QUESTION PAPER CODE 30/4/2
EXPECTED ANSWER/VALUE POINTS

SECTION A

1. Disc. = $144 - 4 \times 4 \times (-k) < 0$ $\frac{1}{2}$

$16k < -144$

$k < -9$ $\frac{1}{2}$

2. Required distance = $\sqrt{(-a-a)^2+(-b-b)^2}$ $\frac{1}{2}$

$= \sqrt{4(a^2+b^2)}$ or $2\sqrt{a^2+b^2}$ $\frac{1}{2}$

3. Here $1.41 < x < 2.6$

Any rational number lying between 1.4 ... & 2.6 ... 1

(variable answer)

OR

$2^2 \times 5^2 \times 5 \times 3^2 \times 17 = (10)^2 \times 5 \times 3^2 \times 17$

$\therefore$ No. of zeroes in the end of the number = Two 1

4. Here $\frac{BC}{EF} = \frac{8}{11}$ $\frac{1}{2}$

$\therefore$ BC = $\frac{8}{11} \times 15.4 = 11.2$ cm $\frac{1}{2}$

5. $\frac{\tan 65°}{\cot 25°} = \frac{\tan(90° - 25°)}{\cot 25°}$ $\frac{1}{2}$

$= \frac{\cot 25°}{\cot 25°} = 1$ $\frac{1}{2}$

OR

$\sin 67° + \cos 75° = \sin (90° - 23°) + \cos (90° - 15°)$ $\frac{1}{2}$

$= \cos 23° + \sin 15°$ $\frac{1}{2}$

6. Here $-47 = 18 + (n-1)\left(-\frac{5}{2}\right)$ $\frac{1}{2}$

$\Rightarrow n = 27$ $\frac{1}{2}$

SECTION B

7. Let the number of white balls = x

$\therefore$ The number of black balls = 15 – x

$P(\text{Black}) = \frac{2}{3}$

$\Rightarrow \frac{15-x}{15} = \frac{2}{3}$ 1

$\Rightarrow 45 - 3x = 30$

$\Rightarrow x = 5$ 1

Hence number of white balls = 5.

8. No. of spade cards + 3 other kings = 13 + 3 = 16 $\frac{1}{2}$

$\therefore$ Cards which are neither spade nor kings = 52 – 16 = 36 $\frac{1}{2}$

Hence P (neither spade nor king) = $\frac{36}{52}$ or $\frac{9}{13}$ 1

9. $\frac{3}{x} + \frac{8}{y} = -1$ ...(i)

$\frac{1}{x} - \frac{2}{y} = 2$ ...(ii)

Multiply (ii) by 3 and subtract from (i), we get

$\frac{14}{y} = -7 \Rightarrow y = -2$ 1

Substitute this value of y = –2 in (i), we get x = 1

Hence, x = 1, y = –2 1

OR

For unique solution $\frac{a_1}{a_2} \neq \frac{b_1}{b_2} \Rightarrow \frac{k}{3} \neq \frac{2}{6}$ 1

$\Rightarrow k \neq 1$ 1

The pair of equations have unique solution for all real values of k except 1.

10. 12, 16, 20, ..., 204 $\frac{1}{2}$

Let the number of multiples be n.

$\therefore t_n = 12 + (n - 1) \times 4 = 204$ 1

$\Rightarrow n = 49$ $\frac{1}{2}$

OR

Here $t_3 = 16$ and $t_7 = t_5 + 12$ $\frac{1}{2}$

$\Rightarrow$ $a + 2d = 16$ (i) and $a + 6d = a + 4d + 12$ (ii) $\frac{1}{2}$

From (ii), $d = 6$

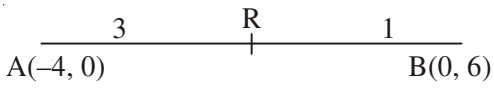
From (i), $a = 4$ 1

$\therefore$ A.P. is 4, 10, 16, ...

11.
$$\left.\begin{aligned} 867 &= 3 \times 255 + 102 \\ 255 &= 2 \times 102 + 51 \\ 102 &= 2 \times 51 + 0 \end{aligned}\right\}$$ $1\frac{1}{2}$

$\therefore$ HCF = 51 $\frac{1}{2}$

12.



$\frac{AR}{AB} = \frac{3}{4} \Rightarrow \frac{AR}{RB} = \frac{3}{1}$ 1

$\therefore R = \left(\frac{3 \times 0 + 1(-4)}{4}, \frac{3 \times 6 + 1 \times 0}{4}\right)$, i.e., $\left(-1, \frac{9}{2}\right)$ 1

SECTION C

13. LHS $= (\sin\theta + \cos\theta + 1)(\sin\theta + \cos\theta - 1)\sec\theta\,\text{cosec}\,\theta$

$= [(\sin\theta + \cos\theta)^2 - 1]\sec\theta\,\text{cosec}\,\theta$ 1

$= 2\sin\theta\cos\theta\sec\theta\,\text{cosec}\,\theta$ 1

$= 2 = \text{RHS}$ 1

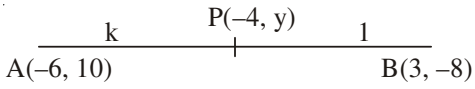
OR

$$\text{LHS} = \sqrt{\frac{\sec\theta - 1}{\sec\theta + 1}} + \sqrt{\frac{\sec\theta + 1}{\sec\theta - 1}} = \frac{(\sec\theta - 1) + (\sec\theta + 1)}{\sqrt{\sec^2\theta - 1}}$$ 1

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

$$= \frac{2}{\sin\theta} = 2\,\text{cosec}\,\theta = \text{RHS}$$ 1

14.



Let point P divides the line segment AB in the ratio k : 1

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

$\Rightarrow 3k - 6 = -4k - 4$

$\Rightarrow 7k = 2$ i.e., $k = \frac{2}{7}$ $\therefore$ Ratio is 2 : 7 1

Again $\frac{2\times(-8) + 7\times 10}{2 + 7} = y \Rightarrow y = 6$ 1

Hence $y = 6$

OR

The points are collinear if the area of triangle formed is zero.

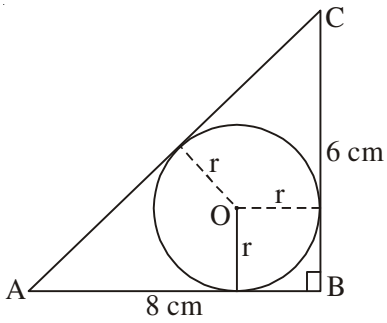
i.e., $-5(p + 2) + 1(-2 - 1) + 4(1 - p) = 0$ $1\frac{1}{2}$

$-5p - 10 - 3 + 4 - 4p = 0$

$-9p = 9$

$p = -1$ $1\frac{1}{2}$

15.



$AC = \sqrt{AB^2 + BC^2} = \sqrt{64 + 36} = 10$ cm $\frac{1}{2}$

Area of $\Delta ABC = \frac{1}{2} \times 8 \times 6 = 24$ cm^2 $\frac{1}{2}$

Let r be the radius of inscribed circle.

ar(ΔABC) = ar(AOB) + ar(ΔBOC) + ar(ΔAOC)

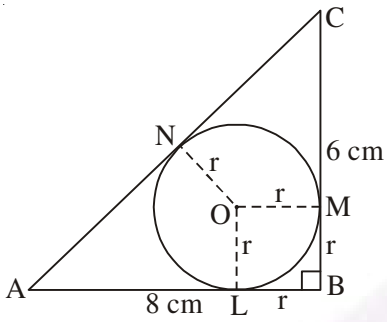
$= \frac{1}{2} \times 8r + \frac{1}{2} \times 6r + \frac{1}{2} \times 10r$ 1

$= \frac{1}{2} r(8 + 6 + 10) = 12r$

$12r = 24 \Rightarrow r = 2$ cm $\frac{1}{2}$

$\therefore$ Diameter = 4 cm $\frac{1}{2}$

Alternate method:



Here BL = BM = r (sides of squares)

$AC = \sqrt{AB^2 + BC^2} = 10$ cm 1

AL = AN = 8 – r and CM = CN = 6 – r $\frac{1}{2}$

AC = AN + NC

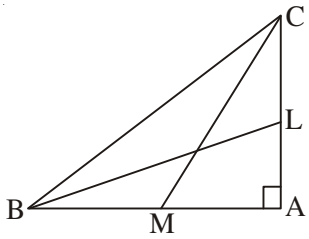
$\Rightarrow$ 10 = 8 – r + 6 – r

$\Rightarrow$ 2r = 4

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

$\therefore$ Diameter = 4 cm 1

16.



In right angled triangle CAM,

$CM^2 = CA^2 + AM^2$ ...(i)

Similarly, $BC^2 = AC^2 + AB^2$ ...(ii) 1

and $BL^2 = AL^2 + AB^2$ ...(iii)

Now $4(BL^2 + CM^2) = 4(AL^2 + AB^2 + AC^2 + AM^2)$ 1

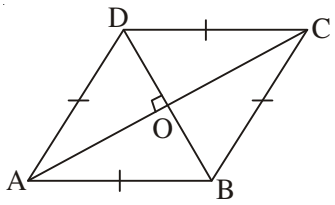
But $AL = LC = \frac{1}{2} AC$ and $AM = MB = \frac{1}{2} AB$

$\therefore\ 4(BL^2 + CM^2) = 4\left(\frac{AC^2}{4} + AB^2 + AC^2 + \frac{AB^2}{4}\right)$

$= 4\left(\frac{5}{4}AB^2 + \frac{5}{4}AC^2\right)$

$= 5(AB^2 + AC^2) = 5BC^2$ 1

OR



Let ABCD be rhombus and its diagonals intersect at O.

In ΔAOB, $AB^2 = AO^2 + OB^2$ 1

$= \left(\frac{AC}{2}\right)^2 + \left(\frac{BD}{2}\right)^2$

$= \frac{1}{4}(AC^2 + BD^2)$ 1

$\Rightarrow 4AB^2 = AC^2 + BD^2$

$\Rightarrow AB^2 + BC^2 + CD^2 + AD^2 = AC^2 + BD^2$ (ABCD being rhombus) 1

17. Area of shaded region

$= \left[\pi(42)^2 - \pi(21)^2\right]\frac{300°}{360°}$ 1

$= \frac{22}{7} \times 63 \times 21 \times \frac{5}{6}.$ 1

$= 3465\ cm^2$ 1

18. Here the modal class is 20 – 25 $\frac{1}{2}$

Mode $= 20 + \frac{20-7}{40-7-8} \times 5$ 2

$= 20 + \frac{13}{25} \times 5 = 22.6$ Hence mode = 22.6 $\frac{1}{2}$

19. Volume of cone $= \frac{1}{3}\pi r^2 h = \frac{1}{3}\pi(6)^2 \times 24\ cm^3$ 1

Let the radius of the sphere be R cm

$\therefore\ \frac{4}{3}\pi R^3 = \frac{1}{3}\pi \times 36 \times 24$ 1

$\Rightarrow R^3 = 6 \times 6 \times 6$

$\Rightarrow R = 6$ cm $\frac{1}{2}$

Surface area $= 4\pi R^2 = 144\pi$ cm^2 $\frac{1}{2}$

OR

Water required to fill the tank $= \pi(5)^2 \times 2 = 50\pi$ m^3 1

Water flown in 1 hour $= \pi\left(\frac{1}{10}\right)^2 \times 3000$ m^3

$= 30\pi$ m^3 1

Time taken to fill 30π m^3 = 60 minutes

Time taken to fill 50π m^3 $= \frac{60}{30} \times 50 = 100$ minutes 1

20. Let $2 + 3\sqrt{3} = a$ where a is a rational number $\frac{1}{2}$

Then $\sqrt{3} = \frac{a-2}{3}$ 1

Which is contradiction as LHS in irrational and

RHS is rational 1

$\therefore$ $2 + 3\sqrt{3}$ is irrational $\frac{1}{2}$

21. Let x and y be length of the sides of two squares.

$\therefore$ $x^2 + y^2 = 157$ and $4(x + y) = 68 \Rightarrow x + y = 17$ 1

$\therefore$ $x^2 + (17 - x)^2 = 157$ 1

$x^2 + 289 + x^2 - 34x - 157 = 0$

or $x^2 - 17x + 66 = 0$

$(x - 6)(x - 11) = 0$

$\therefore$ $x = 6$ or 11

$\therefore$ $y = 11$ or 6

Hence length of sides of squares are 6 m and 11 m. 1

22. If α, β are zeroes of the polynomial, then

$\alpha + \beta = -1,\ \alpha\beta = -20$

$\therefore$ Polynomial is $(x^2 + x - 20)$ $1\frac{1}{2}$

$(x + 5)\ (x - 4)$

$\therefore$ Zeroes of the polynomial are 4 and –5 $1\frac{1}{2}$

SECTION D

23. Let x km/hr be the usual speed of the plane

$\therefore \quad \frac{1500}{x} - \frac{1500}{x+250} = \frac{1}{2}$ $1\frac{1}{2}$

$\Rightarrow\ x^2 + 250x - 750000 = 0$ 1

$\Rightarrow\ x = -1000$ or 750 1

$\therefore$ Speed of the plane = 750 km/h $\frac{1}{2}$

OR

Let l be the length and b be the breadth of the park

$\therefore\ 2(l + b) = 60 \Rightarrow l + b = 30$ and $l \times b = 200$ 1

$l(30 - l) = 200$ 1

$\Rightarrow\ l^2 - 30l + 200 = 0$

$\Rightarrow\ (l - 20)\ (l - 10) = 10$ 1

$\Rightarrow\ l = 20$ or 10

Hence length = 20 m, breadth = 10 m 1

24. Let x be the nth term

$\therefore\ t_n = x = 2 + (n - 1)4$ i.e. $x = 4n - 2$ 1

Also $S_n = 1800 = \frac{n}{2}\{4 + (n-1)4\}$ 1

i.e. $\frac{4n^2}{2} = 1800$

$n^2 = 900 \Rightarrow n = 30$ 1

$\therefore \quad x = 30 \times 4 - 2 = 118$ 1

25. $\sec\theta + \tan\theta = m$ ...(i)

We know that $\sec^2\theta - \tan^2\theta = 1$ 1

$\sec\theta - \tan\theta = \dfrac{1}{m}$ ...(ii) 1

From (i) and (ii), $2\sec\theta = m + \dfrac{1}{m}$ and $2\tan\theta = m - \dfrac{1}{m}$ 1

Now $\sin\theta = \dfrac{2\tan\theta}{2\sec\theta} = \dfrac{m - \frac{1}{m}}{m + \frac{1}{m}} = \dfrac{m^2 - 1}{m^2 + 1}$ 1

26. In ΔABD, $AB^2 = AD^2 + BD^2 \Rightarrow AD^2 = AB^2 - BD^2$ 1

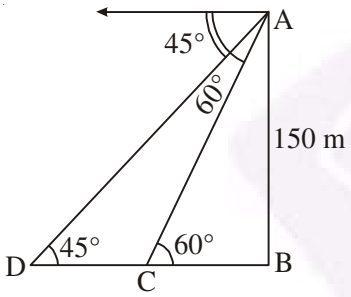
In ΔADC, $AC^2 = AD^2 + CD^2$

$= AB^2 - BD^2 + (BC - BD)^2$ 1

$= AB^2 - BD^2 + BC^2 + BD^2 - 2BC \times BD$ 1

$= AB^2 + BC^2 - 2BC \times BD$ 1

27. Correct Figure 1



$\dfrac{150}{BC} = \tan 60° = \sqrt{3}$

$\Rightarrow BC = \dfrac{150}{\sqrt{3}} = 50\sqrt{3}$ m $\frac{1}{2}$

Also $\dfrac{AB}{BD} = \tan 45° = 1 \Rightarrow AB = BD = 150$ m $\frac{1}{2}$

Now $CD = BD - BC = (150 - 50\sqrt{3})$ m $\frac{1}{2}$

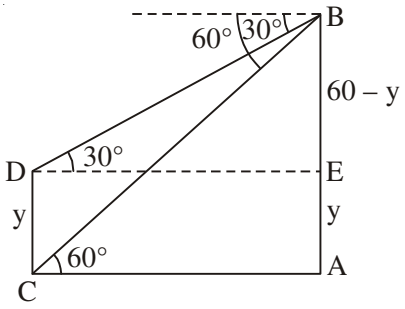
Distance travelled in 2 minutes = $(150 - 50\sqrt{3})$ m

$\therefore$ Distance travelled in 1 minute = $(75 - 25\sqrt{3})$ m 1

or $75 - 25(1.732) = 75 - 43.3 = 31.7$ m/minute

Hence speed of boat is $(75 - 25\sqrt{3})$ m/minutes or 31.7 m/minutes $\frac{1}{2}$

OR



Correct Figure 1

In ΔABC, $\frac{AB}{AC} = \tan 60°$

$\frac{60}{AC} = \sqrt{3}$

$AC = 20\sqrt{3}$ m 1

In ΔBED, $\frac{60 - y}{DE} = \tan 30° = \frac{1}{\sqrt{3}}$ 1

i.e., $\frac{60 - y}{20\sqrt{3}} = \frac{1}{\sqrt{3}} \Rightarrow 60 - y = 20$ i.e., $y = 40$ m $\frac{1}{2}$

Hence width of river $= 20\sqrt{3}$ m and height of other pole $= 40$ m $\frac{1}{2}$

28. Correct Construction of triangle 1

Correct Construction of similar triangle 3

29.

Classes	**Class mark (X)**	**Frequency (f_i)**	$f_i\ x_i$	
10-30	20	5	100	
30-50	40	8	320	
50-70	60	12	720	
70-90	80	20	1600	Correct Table 2
90-110	100	3	300	
110-130	120	2	240	

$\text{Mean} = \frac{\Sigma f_i x_i}{\Sigma f_i}$

$= \frac{3280}{50}$

$= 65.6$ 2

Alternate methods by assuming mean are acceptable.

OR

	cf	
More than or equal to 65	24	
More than or equal to 60	54	
More than or equal to 55	74	Table $1\frac{1}{2}$
More than or equal to 50	90	
More than or equal to 45	96	
More than or equal to 40	100	

Plotting graph of (40, 100), (45, 96), (50, 90), (55, 74), (60, 54)

and (65, 24) and joining the points $1\frac{1}{2}+1$

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

$= \frac{3.14}{3} \times 16\,(20^2 + 8^2 + 20 \times 8)$ $\frac{1}{2}$

$= 3.14 \times 16 \times 208 = 10450 \text{ cm}^3$ 1

$= 10.45$ litres

Cost of milk $= 10.45 \times 50 = ₹\ 522.50$ $\frac{1}{2}$

Slant height of frustum $= \sqrt{16^2 + 12^2} = 20\,\text{cm}$ $\frac{1}{2}$

Surface area $= \pi[(r_1 + r_2)l + r_2^2]$

$= 3.14[(8 + 20)\ 20 + 8^2]$

$= 3.14 \times 624 = 1959.36 \text{ cm}^2$ 1

$\therefore$ Cost of metal used $= \frac{10}{100} \times 1959.36 = ₹195.93$ $\frac{1}{2}$