Strictly Confidential : (For Internal and Restricted Use Only)

Secondary School Examination

March — 2012

Marking Scheme — Mathematics (Delhi) 30/1/1

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 80 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.

QUESTION PAPER CODE 30/1/1

EXPECTED ANSWERS/VALUE POINTS

SECTION - A

Q.No.		Marks
1.	(A) or 3	1
2.	(C) or 400	1
3 .	(B) or 10	1
4.	(A) or 18	1
5.	(C) or 1:4	1
6.	(B) or 26	1
7.	(B) or 30^{o}	1
8.	(A) or (– 6, 7)	1
9 .	(B) or (3, 5)	1
10.	(C) or $\frac{1}{6}$	1

SECTION - B

11. $x^2 - 4kx + k = 0$

$b^2 - 4ac = 0 \quad \Rightarrow \quad 16k^2 - 4k = 0$ 1 m

or $4k(4k - 1) = 0 \quad \Rightarrow \quad k = 0$ or $k = \frac{1}{4}$ 1 m

12. We have to find the sum of 110, 121, 132, ---, 990 ½ m

$990 = 110 + (n - 1) \times 11 \quad \Rightarrow \quad n = 81$ ½ m

$\therefore$ Required sum $= \frac{81}{2}(110 + 990) = 81 \times 550 = 44550$ 1 m

13. Join OP. In right Δ OAP, $OP^2 = AP^2 + OA^2 = 15^2 + 8^2 = 289 = 17^2$

1 m

$\Rightarrow$ OP = 17 cm

Again, $BP^2 = OP^2 - OB^2 = 17^2 - 5^2 = 22 \times 12 = 264$ 1 m

$\therefore$ BP = $\sqrt{264}$ or $2\sqrt{66}$ 1 m

14. AR = AQ, BR = BP and QC = PC (lengths of tangents from an external point are equal) ½ m

$\therefore$ AR + BR + PC = AQ + QC + BP or AB + PC = AC + BP 1 m

But AB = AC (Given) $\Rightarrow$ BP = PC or P bisects base BC ½ m

OR

Join OC. OC $\perp$ AB (A tangent is $\perp$ to the radius at the point of contact) 1 m

Also, perpendicular from the centre of a circle to a chord bisects it

1 m

$\therefore$ AC = CB

15. Volume of a hemisphere $= \frac{2}{3} \pi r^3 = \frac{4851}{2}$

$\Rightarrow r^3 = \frac{441}{2} \times \frac{21}{4} = \left(\frac{21}{2}\right)^3 \Rightarrow r = \frac{21}{2}$ cm 1 m

curved surface area of a hemisphere = $2\pi r^2$

$= \cancel{2} \times \frac{\overset{11}{\cancel{22}}}{7} \times \frac{21}{\cancel{2}} \times \frac{\overset{3}{\cancel{21}}}{\cancel{2}} = 693 \text{ cm}^2$ 1 m

16. Shaded area = (Area of square of side 7 cm) – (Area of Quadrant of circle of radius 7 cm) ½ m

$$= \left(7^2 - \frac{1}{4} \cdot \frac{22}{7} \times 7 \times 7\right) cm^2 = 10.5\ cm^2$$ 1½ m

17. A (0, 2), B (3, p), C (p, 5)

AB = AC (given) $\Rightarrow AB^2 = AC^2$ 1 m

$\therefore \quad 9 + (p-2)^2 = p^2 + 9 \quad \Rightarrow \quad p - 2 = \pm\ p$ 1 m

$\Rightarrow \quad p = 1$

18. Multiple of 3 and 4 is a multiple of 12 ½ m

$\therefore$ Number of mutiples of 12 from first 50 natural numbers (12, 24, 36, 48) = 4 ½ m

$\therefore$ Required probability = $\frac{4}{50}$ or $\frac{2}{25}$ 1 m

SECTION - C

19. $4x^2 - 4ax + (a^2 - b^2) = 0$

$$x = \frac{4a \pm \sqrt{16a^2 - 16(a^2 - b^2)}}{8}$$ 1½ m

$$= \frac{4a \pm 4b}{8} = \frac{a \pm b}{2}$$ 1½ m

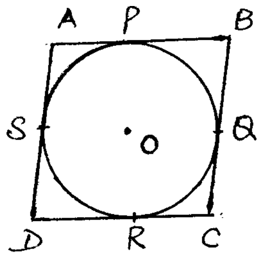
$\therefore$ The solutions are $\frac{a+b}{2}, \frac{a-b}{2}$

OR

$3x^2 - 2\sqrt{6}\ x + 2 = 0$

$\therefore \quad x = \dfrac{2\sqrt{6} \pm \sqrt{24-24}}{6} = \dfrac{2\sqrt{6}}{6} = \dfrac{\sqrt{6}}{3}$ 2+1 m

20. Figure ½ m



ABCD is a parallelogram

circumscribing a circle with centre O

AP = AS, DS = DR, CR = CQ, PB = BQ 1 m

$\therefore$ (AP + PB) + (DR + CR) = (AS + DS) + (BQ + QC) ½ m

$\Rightarrow$ AB + DC = AD + BC or 2AB = 2AD ½ m

$\Rightarrow$ AB = AD

$\therefore$ A BCD is a rhombus ½ m

OR

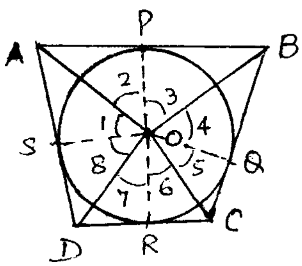


Figure ½ m

Tangents drawn to a circle from an

external point subtend equal angles at the centre

$\therefore\ \angle 1 = \angle 2,\ \angle 3 = \angle 4,\ \angle 5 = \angle 6$ and $\angle 7 = \angle 8$ .....(i) 1 m

Also $\angle 1 + \angle 2 + \angle 3 + \angle 4 + \angle 5 + \angle 6 + \angle 7 + \angle 8 = 360^\circ$ .....(ii)

From (i) and (ii)

$2(\angle 2 + \angle 3) + 2(\angle 6 + \angle 7) = 360^\circ$ 1 m

$\therefore\ (\angle 2 + \angle 3) + (\angle 6 + \angle 7) = 180^\circ$ or $\angle AOB + \angle DOC = 180^\circ$ ½ m

Similarly, $\angle AOD + \angle BOC = 180^\circ$

21. correct construction of Triangle 1 m

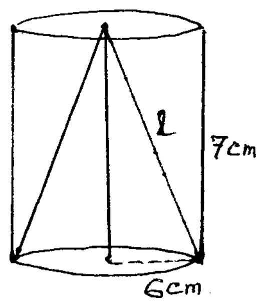
Constructing Similar Triangle 2 m

22. Area of shaded region $= \frac{22}{7} \times \frac{30^\circ}{360^\circ}\left(7^2 - \left(\frac{7}{2}\right)^2\right)$ cm^2 1½ m

$= \left(\frac{\cancel{22}^{\,11}}{\cancel{7}} \times \frac{1}{\cancel{12}_{\,4}} \times \frac{\cancel{147}^{\,\cancel{21}\;7}}{\cancel{4}_{\,2}}\right)$ cm^2 1 m

$= \frac{77}{8}$ or $9\frac{5}{8}$ cm^2 ½ m

23.



$\left.\begin{array}{l}\text{In case of cylinder : } r = 6 \text{ cm}, h = 7 \text{ cm} \\ \text{cone : } \mathbf{l} = \sqrt{36+49} = \sqrt{85} \text{ cm}\end{array}\right\}$ ½ m

$\therefore$ Total surface area of remaining solid

$= \pi r^2 + 2\pi rh + \pi r\mathbf{l}$ ½+½ m

$\left.\begin{array}{l} = \frac{22}{7} \times 6\left[6 + 14 + \sqrt{85}\right] \text{ cm}^2 \\ = \frac{132}{7}\left[20 + \sqrt{85}\right] \text{ cm}^2\end{array}\right\}$ 1½ m

or 550.63 cm^2

OR

. Volume of sand in the bucket $= \left[\pi (18)^2 \cdot 32\right] cm^3$ ....(i) 1 m

let r be the radius of conical heap of sand

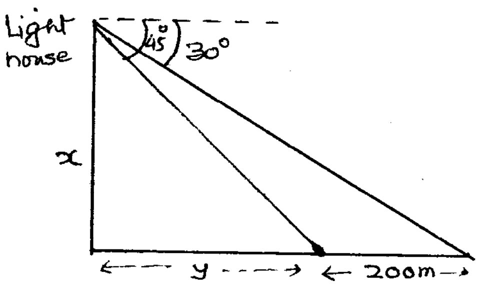
. $\therefore$ Volume of sand in it $= \frac{1}{3}\pi(r)^2 \cdot 24 = 8\pi r^2 \quad cm^3$ ....(ii)

from (i) and (ii), $\pi(18)^2 \times 32 = 8\pi r^2 \Rightarrow r = 36$ cm 1 m

slant height of heap $= \sqrt{r^2 + h^2} = \sqrt{36^2 + 24^2} = \sqrt{1872}$ or $12\sqrt{13}$ cm 1 m

24. Correct figure ½ m

Writing the trigonometric equations



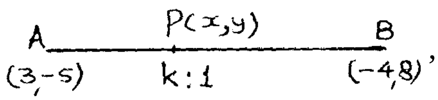
(i) $\frac{x}{y} = \tan 45^\circ = 1 \Rightarrow x = y$ ½ m

(ii) $\frac{x}{y+200} = \tan 30^\circ \Rightarrow \frac{x}{x+200} = \frac{1}{\sqrt{3}}$ 1 m

$\Rightarrow x\left(\sqrt{3}-1\right) = 200 \Rightarrow x = \frac{200\left(\sqrt{3}+1\right)}{2}$

$= 100\left(\sqrt{3}+1\right)$ m 1 m

25. Let the coordinates of P be (x, y) ½ m



, $x = \frac{-4k+3}{k+1}, \quad y = \frac{8k-5}{k+1}$ 1 m

P lies or the line $x + y = 0 \Rightarrow -4k + 3 + 8k - 5 = 0$ 1 m

$4k = 2 \Rightarrow k = \frac{1}{2}$ ½ m

26. A (1, – 3), (4, p), C(– 9, 7) : Area = 5 sq. units

$\therefore \frac{1}{2}\left[1(p-7) + 4(7+3) - 9(-3-p)\right] = 15$ 1½ m

$\Rightarrow p - 7 + 40 + 27 + 9p = 30$ 1 m

$\Rightarrow 10p = -30$ or $p = -3$ ½ m

27. Number of cards : Red : 100, Yellow : 200 ; Blue : 50, Total : 350 ½ m

(i) P(a blue card) = $\frac{50}{350} = \frac{1}{7}$ ½ m

(ii) P(not a yellow card) = $\frac{100+50}{350} = \frac{3}{7}$ 1 m

(ii) P(Neither yellow nor blue card) = P (Red card) = $\frac{100}{350} = \frac{2}{7}$ 1 m

28. Let a be the first term and d the common difference of A.P.

$a_{17} = a + 16d,\ a_8 = a + 7d,\ a_{11} = a + 10d = 43$ ....(i) ½ m

$\therefore\ a + 16d = 5 + 2(a + 7d)$

$\Rightarrow\ a + 5 = 2d \Rightarrow a = 2d - 5$ ....(ii) 1+½ m

from (i) and (ii) a = 3, d = 4 ½ m

$\therefore\ a_n = a + (n-1)d = 3 + 4n - 4 = 4n - 1$ ½ m

SECTION D

29 Let x be the number of books bought for Rs 80

$\therefore$ According to the question $\frac{80}{x} - \frac{80}{x+4} = 1$ 1½ m

or $80 \times 4 = x(x + 4)$ 1 m

or $x^2 + 4x - 320 = 0$ or $(x + 20)(x - 16) = 0$ 1 m

As number of books can not be negative $\Rightarrow x = 16$ ½ m

$\therefore$ Number of books bought = 16

OR

Let x and y be the two numbers

$\therefore \quad x + y = 9$ .... (i) and $\frac{1}{x} + \frac{1}{y} = \frac{1}{2}$ 1½ m

or $\frac{x+y}{xy} = \frac{1}{2} \quad \Rightarrow \quad xy = 18$ ....(ii) 1 m

From (i) and (ii) $x(9 - x) = 18$ or $x^2 - 9x + 18 = 0$ 1 m

$$\Rightarrow \quad x = 3, 6$$

It $x = 3, y = 6$ if $x = 6, y = 3$

$\therefore$ the two numbers are 6 and 3 ½ m

30. $1505 = \frac{14}{2}\left\{2a + 13d\right\} = 7\left\{20 + 13d\right\}$ 1½ m

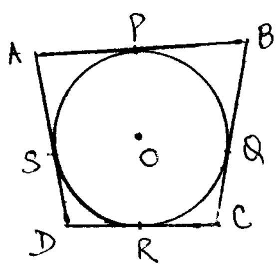
$\Rightarrow \quad \frac{1505}{7} - 20 = 13d \quad \Rightarrow \quad d = 15$ 1 m

now $a = 10$ and $d = 15$ 1½ m

$\therefore \quad a_{25} = 10 + 24 \times 15 = 370$

31. Correctly stated given, to prove, Construction and correct figure $\left(\frac{1}{2} + \frac{1}{2} + \frac{1}{2} + \frac{1}{2}\right)$ 2 m

Correct proof 2 m



OR

Figure ½ m

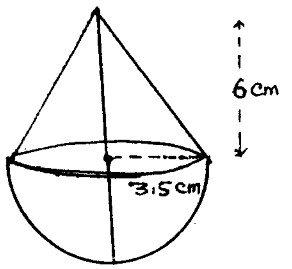
length of tangents from an external point are equal

$\therefore$ AP = AS ; DR = SD, CR = CQ, PB = BQ 2 m

AP + PB + DR + CR = AS + BQ + SD + CQ 1m

or AB + CD = AD + BC ½ m

32. Figure ½ m



Volume of solid =

Volume of conical part + Volume of hemispherical part ½ m

$$= \frac{1}{3}\times\frac{22}{7}\times\frac{7}{2}\times\frac{7}{2}\times 6 + \frac{2}{3}\times\frac{22}{7}\times\frac{7}{2}\times\frac{7}{2}\times\frac{7}{2}$$ 1½+½ m

$$= \frac{1}{3}\times\frac{22}{7}\times\frac{7}{2}\times\frac{7}{2}\left[6+7\right] = \frac{77}{6}\times 13 \text{ or } \frac{1001}{6}\text{ cm}^3$$

1 m

or $166\frac{5}{6}$ cm^3

33. Volume of water in the bucket = 28.49 m or 28490 cm^3 ½ m

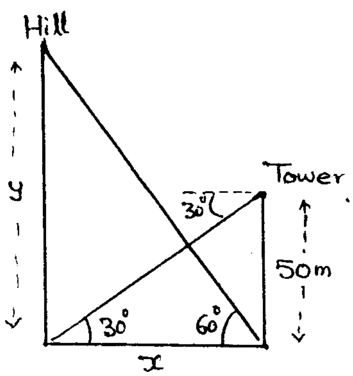
Let h be the height of bucket

$\therefore$ $28490 = \frac{1}{3}\times\frac{22}{7}\times h\ (28^2 + 21^2 + 28\times 21)$ 2 m

$\Rightarrow$ $h = \frac{28490\times 21}{22}\left(\frac{1}{1813}\right)$ or 15 cm 1 m

$\therefore$ height of frustum = 15 cm ½ m

34. Figure 1 m



Writing the trigonometric equations

(i) $\frac{50}{x} = \tan 30^\circ = \frac{1}{\sqrt{3}} \Rightarrow x = 50\sqrt{3}$ 1 m

(ii) $\frac{y}{x} = \tan 60^\circ \Rightarrow \frac{y}{50\sqrt{3}} = \sqrt{3} \Rightarrow y = 150$ 1 m

$\therefore$ Height of hill = 150 m 1 m

QUESTION PAPER CODE 30/1

EXPECTED ANSWERS/VALUE POINTS

SECTION - A

Q.No.		Marks
1.	(B) or $2, -\frac{3}{2}$	1
2.	(B) or 15	1
3 .	(C) or 5	1
4.	(A) or 7.5	1
5.	(C) or $\frac{77}{8}$	1
6.	(D) or 1:8	1
7.	(B) or 30^{o}	1
8.	(C) or 4	1
9 .	(C) or –4	1
10.	(A) or $\frac{1}{2}$	1

SECTION - B

11. $px(x-2) + 6 = 0 \Rightarrow px^2 - 2px + 6 = 0$

For equal roots $b^2 - 4ac = 0$ ½ m

$\Rightarrow (-2p)^2 - 4(p)(6) = 0 \Rightarrow 4p^2 - 24p = 0$ ½ m

$\Rightarrow p = 0$ or $p = 6$ ½ m

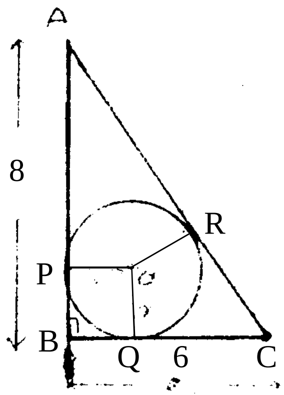
$\left.\begin{array}{l}\text{but } p = 0 \text{ is rejected} \\ \therefore \quad p = 6\end{array}\right\}$ ½ m

12. The numbers are 12, 15, 18, ---, 99 ½ m

$\therefore$ $99 = 12 + (n-1)3$ 1 m

$\Rightarrow n = 30$ ½ m

13.



OP = OQ = BP = BQ = r ½ m

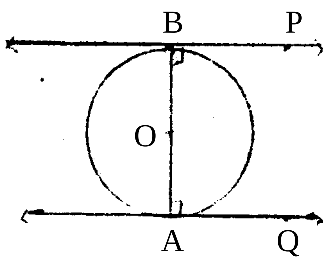
$\therefore$ PA = AR = 8 – r

QC = CR = 6 – r ½ m

AC = $\sqrt{8^2+6^2}$ = 10 cm ½ m

$\Rightarrow$ $8 - r + 6 - r = 10 \Rightarrow r = 2$ cm. ½ m

14.



let BP and AQ be two tangents at B and A respectively, where AOB is a diameter ½ m

$\angle$ OBP = 90^o

$\angle$ OAQ = 90^o (radius $\perp$ to tangent) 1 m

$\therefore$ BP||AQ (sum of interior angles = 180^o ½ m

15. Area of shaded region

= Area of square – 4 (area of quadrant of circle of radius 1 cm) 1 m

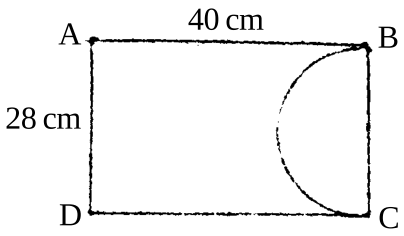
– area of circle of radius 1 cm

$= (4)^2 - 4\left[\frac{1}{4}(3.14)(1)^2\right] - (3.14)\ (1)^2\ cm^2$ ½ m

$= 16 - 6.28 = 9.72\ cm^2$ ½ m

OR

Required area



= Area of rectangle ABCD – area of semi circle of radius 14 cm. ½ m

$= 40 \times 28 - \frac{1}{2} \cdot \frac{22}{7} \times 14 \times 14 \text{ cm}^2$ 1 m

$= 1120 - 308 = 812 \text{ cm}^2$ ½ m

16. Volume of solid sphere $= \frac{4}{3}\pi (10.5)^3 \text{ cm}^3$ ½ m

Volume of one cone $= \frac{1}{3}\pi (3.5)^2 \cdot 3 \text{ cm}^3$ ½ m

$\therefore$ Number of cones $= \dfrac{\frac{4}{3}\pi (10.5)^3}{\frac{1}{3}\pi (3.5)^2 . 3} = 126$ 1 m

17. $PA = PB \Rightarrow PA^2 = PB^2$ ½ m

$\therefore (5-2)^2 + (k-4)^2 = (k-2)^2 + (7-4)^2$ 1 m

$k^2 - 8k + 16 = k^2 - 4k + 4 \Rightarrow k = 3$ ½ m

18. (i) P(red king) $= \frac{2}{52} = \frac{1}{26}$ 1 m

(ii) P(a queen or a jack) $= \frac{8}{52} = \frac{2}{13}$ 1 m

SECTION -C

19. $x = \dfrac{4a \pm \sqrt{(4a)^2 - 4(1)(-b^2 + 4a^2)}}{2}$ 1½ m

$= \dfrac{4a \pm 2b}{2}$ ½ m

$= 2a + b, \quad 2a - b$ 1 m

OR

writing $x + y = 8$ and $xy = 15$ 1 m

$\Rightarrow \quad x(8 - x) = 15$ or $x^2 - 8x + 15 = 0$ 1 m

$\Rightarrow \quad (x - 5)(x - 3) = 0 \quad \Rightarrow \quad x = 3$ or $x = 5$ 1 m

20. The numbers are 504, 511, 518, ---, 896 1 m

$\Rightarrow \quad 896 = 504 + (n - 1) 7$ ½ m

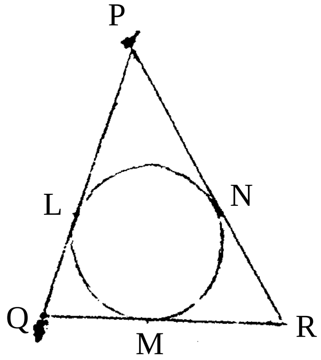
$\Rightarrow \quad n = 57$ ½ m

$S_{57} = \dfrac{57}{2} \cdot [504 + 896] = \dfrac{57}{2} [1400]$ ½ m

$= 57 \times 700 = 39900$ ½ m

21. Constructing Δ ABC 1 m

Constructing similar triangle with scale factor $\dfrac{3}{5}$ 2 m

22. 

Let QM = QL = x

$\left.\begin{array}{l}\therefore \quad MR = NR = 8 - x \\ \text{and} \quad PL = PN = 10 - x\end{array}\right\}$ 1m

PR = PN + NR = (8 – x) + (10 – x) = 12 ½ m

$\Rightarrow$ x = 3 ½ m

$\therefore$ QM = 3cm, RN = 8 – 3 = 5cm and PL = 7cm 1 m

23. Getting BC = $\sqrt{(24)^2 + (7)^2}$ = 25 cm $\therefore$ radius of circle = 12.5 cm ½ m

Required area = Area of circle – area (Δ ABC) – area of the quadrant. ½ m

$= 3.14\,(12.5)^2 - \frac{1}{2}\,(24)(7) - \frac{1}{4}\,(3.14)(12.5)^2 \;\; cm^2$ 1 m

$= \frac{3}{4} \cdot \frac{314}{100} \times \frac{125}{10} \times \frac{125}{10} - 84 \; cm^2 = 283.9 \; cm^2$ or $284 \; cm^2$ (approx) 1 m

OR

Required area = Area of square of side 14 cm – 2 [area of semicircle of radius 7 cm] 1 m

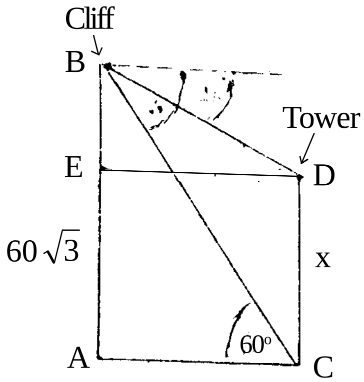
$= (14)^2 - 2\left[\frac{1}{2} \times \frac{22}{7} \times 7 \times 7\right] = 196 - 154 = 42 \; cm^2$ 1+1 m

24. Volume of water in hemi-spherical bowl $= \frac{2}{3} \cdot \pi \cdot (9)^3 \cdot \; cm^3$ 1 m

Volume of water in cylinder $= \pi\,(6)^2 \cdot h \cdot \; cm^3$ 1 m

$\Rightarrow \; \pi\,(6)^2\,h = \frac{2}{3}\,\pi\,(9)^3 \quad \Rightarrow \quad h = \frac{27}{2} = 13.5$ cm. 1 m

25.



Correct figure ½ m

let height of tower be x m

$\therefore$ In Δ ABC, $\dfrac{60\sqrt{3}}{AC} = \tan 60^\circ = \sqrt{3}$

$\Rightarrow$ AC = 60 m 1 m

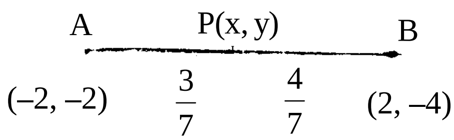
In Δ BED, $\dfrac{\left(60\sqrt{3} - x\right)}{60} = \tan 45^\circ = 1$ ½ m

$\Rightarrow$ $60\sqrt{3} - x = 60$ or $x = 60(\sqrt{3} - 1)$ m. 1 m

or = 43.92 m.

26.

$\dfrac{AP}{AB} = \dfrac{3}{7} \Rightarrow \dfrac{AP}{PB} = \dfrac{3}{4}$ ½ m



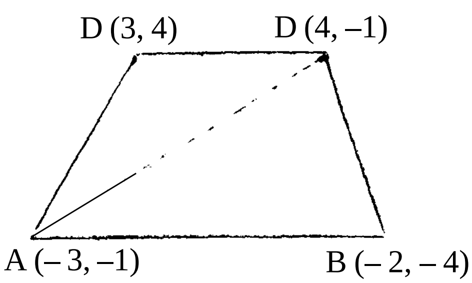
$\therefore$ $x = \dfrac{3(2) + 4(-2)}{7} = -\dfrac{2}{7}$ 1 m

$y = \dfrac{3(-4) + 4(-2)}{7} = -\dfrac{20}{7}$ 1 m

$\Rightarrow$ coordinates of P are $\left(-\dfrac{2}{7}, -\dfrac{20}{7}\right)$ ½ m

OR

Area Δ ABC $= \dfrac{1}{2}\left[-3(-4+1) - 2(-1+1) + 4(-1+4)\right]$



$= \dfrac{1}{2}\left[9 - 0 + 12\right] = \dfrac{21}{2}$ sq U. 1 m

Area Δ ACD $= \dfrac{1}{2}\left[-3(-1-4) + 4(4+1) + 3(-1+1)\right]$

$= \dfrac{1}{2}\left[15 + 20 + 0\right] = \dfrac{35}{2}$ sq U. 1 m

Area ABCD $= \dfrac{21}{2} + \dfrac{35}{2} = \dfrac{56}{2} = 28$ sq U. 1 m

27. A,B,C are collinear $\Rightarrow$ area Δ ABC = 0 ½ m

$\therefore \quad \frac{1}{2}\left[x(6-4)+3(4-y)-3(y-6)\right] = 0$ 1 m

$\Rightarrow \quad 2x + 12 - 3y - 3y + 18 = 0$ ½ m

$\Rightarrow \quad 2x - 6y + 30 = 0$ or $x - 3y + 15 = 0$ 1 m

28. Remaining cards = 52 – 12 = 40 1 m

(i) Number of black face cards (left) = 2

P(black face card) = $\frac{2}{40} = \frac{1}{20}$ 1 m

(ii) Number of red cards = 26 – 6 = 20

P(red card) = $\frac{20}{40} = \frac{1}{2}$ 1 m

SECTION D

29. let the denominator be x, so numerator is $x-3$

Hence, fraction is $\frac{x-3}{x}$ ½ m

$\therefore \quad \frac{x-3}{x} - \frac{x-3}{x+1} = \frac{1}{15}$ 1 m

$\Rightarrow \quad 15\left[(x+1)(x-3)-(x-3)(x)\right] = x(x+1)$

$\Rightarrow \quad 15(x-3)(1) = x^2 + x$

or $x^2 - 14x + 45 = 0$ 1 m

$\Rightarrow \quad (x-5)(x-9) = 0$ or $x = 5, 9$ ½ m

$\therefore$ Fraction is = $\frac{2}{5}$ or $\frac{6}{9}$ 1 m

OR

let original speed be x km/hr.

$$\therefore \quad \frac{2800}{x-100} - \frac{2800}{x} = \frac{1}{2}$$ 1 m

$5600\,(x - x + 100) = x\,(x - 100)$

$x^2 - 100x - 560000 = 0$ 1 m

$(x - 800)\,(x + 700) = 0$

$\Rightarrow \quad x = 800, \ (\text{rejecting } x = -700)$ 1 m

$$\therefore \quad \text{Original duration} = \frac{2800}{800} = 3.5 \text{ hrs.}$$ 1 m

30. $a = 5$ and $S_4 = \frac{1}{2}\,(S_8 - S_4)$ 1 m

$\Rightarrow \quad 2\,S_4 = S_8 - S_4 \quad \text{or} \quad S_8 = 3\,S_4$ 1 m

$$\frac{8}{2} \cdot [10 + 7d] = 3 \cdot \frac{4}{2}\,[10 + 3d]$$ 1 m

$40 + 28d = 60 + 18d$

$\Rightarrow \quad 10d = 20 \quad \Rightarrow \quad d = 2$ 1 m

31. For correct Given, To prove, construction and figure ½×4=2 m

For Correct Proof 2 m

32. Volume of water in hemispherical tank $\frac{2}{3} \times \frac{22}{7} \times \left(\frac{3}{2}\right)^3 \cdot m^3$ 1 m

$$= \frac{99}{14}\ m^3 = \frac{99000}{14} \text{ litres}$$ ½ m

Volume of half tank $= \frac{99000}{28}$ litres 1 m

$\therefore$ Time to empty half tank $= \dfrac{99000 \times 7}{28 \times 25} = 990$ sec 1 m

$= 16$ m 30 sec. ½ m

OR

h = 14 cm, $r_1 = 2$ cm $r_2 = 1$ cm. 1 m

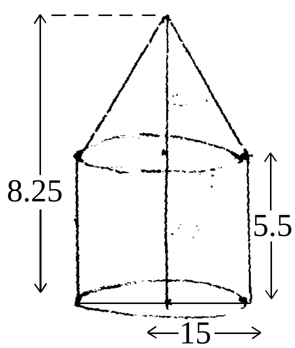
capacity $= \dfrac{1}{3}\pi h \left[r_1^2 + r_2^2 + r_1 r_2\right]$ 1 m

$= \dfrac{1}{3} \times \dfrac{22}{7} \times 14 \left[4 + 1 + 2\right]$ 1 m

$= \dfrac{1}{3} \times 44 \times 7 = \dfrac{308}{3} = 102.67 \text{ cm}^3$ 1 m

33. height of cone = 8.25 – 5.5 = 2.75 m.

$\therefore$ $\mathbf{l} = \sqrt{(15)^2 + (2.75)^2} = 15.25$ m 1 m



Area of canvas required

$= 2 \times \pi \times 15 \times 5.5 + \pi \times 15 \times 15.25$ 1 m

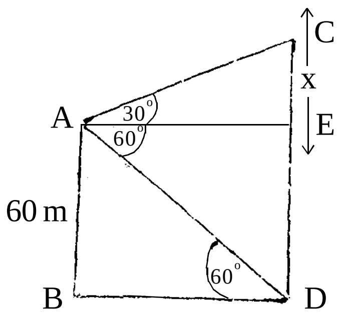
$= 15\pi\ (11 + 15.25) = 15 \times 26.25\pi\ \text{m}^2$ 1 m

length of canvas $= \dfrac{15 \times 26.25\,\pi}{1.5} = 262.5\pi$ m

or $= 824.25$ m 1 m

or 825 m

34. Correct figure 1 m



In Δ ABD, $\frac{60}{BD} = \tan 60^\circ = \sqrt{3}$

$\Rightarrow$ BD = AE = $\frac{60}{\sqrt{3}} = 20\sqrt{3}$ m. 1 m

In Δ ACE, $\frac{x}{20\sqrt{3}} = \tan 30^\circ = \frac{1}{\sqrt{3}}$ 1 m

$\Rightarrow$ x = 20 m.

$\therefore$ (i) Difference of heights = 20 m.

1 m

(ii) Distance = $20\sqrt{3}$ m. or 34.64 m