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Secondary School Certificate Examination

July 2017

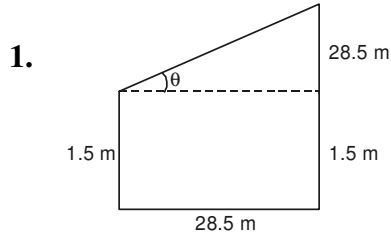
Marking Scheme — Mathematics 30/1/1, 30/1/2, 30/1/3 [Delhi Region]

General Instructions:

1. The Marking Scheme provides general guidelines to reduce subjectivity in the marking. The answers given in the Marking Scheme are suggested answers. The content is thus indicative. If a student has given any other answer which is different from the one given in the Marking Scheme, but conveys the meaning, such answers should be given full weightage
2. 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.
3. Alternative methods are accepted. Proportional marks are to be awarded.
4. If a candidate has attempted an extra question, marks obtained in the question attempted first should be retained and the other answer should be scored out.
5. 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.
6. Separate Marking Scheme for all the three sets has been given.
7. As per orders of the Hon'ble Supreme Court. The candidates would now be permitted to obtain photocopy of the Answer book on request on payment of the prescribed fee. All 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.

QUESTION PAPER CODE 30/1/1
EXPECTED ANSWER/VALUE POINTS

SECTION A



$$\tan \theta = \frac{28.5}{28.5} = 1$$

$\frac{1}{2}$

$$\therefore \theta = 45^\circ$$

$\frac{1}{2}$

2. $d = \frac{1+m}{m} - \frac{1}{m} = 1$

$\frac{1}{2}$

$$\therefore a_n = \frac{1}{m} + n - 1$$

$\frac{1}{2}$

3. $PQ = PR = 5 \text{ cm}$

$\frac{1}{2}$

$$\therefore PS = 2PQ = 10 \text{ cm}$$

$\frac{1}{2}$

4. Total number of outcomes = 8

$\frac{1}{2}$

$$\therefore P(\text{drawn ball is not red}) = \frac{5}{8}$$

$\frac{1}{2}$

SECTION B

5. $(x+3)(2x-3) = (3x-7)(x+2)$

$\frac{1}{2}$

$$\Rightarrow x^2 - 4x - 5 = 0$$

$\frac{1}{2}$

$$\Rightarrow (x-5)(x+1) = 0$$

$\frac{1}{2}$

$$\Rightarrow x = 5, -1$$

$\frac{1}{2}$

$$6. \quad \left. \begin{array}{l} a + 9d = -4 \\ a + 21d = -16 \end{array} \right\} \quad 1$$

Solving to get $d = -1$ and $a = 5$ $\frac{1}{2}$

$$\therefore t_{38} = 5 + 37(-1) = -32. \quad \frac{1}{2}$$

7. Let $\angle OPQ = \theta$

$$\therefore \angle TPQ = 90^\circ - \theta \quad \frac{1}{2}$$

$$\Rightarrow \angle PQT = 90^\circ - \theta \quad \frac{1}{2}$$

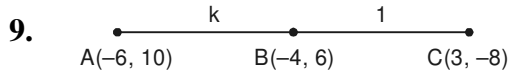
$$\begin{aligned} \text{Hence } \angle PTQ &= 180^\circ - (90^\circ - \theta + 90^\circ - \theta) \\ &= 2\theta \text{ or } 2\angle OPQ \end{aligned} \quad 1$$

8. For points to be collinear

$$-5(k+2) + 1(-2-1) + 4(1-k) = 0 \quad 1$$

$$\Rightarrow -9k - 9 = 0$$

$$\Rightarrow k = -1 \quad 1$$



Let $AP : PB = k : 1$

$$\therefore \frac{3k-6}{k+1} = -4 \quad 1$$

$$\Rightarrow k = \frac{2}{7} \quad \frac{1}{2}$$

Hence $AP : PB = 2 : 7$ $\frac{1}{2}$

$$10. \quad \angle 2 = \frac{1}{2} \angle ROT = \frac{1}{2} \times 130^\circ = 65^\circ \quad \frac{1}{2}$$

$$\angle POQ = 180^\circ - 130^\circ = 50^\circ \quad \frac{1}{2}$$

(2)

30/1/1

$$\therefore \angle 1 = 40^\circ$$

$$\text{Hence } \angle 2 + \angle 1 = 65^\circ + 40^\circ = 105^\circ$$

$\frac{1}{2}$

$\frac{1}{2}$

SECTION C

11. $S_{15} = 8(1 + 2 + 3 + \dots + 15)$

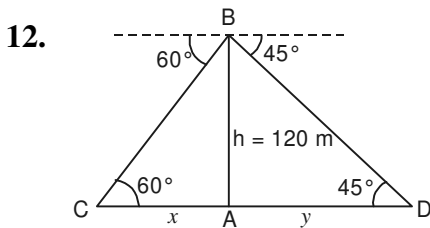
$$= 8 \times \frac{15 \times 16}{2}$$

$$= 960$$

1

1

1



Correct Figure

$\frac{1}{2}$

$$\tan 45^\circ = \frac{120}{y}$$

$$\Rightarrow 1 = \frac{120}{y} \Rightarrow y = 120$$

1

$$\tan 60^\circ = \sqrt{3} = \frac{120}{x}$$

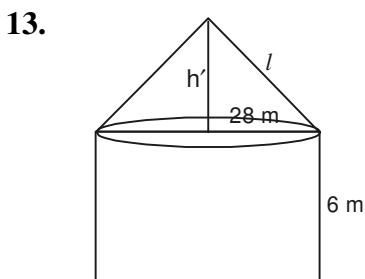
$$\Rightarrow x = \frac{120}{\sqrt{3}} = 40\sqrt{3}$$

1

$$\text{Hence distance between the cars} = 40 \times 1.732 + 120$$

$$= 189.28 \text{ m}$$

$\frac{1}{2}$



$$h' = 27 - 6 = 21 \text{ m}$$

$$l = \sqrt{21^2 + 28^2} = 35 \text{ m}$$

1

$$\text{Area of canvas used} = 2\pi rh + \pi rl$$

1

$$= \frac{22}{7} \times 28 (12 + 35)$$

$$= 4136 \text{ m}^2$$

1

Note: Full marks should be given to any solution with diameter 56 cm

14. Here $r_2 - r_1 = 7$ cm ($r_2 > r_1$) ... (i) $\frac{1}{2}$

and $\pi(r_2^2 - r_1^2) = 1078$ cm² $\frac{1}{2}$

$\Rightarrow \pi(r_2 - r_1)(r_2 + r_1) = 1078$ cm²

$\Rightarrow r_2 + r_1 = \frac{1078 \times 7}{22 \times 7} = 49$ cm ... (ii) 1

Solving (i) and (ii) to get

$r_2 = 28$ cm 1

$r_1 = 21$ cm

\therefore Radius of smaller circle = 21 cm.

15. Let the point P on x-axis be P(x_1 , 0) $\frac{1}{2}$

$PA^2 = PB^2 \Rightarrow (x_1 - 2)^2 + 25 = (x_1 + 2)^2 + 81$ 1

Solving to get $x_1 = -7$ 1

\therefore Point on x-axis is (-7, 0) $\frac{1}{2}$

16. Total number of possible outcomes = 8 1

Prob (Ramesh wins the game) = $\frac{2}{8} = \frac{1}{4}$ 1

\therefore Prob (Ramesh loses the game) = $1 - \frac{1}{4} = \frac{3}{4}$ 1

17. Speed = 5 km/hr \therefore length in t hrs = 5000 t m. $\frac{1}{2}$

Volume of water flown = Volume of water in tank $\frac{1}{2}$

$\Rightarrow \frac{22}{7} \times \left(\frac{7}{100}\right)^2 \times 5000$ t = $50 \times 44 \times \frac{7}{100}$ m³ 1

$$\Rightarrow t = 2$$

Hence required time is 2 hrs.

1

18. Here $r = 21$ cm, $\theta = 60^\circ$

$$\therefore \text{Area of the sector formed} = \frac{22}{7} \times 21 \times 21 \times \frac{60}{360}$$

2

$$= 231 \text{ cm}^2$$

1

19. For roots to be equal

$$D = 4(ac + bd)^2 - 4(a^2 + b^2)(c^2 + d^2) = 0$$

1

$$\Rightarrow a^2c^2 + b^2d^2 + 2acbd - a^2c^2 - a^2d^2 - b^2c^2 - b^2d^2 = 0$$

$$\Rightarrow a^2d^2 + b^2c^2 - 2abcd = 0$$

1

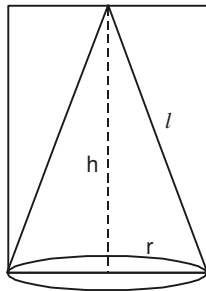
$$\Rightarrow (ad - bc)^2 = 0$$

$\frac{1}{2}$

$$\Rightarrow ad = bc$$

$\frac{1}{2}$

20.



Here $h = 24$ cm, $r = 7$ cm

$$\therefore l = 25 \text{ cm.}$$

$\frac{1}{2}$

Surface Area of remaining solid

$$= \pi r^2 + 2\pi rh + \pi rl$$

1

$$= \frac{22}{7} \times 7(7 + 48 + 25)$$

1

$$= 1760 \text{ cm}^2.$$

$\frac{1}{2}$

SECTION D

21. $4[(x + 3)x - (1 - x)(x - 2)] = 17x(x - 2)$

1

$$\Rightarrow 4(x^2 + 3x + x^2 - 3x + 2) = 17x^2 - 34x$$

1

$$\begin{aligned} \Rightarrow 9x^2 - 34x - 8 &= 0 && \frac{1}{2} \\ \Rightarrow 9x^2 - 36x + 2x - 8 &= 0 \\ \Rightarrow (x - 4)(9x + 2) &= 0 && 1 \\ \Rightarrow x = 4, \frac{-2}{9} &&& \frac{1}{2} \end{aligned}$$

22. Let the two consecutive odd natural numbers be x and $x + 2$. 1

Therefore $x^2 + (x + 2)^2 = 394$ $\frac{1}{2}$

$$\Rightarrow 2x^2 + 4x - 390 = 0 \quad \frac{1}{2}$$

$$\Rightarrow 2(x + 15)(x - 13) = 0 \quad 1$$

$$\Rightarrow x \neq -15 \quad \therefore x = 13 \quad \frac{1}{2}$$

Hence numbers are 13 and 15. $\frac{1}{2}$

23. $\frac{a_{11}}{a_{18}} = \frac{a + 10d}{a + 17d} = \frac{2}{3}$ 1

$$\Rightarrow a = 4d \quad \dots(i) \quad \frac{1}{2}$$

$$\frac{S_5}{S_{10}} = \frac{\frac{5}{2}(2a + 4d)}{5(2a + 9d)} \quad 1$$

$$= \frac{8d + 4d}{2(8d + 9d)} \quad 1$$

$$= \frac{6}{17} \quad \frac{1}{2}$$

Hence $S_5 : S_{10} = 6 : 17$.

24. For correct given, To prove, construction and figure

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

For correct proof

2

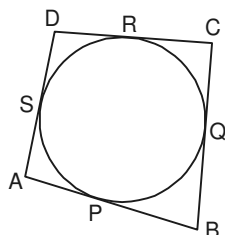
25. For correct construction of right triangle

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

constructing a similar triangle

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

26.



Here AP = AS

BP = BQ

CQ = CR

and DR = DS

2

Hence $AB + CD = (AP + PB) + (CR + DR)$

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

$$= (AS + BQ) + (CQ + DS)$$

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

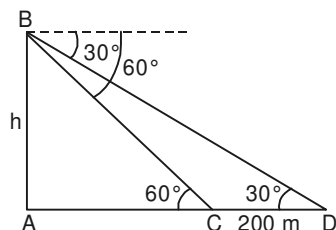
$$= (AS + DS) + (BQ + CQ)$$

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

or $AB + CD = AD + BC$

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

27.



Correct Figure

1

Let speed of car be x m/sec.

Therefore $DC = 6x$ m.

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

Distance CA covered in t sec = tx m

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

$$\text{Now, } \tan 30^\circ = \frac{1}{\sqrt{3}} = \frac{h}{x(6+t)}$$

$$\Rightarrow \frac{h}{x} = \frac{6+t}{\sqrt{3}} \quad \dots(i) \quad \frac{1}{2}$$

$$\tan 60^\circ = \sqrt{3} = \frac{h}{tx}$$

$$\Rightarrow \frac{h}{x} = \sqrt{3}t \quad \dots(ii) \quad \frac{1}{2}$$

Solving (i) and (ii) to get

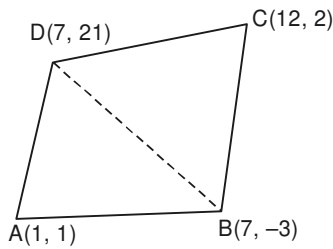
$$t = 3 \text{ sec.} \quad 1$$

28. Total number of possible outcomes = 90 1

(i) Prob (getting a two digit number) = $\frac{81}{90}$ or $\frac{9}{10}$ $1\frac{1}{2}$

(ii) Prob (getting a perfect square number) = $\frac{9}{90}$ or $\frac{1}{10}$ $1\frac{1}{2}$

29.



Area of quad ABCD = Ar Δ ABD + Ar Δ BCD

$$\text{Area } \Delta\text{ABD} = \frac{1}{2} |1(-24) + 7(20) + 7(4)|$$

$$= \frac{1}{2} \times 144$$

$$= 72 \text{ sq.units}$$

$1\frac{1}{2}$

$$\text{Area } \Delta\text{BCD} = \frac{1}{2} |7(19) + 7(5) + 12(-24)|$$

$$= \frac{1}{2} \times 120$$

$$= 60 \text{ sq.units}$$

$1\frac{1}{2}$

Hence Area ABCD = 72 + 60 = 132 sq.units 1

30. Capacity of the bucket = $\frac{1}{3}\pi h(r_1^2 + r_2^2 + r_1r_2)$

= $\frac{1}{3} \times \frac{22}{7} \times 35 (900 + 144 + 360)$ 1

= 51480 cm³

= 51.48 litres 1

Amount received = Rs 40 × 51.48

= Rs 2059.20 1

Any relevant value like we must help economic weaker section of the society to our best. 1

31. Volume of wood in the block = 15 × 10 × 3.5 cm³

= 525 cm³ 1

Volume of wood removed = $4 \times \frac{1}{3} \times \frac{22}{7} \times \left(\frac{5}{10}\right)^2 \times \frac{21}{10}$ cm³ 1

= 2.2 cm³ 1

Volume of wood in remaining solid = 525 – 2.2

= 522.80 cm³ 1

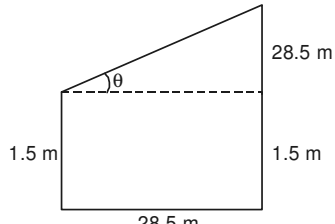
30/1/2
SECTION A

1. Total number of outcomes = 8 $\frac{1}{2}$

$\therefore P(\text{drawn ball is not red}) = \frac{5}{8}$ $\frac{1}{2}$

2. $d = \frac{1+m}{m} - \frac{1}{m} = 1$ $\frac{1}{2}$

$\therefore a_n = \frac{1}{m} + n - 1$ $\frac{1}{2}$

3.  $\tan \theta = \frac{28.5}{28.5} = 1$ $\frac{1}{2}$

$\therefore \theta = 45^\circ$ $\frac{1}{2}$

4. $PQ = PR = 5 \text{ cm}$ $\frac{1}{2}$

$\therefore PS = 2PQ = 10 \text{ cm}$ $\frac{1}{2}$

SECTION B

5. For points to be collinear

$-5(k+2) + 1(-2-1) + 4(1-k) = 0$ 1

$\Rightarrow -9k - 9 = 0$

$\Rightarrow k = -1$ 1

6. Let $\angle OPQ = \theta$

$\therefore \angle TPQ = 90^\circ - \theta$ $\frac{1}{2}$

$$\Rightarrow \angle PQT = 90^\circ - \theta$$

$\frac{1}{2}$

$$\text{Hence } \angle PTQ = 180^\circ - (90^\circ - \theta + 90^\circ - \theta)$$

$$= 2\theta \text{ or } 2\angle OPQ$$

1

$$7. \quad \angle 2 = \frac{1}{2} \angle ROT = \frac{1}{2} \times 130^\circ = 65^\circ$$

$\frac{1}{2}$

$$\angle POQ = 180^\circ - 130^\circ = 50^\circ$$

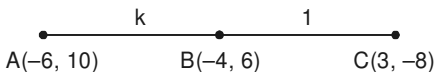
$\frac{1}{2}$

$$\therefore \angle 1 = 40^\circ$$

$\frac{1}{2}$

$$\text{Hence } \angle 2 + \angle 1 = 65^\circ + 40^\circ = 105^\circ$$

$\frac{1}{2}$

8. 

$$\text{Let } AP : PB = k : 1$$

$$\therefore \frac{3k - 6}{k + 1} = -4$$

1

$$\Rightarrow k = \frac{2}{7}$$

$\frac{1}{2}$

$$\text{Hence } AP : PB = 2 : 7$$

$\frac{1}{2}$

$$9. \quad (x + 3)(2x - 3) = (3x - 7)(x + 2)$$

$\frac{1}{2}$

$$\Rightarrow x^2 - 4x - 5 = 0$$

$\frac{1}{2}$

$$\Rightarrow (x - 5)(x + 1) = 0$$

$\frac{1}{2}$

$$\Rightarrow x = 5, -1$$

$\frac{1}{2}$

10. Here $a = 11$, $d = -3$

$$a_n = -150 = 11 - 3(n - 1)$$

$$\Rightarrow n = \frac{164}{3} \text{ or } 54\frac{2}{3}$$

Since n is not a natural number therefore -150 is not a term of the sequence

SECTION C

11. Speed = 5 km/hr \therefore length in t hrs = $5000t$ m.

Volume of water flown = Volume of water in tank

$$\Rightarrow \frac{22}{7} \times \left(\frac{7}{100}\right)^2 \times 5000t = 50 \times 44 \times \frac{7}{100} \text{ m}^3$$

$$\Rightarrow t = 2$$

Hence required time is 2 hrs.

12. Here $r = 21$ cm, $\theta = 60^\circ$

$$\therefore \text{Area of the sector formed} = \frac{22}{7} \times 21 \times 21 \times \frac{60}{360}$$

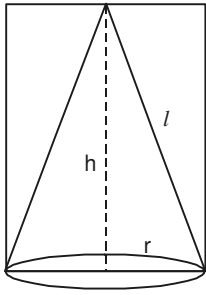
$$= 231 \text{ cm}^2$$

13. Total number of possible outcomes = 8

$$\text{Prob (Ramesh wins the game)} = \frac{2}{8} = \frac{1}{4}$$

$$\therefore \text{Prob (Ramesh loses the game)} = 1 - \frac{1}{4} = \frac{3}{4}$$

14.



Here $h = 24$ cm, $r = 7$ cm

$$\therefore l = 25 \text{ cm.}$$

Surface Area of remaining solid

$$= \pi r^2 + 2\pi rh + \pi rl$$

$$= \frac{22}{7} \times 7(7 + 48 + 25)$$

$$= 1760 \text{ cm}^2.$$

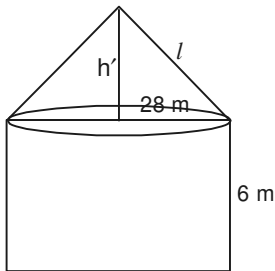
$\frac{1}{2}$

1

1

$\frac{1}{2}$

15.



$$h' = 27 - 6 = 21 \text{ m}$$

$$l = \sqrt{21^2 + 28^2} = 35 \text{ m}$$

Area of canvas used = $2\pi rh + \pi rl$

$$= \frac{22}{7} \times 28(12 + 35)$$

$$= 4136 \text{ m}^2$$

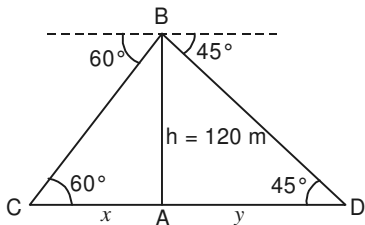
1

1

1

Note: Full marks should be given to any solution with diameter 56 cm

16.



Correct Figure

$$\tan 45^\circ = \frac{120}{y}$$

$$\Rightarrow 1 = \frac{120}{y} \Rightarrow y = 120$$

$$\tan 60^\circ = \sqrt{3} = \frac{120}{x}$$

$$\Rightarrow x = \frac{120}{\sqrt{3}} = 40\sqrt{3}$$

$\frac{1}{2}$

1

1

Hence distance between the cars = $40 \times 1.732 + 120$

$$= 189.28 \text{ m}$$

$\frac{1}{2}$

17. Here $r_2 - r_1 = 7$ cm ($r_2 > r_1$) ... (i) $\frac{1}{2}$

and $\pi(r_2^2 - r_1^2) = 1078$ cm² $\frac{1}{2}$

$\Rightarrow \pi(r_2 - r_1)(r_2 + r_1) = 1078$ cm²

$\Rightarrow r_2 + r_1 = \frac{1078 \times 7}{22 \times 7} = 49$ cm ... (ii) 1

Solving (i) and (ii) to get

$r_2 = 28$ cm 1

$r_1 = 21$ cm

\therefore Radius of smaller circle = 21 cm.

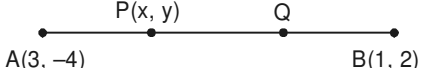
18. Here $a = 12$, $d = 4$, $a_n = 96$ 1

Therefore $96 = 12 + (n - 1) \times 4$

$\Rightarrow n = 22$ 1

Hence $S_{22} = 11[24 + 21 \times 4]$

$= 1188$. 1

19.  Here AP : PB = 1 : 2 1

$x = \frac{7}{3}$, $y = -2$ $1 + \frac{1}{2}$

\therefore Point P is $\left(\frac{7}{3}, -2\right)$ $\frac{1}{2}$

20. For roots to be equal

$4(k - 12)^2 - 4(k - 12) \times 2 = 0$ 1

$\Rightarrow 4(k - 12)(k - 12 - 2) = 0 \Rightarrow k = 12, 14$ 1

$\therefore k \neq 12 \quad \therefore k = 14$ 1

SECTION D

21. Capacity of the bucket = $\frac{1}{3}\pi h(r_1^2 + r_2^2 + r_1r_2)$ 1

= $\frac{1}{3} \times \frac{22}{7} \times 35 (900 + 144 + 360)$ 1

= 51480 cm³

= 51.48 litres 1

Amount received = Rs 40 × 51.48

= Rs 2059.20 1

Any relevant value like we must help economic weaker section of the society to our best. 1

22. Volume of wood in the block = 15 × 10 × 3.5 cm³

= 525 cm³ 1

Volume of wood removed = $4 \times \frac{1}{3} \times \frac{22}{7} \times \left(\frac{5}{10}\right)^2 \times \frac{21}{10}$ cm³ 1

= 2.2 cm³ 1

Volume of wood in remaining solid = 525 – 2.2

= 522.80 cm³ 1

23. $4[(x + 3)x - (1 - x)(x - 2)] = 17x(x - 2)$ 1

$\Rightarrow 4(x^2 + 3x + x^2 - 3x + 2) = 17x^2 - 34x$ 1

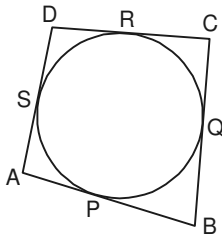
$\Rightarrow 9x^2 - 34x - 8 = 0$ $\frac{1}{2}$

$\Rightarrow 9x^2 - 36x + 2x - 8 = 0$

$\Rightarrow (x - 4)(9x + 2) = 0$ 1

$\Rightarrow x = 4, \frac{-2}{9}$ $\frac{1}{2}$

24.



Here AP = AS

BP = BQ

CQ = CR

and DR = DS

2

Hence $AB + CD = (AP + PB) + (CR + DR)$

$\frac{1}{2}$

$= (AS + BQ) + (CQ + DS)$

$\frac{1}{2}$

$= (AS + DS) + (BQ + CQ)$

$\frac{1}{2}$

or $AB + CD = AD + BC$

$\frac{1}{2}$

25. $\frac{a_{11}}{a_{18}} = \frac{a + 10d}{a + 17d} = \frac{2}{3}$

1

$\Rightarrow a = 4d$... (i)

$\frac{1}{2}$

$\frac{S_5}{S_{10}} = \frac{\frac{5}{2}(2a + 4d)}{5(2a + 9d)}$

1

$= \frac{8d + 4d}{2(8d + 9d)}$

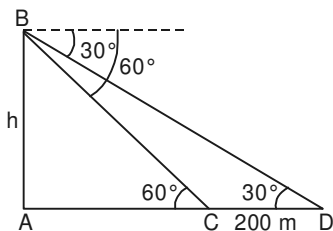
1

$= \frac{6}{17}$

$\frac{1}{2}$

Hence $S_5 : S_{10} = 6 : 17$.

26.



Correct Figure

1

Let speed of car be x m/sec.

Therefore $DC = 6x$ m.

$\frac{1}{2}$

Distance CA covered in t sec = tx m

$\frac{1}{2}$

$$\text{Now, } \tan 30^\circ = \frac{1}{\sqrt{3}} = \frac{h}{x(6+t)}$$

$$\Rightarrow \frac{h}{x} = \frac{6+t}{\sqrt{3}} \quad \dots(\text{i})$$

$\frac{1}{2}$

$$\tan 60^\circ = \sqrt{3} = \frac{h}{tx}$$

$$\Rightarrow \frac{h}{x} = \sqrt{3}t \quad \dots(\text{ii})$$

$\frac{1}{2}$

Solving (i) and (ii) to get

$$t = 3 \text{ sec.}$$

1

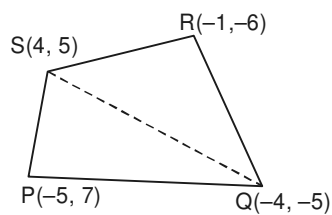
27. For correct given, To prove, construction and figure

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

For correct proof

2

28.



$$\text{Ar. PQRS} = \text{Ar. PQS} + \text{Ar. QRS}$$

$$\text{Ar } \Delta \text{PQS} = \frac{1}{2} |(-5)(-10) - 4(-2) + 4(12)|$$

$$= \frac{1}{2} \times 106 = 53 \text{ sq. units}$$

$1 \frac{1}{2}$

$$\text{Ar } \Delta \text{QRS} = \frac{1}{2} |(-4)(-11) - 1(10) + 4(1)|$$

$$= \frac{1}{2} \times 38 = 19 \text{ sq. units}$$

$1 \frac{1}{2}$

$$\therefore \text{Area PQRS} = 53 + 19 = 72 \text{ sq. units}$$

1

29. Total number of remaining cards = 49

$\frac{1}{2}$

$$\text{(i) Prob. (a face card)} = \frac{9}{49}$$

1

(ii) Prob. (a card of heart) = $\frac{13}{49}$ 1

(iii) Prob. (a card of club) = $\frac{10}{49}$ 1

(iv) Prob. (a queen of diamond) = $\frac{1}{49}$ $\frac{1}{2}$

30. Let speed of the car be x km/hr

Therefore time taken = $\frac{x}{2}$ hr. 1

Hence $x = \frac{2592}{x/2}$ 1

$\Rightarrow x^2 = 5184$

$\Rightarrow x = 72$ 1

\therefore Time taken = 36 hrs. 1

31. Correct construction of first triangle $1\frac{1}{2}$

Correct construction of similar triangle $2\frac{1}{2}$

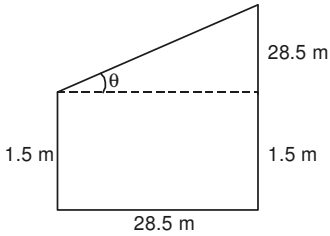
30/1/3
SECTION A

1. $PQ = PR = 5 \text{ cm}$ $\frac{1}{2}$

$\therefore PS = 2PQ = 10 \text{ cm}$ $\frac{1}{2}$

2. Total number of outcomes = 8 $\frac{1}{2}$

$\therefore P(\text{drawn ball is not red}) = \frac{5}{8}$ $\frac{1}{2}$

3.  $\tan \theta = \frac{28.5}{28.5} = 1$ $\frac{1}{2}$

$\therefore \theta = 45^\circ$ $\frac{1}{2}$

4. $d = \frac{1+m}{m} - \frac{1}{m} = 1$ $\frac{1}{2}$

$\therefore a_n = \frac{1}{m} + n - 1$ $\frac{1}{2}$

SECTION B

5. Let $\angle OPQ = \theta$

$\therefore \angle TPQ = 90^\circ - \theta$ $\frac{1}{2}$

$\Rightarrow \angle PQT = 90^\circ - \theta$ $\frac{1}{2}$

Hence $\angle PTQ = 180^\circ - (90^\circ - \theta + 90^\circ - \theta)$
 $= 2\theta$ or $2\angle OPQ$ 1

6. For points to be collinear

$$-5(k + 2) + 1(-2 - 1) + 4(1 - k) = 0 \quad 1$$

$$\Rightarrow -9k - 9 = 0$$

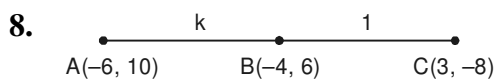
$$\Rightarrow k = -1 \quad 1$$

7. $(x + 3)(2x - 3) = (3x - 7)(x + 2)$ $\frac{1}{2}$

$$\Rightarrow x^2 - 4x - 5 = 0 \quad \frac{1}{2}$$

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

$$\Rightarrow x = 5, -1 \quad \frac{1}{2}$$



Let AP : PB = k : 1

$$\therefore \frac{3k - 6}{k + 1} = -4 \quad 1$$

$$\Rightarrow k = \frac{2}{7} \quad \frac{1}{2}$$

Hence AP : PB = 2 : 7 $\frac{1}{2}$

9. $\angle 2 = \frac{1}{2} \angle ROT = \frac{1}{2} \times 130^\circ = 65^\circ$ $\frac{1}{2}$

$$\angle POQ = 180^\circ - 130^\circ = 50^\circ \quad \frac{1}{2}$$

$$\therefore \angle 1 = 40^\circ \quad \frac{1}{2}$$

$$\text{Hence } \angle 2 + \angle 1 = 65^\circ + 40^\circ = 105^\circ \quad \frac{1}{2}$$

10. Here $a = 3, d = 9$

$$a_{50} = 3 + 49 \times 9 = 444 \quad 1$$

$$\therefore a_n = 444 + 90 = 534 = 3 + (n - 1) \times 9 \quad \frac{1}{2}$$

$$\Rightarrow n = 60 \quad \frac{1}{2}$$

SECTION C

11. Here $r_2 - r_1 = 7 \text{ cm}$ ($r_2 > r_1$) ... (i) $\frac{1}{2}$

and $\pi(r_2^2 - r_1^2) = 1078 \text{ cm}^2$ $\frac{1}{2}$

$$\Rightarrow \pi(r_2 - r_1)(r_2 + r_1) = 1078 \text{ cm}^2$$

$$\Rightarrow r_2 + r_1 = \frac{1078 \times 7}{22 \times 7} = 49 \text{ cm} \quad \dots \text{(ii)} \quad 1$$

Solving (i) and (ii) to get

$$r_2 = 28 \text{ cm} \quad 1$$

$$r_1 = 21 \text{ cm}$$

\therefore Radius of smaller circle = 21 cm.

12. Total number of possible outcomes = 8 1

$$\text{Prob (Ramesh wins the game)} = \frac{2}{8} = \frac{1}{4} \quad 1$$

$$\therefore \text{Prob (Ramesh loses the game)} = 1 - \frac{1}{4} = \frac{3}{4} \quad 1$$

13. Speed = 5 km/hr \therefore length in t hrs = 5000 t m. $\frac{1}{2}$

Volume of water flown = Volume of water in tank $\frac{1}{2}$

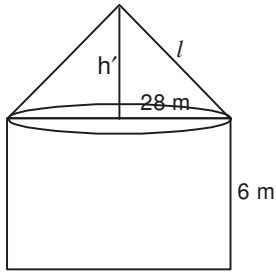
$$\Rightarrow \frac{22}{7} \times \left(\frac{7}{100}\right)^2 \times 5000 \text{ t} = 50 \times 44 \times \frac{7}{100} \text{ m}^3 \quad 1$$

$\Rightarrow t = 2$

Hence required time is 2 hrs.

1

14.



$h' = 27 - 6 = 21 \text{ m}$

$l = \sqrt{21^2 + 28^2} = 35 \text{ m}$

1

Area of canvas used = $2\pi rh + \pi rl$

1

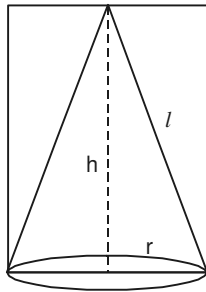
$= \frac{22}{7} \times 28 (12 + 35)$

$= 4136 \text{ m}^2$

1

Note: Full marks should be given to any solution with diameter 56 cm

15.



Here $h = 24 \text{ cm}$, $r = 7 \text{ cm}$

$\therefore l = 25 \text{ cm}$.

$\frac{1}{2}$

Surface Area of remaining solid

$= \pi r^2 + 2\pi rh + \pi rl$

1

$= \frac{22}{7} \times 7 (7 + 48 + 25)$

1

$= 1760 \text{ cm}^2$.

$\frac{1}{2}$

16. Here $r = 21 \text{ cm}$, $\theta = 60^\circ$

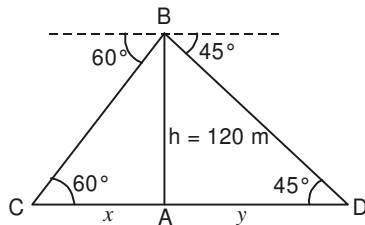
\therefore Area of the sector formed = $\frac{22}{7} \times 21 \times 21 \times \frac{60}{360}$

2

$= 231 \text{ cm}^2$

1

17.



Correct Figure

$\frac{1}{2}$

$\tan 45^\circ = \frac{120}{y}$

$\Rightarrow 1 = \frac{120}{y} \Rightarrow y = 120$

1

$$\tan 60^\circ = \sqrt{3} = \frac{120}{x}$$

$$\Rightarrow x = \frac{120}{\sqrt{3}} = 40\sqrt{3} \quad 1$$

Hence distance between the cars = $40 \times 1.732 + 120$

$$= 189.28 \text{ m} \quad \frac{1}{2}$$

18. For roots to be equal

$$4(c+1)^2 - 16(c+1) = 0 \quad 1$$

$$\Rightarrow 4(c+1)(c+1-4) = 0 \quad 1$$

$$\Rightarrow c = -1, 3 \quad 1$$

19. We have to find $1 + 3 + 5 + 7 + \dots + 49$ 1

$$\therefore 49 = 1 + (n-1) \times 2$$

$$\Rightarrow n = 25 \quad 1$$

$$S_{25} = \frac{25}{2}[2 + 48]$$

$$= 625 \quad 1$$

20. Let the point on y-axis be P(0, y) $\frac{1}{2}$

$$PA^2 = PB^2 \Rightarrow 25 + (y-3)^2 = 1 + (y+5)^2 \quad 1$$

$$\Rightarrow 25 + y^2 + 9 - 6y = 1 + y^2 + 10y + 25$$

$$\Rightarrow y = \frac{1}{2} \quad 1$$

$$\therefore \text{Point on y-axis is } P\left(0, \frac{1}{2}\right) \quad \frac{1}{2}$$

SECTION D

21. For correct given, To prove, construction and figure

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

For correct proof

2

22. Capacity of the bucket = $\frac{1}{3}\pi h(r_1^2 + r_2^2 + r_1r_2)$

$$= \frac{1}{3} \times \frac{22}{7} \times 35 (900 + 144 + 360)$$

1

$$= 51480 \text{ cm}^3$$

$$= 51.48 \text{ litres}$$

1

Amount received = Rs 40×51.48

$$= \text{Rs } 2059.20$$

1

Any relevant value like we must help economic weaker section of the society to our best.

1

23. Volume of wood in the block = $15 \times 10 \times 3.5 \text{ cm}^3$

$$= 525 \text{ cm}^3$$

1

$$\text{Volume of wood removed} = 4 \times \frac{1}{3} \times \frac{22}{7} \times \left(\frac{5}{10}\right)^2 \times \frac{21}{10} \text{ cm}^3$$

1

$$= 2.2 \text{ cm}^3$$

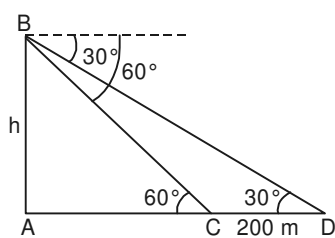
1

Volume of wood in remaining solid = $525 - 2.2$

$$= 522.80 \text{ cm}^3$$

1

24.



Correct Figure

1

Let speed of car be $x \text{ m/sec}$.

Therefore $DC = 6x \text{ m}$.

$\frac{1}{2}$

Distance CA covered in $t \text{ sec} = tx \text{ m}$

$\frac{1}{2}$

$$\text{Now, } \tan 30^\circ = \frac{1}{\sqrt{3}} = \frac{h}{x(6+t)}$$

$$\Rightarrow \frac{h}{x} = \frac{6+t}{\sqrt{3}} \quad \dots(i) \quad \frac{1}{2}$$

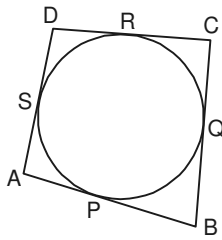
$$\tan 60^\circ = \sqrt{3} = \frac{h}{tx}$$

$$\Rightarrow \frac{h}{x} = \sqrt{3}t \quad \dots(ii) \quad \frac{1}{2}$$

Solving (i) and (ii) to get

$$t = 3 \text{ sec.} \quad 1$$

25.



Here AP = AS

BP = BQ

CQ = CR

and DR = DS

2

$$\text{Hence } AB + CD = (AP + PB) + (CR + DR) \quad \frac{1}{2}$$

$$= (AS + BQ) + (CQ + DS) \quad \frac{1}{2}$$

$$= (AS + DS) + (BQ + CQ) \quad \frac{1}{2}$$

$$\text{or } AB + CD = AD + BC \quad \frac{1}{2}$$

$$26. \quad 4[(x+3)x - (1-x)(x-2)] = 17x(x-2) \quad 1$$

$$\Rightarrow 4(x^2 + 3x + x^2 - 3x + 2) = 17x^2 - 34x \quad 1$$

$$\Rightarrow 9x^2 - 34x - 8 = 0 \quad \frac{1}{2}$$

$$\Rightarrow 9x^2 - 36x + 2x - 8 = 0$$

$$\Rightarrow (x-4)(9x+2) = 0 \quad 1$$

$$\Rightarrow x = 4, \frac{-2}{9} \quad \frac{1}{2}$$

$$27. \frac{a_{11}}{a_{18}} = \frac{a+10d}{a+17d} = \frac{2}{3} \quad 1$$

$$\Rightarrow a = 4d \quad \dots(i) \quad \frac{1}{2}$$

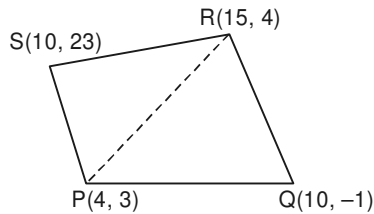
$$\frac{S_5}{S_{10}} = \frac{\frac{5}{2}(2a+4d)}{5(2a+9d)} \quad 1$$

$$= \frac{8d+4d}{2(8d+9d)} \quad 1$$

$$= \frac{6}{17} \quad \frac{1}{2}$$

Hence $S_5 : S_{10} = 6 : 17$.

28.



$$\text{Area PQRS} = \text{Ar PQR} + \text{Ar PRS}$$

$$\text{Ar } \Delta PQR = \frac{1}{2} |4(-5) + 10(1) + 15(4)|$$

$$= \frac{1}{2} \times 50 = 25 \text{ sq.units} \quad 1\frac{1}{2}$$

$$\text{Ar } \Delta PRS = \frac{1}{2} |4(-19) + 15(20) + 10(-1)|$$

$$= \frac{1}{2} \times 214 = 107 \text{ sq.units} \quad 1\frac{1}{2}$$

$$\text{Ar. PQRS} = 25 + 107 = 132 \text{ sq.units} \quad 1$$

29. Correct construction of ΔABC 1 $\frac{1}{2}$

Correct construction of similar triangle 2 $\frac{1}{2}$

30. Let Bhagat alone can do in x number of days

\therefore Ram takes $(x-6)$ number of days 1 $\frac{1}{2}$

According to the question

$$\frac{1}{x} + \frac{1}{x-6} = \frac{1}{4}$$

1

$$\Rightarrow x^2 - 14x + 24 = 0$$

1

$$\Rightarrow (x-12)(x-2) = 0$$

1

$$\Rightarrow x = 12, \text{ as } x \neq 2$$

$\frac{1}{2}$

31. Total number of cards = 100

(i) Prob. (an even number) = $\frac{50}{100}$ or $\frac{1}{2}$

1

(ii) Prob. (a number multiple of 13) = $\frac{7}{100}$

1

(iii) Prob. (a perfect square number) = $\frac{10}{100}$ or $\frac{1}{10}$

1

(iv) Prob. (a prime no. less than 20) = $\frac{8}{100}$ or $\frac{2}{25}$

1