

Secondary School Examination

March -2015

Marking Scheme--- Mathematics (Outside Delhi) 30/1, 30/2, 30/3

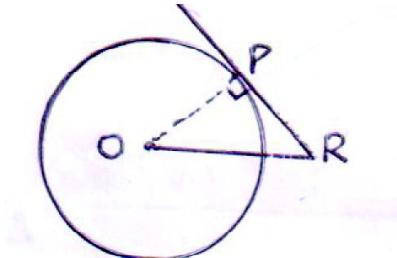
General Instructions

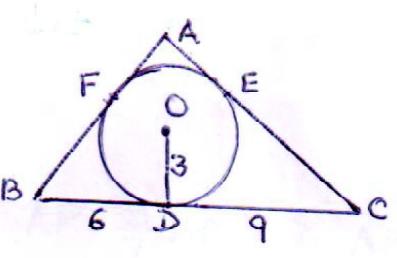
1. The Marking Scheme provides general guidelines to reduce subjectivity and maintain uniformity among large number of examiners involved in the marking. The answers given in the marking scheme are the best suggested answers.
2. Marking is to be done as per the instructions provided in the marking scheme. (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.
3. Alternative methods are accepted. Proportional marks are to be awarded.
4. The Head-Examiners have to go through the first five answer-scripts evaluated by each evaluator to ensure that the evaluation has been done as per instructions given in the marking scheme. The remaining answer scripts meant for evaluation shall be given only after ensuring that there is no significant variation in the marking of individual evaluators.
5. If a question is attempted twice and the candidate has not crossed any answer, only first attempt is to be evaluated. Write 'EXTRA' with second attempt.
6. A full scale of marks 0 to 90 has to be used. Please do not hesitate to award full marks if the answer deserves it.
7. Separate Marking Scheme for all the three sets has been given.
8. The Examiners should acquaint themselves with the guidelines given in the Guidelines for Spot Evaluation before starting the actual evaluation.
9. Every Examiner should stay upto sufficiently reasonable time normally 5-6 hours every day and evaluate 20-25 answer books and should devote minimum 15-20 minutes to evaluate each answer book.
10. Every Examiner should acquaint himself/herself with the marking schemes of all the sets.

QUESTION PAPER CODE 30/1
EXPECTED ANSWERS/VALUE POINTS

Q.No.	SECTION - A	Marks
1.	$p = 3$	1 m
2.	30°	1 m
3.	$\frac{1}{9}$	1 m
4.	120°	1 m

SECTION - B

5.		$\angle POR = 90 - 60 = 30^\circ$	$\frac{1}{2}$ m
		$\frac{PRO}{OR} = \sin 30^\circ = \frac{1}{2} \Rightarrow OR = 2 PR$ $= PR + QR$	$\frac{1}{2}$ m

6.		Let $AF = AE = x$	
		$\therefore AB = 6 + x, AC = 9 + x, BC = 15$	$\frac{1}{2}$ m
		$\frac{1}{2} [15 + 6 + x + 9 + x] \cdot 3 = 54$	1 m
		$\Rightarrow x = 3 \therefore AB = 9 \text{ cm}, AC = 12 \text{ cm}$	$\frac{1}{2}$ m
		and $BC = 15 \text{ cm}$	

$$7. \quad 4x^2 + 4bx + b^2 - a^2 = 0 \quad \Rightarrow \quad (2x + b)^2 - (a)^2 = 0$$

$$\Rightarrow (2x + b + a)(2x + b - a) = 0 \quad \frac{1}{2} m$$

$$\Rightarrow x = -\frac{a+b}{2}, \quad x = \frac{a-b}{2} \quad \frac{1}{2} + \frac{1}{2} m$$

$$8. \quad S_5 + S_7 = 167 \Rightarrow \frac{5}{2}[2a + 4d] + \frac{7}{2}[2a + 6d] = 167$$

Solving (i) and (ii) to get $a = 1$, $d = 5$. Hence AP is 1, 6, 11, $\frac{1}{2} + \frac{1}{2}$ m

9. Here, $AB^2 + BC^2 = AC^2$ $\frac{1}{2} m$

$$\Rightarrow (4)^2 + (p - 4)^2 + (7 - p)^2 = (3)^2 + (-4)^2$$

$$\Rightarrow p = 7 \text{ or } 4 \quad 1 \text{ m}$$

since $p \neq 7 \therefore p = 4$ $\frac{1}{2} m$

10. Using $\text{ar}(\Delta ABC) = 0$ $\frac{1}{2} m$

$$\Rightarrow x(7-5) - 5(5-y) - 4(y-7) = 0 \quad 1\text{ m}$$

$$2x - 25 + 5y - 4y + 28 = 0$$

$$2x + y + 3 = 0 \qquad \frac{1}{2}m$$

SECTION - C

$$11. \quad a_{14} = 2 a_8 \Rightarrow a + 13d = 2(a + 7d) \Rightarrow a = -d \quad 1 \text{ m}$$

$$a_6 = -8 \quad \Rightarrow \quad a + 5d = -8 \quad | \cdot 2m$$

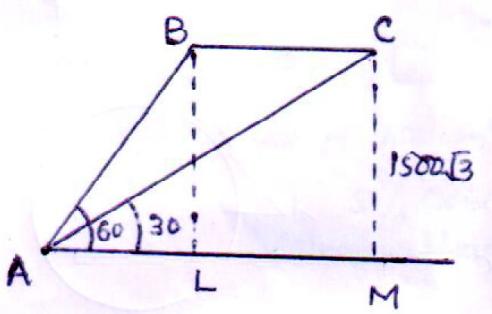
solving to get $a = 2$, $d = -2$ $\frac{1}{2} m$

$$S_{20} = 10(2a + 19d) = 10(4 - 38) = -340 \quad 1\text{ m}$$

12. $\sqrt{3}x^2 - 2\sqrt{2}x - 2\sqrt{3} = 0$

$$\Rightarrow \sqrt{3}x^2 - 3\sqrt{2}x + \sqrt{2}x - 2\sqrt{3} = 0 \Rightarrow (\sqrt{3}x - \sqrt{6})(\sqrt{3}x + \sqrt{2}) = 0 \quad 1+1 \text{ m}$$

$$\Rightarrow x = \sqrt{6}, \quad x = -\sqrt{\frac{2}{3}} \quad \frac{1}{2} + \frac{1}{2} \text{ m}$$

13. 

Let $AL = x \quad \therefore \frac{BL}{x} = \tan 60^\circ \quad \text{Fig.} \quad \frac{1}{2} \text{ m}$

$$\Rightarrow \frac{1500\sqrt{3}}{x} = \sqrt{3} \Rightarrow x = 1500 \text{ m.} \quad 1 \text{ m}$$

$$\frac{CM}{AL + LM} = \tan 30^\circ = \frac{1}{\sqrt{3}}$$

$$\Rightarrow 1500 + LM = 1500(3) = 4500 \quad 1 \text{ m}$$

$$\Rightarrow LM = 3000 \text{ m.}$$

$$\therefore \text{Speed} = \frac{3000}{15} = 200 \text{ m./s.} = 720 \text{ Km/hr.} \quad \frac{1}{2} \text{ m}$$

14. $AP = \frac{3}{7} AB \Rightarrow AP : PB = 3 : 4 \quad 1 \text{ m}$

$$\frac{A}{(-2, -2)} \quad P(x, y) \quad \frac{B}{(2, -4)} \quad \therefore x = \frac{6-8}{7} = -\frac{2}{7} \quad 1 \text{ m}$$

$$y = \frac{-12-8}{7} = -\frac{20}{7} \quad \frac{1}{2} \text{ m}$$

$$P\left(-\frac{2}{7}, -\frac{20}{7}\right) \quad \frac{1}{2} \text{ m}$$

15. $P(\text{Red}) = \frac{1}{4}, \quad P(\text{blue}) = \frac{1}{3}$

$$\Rightarrow P(\text{orange}) = 1 - \frac{1}{4} - \frac{1}{3} = \frac{5}{12} \quad 1\frac{1}{2} \text{ m}$$

$$\Rightarrow \frac{5}{12} (\text{Total no. of balls}) = 10 \quad \frac{1}{2} \text{ m}$$

$$\Rightarrow \text{Total no. of balls} = \frac{10 \times 12}{5} = 24 \quad 1 \text{ m}$$

16. $r = 14 \text{ cm}$. $\theta = 60^\circ$

$$\text{Area of minor segment} = \pi r^2 \frac{\theta}{360} - \frac{1}{2} r^2 \sin \theta \quad \frac{1}{2} \text{ m}$$

$$= \frac{22}{7} \times 14 \times 14 \times \frac{60}{360} - \frac{1}{2} \times 14 \times 14 \times \frac{\sqrt{3}}{2} \quad \frac{1}{2} \text{ m}$$

$$= \left(\frac{308}{3} - 49\sqrt{3} \right) \text{cm}^2 \text{ or } 17.89 \text{ cm}^2 \text{ or } 17.9 \text{ cm}^2 \text{ Approx.} \quad 1 \text{ m}$$

Area of Major segment

$$= \pi r^2 - \left(\frac{308}{3} - 49\sqrt{3} \right) \quad \frac{1}{2} \text{ m}$$

$$= \left(\frac{1540}{3} + 49\sqrt{3} \right) \text{ cm}^2 \text{ or } 598.10 \text{ cm}^2 \quad \frac{1}{2} \text{ m}$$

or 598 cm^2 Approx.

17. Slant height (ℓ) = $\sqrt{(2.8)^2 + (2.1)^2} = 3.5 \text{ cm}$. $\frac{1}{2} \text{ m}$

$$\therefore \text{Area of canvas} = 2 \times \frac{22}{7} \times (2.1) \times 4 + \frac{22}{7} \times 2.1 \times 3.5$$

for one tent

$$= 6.6 (8 + 3.5) = 6.6 \times 11.5 \text{ m}^2 \quad \frac{1}{2} \text{ m}$$

$$\therefore \text{Area for 100 tents} = 66 \times 115 \text{ m}^2$$

$$\text{Cost of 100 tents} = \text{Rs. } 66 \times 115 \times 100 \quad \frac{1}{2} \text{ m}$$

$$50\% \text{ Cost} = 33 \times 11500 = \text{Rs. } 379500 \quad \frac{1}{2} \text{ m}$$

Values : Helping the flood victims 1 m

18. Volume of liquid in the bowl = $\frac{2}{3} \cdot \pi \cdot (18)^3 \text{ cm}^3$ $\frac{1}{2} \text{ m}$

$$\text{Volume, after wastage} = \frac{2\pi}{3} \cdot (18)^3 \cdot \frac{90}{100} \text{ cm}^3 \quad \frac{1}{2} \text{ m}$$

$$\text{Volume of liquid in 72 bottles} = \pi (3)^2 \cdot h \cdot 72 \text{ cm}^3 \quad \frac{1}{2} \text{ m}$$

$$\Rightarrow h = \frac{\frac{2}{3}\pi(18)^3 \cdot \frac{9}{10}}{\pi(3)^2 \cdot 72} = 5.4 \text{ cm.} \quad \frac{1}{2} + 1 \text{ m}$$

19. Largest possible diameter = 10 cm.

$$\text{of hemisphere} \quad 1 \text{ m}$$

$$\therefore \text{radius} = 5 \text{ cm.}$$

$$\text{Total surface area} = 6(10)^2 + 3.14 \times (5)^2 \quad 1 \text{ m}$$

$$\begin{aligned}\text{Cost of painting} &= \frac{678.5 \times 5}{100} = \frac{\text{Rs. } 3392.50}{100} = \text{₹ } 33.9250 \\ &= \text{₹ } 33.93\end{aligned} \quad 1 \text{ m}$$

20. Volume of metal in 504 cones = $504 \times \frac{1}{3} \times \frac{22}{7} \times \frac{35}{20} \times \frac{35}{20} \times 3 \text{ cm.}$ 1 m

$$\therefore \frac{4}{3} \times \frac{22}{7} \times r^3 = 504 \times \frac{1}{3} \times \frac{22}{7} \times \frac{35}{20} \times \frac{35}{20} \times 3 \quad \frac{1}{2} \text{ m}$$

$$r = 10.5 \text{ cm.} \quad \therefore \text{diameter} = 21 \text{ cm.} \quad \frac{1}{2} \text{ m}$$

$$\text{Surface area} = 4 \times \frac{22}{7} \times \frac{21}{7} \times \frac{21}{2} \times \frac{21}{2} = 1386 \text{ cm}^2 \quad 1 \text{ m}$$

21. Let the length of shorter side be $x \text{ m.}$

$$\therefore \text{length of diagonal} = (x + 16) \text{ m} \quad \frac{1}{2} \text{ m}$$

$$\text{and, length of longer side} = (x + 14) \text{ m} \quad \frac{1}{2} \text{ m}$$

$$\therefore x^2 + (x + 14)^2 = (x + 16)^2 \quad 1 \text{ m}$$

$$\Rightarrow x^2 - 4x - 6 = 0 \quad \Rightarrow x = 10 \text{ m.} \quad 1 \text{ m}$$

$$\therefore \text{length of sides are } 10 \text{ m and } 24 \text{ m.} \quad \frac{1}{2} + \frac{1}{2} \text{ m}$$

22. $t_{60} = 8 + 59(2) = 126$ 1 m

sum of last 10 terms = $(t_{51} + t_{52} + \dots + t_{60})$ 1 m

$t_{51} = 8 + 50(2) = 108$ $\frac{1}{2}$ m

\therefore Sum of last 10 terms = $5[108 + 126]$ 1 m

= 1170 $\frac{1}{2}$ m

23. Let the original average speed of (first) train be x km/h.

$$\therefore \frac{54}{x} + \frac{63}{x+6} = 3 \quad 1\frac{1}{2} \text{ m}$$

$$\Rightarrow 54x + 324 + 63x = 3x(x+6)$$

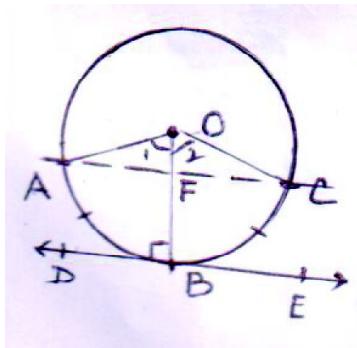
$$\Rightarrow x^2 - 33x - 108 = 0 \quad 1 \text{ m}$$

Solving to get $x = 36$ 1 m

\therefore First speed of train = 36 km/h. $\frac{1}{2}$ m

24. For correct Given, To Prove, const. and figure $\frac{1}{2} \times 4 = 2$ m

For correct proof 2 m

25.  B is mid point of arc (ABC) Correct Fig. 1 m

$$\therefore \angle 1 = \angle 2 \quad \frac{1}{2} \text{ m}$$

$$\therefore \triangle OAF \cong \triangle OCF \quad \text{SAS.} \quad \frac{1}{2} \text{ m}$$

$$\therefore \angle AFO = \angle CFO = 90^\circ \quad \frac{1}{2} \text{ m}$$

$$\Rightarrow \angle AFO = \angle DBO = 90^\circ \quad \frac{1}{2} \text{ m}$$

But these are corresponding angles $\frac{1}{2}$ m

$$\therefore AC \parallel DE \quad \frac{1}{2} \text{ m}$$

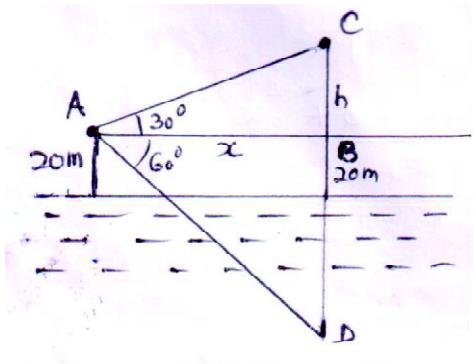
26. Constructing ΔABC

$1\frac{1}{2}$ m

Constructing $\Delta AB'C'$

$2\frac{1}{2}$ m

27.



correct figure

1 m

$$\frac{h}{x} = \tan 30^\circ = \frac{1}{\sqrt{3}} \Rightarrow x = \sqrt{3} h. \quad \frac{1}{2} \text{ m}$$

$$\frac{40+h}{x} = \tan 60^\circ = \sqrt{3} \Rightarrow x = \frac{40+h}{\sqrt{3}} \quad \frac{1}{2} \text{ m}$$

$$\therefore \sqrt{3} h = \frac{40+b}{\sqrt{3}} \Rightarrow h = 20 \text{ m.} \quad \frac{1}{2} \text{ m}$$

$$\therefore x = 20\sqrt{3} \text{ m} \quad \frac{1}{2} \text{ m}$$

$$\therefore AC = \sqrt{(20)^2 + (20\sqrt{3})^2} = 40 \text{ m.} \quad 1 \text{ m}$$

28. (i) $P(\text{spade or an ace}) = \frac{13+3}{52} = \frac{4}{13} \quad 1 \text{ m}$

(ii) $P(\text{a black king}) = \frac{2}{52} = \frac{1}{26} \quad 1 \text{ m}$

(iii) $P(\text{neither a jack nor a king}) = \frac{52-8}{52} = \frac{44}{52} = \frac{11}{13} \quad 1 \text{ m}$

(iv) $P(\text{either a king or a queen}) = \frac{4+4}{52} = \frac{8}{52} = \frac{2}{13} \quad 1 \text{ m}$

29. $\frac{1}{2} [1(2k+5) - 4(-5+1) - k(-1-2k)] = 24$ 2 m

$$\Rightarrow 2k^2 + 3k - 27 = 0 \quad 1 \text{ m}$$

Solving to get $k = 3$, $k = -\frac{9}{2}$ 1 m

30. Radius of circle with centre O is OR

let $OR = x \therefore x^2 + x^2 = (42)^2 \Rightarrow x = 21\sqrt{2} \text{ m.}$ 1 m

Area of one flower bed = Area of segment of circle with

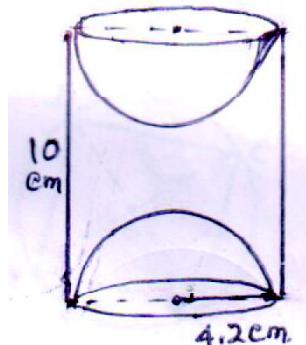
centre angle 90°

$$= \frac{22}{7} \times 21\sqrt{2} \times 21\sqrt{2} \times \frac{90}{360} - \frac{1}{2} \times 21\sqrt{2} \times 21\sqrt{2} \quad 1 \text{ m}$$

$$= 693 - 441 = 252 \text{ m}^2 \quad \frac{1}{2} + \frac{1}{2} + \frac{1}{2} \text{ m}$$

$$\therefore \text{Area of two flower beds} = 2 \times 252 = 504 \text{ m}^2 \quad \frac{1}{2} \text{ m}$$

31. Total Volume of cylinder = $\frac{22}{7} \times \frac{42}{10} \times \frac{42}{10} \times 10 \text{ cm}^3 \quad \frac{1}{2} \text{ m}$



$$= 554.40 \text{ cm.} \quad \frac{1}{2} \text{ m}$$

$$\text{Volume of metal scooped out} = \frac{4}{3} \times \frac{42}{7} \times \left(\frac{42}{10}\right)^3 \quad \frac{1}{2} \text{ m}$$

$$= 310.46 \text{ cm}^3 \quad \frac{1}{2} \text{ m}$$

$$\therefore \text{Volume of rest of cylinder} = 554.40 - 310.46$$

$$= 243.94 \text{ cm}^3 \quad \frac{1}{2} \text{ m}$$

If ℓ is the length of were, then

$$\frac{22}{7} \times \frac{7}{10} \times \frac{7}{10} \times \ell = \frac{24394}{100} \quad 1 \text{ m}$$

$$\Rightarrow \ell = 158.4 \text{ cm.} \quad \frac{1}{2} \text{ m}$$

QUESTION PAPER CODE 30/2

SECTION - A

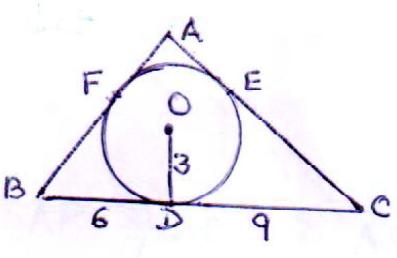
Q.No.	SECTION-A	Marks
1.	120°	1 m
2.	$p = 3$	1 m
3.	30°	1 m
4.	$\frac{1}{9}$	1 m

SECTION - B

7.  $\angle POR = 90 - 60 = 30^\circ$ $\frac{1}{2} m$

$$\frac{PRO}{OR} = \sin 30^\circ = \frac{1}{2} \Rightarrow OR = 2 PR$$

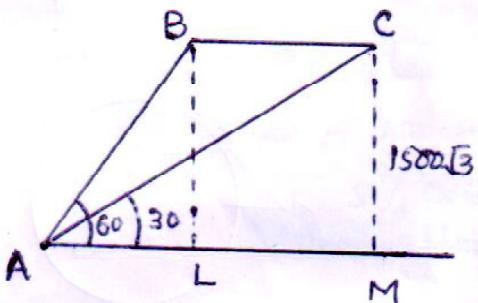
$$= PR + QR$$
 $\frac{1}{2} m$

8. 
- Let $AF = AE = x$
- $\therefore AB = 6 + x, AC = 9 + x, BC = 15$ $\frac{1}{2} m$
- $$\frac{1}{2} [15 + 6 + x + 9 + x] \cdot 3 = 54$$
- $\Rightarrow x = 3 \therefore AB = 9 \text{ cm}, AC = 12 \text{ cm}$ $\frac{1}{2} m$
- and $BC = 15 \text{ cm}$
9. $4x^2 + 4bx + b^2 - a^2 = 0 \Rightarrow (2x + b)^2 - (a)^2 = 0$ $\frac{1}{2} m$
- $$\Rightarrow (2x + b + a)(2x + b - a) = 0$$
- $$\Rightarrow x = -\frac{a+b}{2}, x = \frac{a-b}{2}$$
- $\frac{1}{2} + \frac{1}{2} m$
10. Here $AB^2 + AC^2 = BC^2$ $\frac{1}{2} m$
- $$(5)^2 + (3+y)^2 + (1)^2 + (-1)^2 = (-4)^2 + (y-4)^2$$
- $$\Rightarrow y = -2$$
- $\frac{1}{2} m$

SECTION - C

11. Slant height (ℓ) = $\sqrt{(2.8)^2 + (2.1)^2} = 3.5 \text{ cm.}$ $\frac{1}{2} m$
- $$\therefore \text{Area of canvas} = 2 \times \frac{22}{7} \times (2.1) \times 4 + \frac{22}{7} \times 2.1 \times 3.5$$
- for one tent
- $$= 6.6 (8 + 3.5) = 6.6 \times 11.5 \text{ m}^2$$
- $\frac{1}{2} m$
- $\therefore \text{Area for 100 tents} = 66 \times 115 \text{ m}^2$
- Cost of 100 tents = Rs. $66 \times 115 \times 100$ $\frac{1}{2} m$
- 50% Cost = $33 \times 11500 = \text{Rs. } 379500$ $\frac{1}{2} m$
- Values : Helping the flood victims $1 m$

12.



Let $AL = x \therefore \frac{BL}{x} = \tan 60^\circ$ Fig. $\frac{1}{2}$ m

$$\Rightarrow \frac{1500\sqrt{3}}{x} = \sqrt{3} \Rightarrow x = 1500 \text{ m.} \quad 1 \text{ m}$$

$$\frac{CM}{AL + LM} = \tan 30^\circ = \frac{1}{\sqrt{3}}$$

$$\Rightarrow 1500 + LM = 1500(3) = 4500 \quad 1 \text{ m}$$

$$\Rightarrow LM = 3000 \text{ m.}$$

$$\therefore \text{Speed} = \frac{3000}{15} = 200 \text{ m./s.} = 720 \text{ Km/hr.} \quad \frac{1}{2} \text{ m}$$

13. Volume of liquid in the bowl = $\frac{2}{3} \cdot \pi \cdot (18)^3 \text{ cm}^3$ $\frac{1}{2}$ m

$$\text{Volume, after wastage} = \frac{2\pi}{3} \cdot (18)^3 \cdot \frac{90}{100} \text{ cm}^3 \quad \frac{1}{2} \text{ m}$$

$$\text{Volume of liquid in 72 bottles} = \pi(3)^2 \cdot h \cdot 72 \text{ cm}^3 \quad \frac{1}{2} \text{ m}$$

$$\Rightarrow h = \frac{\frac{2}{3}\pi(18)^3 \cdot \frac{9}{10}}{\pi(3)^2 \cdot 72} = 5.4 \text{ cm.} \quad \frac{1}{2} + 1 \text{ m}$$

14. $P(\text{Red}) = \frac{1}{4}, P(\text{blue}) = \frac{1}{3}$

$$\Rightarrow P(\text{orange}) = 1 - \frac{1}{4} - \frac{1}{3} = \frac{5}{12} \quad 1\frac{1}{2} \text{ m}$$

$$\Rightarrow \frac{5}{12} (\text{Total no. of balls}) = 10 \quad \frac{1}{2} \text{ m}$$

$$\Rightarrow \text{Total no. of balls} = \frac{10 \times 12}{5} = 24 \quad 1 \text{ m}$$

15. Largest possible diameter = 10 cm.

of hemisphere 1 m

$$\therefore \text{radius} = 5 \text{ cm.}$$

$$\text{Total surface area} = 6(10)^2 + 3.14 \times (5)^2 \quad 1 \text{ m}$$

$$\text{Cost of painting} = \frac{678.5 \times 5}{100} = \frac{\text{Rs. } 3392.50}{100} = \text{₹ } 33.9250 \quad 1 \text{ m}$$

$$= \text{₹ } 33.93$$

$$16. \quad AP = \frac{3}{7} AB \Rightarrow AP : PB = 3 : 4 \quad 1 \text{ m}$$

$$\begin{array}{ccc} A & P(x, y) & B \\ (-2, -2) & 3 : 4 & (2, -4) \end{array} \quad \therefore x = \frac{6-8}{7} = -\frac{2}{7} \quad 1 \text{ m}$$

$$y = \frac{-12-8}{7} = -\frac{20}{7} \quad \frac{1}{2} \text{ m}$$

$$P \left(-\frac{2}{7}, -\frac{20}{7} \right) \quad \frac{1}{2} \text{ m}$$

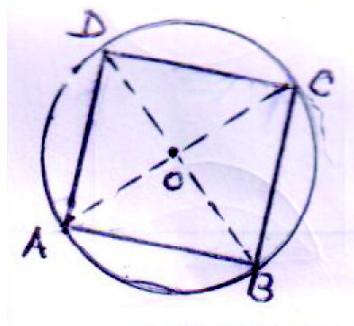
$$17. \quad \text{Volume of metal in 504 cones} = 504 \times \frac{1}{3} \times \frac{22}{7} \times \frac{35}{20} \times \frac{35}{20} \times 3 \text{ cm.} \quad 1 \text{ m}$$

$$\therefore \frac{4}{3} \times \frac{22}{7} \times r^3 = 504 \times \frac{1}{3} \times \frac{22}{7} \times \frac{35}{20} \times \frac{35}{20} \times 3 \quad \frac{1}{2} \text{ m}$$

$$r = 10.5 \text{ cm.} \quad \therefore \text{diameter} = 21 \text{ cm.} \quad \frac{1}{2} \text{ m}$$

$$\text{Surface area} = 4 \times \frac{22}{7} \times \frac{21}{7} \times \frac{21}{2} \times \frac{21}{2} = 1386 \text{ cm}^2 \quad 1 \text{ m}$$

$$18. \quad AB = BC = CD = AD \Rightarrow AC = BD = 2r \quad 1 \text{ m}$$



$$3.14 r^2 = 1256 \Rightarrow r = 20 \text{ cm.} \quad 1 \text{ m}$$

$$\text{Area} = \frac{1}{2} \times 40 \times 40 = 800 \text{ cm}^2 \quad 1 \text{ m}$$

19. Given equation can be written as $x^2 + 3\sqrt{3} x - 30 = 0$ ½ m

$$\Rightarrow x^2 + 5\sqrt{3}x - 2\sqrt{3}x - 30 = 0 \quad 1 \text{ m}$$

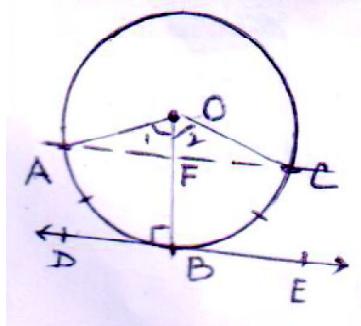
$$\Rightarrow (x + 5\sqrt{3})(x - 2\sqrt{3}) = 0 \quad \frac{1}{2} m$$

$$\Rightarrow x = -5\sqrt{3}, 2\sqrt{3} \quad \frac{1}{2} + \frac{1}{2} m$$

Solving (i) and (ii) we get $a = 5$, $d = 4$ $\frac{1}{2} m$

$$S_{15} = \frac{15}{2} (10 + 14 \times 4) = 495 \quad 1 \text{ m}$$

21. B is mid point of arc (ABC) Correct Fig. 1 m



B is mid point of arc (ABC)

Correct Fig.

$$\therefore \angle 1 = \angle 2 \quad \frac{1}{2} m$$

$\therefore \Delta \text{OAF} \cong \Delta \text{OCF}$ SAS. $\frac{1}{2} \text{ m}$

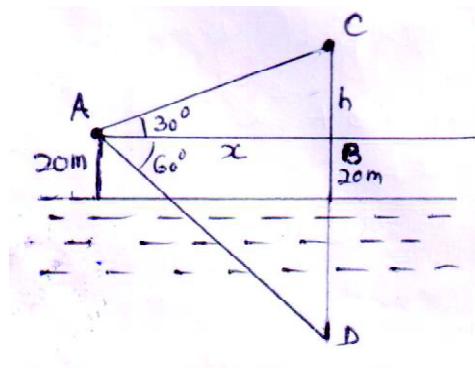
$$\therefore \angle AFO = \angle CFO = 90^\circ \quad \frac{1}{2} \text{ m}$$

$$\Rightarrow \angle AFO = \angle DBO = 90^\circ \quad \frac{1}{2} m$$

But these are corresponding angles ½ m

$$\therefore AC \parallel DE \quad \frac{1}{2} m$$

22. correct figure 1 m



correct figure

$$\frac{h}{x} = \tan 30^\circ = \frac{1}{\sqrt{3}} \Rightarrow x = \sqrt{3} h. \quad \frac{1}{2} m$$

$$\frac{40+h}{x} = \tan 60^\circ = \sqrt{3} \Rightarrow x = \frac{40+h}{\sqrt{3}} \quad \frac{1}{2} m$$

$$\therefore \sqrt{3} h = \frac{40+b}{\sqrt{3}} \Rightarrow h = 20 \text{ m.} \quad \frac{1}{2} \text{ m}$$

$$\therefore x = 20\sqrt{3} \text{ m} \quad \frac{1}{2} \text{ m}$$

$$\therefore AC = \sqrt{(20)^2 + (20\sqrt{3})^2} = 40 \text{ m.} \quad 1 \text{ m}$$

23. (i) $P(\text{spade or an ace}) = \frac{13+3}{52} = \frac{4}{13}$ 1 m

(ii) $P(\text{a black king}) = \frac{2}{52} = \frac{1}{26}$ 1 m

(iii) $P(\text{neither a jack nor a king}) = \frac{52-8}{52} = \frac{44}{52} = \frac{11}{13}$ 1 m

(iv) $P(\text{either a king or a queen}) = \frac{4+4}{52} = \frac{8}{52} = \frac{2}{13}$ 1 m

24. Radius of circle with centre O is OR

let $OR = x \therefore x^2 + x^2 = (42)^2 \Rightarrow x = 21\sqrt{2} \text{ m.}$ 1 m

Area of one flower bed = Area of segment of circle with

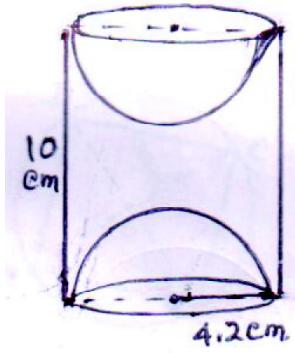
centre angle 90°

$$= \frac{22}{7} \times 21\sqrt{2} \times 21\sqrt{2} \times \frac{90}{360} - \frac{1}{2} \times 21\sqrt{2} \times 21\sqrt{2} \quad 1 \text{ m}$$

$$= 693 - 441 = 252 \text{ m}^2 \quad \frac{1}{2} + \frac{1}{2} + \frac{1}{2} \text{ m}$$

\therefore Area of two flower beds = $2 \times 252 = 504 \text{ m}^2$ $\frac{1}{2} \text{ m}$

25.



$$\text{Total Volume of cylinder} = \frac{22}{7} \times \frac{42}{10} \times \frac{42}{10} \times 10 \text{ cm}^3 \quad \frac{1}{2} \text{ m}$$

$$= 554.40 \text{ cm.} \quad \frac{1}{2} \text{ m}$$

$$\text{Volume of metal scooped out} = \frac{4}{3} \times \frac{42}{7} \times \left(\frac{42}{10}\right)^3 \quad \frac{1}{2} \text{ m}$$

$$= 310.46 \text{ cm}^3 \quad \frac{1}{2} \text{ m}$$

$$\therefore \text{Volume of rest of cylinder} = 554.40 - 310.46$$

$$= 243.94 \text{ cm}^3 \quad \frac{1}{2} \text{ m}$$

If ℓ is the length of were, then

$$\frac{22}{7} \times \frac{7}{10} \times \frac{7}{10} \times \ell = \frac{24394}{100} \quad 1 \text{ m}$$

$$\Rightarrow \ell = 158.4 \text{ cm.} \quad \frac{1}{2} \text{ m}$$

26. Let the length of shorter side be x m.

$$\therefore \text{length of diagonal} = (x + 16) \text{ m} \quad \frac{1}{2} \text{ m}$$

$$\text{and, lenght of longer side} = (x + 14) \text{ m} \quad \frac{1}{2} \text{ m}$$

$$\therefore x^2 + (x + 14)^2 = (x + 16)^2 \quad 1 \text{ m}$$

$$\Rightarrow x^2 - 4x - 6 = 0 \Rightarrow x = 10 \text{ m.} \quad 1 \text{ m}$$

$$\therefore \text{length of sides are } 10\text{m and } 24\text{m.} \quad \frac{1}{2} + \frac{1}{2} \text{ m}$$

$$27. t_{60} = 8 + 59(2) = 126 \quad 1 \text{ m}$$

$$\text{sum of last 10 terms} = (t_{51} + t_{52} + \dots + t_{60}) \quad 1 \text{ m}$$

$$t_{51} = 8 + 50(2) = 108 \quad \frac{1}{2} \text{ m}$$

$$\therefore \text{Sum of last 10 terms} = 5 [108 + 126] = 1170$$

1 m
½ m

28. Let the first average speed of the bus be x km./h.

$$\therefore \frac{75}{x} + \frac{90}{x+10} = 3$$

1½ m

$$\Rightarrow 75x + 750 + 90x = 3(x^2 + 10x)$$

1 m

$$\Rightarrow x^2 - 45x - 250 = 0$$

Solving to get $x = 50$

1 m

$$\therefore \text{Speed} = 50 \text{ km/h.}$$

½ m

29. For correct Given, To Prove, construction and figure

½ x 4=2 m

correct proof

2 m

30. Constructing ΔABC

1½ m

Constructing the perpendicular (BD)

1 m

Constructing the circle and tangents

1½ m

31. Here

$$\frac{1}{2} \{(k+1)(-3+k) + 4(-k-1) + 7(4)\} = 6$$

2 m

$$\Rightarrow k^2 - 6k + 9 = 0$$

1 m

Solving to get $k = 3$

1 m

QUESTION PAPER CODE 30/3

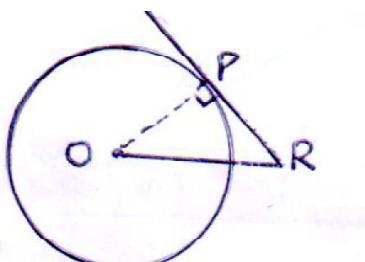
EXPECTED ANSWERS/VALUE POINTS

Q.No.	SECTION - A	Marks
1.	30°	1 m
2.	$\frac{1}{9}$	1 m
3.	$p = 3$	1 m
4.	120°	1 m

SECTION - B

5. $S_5 + S_7 = 167 \Rightarrow \frac{5}{2}[2a+4d] + \frac{7}{2}[2a+6d] = 167$
 $24a + 62d = 334 \quad \text{or} \quad 12a + 31d = 167 \dots \dots \dots \text{(i)}$ $\frac{1}{2} \text{ m}$
 $S_{10} = 235 \Rightarrow 5[2a+9d] = 235 \quad \text{or} \quad 2a+9d = 47 \dots \dots \dots \text{(ii)}$ $\frac{1}{2} \text{ m}$
 Solving (i) and (ii) to get $a=1, d=5$. Hence AP is $1, 6, 11, \dots \dots \dots$ $\frac{1}{2} + \frac{1}{2} \text{ m}$

6. Here, $AB^2 + BC^2 = AC^2$ $\frac{1}{2} \text{ m}$
 $\Rightarrow (4)^2 + (p-4)^2 + (7-p)^2 = (3)^2 + (-4)^2$
 $\Rightarrow p = 7 \quad \text{or} \quad 4$ 1 m
 since $p \neq 7 \therefore p = 4$ $\frac{1}{2} \text{ m}$

7.  $\angle POR = 90 - 60 = 30^\circ$ $\frac{1}{2} \text{ m}$
 $\frac{PRO}{OR} = \sin 30^\circ = \frac{1}{2} \Rightarrow OR = 2 PR$
 $= PR + QR$ $\frac{1}{2} \text{ m}$

- 8.
-
- Let $AF = AE = x$
- $\therefore AB = 6 + x, AC = 9 + x, BC = 15$
- $\frac{1}{2} [15 + 6 + x + 9 + x] \cdot 3 = 54$
- $\Rightarrow x = 3 \therefore AB = 9 \text{ cm}, AC = 12 \text{ cm}$
- and $BC = 15 \text{ cm}$

9. Using $\text{ar} (\Delta ABC) = 0$

$\Rightarrow x(7-5) - 5(5-y) - 4(y-7) = 0$

$2x - 25 + 5y - 4y + 28 = 0$

$2x + y + 3 = 0$

10. Given equation can be written as

$$x^2 - 2ax + a^2 - 4b^2 = 0 \text{ or } (x-a)^2 - (2b)^2 = 0 \quad 1 \text{ m}$$

$\therefore (x-a+2b)(x-a-2b) = 0$

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

SECTION - C

11. Slant height (ℓ) = $\sqrt{(2.8)^2 + (2.1)^2} = 3.5 \text{ cm.}$
- \therefore Area of canvas = $2 \times \frac{22}{7} \times (2.1) \times 4 + \frac{22}{7} \times 2.1 \times 3.5$
for one tent
 $= 6.6 (8 + 3.5) = 6.6 \times 11.5 \text{ m}^2$
- \therefore Area for 100 tents = $66 \times 115 \text{ m}^2$

Cost of 100 tents = Rs. $66 \times 115 \times 100$	$\frac{1}{2}$ m
50% Cost = 33×11500 = Rs. 379500	$\frac{1}{2}$ m
Values : Helping the flood victims	1 m

12. Volume of liquid in the bowl = $\frac{2}{3} \cdot \pi \cdot (18)^3 \text{ cm}^3$ $\frac{1}{2}$ m

$$\text{Volume, after wastage} = \frac{2\pi}{3} \cdot (18)^3 \cdot \frac{90}{100} \text{ cm}^3$$
 $\frac{1}{2}$ m

$$\text{Volume of liquid in 72 bottles} = \pi (3)^2 \cdot h \cdot 72 \text{ cm}^3$$
 $\frac{1}{2}$ m

$$\Rightarrow h = \frac{\frac{2}{3}\pi(18)^3 \cdot \frac{9}{10}}{\pi(3)^2 \cdot 72} = 5.4 \text{ cm.}$$
 $\frac{1}{2} + 1$ m

13. Largest possible diameter = 10 cm.

$$\text{of hemisphere}$$
 1 m

$$\therefore \text{radius} = 5 \text{ cm.}$$

$$\text{Total surface area} = 6 (10)^2 + 3.14 \times (5)^2$$
 1 m

$$\begin{aligned} \text{Cost of painting} &= \frac{678.5 \times 5}{100} = \frac{\text{Rs. } 3392.50}{100} = \text{₹ } 33.9250 \\ &= \text{₹ } 33.93 \end{aligned}$$
 1 m

14. Volume of metal in 504 cones = $504 \times \frac{1}{3} \times \frac{22}{7} \times \frac{35}{20} \times \frac{35}{20} \times 3 \text{ cm.}$ 1 m

$$\therefore \frac{4}{3} \times \frac{22}{7} \times r^3 = 504 \times \frac{1}{3} \times \frac{22}{7} \times \frac{35}{20} \times \frac{35}{20} \times 3$$
 $\frac{1}{2}$ m

$$r = 10.5 \text{ cm.} \quad \therefore \text{diameter} = 21 \text{ cm.}$$
 $\frac{1}{2}$ m

$$\text{Surface area} = 4 \times \frac{22}{7} \times \frac{21}{7} \times \frac{21}{2} \times \frac{21}{2} = 1386 \text{ cm}^2$$
 1 m

15. $\sqrt{3}x^2 - 2\sqrt{2}x - 2\sqrt{3} = 0$

$$\Rightarrow \sqrt{3}x^2 - 3\sqrt{2}x + \sqrt{2}x - 2\sqrt{3} = 0 \Rightarrow (\sqrt{3}x - \sqrt{6})(\sqrt{3}x + \sqrt{2}) = 0 \quad 1+1 \text{ m}$$

$$\Rightarrow x = \sqrt{6}, \quad x = -\sqrt{\frac{2}{3}} \quad \frac{1}{2} + \frac{1}{2} \text{ m}$$

16.

Let $AL = x \quad \therefore \frac{BL}{x} = \tan 60^\circ \quad \text{Fig.} \quad \frac{1}{2} \text{ m}$

$$\Rightarrow \frac{1500\sqrt{3}}{x} = \sqrt{3} \Rightarrow x = 1500 \text{ m.} \quad 1 \text{ m}$$

$$\frac{CM}{AL + LM} = \tan 30^\circ = \frac{1}{\sqrt{3}}$$

$$\Rightarrow 1500 + LM = 1500(3) = 4500 \quad 1 \text{ m}$$

$$\Rightarrow LM = 3000 \text{ m.}$$

$$\therefore \text{Speed} = \frac{3000}{15} = 200 \text{ m./s.} = 720 \text{ Km/hr.} \quad \frac{1}{2} \text{ m}$$

17. $r = 14 \text{ cm. } \theta = 60^\circ$

Area of minor segment $= \pi r^2 \frac{\theta}{360} - \frac{1}{2} r^2 \sin \theta \quad \frac{1}{2} \text{ m}$

$$= \frac{22}{7} \times 14 \times 14 \times \frac{60}{360} - \frac{1}{2} \times 14 \times 14 \times \frac{\sqrt{3}}{2} \quad \frac{1}{2} \text{ m}$$

$$= \left(\frac{308}{3} - 49\sqrt{3} \right) \text{cm}^2 \text{ or } 17.89 \text{ cm}^2 \text{ or } 17.9 \text{ cm}^2 \text{ Approx.} \quad 1 \text{ m}$$

Area of Major segment

$$= \pi r^2 - \left(\frac{308}{3} - 49\sqrt{3} \right) \quad \frac{1}{2} \text{ m}$$

$$= \left(\frac{1540}{3} + 49\sqrt{3} \right) \text{cm}^2 \text{ or } 598.10 \text{ cm}^2 \quad \frac{1}{2} \text{ m}$$

or $598 \text{ cm}^2 \text{ Approx.}$

Solving (i) and (ii) to get $a = 4$ and $d = 3$ ½ m

$$S_{10} = 5 (8 + 27) = 175 \quad 1 \text{ m}$$

19. $\frac{A}{(1, 2)} \quad \frac{P}{2 : 3} \quad \frac{B}{(6, 7)}$ $AP = \frac{2}{5} AB \Rightarrow AP : PB = 2 : 3$ 1 m
 (x, y)

$$\therefore x = \frac{12+3}{5} = 3, y = \frac{14+6}{5} = 4 \quad 1+\frac{1}{2} \text{ m}$$

$$P(x, y) = (3, 4) \quad \frac{1}{2} m$$

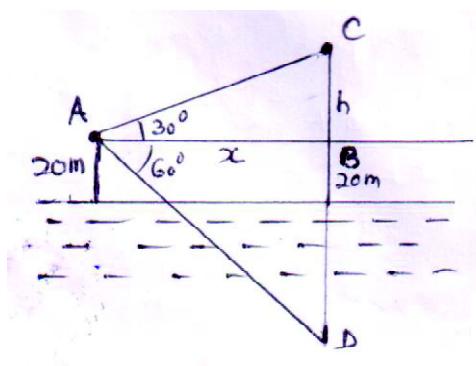
$$20. \quad P(W) = \frac{3}{10}, \quad P(B) = \frac{2}{5} \quad \therefore P(R) = 1 - \frac{3}{10} - \frac{2}{5} = \frac{3}{10} \quad 1\frac{1}{2} \text{ m}$$

$$\frac{2}{5} \text{ (Total no. of balls)} = 20 \quad \frac{1}{2} \text{ m}$$

$$\Rightarrow \text{Total no. of balls} = \frac{20 \times 5}{2} = 50 \quad 1 \text{ m}$$

SECTION - D

21.  correct figure 1 m



$$\frac{h}{x} = \tan 30^\circ = \frac{1}{\sqrt{3}} \Rightarrow x = \sqrt{3} h. \quad \frac{1}{2} m$$

$$\frac{40+h}{x} = \tan 60^\circ = \sqrt{3} \Rightarrow x = \frac{40+h}{\sqrt{3}} \quad \frac{1}{2} m$$

$$\therefore \sqrt{3} h = \frac{40+b}{\sqrt{3}} \Rightarrow h = 20 \text{ m.}$$

$$\therefore x = 20\sqrt{3} \text{ m} \quad \frac{1}{2} \text{ m}$$

$$\therefore AC = \sqrt{(20)^2 + (20\sqrt{3})^2} = 40 \text{ m.} \quad 1 \text{ m}$$

22. (i) $P(\text{spade or an ace}) = \frac{13+3}{52} = \frac{4}{13}$ 1 m

(ii) $P(\text{a black king}) = \frac{2}{52} = \frac{1}{26}$ 1 m

(iii) $P(\text{neither a jack nor a king}) = \frac{52-8}{52} = \frac{44}{52} = \frac{11}{13}$ 1 m

(iv) $P(\text{either a king or a queen}) = \frac{4+4}{52} = \frac{8}{52} = \frac{2}{13}$ 1 m

23. Radius of circle with centre O is OR

$$\text{let } OR = x \quad \therefore x^2 + x^2 = (42)^2 \Rightarrow x = 21\sqrt{2} \text{ m.} \quad 1 \text{ m}$$

Area of one flower bed = Area of segment of circle with

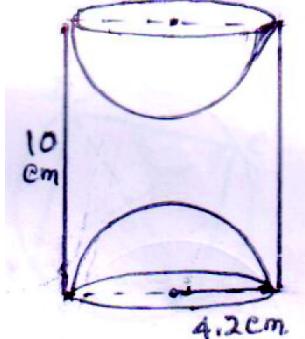
centre angle 90°

$$= \frac{22}{7} \times 21\sqrt{2} \times 21\sqrt{2} \times \frac{90}{360} - \frac{1}{2} \times 21\sqrt{2} \times 21\sqrt{2} \quad 1 \text{ m}$$

$$= 693 - 441 = 252 \text{ m}^2 \quad \frac{1}{2} + \frac{1}{2} + \frac{1}{2} \text{ m}$$

$$\therefore \text{Area of two flower beds} = 2 \times 252 = 504 \text{ m}^2 \quad \frac{1}{2} \text{ m}$$

24.



$$\text{Total Volume of cylinder} = \frac{22}{7} \times \frac{42}{10} \times \frac{42}{10} \times 10 \text{ cm}^3 \quad \frac{1}{2} \text{ m}$$

$$= 554.40 \text{ cm.} \quad \frac{1}{2} \text{ m}$$

$$\text{Volume of metal scooped out} = \frac{4}{3} \times \frac{42}{7} \times \left(\frac{42}{10}\right)^3 \quad \frac{1}{2} \text{ m}$$

$$= 310.46 \text{ cm}^3 \quad \frac{1}{2} \text{ m}$$

$$\therefore \text{Volume of rest of cylinder} = 554.40 - 310.46$$

$$= 243.94 \text{ cm}^3 \quad \frac{1}{2} \text{ m}$$

If ℓ is the length of were, then

$$\frac{22}{7} \times \frac{7}{10} \times \frac{7}{10} \times \ell = \frac{24394}{100} \quad 1 \text{ m}$$

$$\Rightarrow \ell = 158.4 \text{ cm.} \quad \frac{1}{2} \text{ m}$$

25. Let the length of shorter side be x m.

$$\therefore \text{length of diagonal} = (x + 16) \text{ m} \quad \frac{1}{2} \text{ m}$$

$$\text{and, lenght of longer side} = (x + 14) \text{ m} \quad \frac{1}{2} \text{ m}$$

$$\therefore x^2 + (x + 14)^2 = (x + 16)^2 \quad 1 \text{ m}$$

$$\Rightarrow x^2 - 4x - 6 = 0 \Rightarrow x = 10 \text{ m.} \quad 1 \text{ m}$$

$$\therefore \text{length of sides are } 10\text{m and } 24\text{m.} \quad \frac{1}{2} + \frac{1}{2} \text{ m}$$

26. For correct Given, To Prove, const. and figure

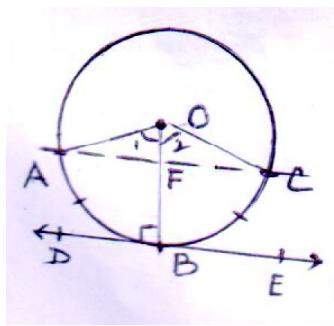
 $\frac{1}{2} \times 4 = 2 \text{ m}$

For correct proof 2 m

27.

B is mid point of arc (ABC) Correct Fig. 1 m

$$\therefore \angle 1 = \angle 2 \quad \frac{1}{2} \text{ m}$$



$$\therefore \Delta OAF \cong \Delta OCF \quad \text{SAS.} \quad \frac{1}{2} \text{ m}$$

$$\therefore \angle AFO = \angle CFO = 90^\circ \quad \frac{1}{2} \text{ m}$$

$$\Rightarrow \angle AFO = \angle DBO = 90^\circ \quad \frac{1}{2} \text{ m}$$

But these are corresponding angles $\frac{1}{2} \text{ m}$

$$\therefore AC \parallel DE \quad \frac{1}{2} \text{ m}$$

28. Let the first average speed of truck be x km/h.

$$\therefore \frac{150}{x} + \frac{200}{x+20} = 5 \quad 1\frac{1}{2} \text{ m}$$

$$\Rightarrow 150x + 3000 + 200x = 5(x^2 + 20x) \quad 1 \text{ m}$$

$$\Rightarrow x^2 - 50x - 600 = 0 \quad 1 \text{ m}$$

Solving to get $x = 60$ \therefore speed = 60 km/h. $1+\frac{1}{2} \text{ m}$

29. $a_{50} = 5 + 49(7) = 5 + 343 = 348 \quad 1 \text{ m}$

$$a_{36} = 5 + 35(7) = 250 \quad 1 \text{ m}$$

$$\text{Required sum} = \frac{15}{2} \cdot [250 + 348] = \frac{15}{2}(598) = 4485 \quad 2 \text{ m}$$

30. Constructing $\triangle ABC$ $1\frac{1}{2} \text{ m}$

Constructing similar triangle $2\frac{1}{2} \text{ m}$

31. Here $(k+1)(2k+3-5k) + 3k(5k-2k) + (5k-1)(2k-2k-3) = 0 \quad 2 \text{ m}$

$$\Rightarrow 6k^2 - 15k + 6 = 0 \quad \text{or} \quad 2k^2 - 5k + 2 = 0 \quad 1 \text{ m}$$

Solving to get $k = 2$ or $k = +\frac{1}{2} \quad \frac{1}{2}+\frac{1}{2} \text{ m}$