BOARD OF SECONDARY EDUCATION (AP)

SUMMATIVE ASSESSMENT – II

TENTH CLASS MATHEMATICS MODEL PAPER

PAPER – II (ENGLISH VERSION)

Time: 2 hrs. 45 mins. **PART – A & B** **Maximum Marks: 40**

INSTRUCTIONS:

i) **In the time duration of 2 hrs. 45 mins., 15 minutes of time is allotted to read and understand the question paper.**

ii) **Answer the questions under PART – A in a separate answer book.**

iii) **Write the answers to the questions under PART – B on the question paper itself and attach it to the answer book of PART – A.**

Time: 2 hrs. **PART – A** **Marks: 30**

INSTRUCTIONS:

i) **PART – A comprises of three Sections I, II, III.**

ii) **All the questions are compulsory.**

iii) **There is no overall choice. However, there is an internal choice to the questions under Section – III.**

SECTION – I

INSTRUCTIONS:

i) **Answer ALL the questions.**

ii) **Each question carries ONE mark.** **4 × 1 = 4**

1. If the points A (4, 3) and B (x, 5) are on the circle with centre O(2, 4). Find the value of 'x'. (AB is diameter)

2. Prove that the tangents to a circle at the end points of a diameter are parallel.

3. Simplify sec A(1 – sin A) (sec A + tan A).

4. It is given that in a group of 3 students the probability of the students not having the same birthday in a year is 0.992. What is the probability that the students have the same birthday?

SECTION – II

INSTRUCTIONS:

i) **Answer ALL the questions.**

ii) **Each question carries TWO marks.** **5 × 2 = 10**

5. If A (–2, –1), B (a, 0), C (4, b) and D (1, 2) are the vertices of a parallelogram, find the values of 'a' and 'b'.

6. ABCD is a trapezium which AB//DC and its diagonals intersect each other at point 'O'. Show that $\frac{AO}{BO} = \frac{CO}{DO}$.

7. A tree breaks due to storm and the broken part bends so that the top of the tree touches the ground by making $30°$ angle with the ground. The distance between the foot of the tree and the top of the tree on the ground is 6 cm. Find the height of the tree before falling down.

8. 12 defective pens are accidentally mixed with 132 good ones. It is not possible to just look at a pen and tell whether or not it is defective. one pen is taken out at random from this lot. Determine the probability that the pen taken out is a good one.

9. If $l = 40$, $n = 73 + x$, $cf = 35$, $f = 25$, $h = 20$ and median of a data is 48, find 'x'.

SECTION – III

INSTRUCTIONS:

i) Answer ALL the questions.

ii) Each question carries FOUR marks.

iii) Each question has Internal Choice. **$4 \times 4 = 16$**

10. **a)** Find the coordinates of points which divide the line segment joining A (–4, 0), B (0, 6) into four equal parts.

(OR)

b) A chord of a circle of radius 12 cm subtends an angle of $120°$ at the centre. Find the area of the corresponding minor segment of the circle. (Take $\Pi = 3.14$ and $\sqrt{3} = 1.732$)

11. **a)** If $\text{cosec}\,\theta + \cot\theta = p$ then prove that $\sec\theta = \dfrac{p^2 + 1}{p^2 - 1}$.

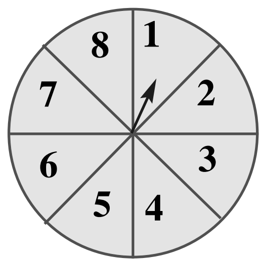
(OR)

b) A wire of length 18 m had been tied with electric pole at an angle of elevation $30°$ with the ground. As it is covering a long distance, it was cut and tied at an angle of elevation $60°$ with the ground. How much length of the wire was cut?

12. **a)** A game of chance consists of spinning an arrow which comes to rest pointing at one of the numbers 1, 2, 3, 4, 5, 6, 7, 8 (see figure) and these are equally likely outcomes. what is the probability that it will point at

i) 8 ii) an odd number

iii) a number greater than 2 iv) a number less than 9.



(OR)

b) Find the mean by deviation method of the following data.

Class Interval	65 – 85	85 – 105	105 – 125	125 – 145	145 – 165	165 – 185	185 – 205
Frequency	4	5	13	20	14	8	4

13. **a)** Draw a triangle ABC with side BC = 7 cm, $\angle B = 45°$, $\angle A = 105°$. Then construct a triangle whose sides are 4/3 times the corresponding sides of ΔABC.

(OR)

b) Draw a circle of radius of 5 cm from a point 8 cm, away from its centre, construct the pair of tangents to the circle.

Time: 30 Minutes **PART – B** **Marks: 10**

INSTRUCTIONS:

i) Answer ALL the questions.

ii) Each question carries $\frac{1}{2}$ Mark.

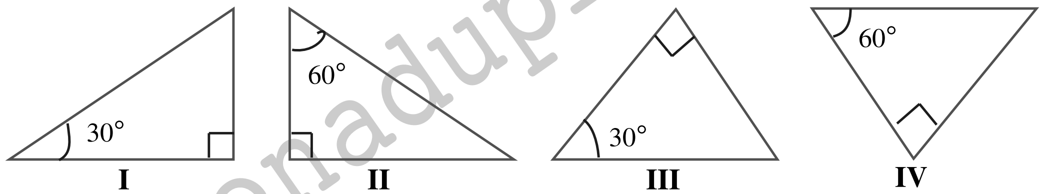
iii) Answers are to be written in question paper only.

iv) Marks will not be awarded in any case of over writing and rewriting or erased answers.

v) Write the CAPITAL LETTER (A, B, C, D) showing the correct answer for the following questions in the brackets provided against them. **$20 \times \frac{1}{2} = 10$**

SECTION – IV

14. In the given figures, the similar triangles are ( )



A) I, III only B) II, IV only C) I, II, III D) All

15. In Δ ABC, DE//AB and AD = 8x + 9, CD = x + 3, BE = 3x + 4, CE = x then x = ... ( )

A) 1 B) 2 C) 3 D) 4

16. In ΔABC, DE//BC and $\frac{AE}{AC} = \frac{1}{4}$, DB = 7.2 then AD = ... ( )

A) 5.4 B) 4.4 C) 3.4 D) 2.4

17. The length of the tanget drawn from a point 8 cm away from the centre of a circle of radius 6 cm is ( )

A) $\sqrt{7}$ cm B) 5 cm C) $2\sqrt{7}$ cm D) 10 cm

18. If TP and TQ are two tangents to a circle with centre 'O' such that $\angle POQ = 110^\circ$, then $\angle PTQ$ = ... ( )

A) 60° B) 70° C) 250° D) 110°

19. The number of tangents drawn at the end points of the diameter is ( )

A) ∞ B) 1 C) 2 D) 0

20. $\left(1 + \tan^{2018} 45^\circ\right)^2$ = ... ( )

A) 2018 B) 2 C) 4 D) can't find

21. sin25 °. cos65 ° + cos25 °. sin65 ° = ... ( )

A) 1 B) sin90° C) cos 90° D) A, B

22. $\frac{\sqrt{\sec^2\theta - 1}}{\sec\theta}$ = ... ( )

A) $\sin\theta$ B) $\tan\theta$ C) $\cos\theta$ D) 1

23. The length of the shadow of a tree is 8 m long when the sun's angle of elevation is 45°, height of the tree is ...... m. ( )

A) $\frac{8}{\sqrt{3}}$ B) $8\sqrt{3}$ C) 8 D) $16\sqrt{3}$

24. The ratio of the length of a rod and its shadow is $1 : \sqrt{3}$ then the angle of elevation is ( )

A) 45° B) 30° C) 90° D) 60°

25. The angle of elevation of the top of a tower at a distance of 200 m away from the foot is 30° then the height of the tower is ( )

A) $200\sqrt{3}$ m B) $100\sqrt{3}$ m C) $\frac{200}{\sqrt{3}}$ m D) 200 m

26. Which of the following cannot be the probability of an event? ( )

A) 1 B) 2 C) 0 D) 20%

27. A coin is tossed 1000 times if the probability of getting a tail is $\frac{3}{8}$. How many times, head is obtained? ( )

A) 625 B) 375 C) 725 D) 575

28. When two dice are rolled, the probaility of getting a total 4 is ( )

A) $\frac{1}{6}$ B) $\frac{1}{8}$ C) $\frac{1}{10}$ D) $\frac{1}{12}$

29. Lower limit of the class 20 – 29 is ( )

A) 20 B) 24.5 C) 19.5 D) 29

30. Match the following. ( )

1. Mean the 1st 10 natural numbers a) 4.5
2. Median of 1st 10 whole numbers. b) 5.5
3. Mode of 1st 10 natural numbers c) does not exist

A) 1–c, 2–a, 3–b B) 1–b, 2–a, 3–c

C) 1–a, 2–c, 3–b D) 1–b, 2–c, 3–a

31. Which of the following is false. ( )

A) The slope of the line joining (1, 1) and (2, 2) is 1.

B) The mid point of the line joining (0, 3), (–2, 5) is (–1, 4).

C) The distance between (0, 0) and (–2, –1) is 5.

D) The centroid of (1, 1), (2, 2), (3, 3) is (2, 2).

32. The area of the triangle joining the points (0, 0), (2, 0) and (0, 5) is ( )

A) 2 sq.units B) 5 sq.units C) 10 sq.units D) 25 sq.units

33. The nearest point from the origin is ( )

A) (2, –1) B) (3, –1) C) (5, 0) D) (2, –3)

ANSWERS

PART – A

SECTION – I

1. If the points A (4, 3) and B (x, 5) are on the circle with centre O(2, 4). Find the value of 'x'. (AB is diameter)

A: A (4, 3) , B (x, 5) are on the circle and centre O(2, 4)

$\therefore$ AB is the diameter, and 'O' is the mid point.

mid point of A (4, 3), B (x, 5) $= \left(\frac{4+x}{2}, \frac{3+5}{2}\right) = \left(\frac{4+x}{2}, 4\right)$

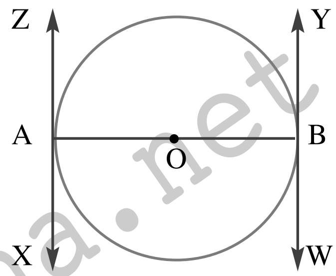
$\therefore \left(\frac{4+x}{2}, 4\right) = (2, 4)$

$\therefore \frac{4+x}{2} = 2 \Rightarrow 4 + x = 4 \Rightarrow x = 4 - 4 = 0$

$\therefore x = 0$

2. Prove that the tangents to a circle at the end points of a diameter are parallel.

A: OA is raidius



$\therefore$ ZAX is a tangent

$\therefore \angle OAX = 90°$

($\because$ Angle between radius and tangent)

similarly OB is raidius

WBY is tangent

$\therefore \angle OBY = 90°$

But $\angle OAX$, $\angle OBY$ are alternate angles

$\therefore$ ZX // YW

3. Simplify secA (1 – sin A) (sec A + tan A).

A: Given that secA(1 – sinA) (secA + tanA)

= (secA – secA.sinA) (secA + tanA)

= (secA – 1/cosA.sinA) (secA + tanA)

= (secA – tanA) (secA + tanA)

$= \sec^2 A - \tan^2 A = 1$

4. It is given that in a group of 3 students the probability of the students not having the same birthday in a year is 0.992. What is the probability that the students have the same birthday?

A: Probability of two students not having the same birthday in a year is P(E) = 0.992

Probability of two students having the same birthday in a year is $P(\overline{E}) = 1- P(E)$

$= 1- 0.992 = 0.008$

SECTION – II

5. If A (−2, −1), B (a, 0), C (4, b) and D (1, 2) are the vertices of a parallelogram, find the values of 'a' and 'b'.

A: Given that A(−2, −1), B(a, 0), C(4, b), D(1, 2) are the vertices of a parallelogram.

Then the mid points of the diagonals are same mid point of A(−2, −1), C(4, b)

= mid point of B(a, 0) and D(1, 2)

$$\Rightarrow \left(\frac{-2+4}{2}, \frac{-1+b}{2}\right) = \left(\frac{a+1}{2}, \frac{0+2}{2}\right)$$

$$\Rightarrow \left(1, \frac{b-1}{2}\right) = \left(\frac{a+1}{2}, 1\right)$$

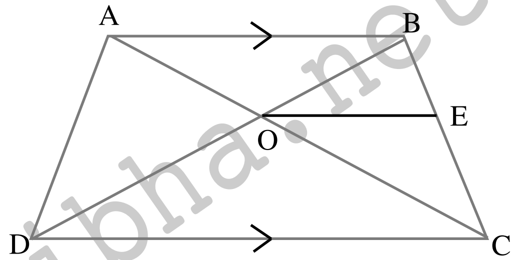
$$\therefore \frac{a+1}{2} = 1, \frac{b-1}{2} = 1$$

$\Rightarrow a = 2 - 1, b = 2 + 1$

$\therefore a = 1, b = 3$

6. ABCD is a trapezium which AB//DC and its diagonals intersect each other at point 'O'. Show that $\frac{AO}{BO} = \frac{CO}{DO}$.

A: In trapezium ABCD, AC and BD are intersect at 'O'. Draw OE//AB//CD



since OE//DC

$\frac{BO}{DO} = \frac{BE}{EC}$ ($\because$ by Thales theorem)......(1)

since OE//AB

$\frac{AO}{OC} = \frac{BE}{EC}$ ($\because$ by Thales theorem)......(2)

from eq'n (1) and (2) $\frac{BO}{DO} = \frac{AO}{OC}$

$$\Rightarrow \frac{AO}{BO} = \frac{CO}{DO}$$

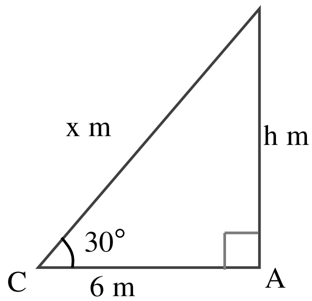
7. A tree breaks due to storm and the broken part bends so that the top of the tree touches the ground by making 30° angle with the ground. The distance between the foot of the tree and the top of the tree on the ground is 6 cm. Find the height of the tree before falling down.

A: Let the height of the broken tree AB = h m.

and length of broken part BA = x m.

angle of elevation θ = 30°

from the figure AC = 6m



In ΔABC $\tan 30° = \frac{AB}{AC}$

$$\Rightarrow \frac{1}{\sqrt{3}} = \frac{AB}{6} \Rightarrow AB = \frac{6}{\sqrt{3}} \text{ m}$$

$\cos 30° = \frac{AC}{BC}$

$\Rightarrow \frac{\sqrt{3}}{2} = \frac{x}{6} \Rightarrow x = 3\sqrt{3}$

Height of the tree before broken = $AB + BC = \frac{6}{\sqrt{3}} + 3\sqrt{3}$

$$= \frac{6 + 3 \times 3}{\sqrt{3}} = \frac{15}{\sqrt{3}}$$

$$= \frac{15 \times \sqrt{3}}{\sqrt{3} \times \sqrt{3}} = \frac{15 \times \sqrt{3}}{3} = 5\sqrt{3} \text{ m.}$$

or $5(1.732) = 8.660$ m

8. 12 defective pens are accidentally mixed with 132 good ones. It is not possible to just look at a pen and tell whether or not it is defective. one pen is taken out at random from this lot. Determine the probability that the pen taken out is a good one.

A: No. of defective pens = 12

No. of good pens = 132

Total number of pens = 132 + 12 = 144

Number of favourable out comes to take a good pen n(E) = 132

Total No. of out comes n(S) = 144

Probability of getting a good pen = $P(E) = \frac{n(E)}{n(S)} = \frac{132}{144} = \frac{11}{12}$

9. If l = 40, n = 73 + x, cf = 35, f = 25, h = 20 and median of a data is 48, find 'x'.

A: Given that $l = 40$, $n = 73 + x$, $cf = 35$, $f = 25$, $h = 20$ and median = 48

$$\text{Median} = l + \frac{\frac{n}{2} - cf}{f} \times h$$

$$\Rightarrow 48 = 40 + \frac{\frac{73 + x}{2} - 35}{25} \times 20$$

$$\Rightarrow 48 - 40 = \frac{73 + x - 70}{2 \times 25} \times 20$$

$$\Rightarrow 8 = \frac{3 + x}{5} \times 2$$

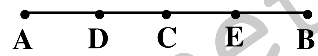
$$\Rightarrow \frac{8 \times 5}{2} - 3 = x$$

$\therefore$ x = 17

SECTION – III

10. a) Find the coordinates of points which divide the line segment joining A (–4, 0), B (0, 6) into four equal parts.

A: Given that A(–4, 0); B(0, 6) are two points to join a line segment.



'C' is the mid point of AB,

it follows that $C\ (x, y) = \left(\dfrac{-4+0}{2}, \dfrac{0+6}{2}\right)$

$= (-2, 3)$

'D' is the mid point of A (–4, 0), C(–2, 3) then

$$D = \left(\frac{-4+(-2)}{2}, \frac{0+3}{2}\right) = \left(-3, \frac{3}{2}\right)$$

'E' is the mid point of C(–2, 3), B(0, 6) then

$$E = \left(\frac{-2+0}{2}, \frac{3+6}{2}\right) = \left(-1, \frac{9}{2}\right)$$

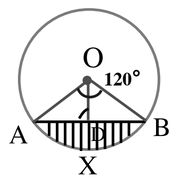
$\therefore$ C(–2, 3), $D\left(-3, \dfrac{3}{2}\right)$, $E\left(-1, \dfrac{9}{2}\right)$ are the coordinates to divide AB into four qual parts.

i.e., AD = DC = CE = EB

(OR)

b) AB is chord of a circle of radius 12 cm subtends an angle of 120° at the centre. Find the area of the corresponding minor segment of the circle. (Take θ = 3.14 and $\sqrt{3} = 1.732$)

A: Let 'O' be the centre of the circle



AB is a chord subtended an angle 120° at the centre.

Radii of the circle r = OA = OB = 12 cm.

OAXB is a sector, AXB is the minor segment.

Area of AXB = Area of OAXB – Area of ΔOAB

Draw OD $\perp^r$ to AB

then in ΔOAD, $\angle ODA = 90°$, $\angle AOD = \dfrac{120°}{2} = 60°$

$\Rightarrow \angle OAD = 30°$ ($\because$ sum of the angles in Δ^le is 180°)

$\sin 30° = \dfrac{OD}{OA} \Rightarrow \dfrac{1}{2} = \dfrac{OD}{12} \Rightarrow OD = 6$ cm

$\cos 30° = \dfrac{AD}{OA} \Rightarrow \dfrac{\sqrt{3}}{2} = \dfrac{AD}{6} \Rightarrow AD = 3\sqrt{3}$ cm

$AB = 2 \times AD = 2 \times 3\sqrt{3} = 6\sqrt{3}$ cm

$\therefore$ Area of Δ OAB $= \dfrac{1}{2} \times AB \times OD$

$= \dfrac{1}{2} \times 6\sqrt{3} \times 6 = 18\sqrt{3}$

$= 18 \times 1.732 = 31.176\ cm^2$

Area of OA X B = $\frac{x^\circ}{360^\circ} \times \pi r^2$

$= \frac{120^\circ}{360^\circ} \times 3.14 \times 12 \times 12$

$= 48 \times 3.14$

$= 150.72\ cm^2$

Area of minor segment A X B = 150.72 − 31.176

= 119.544 cm^2

11. a) If cosec θ + cot θ = p then prove that sec θ = $\frac{p^2+1}{p^2-1}$.

A: Given that cosec θ + cot θ = p

$p^2 = (\text{cosec}\,\theta + \cot\theta)^2 = \text{cosec}^2\theta + \cot^2\theta + 2.\text{cosec}\,\theta.\cot\theta$

$$\text{R.H.S} = \frac{p^2+1}{p^2-1} = \frac{(\text{cosec}\theta + \cot\theta)^2 + 1}{(\text{cosec}\theta + \cot\theta)^2 - 1}$$

$$= \frac{\text{cosec}^2\theta + \cot^2\theta + 2\,\text{cosec}\theta.\cot\theta + 1}{\text{cosec}^2\theta + \cot^2\theta + 2\,\text{cosec}\theta.\cot\theta - 1}$$

$$= \frac{\text{cosec}^2\theta + (\cot^2\theta + 1) + 2\,\text{cosec}\theta.\cot\theta}{(\text{cosec}^2\theta - 1) + \cot^2\theta + 2\,\text{cosec}\theta.\cot\theta}$$

$$= \frac{2\text{cosec}^2\theta + 2\,\text{cosec}\theta.\cot\theta}{2\cot^2\theta + 2\,\text{cosec}\theta.\cot\theta}$$

$$= \frac{2\,\text{cosec}\theta\,(\text{cosec}\theta + \cot\theta)}{2\cot\theta\,(\text{cosec}\theta + \cot\theta)}$$

$$= \text{cosec}\theta.\tan\theta$$

$$= \frac{1}{\sin\theta} \times \frac{\sin\theta}{\cos\theta}$$

$$= \frac{1}{\cos\theta} = \sec\theta = \text{L.H.S}$$

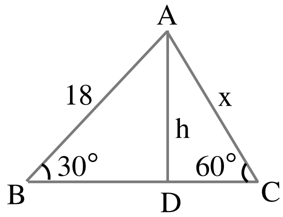
(OR)

b) A wire of length 18 m had been tied with electric pole at an angle of elevation 30° with the ground. As it is covering a long distance, it was cut and tied at an angle of elevation 60° with the ground. How much length of the wire was cut?

A: Height of the electric pole AD = h m.

length of wire which tied by making 30° angle with ground AB = 18 m

length of wire which tied by making 60° angle with ground AC = x m.



In ABD, $\sin 30^\circ = \frac{AD}{AB} = \frac{h}{18}$

$\Rightarrow \frac{1}{2} = \frac{h}{18} \Rightarrow h = 9$ m.

In ΔADC $\sin 60° = \frac{AD}{AC}$

$\Rightarrow \frac{\sqrt{3}}{2} = \frac{h}{x} = \frac{9}{x}$

$\Rightarrow x = \frac{9 \times 2}{\sqrt{3}}$

$= \frac{18}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}}$

$= \frac{18\sqrt{3}}{3} = 6\sqrt{3} = 6(1.732)$

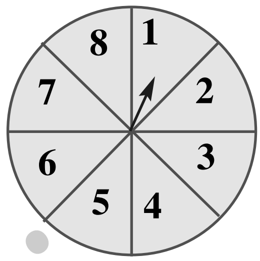
$\therefore x = 10.392$ m.

Total length of the wire = 18 m

If 10.392 m. wire is used then length of remaining wire = 18 − 10.392

= 7.608 m

12. a) A game of chance consists of spinning an arrow which comes to rest pointing at one of the numbers 1, 2, 3, 4, 5, 6, 7, 8 (see figure) and these are equally likely outcomes. what is the probability that it will point at



i) 8 **ii) an odd number**

iii) a number greater than 2 **iv) a number less than 9.**

A: Total number of out comes n(S) = 8

i) Number of favourable out comes that the pointer points at 8 is $n(E_1) = 1$

Probability of getting that the pointer points at 8 is $P(E_1) = \frac{n(E_1)}{n(S)} = \frac{1}{8}$

ii) Number of favourable out comes that the pointer points at an odd number is $n(E_2) = 4$ ($\because$ 1, 3, 5, 7 are odd no.s)

Probability that the pointer points at an odd number is $P(E_2) = \frac{n(E_2)}{n(S)} = \frac{4}{8} = \frac{1}{2}$

iii) Number of favourable out comes that a number greater than 2 is $n(E_3) = 6$

Probability that the pointer points a number greater than 2 is $P(E_3) = \frac{n(E_3)}{n(S)} = \frac{6}{8} = \frac{3}{4}$

iv) Number of favourable out comes that a number less than 9 is $n(E_4) = 8$

Probability that the pointer points a number less than 9 is $P(E_4) = \frac{n(E_4)}{n(S)} = \frac{8}{8} = 1$

(OR)

b) Find the mean by deviation method of the following data.

Class Interval	65 – 85	85 – 105	105 – 125	125 – 145	145 – 165	165 – 185	185 – 205
Frequency	4	5	13	20	14	8	4

A:

class interval	frequencies (f_i)	mid values (x_i)	$d_i = x_i - A$	$u_i = \frac{d_i}{h}$	f_iu_i
65–85	4	75	–60	–3	–12
85–105	5	95	–40	–2	–10
105–125	13	115	–20	–1	–13
125–145	20	135^A	0	0	0
145–165	14	155	20	1	14
165–185	8	175	40	2	16
185–205	4	195	60	3	12

Total = 68 $\Sigma f_iu_i = 7$

Mean $= \overline{x} = A + \frac{\Sigma f_iu_i}{\Sigma f_i} \times h$

here, $A = 135$, $\Sigma f_iu_i = 7$, $\Sigma f_i = 68$, $h = 20$

$\therefore$ Mean $\overline{x} = 135 + \frac{7}{68} \times 20$

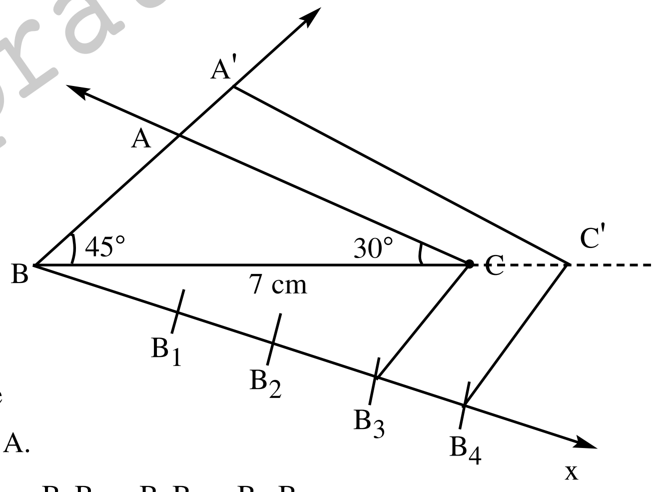
$= 135 + 2.06$ (approximately)

$= 137.06$ (approx.)

13. a) Draw a triangle ABC with side BC = 7 cm, ∠B = 45°, ∠A = 105°. Then construct a triangle whose sides are 4/3 times the corresponding sides of ΔABC.

A: Construction Steps:

1. Given that BC = 7 cm ∠B = 45°, ∠A = 105° to construct a triangle.
 ∠A + ∠B + ∠C = 180°
 ⇒ 105° + 45° + ∠C = 180°
 ⇒ ∠C = 30°
2. By using BC = 7 cm, ∠B = 45°, ∠C = 30° draw ΔABC.
3. Extend BC. Draw a ray BX making an acute angle with BC on the side opposite to vertex A.

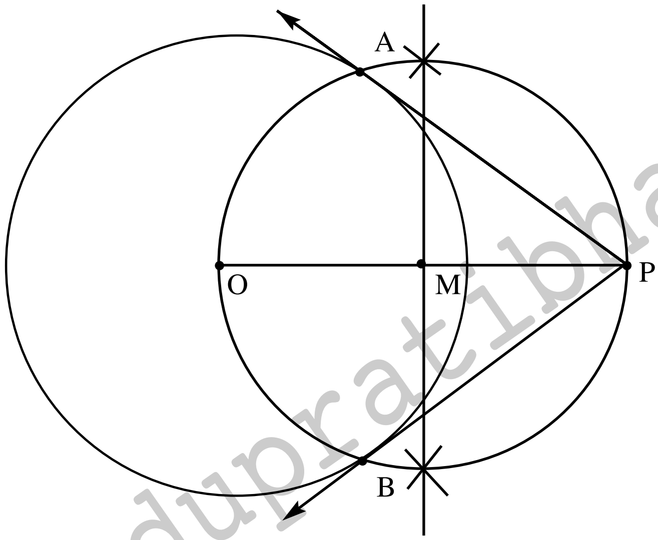


4. Locate B_1, B_2, B_3, B_4 on BX such that $BB_1 = B_1B_2 = B_2B_3 = B_3B_4$.
5. Join B_3C and draw a line parallel to B_3C through B_4 to cut BC at C'
6. Draw a line through C' parallel to CA to cut BA at A'
7. A'BC' is the required triangle.

(OR)

b) Draw a circle of radius of 5 cm from a point 8 cm, away from its centre, construct the pair of tangents to the circle.

A:



Construction Steps:

1. Draw a circle of radius 5 cm, with centre 'O'.
2. P is a point 8 cm away from centre 'O'.
3. Join $\overline{OP}$ and draw perpendicular bisector of $\overline{OP}$
4. M is a mid point of OP.
5. Draw a circle with centre M, Whose radius MP = OM.
6. Two circles are intersecting at A and B.
7. Join $\overline{PA}$, $\overline{PB}$
8. $\overline{PA}$ and $\overline{PB}$ are required tangents.

PART –B ANSWERS

14–A; 15–B; 16–D; 17–C; 18–B; 19–C; 20–C; 21–D; 22–A; 23–C; 24–B; 25–C; 26–B; 27–A; 28–D; 29–A; 30–B; 31–C; 32–B; 33–A.

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