Marking Scheme
Strictly Confidential
(For Internal and Restricted use only)
Secondary School Examination, 2024
SUBJECT NAME: MATHEMATICS BASIC (241) (Q.P. CODE 430/1/1)

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. It's 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 _____(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 and 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 430/1/1

MARKING SCHEME

MATHEMATICS BASIC (241)

Section A

1. For what value of k, the product of zeroes of the polynomial $kx^2 - 4x - 7$ is 2 ?

(a) $-\frac{1}{14}$ (b) $-\frac{7}{2}$ (c) $\frac{7}{2}$ (d) $-\frac{2}{7}$

Ans: (b) $-\frac{7}{2}$ 1

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2. In an A.P., if $a = 8$ and $a_{10} = -19$, then value of d is :

(a) 3 (b) $-\frac{11}{9}$ (c) $-\frac{27}{10}$ (d) -3

Ans: (d) -3 1

---

3. The mid-point of the line segment joining the points $(-1, 3)$ and $\left(8, \frac{3}{2}\right)$ is :

(a) $\left(\frac{7}{2}, -\frac{3}{4}\right)$ (b) $\left(\frac{7}{2}, \frac{9}{2}\right)$ (c) $\left(\frac{9}{2}, -\frac{3}{4}\right)$ (d) $\left(\frac{7}{2}, \frac{9}{4}\right)$

Ans: (d) $\left(\frac{7}{2}, \frac{9}{4}\right)$ 1

---

4. If $\sin\theta = \frac{1}{3}$, then $\sec\theta$ is equal to :

(a) $\frac{2\sqrt{2}}{3}$ (b) $\frac{3}{2\sqrt{2}}$ (c) 3 (d) $\frac{1}{\sqrt{3}}$

Ans: (b) $\frac{3}{2\sqrt{2}}$ 1

---

5. HCF (132, 77) is :

(a) 11 (b) 77 (c) 22 (d) 44

Ans: (a) 11 1

6. If the roots of quadratic equation $4x^2 - 5x + k = 0$ are real and equal, then value of k is :

(a) $\frac{5}{4}$ (b) $\frac{25}{16}$ (c) $-\frac{5}{4}$ (d) $-\frac{25}{16}$

Ans: (b) $\frac{25}{16}$ 1

---

7. If probability of winning a game is p, then probability of losing the game is :

(a) $1 + p$ (b) $-p$ (c) $p - 1$ (d) $1 - p$

Ans: (d) 1 – p 1

---

8. The distance between the points (2, –3) and (–2, 3) is :

(a) $2\sqrt{13}$ units (b) 5 units (c) $13\sqrt{2}$ units (d) 10 units

Ans: (a) $2\sqrt{13}$ units 1

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9. For what value of θ, $\sin^2\theta + \sin\theta + \cos^2\theta$ is equal to 2 ?

(a) 45° (b) 0° (c) 90° (d) 30°

Ans: (c) 90° 1

---

10. A card is drawn from a well shuffled deck of 52 playing cards. The probability that drawn card is a red queen, is :

(a) $\frac{1}{13}$ (b) $\frac{2}{13}$ (c) $\frac{1}{52}$ (d) $\frac{1}{26}$

Ans: (d) $\frac{1}{26}$ 1

---

11. If a certain variable x divides a statistical data arranged in order into two equal parts; then the value of x is called the :

(a) mean (b) median (c) mode (d) range of the data.

Ans: (b) median 1

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12. The radius of a sphere is $\frac{7}{2}$ cm. The volume of the sphere is :

(a) $\frac{231}{3}$ cu cm (b) $\frac{539}{12}$ cu cm (c) $\frac{539}{3}$ cu cm (d) 154 cu cm

Ans: (c) $\frac{539}{3}$ cu cm 1

---

13. The mean and median of a statistical data are 21 and 23 respectively. The mode of the data is :

(a) 27 (b) 22 (c) 17 (d) 23

Ans: (a) 27 1

---

14. The height and radius of a right circular cone are 24 cm and 7 cm respectively. The slant height of the cone is :

(a) 24 cm (b) 31 cm (c) 26 cm (d) 25 cm

Ans: (d) 25 cm 1

---

15. If one of the zeroes of the quadratic polynomial $(\alpha-1)x^2+\alpha x+1$ is -3, then the value of α is :

(a) $-\frac{2}{3}$ (b) $\frac{2}{3}$ (c) $\frac{4}{3}$ (d) $\frac{3}{4}$

Ans: (c) $\frac{4}{3}$ 1

---

16. The diameter of a circle is of length 6 cm. If one end of the diameter is $(-4, 0)$, the other end on x-axis is at :

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

Ans: (c) (2, 0) 1

---

17. The value of k for which the pair of linear equations $5x+2y-7=0$ and $2x+ky+1=0$ don't have a solution, is :

(a) 5 (b) $\frac{4}{5}$ (c) $\frac{5}{4}$ (d) $\frac{5}{2}$

Ans: (b) $\frac{4}{5}$ 1

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18. Two dice are rolled together. The probability of getting a doublet is :

(a) $\frac{2}{36}$ (b) $\frac{1}{36}$ (c) $\frac{1}{6}$ (d) $\frac{5}{6}$

Ans: (c) $\frac{1}{6}$ 1

Directions :

In Q. No. 19 and 20, a statement of Assertion (A) is followed by a statement of Reason (R). Select the correct option from the following options :

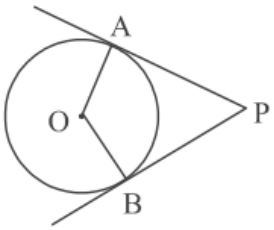
(a) Both, Assertion (A) and Reason (R) are true. Reason (R) explains Assertion (A) completely.

(b) Both, Assertion (A) and Reason (R) are true. Reason (R) does not explain Assertion (A).

(c) Assertion (A) is true but Reason (R) is false.

(d) Assertion (A) is false but Reason (R) is true.

19.



Assertion (A) : If the PA and PB are tangents drawn to a circle with centre O from an external point P, then the quadrilateral OAPB is a cyclic quadrilateral.

Reason (R) : In a cyclic quadrilateral, opposite angles are equal.

Ans: (c) Assertion (A) is true but Reason (R) is false. 1

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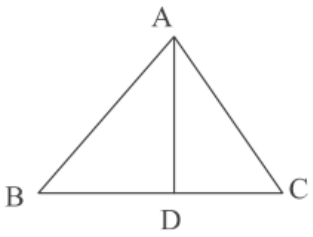
20. Assertion (A) : Zeroes of a polynomial $p(x) = x^2 - 2x - 3$ are -1 and 3.

Reason (R) : The graph of polynomial $p(x) = x^2 - 2x - 3$ intersects x-axis at $(-1, 0)$ and $(3, 0)$.

Ans: (a) Both Assertion (A) and Reason (R) are true. Reason (R) explains Assertion (A) completely. 1

Section B

21. D is a point on the side BC of ΔABC such that $\angle ADC = \angle BAC$. Show that $AC^2 = BC \times DC$.



Sol: In Δ ABC and Δ DAC, $\angle$ ADC = $\angle$ BAC (given) $\frac{1}{2}$

$\angle$ ACD = $\angle$ ACB (common) $\frac{1}{2}$

$\therefore \Delta ABC \sim \Delta DAC$ (AA similarity) $\frac{1}{2}$

$\Rightarrow \frac{AC}{DC} = \frac{BC}{AC}$ or $AC^2 = BC \times DC$ $\frac{1}{2}$

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22. (A) Solve the following pair of linear equations for x and y algebraically :
$x + 2y = 9$ and $y - 2x = 2$

OR

(B) Check whether the point $(-4, 3)$ lies on both the lines represented by the linear equations $x + y + 1 = 0$ and $x - y = 1$.

Sol: (A) x + 2y = 9, _____ (i)

y – 2x = 2 _____ (ii)

Solving to get x = 1, y = 4. *1+1*

OR

(B) Substituting x = – 4 and y = 3 in equation x + y + 1 = 0,

(– 4, 3) satisfies the equation x + y + 1 = 0

So (– 4, 3) lies on it. *1*

For x – y = 1, (– 4, 3) doesn't satisfy the equation x – y = 1

therefore (– 4, 3) does not lie on x – y = 1 *1*

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23. (A) Prove that $6-4\sqrt{5}$ is an irrational number, given that $\sqrt{5}$ is an irrational number.

OR

(B) Show that $11 \times 19 \times 23 + 3 \times 11$ is not a prime number.

Sol: (A) Let us assume $6 - 4\sqrt{5}$ = x is a rational number

$\Rightarrow \sqrt{5} = \frac{6 - x}{4}$ *1*

Now RHS is rational but LHS is irrational. *1*

$\therefore$ Our assumption is wrong

Hence $6 - 4\sqrt{5}$ is irrational.

OR

(B) $11 \times 19 \times 23 + 3 \times 11 = 11 \times (19 \times 23 + 3)$ *1*

$\Rightarrow$ The given number has more than two factors *1*

Hence it is not a prime number.

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24. Evaluate : sin A cos B + cos A sin B; if A = 30° and B = 45°.

Sol: $\sin 30° \cos 45° + \cos 30° \sin 45° = \frac{1}{2} \times \frac{1}{\sqrt{2}} + \frac{\sqrt{3}}{2} \times \frac{1}{\sqrt{2}}$ *1 $\frac{1}{2}$*

$= \frac{\sqrt{3}+1}{2\sqrt{2}}$ *$\frac{1}{2}$*

---

25. A bag contains 4 red, 5 white and some yellow balls. If probability of drawing a red ball at random is $\frac{1}{5}$, then find the probability of drawing a yellow ball at random.

Sol: Let no. of yellow balls in the bag be n.

$\therefore$ Total no. of balls = 9 + n

P (red ball) = $\frac{1}{5} = \frac{4}{9+n} \Rightarrow n = 11$ *1+$\frac{1}{2}$*

$\Rightarrow$ P(yellow ball) = $\frac{11}{20}$ *$\frac{1}{2}$*

Section C

26. Two alarm clocks ring their alarms at regular intervals of 20 minutes and 25 minutes respectively. If they first beep together at 12 noon, at what time will they beep again together next time ?

Sol: LCM (20, 25) = 100 *2*

$\therefore$ After 100 minutes from 12:00 noon

$\Rightarrow$ They will beep again together at 1:40 pm *1*

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27. The greater of two supplementary angles exceeds the smaller by 18°. Find measures of these two angles.

Sol: Let the measure of two angles be x° and y° (x > y)

Given x + y = 180 and x – y = 18 1+1

solving equations to get y = 81 and x = 99 *$\frac{1}{2}+\frac{1}{2}$*

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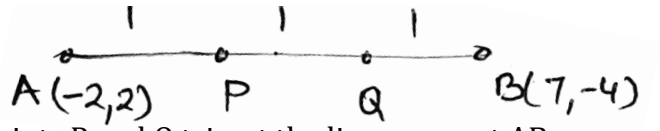
28. Find the co-ordinates of the points of trisection of the line segment joining the points (–2, 2) and (7, – 4).

Sol:



Let points P and Q trisect the line segment AB.

Therefore AP : PB = 1 : 2.

Co-ordinates of point P are $\left(\frac{7-4}{3}, \frac{-4+4}{3}\right)$ i.e. (1, 0) $1+\frac{1}{2}$

Also AQ : QB = 2 : 1

Co-ordinates of point Q are $\left(\frac{14-2}{3}, \frac{-8+2}{3}\right)$ i.e. (4, – 2) $1+\frac{1}{2}$

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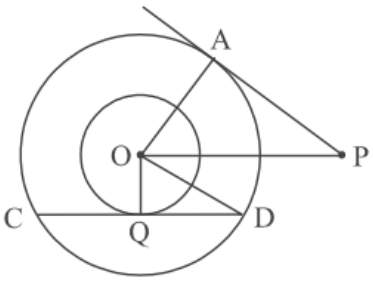
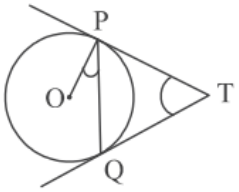
29. (A) In two concentric circles, the radii are OA = r cm and OQ = 6 cm, as shown in the figure. Chord CD of larger circle is a tangent to smaller circle at Q. PA is tangent to larger circle. If PA = 16 cm and OP = 20 cm, find the length CD.



OR

(B) In given figure, two tangents PT and QT are drawn to a circle with centre O from an external point T. Prove that ∠PTQ = 2 ∠OPQ.



Sol : (A) Since PA ⊥ OA therefore $OA^2 = 20^2 - 16^2 = 144$

$\Rightarrow$ OA = r = 12 cm *1*

In Δ OQD, $QD^2 = 12^2 - 6^2 = 108$

$\Rightarrow$ QD = $6\sqrt{3}$ cm *1*

Now OQ bisects CD

$\Rightarrow$ CD = $2 \times 6\sqrt{3} = 12\sqrt{3}$ cm *1*

OR

(B) Let ∠ PTQ = θ

In Δ TPQ, ∠ PQT = ∠ QPT and ∠ PQT + ∠ QPT + ∠ PTQ = 180°

$\Rightarrow \angle QPT = 90° - \frac{\theta}{2}$ $1\frac{1}{2}$

Now OP ⊥ PT $\Rightarrow \angle OPQ + \angle QPT = 90°$

$\Rightarrow \angle OPQ = \frac{\theta}{2}$ 1

$\Rightarrow \angle PTQ = 2\angle OPQ.$ $\frac{1}{2}$

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30. (A) A solid is in the form of a cylinder with hemi–spherical ends of same radii. The total height of the solid is 20 cm and the diameter of the cylinder is 14 cm. Find the surface area of the solid.

OR

(B) A juice glass is cylindrical in shape with hemi–spherical raised up portion at the bottom. The inner diameter of glass is 10 cm and its height is 14 cm. Find the capacity of the glass. (use $\pi = 3.14$)

Sol: (A) Height of cylinder = $20 - (2 \times 7) = 6$ cm $\frac{1}{2}$

radius of cylinder = radius of hemisphere = 7 cm $\frac{1}{2}$

Total SA = $2\pi rh + 4\pi r^2 = 2\pi r(h + 2r)$

$= 2 \times \frac{22}{7} \times 7 \times 20$ $1\frac{1}{2}$

$= 880 \text{ cm}^2$ $\frac{1}{2}$

OR

(B) radius of glass = 5 cm $\frac{1}{2}$

Capacity of glass = volume of cylinder – volume of hemisphere

$= \pi r^2 h - \frac{2}{3}\pi r^3$

$= 3.14 \times 5 \times 5 \times 14 - \frac{2}{3} \times 3.14 \times 5 \times 5 \times 5$ 2

$= \frac{2512}{3} \text{ cm}^3$ or 837.33 cm^3 (approx) $\frac{1}{2}$

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31. Prove that : $(\cot\theta - \text{cosec}\,\theta)^2 = \frac{1-\cos\theta}{1+\cos\theta}$.

Sol: LHS = $(\frac{\cos\theta}{\sin\theta} - \frac{1}{\sin\theta})^2$ 1

$$= \frac{1}{\sin^2 \theta} (\cos \theta - 1)^2$$ *1*

$$= \frac{(\cos \theta - 1)^2}{(1 - \cos \theta)(1 + \cos \theta)}$$ *1/2*

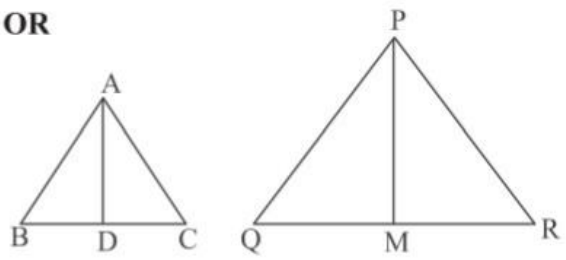
$$= \frac{1 - \cos \theta}{1 + \cos \theta} = \text{RHS}$$ *1/2*

Section D

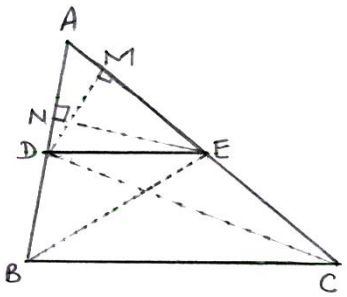
32. (A) If a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, then prove that other two sides are divided in the same ratio.

OR

(B) Sides AB and AC and median AD of a ΔABC are respectively proportional to sides PQ and PR and median PM of ΔPQR. Show that ΔABC ~ ΔPQR.



Sol: (A)



1/2 for fig.

Given: In Δ ABC, DE || BC

To Prove: $\frac{AD}{DB} = \frac{AE}{EC}$

Construction: Join BE, DC

Draw DM ⊥ AC and EN ⊥ AB 1

Proof: $\frac{ar(\Delta ADE)}{ar(\Delta BDE)} = \frac{\frac{1}{2} \times AD \times EN}{\frac{1}{2} \times DB \times EN}$ 1

$\frac{ar(\Delta ADE)}{ar(\Delta BDE)} = \frac{AD}{DB}$ .....(i)

and $\frac{ar(\Delta ADE)}{ar(\Delta CDE)} = \frac{\frac{1}{2} \times AE \times DM}{\frac{1}{2} \times EC \times DM}$ 1

$\frac{ar(\Delta ADE)}{ar(\Delta CDE)} = \frac{AE}{EC}$ ..... (ii)

Δ BDE and Δ CDE are on the same base DE and between the same parallels DE and BC.

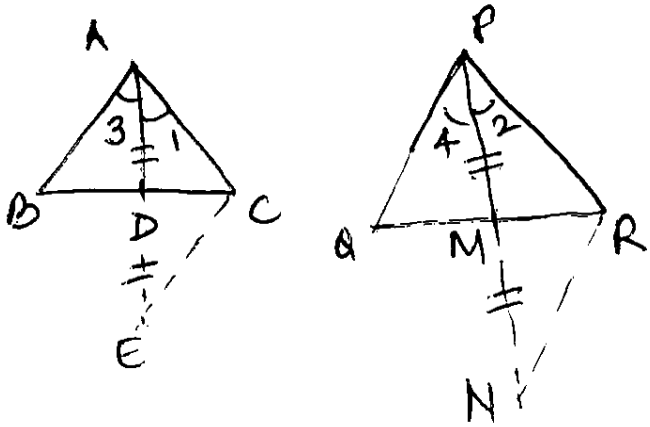
$\therefore$ ar (Δ BDE) = ar (Δ CDE) .....(iii) 1

From (i), (ii) and (iii)

we get $\frac{AD}{DB} = \frac{AE}{EC}$ $\frac{1}{2}$

OR

(B) Produce AD to E and PM to N such that AD = DE, PM = MN. *1*



Δ ADB $\cong$ Δ EDC $\Rightarrow$ AB = CE, similarly PQ = RN. *1*

Given $\frac{AB}{PQ} = \frac{AC}{PR} = \frac{AD}{PM}$

$\Rightarrow \frac{CE}{RN} = \frac{AC}{PR} = \frac{\frac{AE}{2}}{\frac{PN}{2}} \Rightarrow \Delta AEC \sim \Delta PNR$ *1*

$\Rightarrow \angle 1 = \angle 2$. similarly $\angle 3 = \angle 4$

therefore $\angle 1 + \angle 3 = \angle 2 + \angle 4$ or $\angle BAC = \angle QPR$ *1*

Also $\frac{AB}{PQ} = \frac{AC}{PR}$ (given)

therefore $\Delta ABC \sim \Delta PQR$ *1*

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33. How many terms of the A.P. 27, 24, 21, ... must be taken so that their sum is 105 ? Which term of the A.P. is zero ?

Sol: Let n be the required number of terms.

Here d = – 3 $\frac{1}{2}$

$\therefore 105 = \frac{n}{2}[54 + (n-1)(-3)]$ $1\frac{1}{2}$

$\Rightarrow 3n^2 - 57n + 210 = 0$ or $n^2 - 19n + 70 = 0$ 1

$\Rightarrow n = 14$ or $n = 5$ 1

$a_{10} = 0$ or 10^{th} term is zero 1

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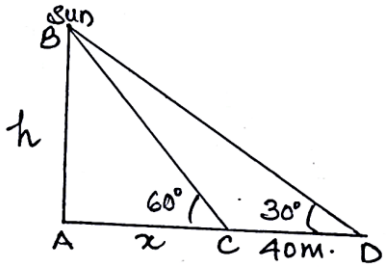
34. (A) The shadow of a tower standing on a level ground is found to be 40 m longer when the Sun's altitude is 30° than when it was 60°. Find the height of the tower and the length of original shadow. (use $\sqrt{3} = 1.73$)

OR

(B) The angles of depression of the top and the bottom of an 8 m tall building from the top of a multi–storeyed building are 30° and 45° respectively. Find the height of the multi–storeyed building and the distance between the two buildings. (use $\sqrt{3} = 1.73$)

Sol: (A) Let AB be the tower and AC and AD are shadows.



Correct figure *1*

In ΔBAD, $\tan 30° = \frac{h}{x+40} \Rightarrow \frac{1}{\sqrt{3}} = \frac{h}{x+40}$ 1

$\Rightarrow x + 40 = h\sqrt{3}$ _____ (i) $\frac{1}{2}$

In ΔBAC, $\tan 60° = \frac{h}{x} \Rightarrow \sqrt{3} = \frac{h}{x} \Rightarrow h = x\sqrt{3}$ _____ (ii) *1*

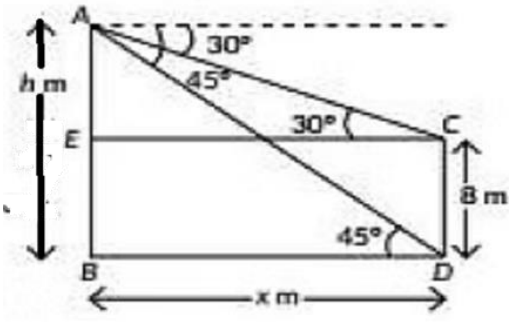
From (i) and (ii) $h = \frac{60}{\sqrt{3}} = 20\sqrt{3} = 34{\cdot}6$ m *1*

and $x = 20$ $\frac{1}{2}$

length of original shadow = 20 m, height = 34·6 m

OR

(B) Let CD and AB are buildings



Correct figure *1*

In ΔAEC, $\tan 30° = \frac{h-8}{x}$ $\Rightarrow h - 8 = \frac{x}{\sqrt{3}}$ _____ (i) *1+$\frac{1}{2}$*

In ΔABD, $\tan 45° = \frac{h}{x}$ $\Rightarrow h = x$ _____ (ii) *1*

Solving (i) and (ii) $h = x = 12 + 4\sqrt{3} = 18{\cdot}92$ m *1+$\frac{1}{2}$*

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35. A chord of a circle of radius 14 cm subtends an angle of 90° at the centre. Find the area of the corresponding minor and major segments of the circle.

Sol: Area of minor segment

$= (\frac{1}{4} \times \frac{22}{7} \times 14 \times 14) - (\frac{1}{2} \times 14 \times 14)$ *1+1*

$= 154 - 98 = 56$ sq. cm. *1$\frac{1}{2}$*

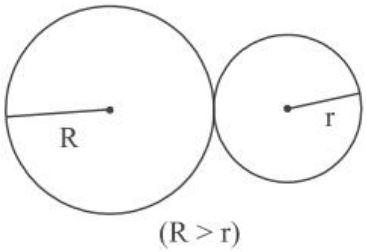
Area of major segment

$= (\frac{22}{7} \times 14 \times 14) - 56 = 560$ sq. cm. *1+$\frac{1}{2}$*

SECTION E

36. To keep the lawn green and cool, Sadhna uses water sprinklers which rotate in circular shape and cover a particular area.

The diagram below shows the circular areas covered by two sprinklers :



(R > r)

Two circles touch externally. The sum of their areas is 130 π sq m and the distance between their centres is 14 m.

Based on above information, answer the following questions :

(i) Obtain a quadratic equation involving R and r from above. **1**

(ii) Write a quadratic equation involving only r. **1**

(iii) (a) Find the radius r and the corresponding area irrigated. **2**

OR

(b) Find the radius R and the corresponding area irrigated. **2**

Sol: (i) $R^2 + r^2 = 130$ *1*

(ii) $r^2 - 14r + 33 = 0$ *1*

(iii) (a) $r^2 - 14r + 33 = 0 \Rightarrow (r - 11)(r - 3) = 0$

$\Rightarrow r = 3$ m, $r \neq 11$ m (As $r < R$) *1*

Corresponding area irrigated $= 9\pi$ m^2 *1*

OR

(b) $R^2 - 14R + 33 = 0 \Rightarrow (R - 11)(R - 3) = 0$

$\Rightarrow R = 11$ m, $R \neq 3$ (As $R > r$) *1*

Area irrigated $= 121\pi$ m^2 *1*

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37. Gurpreet is very fond of doing research on plants. She collected some leaves from different plants and measured their lengths in mm.

The data obtained is represented in the following table :

Length (in mm) :	70-80	80-90	90-100	100-110	110-120	120-130	130-140
Number of leaves :	3	5	9	12	5	4	2

Based on the above information, answer the following questions :

(i) Write the median class of the data. **1**

(ii) How many leaves are of length equal to or more than 10 cm ? **1**

(iii) (a) Find median of the data. **2**

OR

(b) Write the modal class and find the mode of the data. **2**

Sol: (i) Median class : 100 – 110 1

(ii) No. of leaves equal to or more than 10cm(100 mm) = 23 *1*

(iii)(a)

C.I.	f	cf
70 – 80	3	3
80 – 90	5	8
90 – 100	9	17
100 – 110	12	29
110 – 120	5	34
120 – 130	4	38
130 – 140	2	40 = N

Correct table $\frac{1}{2}$

$$\text{Median} = 100 + \frac{10}{12}(20 - 17) = 102{\cdot}5 \qquad 1+\frac{1}{2}$$

OR

(iii) (b) Modal class is 100 – 110 $\frac{1}{2}$

$$\text{Mode} = 100 + 10 \times \frac{12 - 9}{24 - 9 - 5} = 103 \qquad 1+\frac{1}{2}$$

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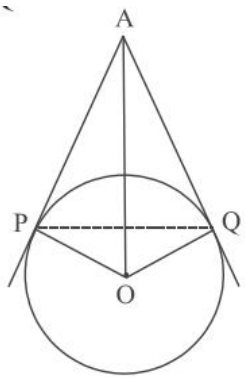
38. The picture given below shows a circular mirror hanging on the wall with a cord. The diagram represents the mirror as a circle with centre O. AP and AQ are tangents to the circle at P and Q respectively such that AP = 30 cm and $\angle PAQ = 60°$.



Based on the above information; answer the following questions :

(i) Find the length PQ. **1**

(ii) Find m $\angle POQ$. **1**

(iii) (a) Find the length OA. **2**

OR

(b) Find the radius of the mirror. **2**

Sol: (i) $\angle PAQ = 60° \Rightarrow \Delta APQ$ is an equilateral triangle $\frac{1}{2}$

$\therefore PQ = AP = 30$ cm. $\frac{1}{2}$

(ii) $\angle POQ = 180° - 60° = 120°$ *1*

(iii) (a) $\angle PAO = 30°$ $\frac{1}{2}$

$$\cos 30° = \frac{AP}{OA} \Rightarrow \frac{\sqrt{3}}{2} = \frac{30}{OA}$$ *1*

$$\Rightarrow OA = 20\sqrt{3} \text{ cm.}$$ $\frac{1}{2}$

OR

(iii) (b) $\angle PAO = 30°$ $\frac{1}{2}$

$$\therefore \tan 30° = \frac{OP}{AP} \Rightarrow \frac{1}{\sqrt{3}} = \frac{OP}{30}$$ *1*

$$\Rightarrow OP = 10\sqrt{3} \text{ cm.}$$ $\frac{1}{2}$
