QUESTION PAPER CODE 30/1

EXPECTED ANSWER/VALUE POINTS

SECTION A

1. For $\angle ACB = 90°$ $\frac{1}{2}$

$\angle PCA = 60°$ $\frac{1}{2}$

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

$k = 18$ $\frac{1}{2}$

3. $\frac{l}{2.5} = 2$ $\frac{1}{2}$

$l = 5$ m $\frac{1}{2}$

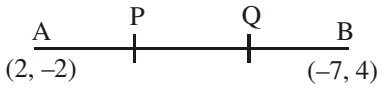
4. No. of red cards and queens: 28 $\frac{1}{2}$

Required Probability: $\frac{24}{52}$ or $\frac{6}{13}$ $\frac{1}{2}$

SECTION B

5. $2(-5)^2 + p(-5) - 15 = 0 \Rightarrow p = 7$ 1

$7x^2 + 7x + k = 0$ gives $49 - 28k = 0 \Rightarrow k = \frac{7}{4}$ 1

6. 

P divides AB in 1 : 2 $\frac{1}{2}$

$\therefore$ Coords of P are: (–1, 0) 1

Q is mid-point of PB

$\therefore$ Coords of Q are: (–4, 2) $\frac{1}{2}$

7. AP = AS, BP = BQ, CR = CQ and DR = DS 1

$AP + BP + CR + DR = AS + BQ + CQ + DS \Rightarrow AB + CD = AD + BC$ 1

8. Let the point be A(3, 0), B(6, 4), C(–1, 3)

$AB = \sqrt{9+16} = 5, BC = \sqrt{49+1} = 5\sqrt{2}, AC = \sqrt{16+9} = 5$ $1\frac{1}{2}$

$AB = AC$ and $AB^2 + AC^2 = BC^2$: ΔABC isosceles, right Δ $\frac{1}{2}$

9. $a + 3d = 0 \Rightarrow a = -3d$ $\frac{1}{2}$

$a_{25} = a + 24d = 21d$ $\frac{1}{2}$

$3a_{11} = 3(a + 10d) = 3(7d) = 21d$ 1

10. Let $\angle TOP = \theta \therefore \cos\theta = \frac{OT}{OP} = \frac{r}{2r} = \frac{1}{2} \therefore \theta = 60°$ Hence $\angle TOS = 120°$ 1

In ΔOTS, $OT = OS \Rightarrow \angle OTS = \angle OST = 30°$ 1

SECTION C

11. $BC^2 = AB^2 - AC^2 = 169 - 144 = 25 \therefore BC = 5cm$ 1

Area of the shaded region = Area of semicircle – area of rt. ΔABC

$$= \frac{1}{2}(3.14)\left(\frac{13}{2}\right)^2 - \frac{1}{2}.12\times5$$ 1

$= 66.33 - 30 = 36.33\ cm^2$ 1

12. Area of canvas needed $= 2\times\frac{22}{7}\times(1.5)\times2.1 + \frac{22}{7}\times1.5\times2.8$ $1\frac{1}{2}$

$$= \frac{22}{7}[6.3+4.2] = \frac{22}{7}\times10.5 = 33\,m^2$$ 1

cost $= 33 \times 500 = ₹\ 16500$ $\frac{1}{2}$

13. $PA = PB$ or $(PA)^2 = (PB)^2$ 1

$(a + b - x)^2 + (b - a - y)^2 = (a - b - x)^2 + (a + b - y)^2$ 1

$(a + b)^2 + x^2 - 2ax - 2bx + (b - a)^2 + y^2 - 2by + 2ay$

$= (a - b)^2 + x^2 - 2ax + 2bx + (a + b)^2 + y^2 - 2ay - 2by$

$\Rightarrow$ $4ay = 4bx$ or $bx = ay$ 1

14. Shaded area $= \pi(14^2 - 7^2) \times \frac{320}{360}$ 2

$= \frac{22}{7} \times 147 \times \frac{8}{9}$ $\frac{1}{2}$

$= \frac{1232}{3} = 410.67 \text{ cm}^2$ $\frac{1}{2}$

15. $\frac{Sn}{S_n'} = \frac{n/2\,(2a + (n-1)d)}{n/2\,(2a' + (n-1)\,d')} = \frac{7n+1}{4n+27}$ 1

$= \frac{a + \frac{n-1}{2}d}{a' + \frac{n-1}{2}d'} = \frac{7n+1}{An+27}$ ...(i) $\frac{1}{2}$

Since $\frac{t_m}{t_m'} = \frac{a + (m-1)\,d}{a + (m-1)\,d'}$, So replacing $\frac{n-1}{2}$ by m – 1 i.e. n = 2m – 1 in (i) 1

$\frac{t_m}{t_m'} = \frac{a + (m-1)\,d}{a' + (m-1)\,d'} = \frac{7\,(2m-1)+1}{4\,(2m-1)+27} = \frac{14m-6}{8m+23}$ $\frac{1}{2}$

16. Here $3(x - 3 + x - 1) = 2(x - 1)\,(x - 2)\,(x - 3)$ $1\frac{1}{2}$

$\Rightarrow$ $3(2x - 4) = 2(x - 1)\,(x - 2)\,(x - 3)$ $\frac{1}{2}$

$\Rightarrow$ $3 = (x - 1)\,(x - 3)$ i.e. $x^2 - 4x = 0$

$\therefore$ $x = 0,\ x = 4$ 1

17. Volume of water in conical vessel $= \frac{1}{3} \times \frac{22}{7} \times 25 \times 24 \text{ cm}^2$ 1

$\therefore$ $\frac{1}{3} \times \frac{22}{7} \times 25 \times 24 = \frac{22}{7} \times 10 \times 10 \times h$ $1\frac{1}{2}$

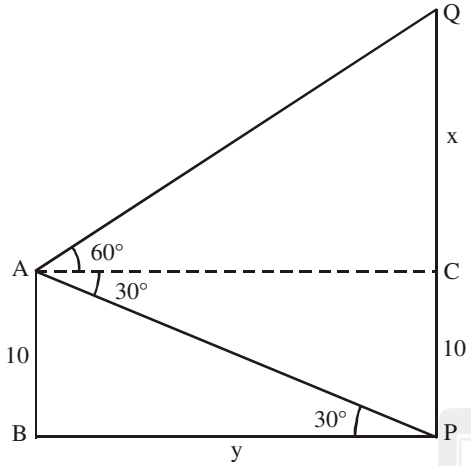
$\Rightarrow$ $h = 2$ cm $\frac{1}{2}$

18. Volume of sphere $= \frac{4}{3}\pi.(6)^3.\text{cm}^3$ 1

$\therefore \quad \pi r^2 \frac{32}{9} = \frac{4}{3}\pi (6)^3$ $1\frac{1}{2}$

$\Rightarrow \quad r = 9$ cm. $\frac{1}{2}$

19.



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

In ΔABP, $\frac{y}{10} = \cot 30° = \sqrt{3}$

$\therefore \quad y = 10\sqrt{3}$ m 1

In ΔACQ, $\frac{x}{y} = \tan 60° = \sqrt{3}$

$x = \sqrt{3}(10\sqrt{3}) = 30$ m 1

$\therefore$ Height of hill = 30 + 10 = 40 m $\frac{1}{2}$

20. Set of possible outcomes is

{HHH, HHT, HTH, THH, HTT, THT, TTH, TTT}

(i) P(exactly 2 heads) = 3/8 1

(ii) P(at least 2 heads) = 4/8 or 1/2 1

(iii) P(at least 2 tails) = 4/8 or 1/2 1

SECTION D

21. Slant height of conical part = $\sqrt{(2.8)^2 + (2.1)^2} = 3.5$ m $\frac{1}{2}$

Area of canvas/tent $= 2 \times \frac{22}{7} \times 2.8 \times 3.5 + \frac{22}{7} \times 2.8 \times 3.5 \text{ m}^2$

$= 92.4 \text{ m}^2$ 1

Cost of 1500 tents = 1500 × 92.4 × 120 = ₹ 16632000 1

Share of each school $= \frac{1}{50} \times 1663200$

= ₹ 332640 /- $\frac{1}{2}$

"Helping the needy" 1

22. Correct Given, To prove, Construction and Figure $4 \times \frac{1}{2} = 2$

Correct proof 2

23. Correct construction 4

24. AC is tangent to circle with centre 0,

Thus $\angle ACO = 90°$ 1

$\therefore$ $\Delta AO'D \sim \Delta AOC$ 1

$\Rightarrow$ $\frac{AO'}{AO} = \frac{DO'}{CO}$ 1

$\therefore$ $\frac{DO'}{CO} = \frac{r}{3r} = \frac{1}{3}$ 1

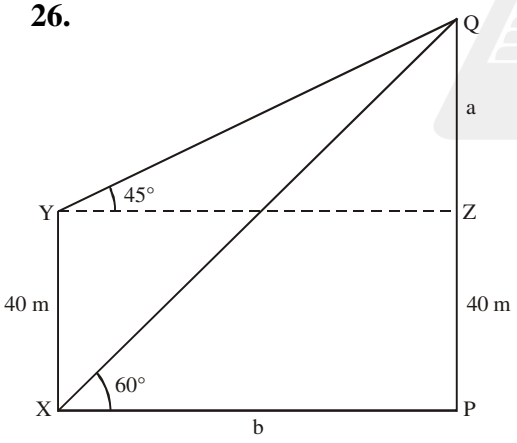
25. $(x + 4)(x + 2 + 2x + 2) = 4(x + 1)(x + 2)$ 1

$(x + 4)(3x + 4) = 4(x^2 + 3x + 2)$

$\Rightarrow$ $x^2 - 4x - 8 = 0$ $1\frac{1}{2}$

$\Rightarrow$ $x = \frac{4 \pm \sqrt{16 + 32}}{2} = 2 \pm 2\sqrt{3}$ $1\frac{1}{2}$

26.



Correct Figure 1

In ΔYZQ, $\frac{a}{YZ} = \tan 45° = 1$

$\Rightarrow$ YZ = a i.e. a = b 1

In ΔQPX, $\frac{a + 40}{b} = \frac{a + 40}{a} = \tan 60° = \sqrt{3}$

$\therefore$ $(\sqrt{3} - 1)\,a = 40$ or $a = \frac{40}{\sqrt{3} - 1} = 20(\sqrt{3} + 1)$

$= 20(2.73) = 54.60$ m 1

$\therefore$ PX = 54.6 m

PQ = 54.6 + 40 = 94.6m 1

27. Sum of numbers preceeding X

$$= \frac{(X-1)\,X}{2} \qquad 1\frac{1}{2}$$

Sum of numbers following $X = \frac{(49)\,(50)}{2} - \frac{(X-1)}{2} - X$

$$= \frac{2450 - X^2 - X}{2} \qquad 1\frac{1}{2}$$

$\therefore \quad \frac{(X-1)\,X}{2} = \frac{2450 - X^2 - X}{2}$

$\Rightarrow \quad 2X^2 = 2450$

$X^2 = 1225$

$X = 35 \qquad 1$

[Since there is a typographic error in the question, which makes it unsolvable, hence 4 marks be given to each student]

28. Coords of D are: $\left(\frac{1\,(1)+2(4)}{3}\right), \left(\frac{1(5)+2(6)}{3}\right)$ i.e. $\left(3, \frac{17}{3}\right)$ $\frac{1}{2}$

Coords of E are: $\left(\frac{1(7)+2(4)}{3}, \frac{1(2)+2(6)}{3}\right)$ i.e. $\left(5, \frac{14}{3}\right)$ $\frac{1}{2}$

ar. $\Delta ADE = \frac{1}{2}\left[4(1) + 3\left(\frac{14}{3} - 6\right) + 5\left(6 - \frac{17}{3}\right)\right] = \frac{5}{6}$ 1

ar. $\Delta ABC = \frac{1}{2}[4(3) + 1(-4) + 7(1)] = \frac{15}{2}$ 1

ar. ΔADE: ar. $\Delta ABC = \frac{5}{6} : \frac{15}{2}$ or $1:9$ 1

29. x can be any one of 1, 2, 3 or 4.

y can be any one of 1, 4, 9 of 16

Total number of cases of xy = 16 $1\frac{1}{2}$

Number of cases, where product is less than 16 = 8 $1\frac{1}{2}$

{1, 4, 9, 2, 8, 3, 12, 4}

$\therefore$ Required Probability = $\frac{8}{16}$ or $\frac{1}{2}$ 1

30. Length of are $\overset{\frown}{AP} = 2\pi r \frac{\theta}{360}$ or $\frac{\pi r\theta}{180}$ ...(i) 1

$\frac{AB}{r} = \tan\theta \Rightarrow AB = r\tan\theta$ ...(ii) $\frac{1}{2}$

$\frac{OB}{r} = \sec\theta \Rightarrow OB = r\sec\theta$ $\frac{1}{2}$

$PB = OB - r = r\sec\theta - r$ ...(iii) 1

Perimeter = $AB + PB + \overset{\frown}{AP}$

$= r\tan\theta + r\sec\theta - r + \frac{\pi r\theta}{180}$ 1

or $r\left[\tan\theta + \sec\theta - 1 + \frac{\pi\theta}{180}\right]$

31. let x km/h be the speed of the stream

$\therefore \quad \frac{32}{24-x} - \frac{32}{24+x} = 1$ 2

$\Rightarrow \quad 32(2x) = (24 - x)(24 + x)$

$x^2 + 64x - 576 = 0$ 1

$(x + 72)(x - 8) = 0 \Rightarrow x = 8$

$\therefore$ Speed of stream = 8 km/h. 1