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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.

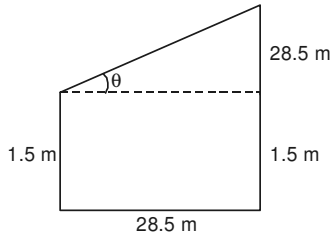
7. As per orders of the Hon'ble Supreme Court. The candidates would now be permitted to obtain photocopy of the Answer book on request on payment of the prescribed fee. All examiners/Head Examiners are once again reminded that they must ensure that evaluation is carried out strictly as per value points for each answer as given in the Marking Scheme.

QUESTION PAPER CODE 30/1/1

EXPECTED ANSWER/VALUE POINTS

SECTION A

1.



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

$\therefore \quad \theta = 45°$ $\frac{1}{2}$

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

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

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

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

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

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

SECTION B

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

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

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

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

6. $a + 9d = -4$
$a + 21d = -16$ } 1

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

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

7. Let $\angle OPQ = \theta$

$\therefore \quad TPQ = 90° - \theta$ $\frac{1}{2}$

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

Hence $\angle PTQ = 180° - (90° - \theta + 90° - \theta)$

$= 2\theta$ or $2\angle OPQ$ 1

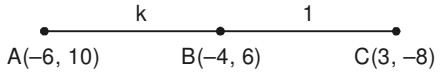
8. For points to be collinear

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

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

$\Rightarrow \quad k = -1$ 1

9.



Let AP : PB = k : 1

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

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

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

10. $\angle 2 = \frac{1}{2}\angle ROT = \frac{1}{2} \times 130° = 65°$ $\frac{1}{2}$

$\angle POQ = 180° - 130° = 50°$ $\frac{1}{2}$

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

Hence $\angle 2 + \angle 1 = 65° + 40° = 105°$ $\frac{1}{2}$

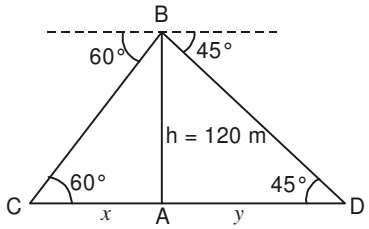
SECTION C

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

$= 8 \times \frac{15 \times 16}{2}$ 1

$= 960$ 1

12.



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

$\tan 45° = \frac{120}{y}$

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

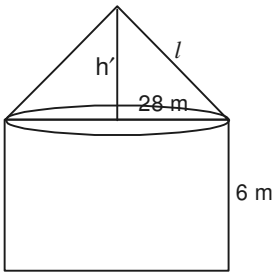
$\tan 60° = \sqrt{3} = \frac{120}{x}$

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

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

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

13.



$h' = 27 - 6 = 21$ m

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

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

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

$\Rightarrow \quad \pi(r_2 - r_1)(r_2 + r_1) = 1078$ cm^2

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

Solving (i) and (ii) to get

$r_2 = 28$ cm

$r_1 = 21$ cm $\quad 1$

$\therefore$ Radius of smaller circle = 21 cm.

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

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

Solving to get $x_1 = -7$ $\quad 1$

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

16. Total number of possible outcomes = 8 $\quad 1$

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

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

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

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

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

$\Rightarrow$ $t = 2$

Hence required time is 2 hrs. 1

18. Here $r = 21$ cm, $\theta = 60°$

$\therefore$ 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

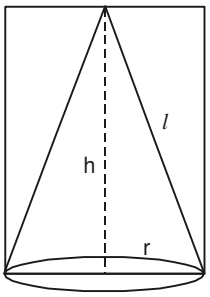
$\Rightarrow$ $a^2c^2 + b^2d^2 + 2acbd - a^2c^2 - a^2d^2 - b^2c^2 - b^2d^2 = 0$

$\Rightarrow$ $a^2d^2 + b^2c^2 - 2abcd = 0$ 1

$\Rightarrow$ $(ad - bc)^2 = 0$ $\frac{1}{2}$

$\Rightarrow$ $ad = bc$ $\frac{1}{2}$

20.



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

$\therefore$ $l = 25$ 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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

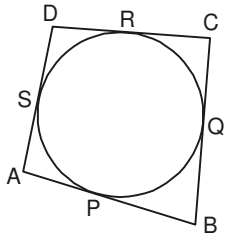
24. For correct given, To prove, construction and figure $4\times\frac{1}{2}=2$

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 2

and DR = DS

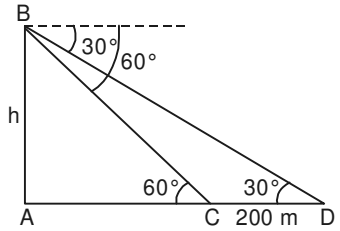
Hence AB + CD = (AP + PB) + (CR + DR) $\frac{1}{2}$

= (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 $\frac{1}{2}$

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

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

$\tan 60° = \sqrt{3} = \frac{h}{tx}$

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

Solving (i) and (ii) to get

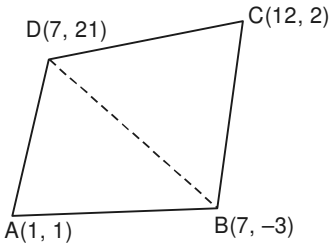
$t = 3$ sec. 1

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 ΔABD + Ar ΔBCD

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

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

$= 72$ sq.units $1\frac{1}{2}$

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

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

$= 60$ sq.units $1\frac{1}{2}$

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

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

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

$= 51480 \text{ cm}^3$

$= 51.48$ 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 $= 15 \times 10 \times 3.5 \text{ cm}^3$

$= 525 \text{ cm}^3$ 1

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

$= 2.2 \text{ cm}^3$ 1

Volume of wood in remaining solid = 525 – 2.2

$= 522.80 \text{ cm}^3$ 1

30/1/2

SECTION A

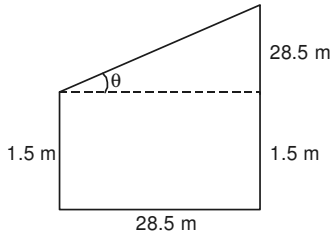
1. Total number of outcomes = 8 $\frac{1}{2}$

$\therefore$ P(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.



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

$\therefore$ $\theta = 45°$ $\frac{1}{2}$

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

$\therefore$ PS = 2PQ = 10 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 $\angle OPQ = \theta$

$\therefore$ $TPQ = 90° - \theta$ $\frac{1}{2}$

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

Hence $\angle PTQ = 180° - (90° - \theta + 90° - \theta)$

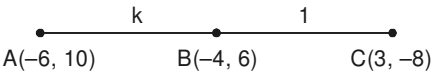
$= 2\theta$ or $2\angle OPQ$ 1

7. $\angle 2 = \frac{1}{2}\angle ROT = \frac{1}{2} \times 130° = 65°$ $\frac{1}{2}$

$\angle POQ = 180° - 130° = 50°$ $\frac{1}{2}$

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

Hence $\angle 2 + \angle 1 = 65° + 40° = 105°$ $\frac{1}{2}$

8. 

Let AP : PB = k : 1

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

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

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

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

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

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

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

10. Here a = 11, d = –3

$a_n = -150 = 11 - 3(n - 1)$ $\frac{1}{2}$

$\Rightarrow \quad n = \frac{164}{3}$ or $54\frac{2}{3}$ 1

Since n is not a natural number therefore –150 is not a term of the sequence $\frac{1}{2}$

SECTION C

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

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

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

$\Rightarrow \quad t = 2$

Hence required time is 2 hrs. 1

12. Here r = 21 cm, $\theta = 60°$

$\therefore$ Area of the sector formed = $\frac{22}{7} \times 21 \times 21 \times \frac{60}{360}$ 2

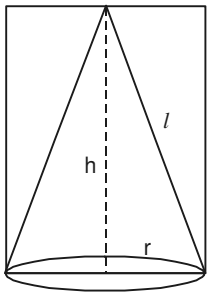
$= 231\ cm^2$ 1

13. Total number of possible outcomes = 8 1

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

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

14.



Here h = 24 cm, r = 7 cm

$\therefore$ $l = 25$ cm. $\frac{1}{2}$

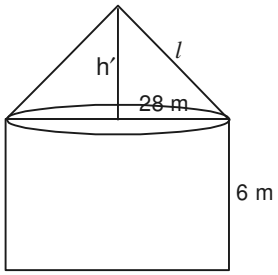
Surface Area of remaining solid

$= \pi r^2 + 2\pi rh + \pi rl$ 1

$= \frac{22}{7} \times 7\,(7 + 48 + 25)$ 1

$= 1760\ cm^2$. $\frac{1}{2}$

15.



$h' = 27 - 6 = 21$ m

$l = \sqrt{21^2 + 28^2} = 35$ m 1

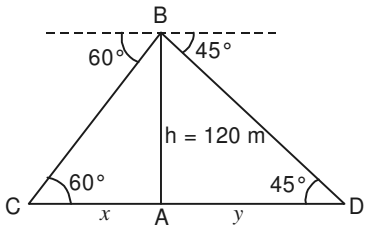
Area of canvas used = $2\pi rh + \pi rl$ 1

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

$= 4136\ m^2$ 1

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

16.



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

$\tan 45° = \frac{120}{y}$

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

$\tan 60° = \sqrt{3} = \frac{120}{x}$

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

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

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

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

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

$\Rightarrow \quad \pi(r_2 - r_1)(r_2 + r_1) = 1078$ cm^2

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

Solving (i) and (ii) to get

$r_2 = 28$ cm

$r_1 = 21$ cm 1

$\therefore$ Radius of smaller circle = 21 cm.

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

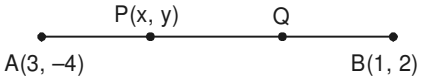
Therefore $96 = 12 + (n - 1) \times 4$

$\Rightarrow \quad n = 22$ 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

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

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

SECTION D

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

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

$= 51480\ cm^3$

$= 51.48$ 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 = $15 \times 10 \times 3.5\ cm^3$

$= 525\ cm^3$ 1

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

$= 2.2\ cm^3$ 1

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

$= 522.80\ cm^3$ 1

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

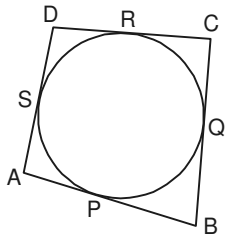
$\Rightarrow \quad 4(x^2 + 3x + x^2 - 3x + 2) = 17x^2 - 34x$ 1

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

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

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

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

24. 

Here AP = AS

BP = BQ

CQ = CR 2

and DR = DS

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

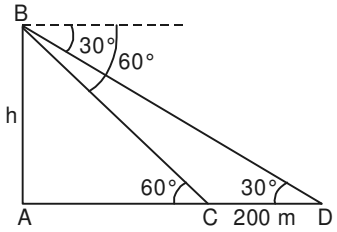
$\Rightarrow$ $a = 4d$ ...(i) $\frac{1}{2}$

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

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

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

$\tan 60° = \sqrt{3} = \frac{h}{tx}$

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

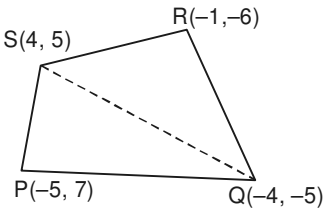
Solving (i) and (ii) to get

$t = 3$ sec. 1

27. For correct given, To prove, construction and figure $4 \times \frac{1}{2} = 2$

For correct proof 2

28.



Ar. PQRS = Ar. PQS + Ar. QRS

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

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

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

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

$\therefore$ Area PQRS = 53 + 19 = 72 sq.units 1

29. Total number of remaining cards = 49 $\frac{1}{2}$

(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

$\Rightarrow \quad x^2 = 5184$

$\Rightarrow \quad x = 72$ 1

$\therefore \quad$ 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

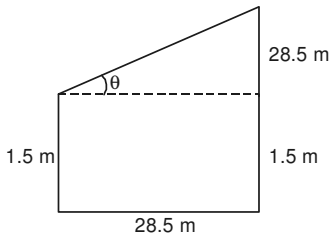
1. PQ = PR = 5 cm $\frac{1}{2}$

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

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

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

3.



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

$\therefore$ $\theta = 45°$ $\frac{1}{2}$

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 $\angle OPQ = \theta$

$\therefore$ $TPQ = 90° - \theta$ $\frac{1}{2}$

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

Hence $\angle PTQ = 180° - (90° - \theta + 90° - \theta)$

$= 2\theta$ or $2\angle OPQ$ 1

6. For points to be collinear

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

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

$\Rightarrow \quad k = -1$ 1

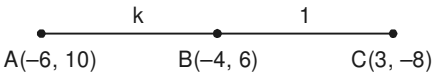
7. $(x + 3)(2x - 3) = (3x - 7)(x + 2)$ $\frac{1}{2}$

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

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

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

8.



Let AP : PB = k : 1

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

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

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

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

$\angle POQ = 180° - 130° = 50°$ $\frac{1}{2}$

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

Hence $\angle 2 + \angle 1 = 65° + 40° = 105°$ $\frac{1}{2}$

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

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

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

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

SECTION C

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

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

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

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

Solving (i) and (ii) to get

$r_2 = 28$ cm

$r_1 = 21$ cm 1

$\therefore \quad$ Radius of smaller circle = 21 cm.

12. Total number of possible outcomes = 8 1

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

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

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

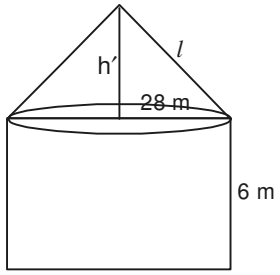
Volume of water flown = Volume of water in tank $\frac{1}{2}$

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

$\Rightarrow \quad t = 2$

Hence required time is 2 hrs. 1

14.



$h' = 27 - 6 = 21$ m

$l = \sqrt{21^2 + 28^2} = 35$ m 1

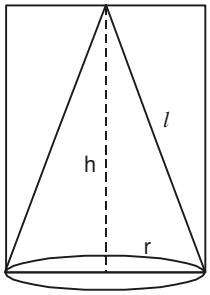
Area of canvas used = $2\pi rh + \pi rl$ 1

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

$= 4136\ m^2$ 1

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

15.



Here h = 24 cm, r = 7 cm

$\therefore \quad l = 25$ 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

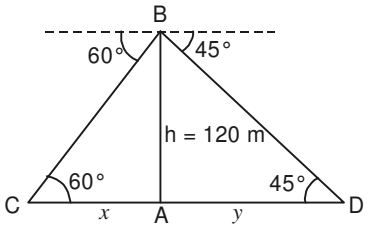
$= 1760\ cm^2.$ $\frac{1}{2}$

16. Here r = 21 cm, $\theta = 60°$

$\therefore \quad$ Area of the sector formed = $\frac{22}{7} \times 21 \times 21 \times \frac{60}{360}$ 2

$= 231\ cm^2$ 1

17.



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

$\tan 45° = \frac{120}{y}$

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

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

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

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

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

18. For roots to be equal

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

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

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

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

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

$\Rightarrow$ $n = 25$ 1

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

$= 625$ 1

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

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

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

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

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

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 = $\frac{1}{3}\pi h(r_1^2 + r_2^2 + r_1 r_2)$

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

$= 51480\ cm^3$

$= 51.48$ 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

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

$= 525\ cm^3$ 1

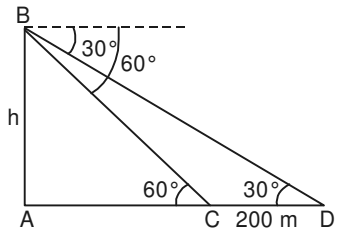
Volume of wood removed = $4\times\frac{1}{3}\times\frac{22}{7}\times\left(\frac{5}{10}\right)^2\times\frac{21}{10}\ cm^3$ 1

$= 2.2\ cm^3$ 1

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

$= 522.80\ cm^3$ 1

24.



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 $\frac{1}{2}$

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

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

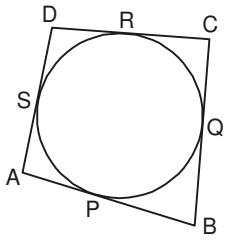
$\tan 60° = \sqrt{3} = \frac{h}{tx}$

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

Solving (i) and (ii) to get

$t = 3$ sec. 1

25.



Here AP = AS

BP = BQ

CQ = CR 2

and DR = DS

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 $\frac{1}{2}$

26. $4[(x + 3)x – (1 – x)(x – 2)] = 17x(x – 2)$ 1

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

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

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

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

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

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

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

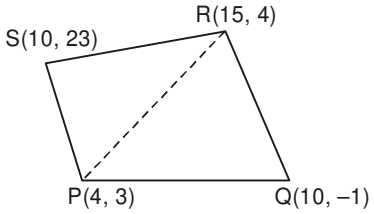
$\frac{S_5}{S_{10}} = \frac{\frac{5}{2}(2a+4d)}{5(2a+9d)}$ 1

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

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

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

28.



Area PQRS = Ar PQR + Ar PRS

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

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

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

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

Ar. PQRS = 25 + 107 = 132 sq.units 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 $\frac{1}{2}$

According to the questioon

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

$\Rightarrow \quad x^2 - 14x + 24 = 0$ 1

$\Rightarrow \quad (x - 12)\ (x - 2) = 0$ 1

$\Rightarrow \quad x = 12$, 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