y^2$ and $(x + 4)^2 = y^2 + 25$ *1+1*

Solving equations to get $x = \frac{9}{4}$ and $y = \frac{15}{4}$ *1+$\frac{1}{2}$*

OR

(b) Let ABCD be a parallelogram touching the circle at P, Q, R and S

AP = AS, BP = BQ, CR= CQ and DR = DS *1*

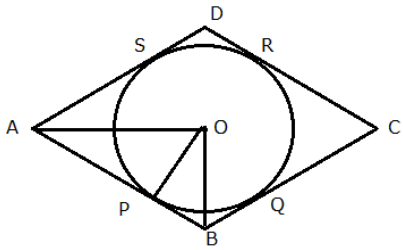


Fig: 1 mark

Adding all equations

$AP + BP + CR + DR = AS + DS + CQ + BQ$ $\frac{1}{2}$

$\Rightarrow AB + CD = AD + BC$ $\frac{1}{2}$

$\Rightarrow 2AB = 2BC$ or $AB = BC$ *1*

Hence, ABCD is a rhombus

Area of the rhombus = 4 × area of triangle AOB

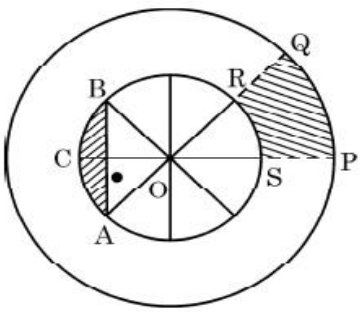
$$= 4 \times \frac{1}{2} \times 10 \times 3 = 60 \text{ cm}^2$$ *1*

SECTION E

36. NSS (National Service Scheme) aims to connect the students to the community and to involve them in problem solving process.

NSS symbol is based on the 'Rath' wheel of the Konark Sun Temple situated in Odisha. The wheel signifies the progress cycle of life.

The diagramatic representation of the symbol is given below :



Observe the figure given above. The diameters of inner circle are equally placed. Given that OP = 21 cm, OS = 10 cm.

Based on the above information, answer the following questions :

(i) Find m∠ROS.

(ii) Find the perimeter of sector OPQ.

(iii) (a) Find the area of shaded region PQRS.

OR

(iii) (b) Find the area of shaded region ACB i.e. the segment ACB.

Solution: (i) $\angle ROS = \frac{360°}{8} = 45°$ *1*

(ii) Perimeter of sector OPQ = $21 + 21 + \frac{45}{360} \times 2 \times \frac{22}{7} \times 21 = 58.5$ cm *1*

(iii) (a) Area of the region PQRS = Ar (OPQO) – Ar (OSRO)

$= \frac{45}{360} \times \frac{22}{7} \times (21^2 - 10^2)$ *1*

$= \frac{1}{8} \times \frac{22}{7} \times 341 = \frac{3751}{28}$ cm^2 or 133.96 cm^2 *1*

OR

(iii) (b) Area of segment ACB = $\frac{90}{360} \times \frac{22}{7} \times 100 - \frac{1}{2} \times 10 \times 10$ *1*

$= \frac{200}{7}$ cm^2 or 28.57 cm^2 *1*

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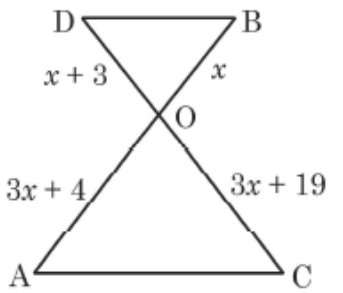
37. In the figure given below, a folding table is shown :



The legs of the table are represented by line segments AB and CD intersecting at O. Join AC and BD.

Considering table top is parallel to the ground, and OB = x, OD = $x + 3$, OC = $3x + 19$ and OA = $3x + 4$, answer the following questions :

(i) Prove that Δ OAC is similar to ΔOBD.

(ii) Prove that $\frac{OA}{AC} = \frac{OB}{BD}$.

(iii) (a) Observe the figure and find the value of x. Hence, find the length of OC.

OR

(iii) (b) Observe the figure and find $\frac{BD}{AC}$.

Solution: (i) Since $\angle D = \angle C$ and $\angle B = \angle A$ (Alternate interior angles)

$\therefore$ Δ OAC ~ Δ OBD (By AA similarity) *1*

(ii) Δ OAC ~ Δ OBD $\Rightarrow \frac{OA}{OB} = \frac{AC}{BD}$ or $\frac{OA}{AC} = \frac{OB}{BD}$ *1*

(iii) (a) Δ OAC ~ Δ OBD $\Rightarrow \frac{OA}{OB} = \frac{OC}{OD}$

$\Rightarrow \frac{3x + 4}{x} = \frac{3x + 19}{x + 3} \Rightarrow x = 2$ *1+$\frac{1}{2}$*

$\therefore$ OC = 25 *$\frac{1}{2}$*

OR

(iii) (b) Δ OBD ~ Δ OAC $\Rightarrow \frac{OB}{OA} = \frac{OD}{OC} = \frac{BD}{AC}$

$\Rightarrow \frac{x}{3x + 4} = \frac{x + 3}{3x + 19} \Rightarrow x = 2$ *1+$\frac{1}{2}$*

$\therefore \frac{BD}{AC} = \frac{2}{10}$ or $\frac{1}{5}$ *$\frac{1}{2}$*

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38. While preparing for a competitive examination, Akbar came across a match-stick pattern based question. The pattern is given below :

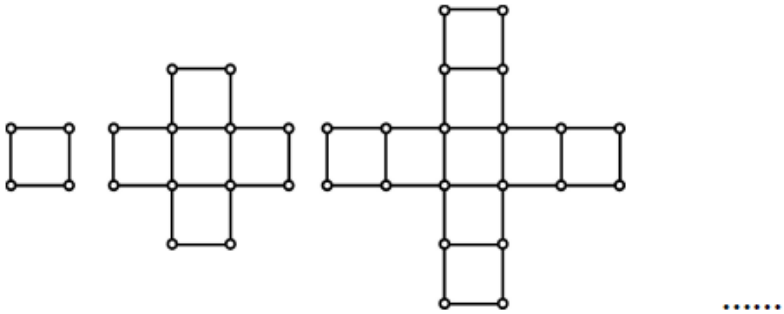

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Fig. (1) **Fig. (2)** **Fig. (3)**

Based on the above information, answer the following questions :

(i) Write first term and common difference of the A.P. formed by number of squares in each figure.

(ii) Write first term and common difference of the A.P. formed by number of sticks used in each figure.

(iii) (a) How many squares are there in Fig. (10) ? Also, write the number of sticks used in Fig. (10).

OR

(iii) (b) If 88 sticks are used to make m^{th} figure (Fig. (m)), find the value of m. How many squares are formed in this figure ?

Solution: (i) First Term = 1 and Common difference = 4 *1*

(ii) First Term = 4 and Common difference = 12 *1*

(iii) (a) Required number of squares = $1 + (9) \times 4 = 37$ *1*

Required number of sticks = $4 + 9 \times 12 = 112$ *1*

OR

(iii) (b) $88 = 4 + (m - 1) \times 12$ *1*

$\Rightarrow m = 8$ $\frac{1}{2}$

Number of squares formed in 8^{th} fig. $= 1 + 7 \times 4 = 29$ $\frac{1}{2}$
