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Secondary School Certificate Examination

March 2017

Marking Scheme — Mathematics 30/B

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/B

EXPECTED ANSWER/VALUE POINTS

SECTION A

1. $7 \times \left(\frac{1}{7}\right)^2 + k\left(\frac{1}{7}\right) + 7 = 0 \Rightarrow k = -50$ $\frac{1}{2}+\frac{1}{2}$

2. Length of Tangent $= \sqrt{29^2 - 20^2}$ cm $= 21$ cm $\frac{1}{2}+\frac{1}{2}$

3. $\tan\theta = \frac{\sqrt{3}}{1} \Rightarrow \theta = 60°$ $\frac{1}{2}+\frac{1}{2}$

4. Favourable outcomes: $2 \Rightarrow$ Required probability $= \frac{2}{36}$ or $\frac{1}{18}$ $\frac{1}{2}+\frac{1}{2}$

SECTION B

5. Let the coordinates of required point be (x, 0) $\frac{1}{2}$

$AP^2 = BP^2$ $\frac{1}{2}$

$\Rightarrow$ $(x+2)^2 + 25 = (x-2)^2 + 9 \Rightarrow x = -2$ 1

$\therefore$ The required point is (–2, 0)

6. P(x, y) divides A(7, –2) and B(1, –5) in 1 : 2, Q

Let P and Q be the points of trisection $\Rightarrow \frac{AP}{PB} = \frac{1}{2}$ $\frac{1}{2}$

$\therefore$ $x = \frac{1+14}{3} = 5,\ y = \frac{-5-4}{3} = -3$ $\frac{1}{2}+\frac{1}{2}$

$\therefore$ P is (5, –3)

Q is the mid-point of PB $\Rightarrow$ Q is (3, –4) $\frac{1}{2}$

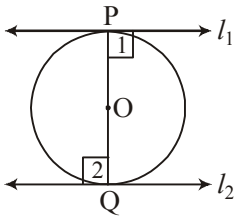
7. $kx^2 - 2kx + 6 = 0$ $\frac{1}{2}$

$b^2 - 4ac = 0 \Rightarrow 4k^2 - 24k = 0 \Rightarrow k = 6$ (k = 0 rejected) $\frac{1}{2}+1$

8. $2(3p + 1) = (2p - 1) + 11$ or $6p + 2 = 2p + 10$ 1

$\Rightarrow \quad p = 2$ 1

9.



l_1 and l_2 are tangents at the end points of a diameter

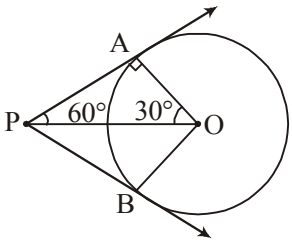
$\therefore \quad \angle 1 = \angle 2$ 1

$\Rightarrow \quad l_1 \parallel l_2$ 1

10.

$$\frac{PA}{OP} = \cos 60° = \frac{1}{2}$$ 1

$\Rightarrow \quad OP = 2PA$ 1



SECTION C

11. Putting $x = \frac{-bc}{ad}$ in the given equation, we get

$$ad^2\left(\frac{a}{b}\left(-\frac{bc}{ad}\right) + \frac{2c}{d}\right)\left(-\frac{bc}{ad}\right) + bc^2$$ **1**

$\Rightarrow \quad ad^2\left(\frac{c}{d}\right)\left(-\frac{bc}{ad}\right) + bc^2 = -bc^2 + bc^2 = 0$ 1+1

12. $a + 5d = 0 \Rightarrow a = -5d$ 1

$a_{33} = a + 32d = -5d + 32d = 27d$ 1

$a_{15} = a + 14d = 9d$ $\frac{1}{2}$

$\Rightarrow \quad a_{33} = 3.a_{15}$ $\frac{1}{2}$

13. $r = 21$ cm, $\theta = 120°$

$\therefore$ Area of sector $= \frac{22}{7} \times 21 \times 21 \times \frac{\cancel{120}^{1}}{\cancel{360}^{3}}$ 2

$= 462 \text{ cm}^2$ 1

14. 66 km/hour $= \frac{66 \times 1000 \times 100}{60} = 110000$ cm/min 1

$\therefore$ $2\pi r = 2 \times \frac{22}{7} \times 35 = 220$ cm 1

$\therefore$ Number of revolutions $= \frac{11000\cancel{0}}{22\cancel{0}} = 500$ 1

15. Volume of sphere $= \frac{4}{3}\pi r^3 = \frac{4}{3}\pi\left(\frac{21}{2}\right)^3 \text{ cm}^3$ 1

Volume of one cone $= \frac{1}{3}\pi\left(\frac{7}{2}\right)^2 \times 3 \text{ cm}^3$ 1

$\therefore$ Number of cones formed by melting the sphere

$= \frac{\left\{\frac{4}{3}\pi\left(\frac{21}{2}\right)^3\right\}}{\frac{1}{3}\pi\left(\frac{7}{2}\right)^2 \times 3}$

$= 21 \times 6 = 126$ } 1

16. Maximum diameter of hemisphere $= 7$ cm $\Rightarrow r = \frac{7}{2}$ cm $\frac{1}{2}$

Surface area of the solid formed

$= 6(7)^2 + \frac{22}{7} \times \frac{7}{2} \times \frac{7}{2} \text{ cm}^2$ $1+\frac{1}{2}$

$= (294 + 38.5) \text{ cm}^2 = 332.5 \text{ cm}^2$ 1

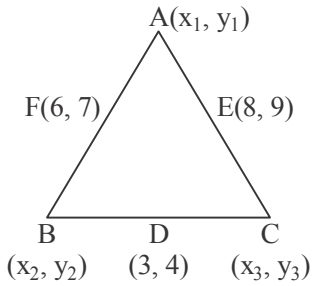
17. Water flowing in 30 min. in canal $= \frac{6 \times 1.5 \times 10 \times 1000}{2} m^3$

$= 45000\ m^3$ $\quad 1\frac{1}{2}$

$\therefore$ Area irrigated in the given time $= \frac{45000 \times 100}{8}$ $\quad 1$

$= 562500\ m^2$ $\quad \frac{1}{2}$

18.



$x_1 + x_2 = 12,\ x_1 + x_3 = 16,\ x_2 + x_3 = 6$

$y_1 + y_2 = 14,\ y_1 + y_3 = 18,\ y_2 + y_3 = 8$ $\quad 1$

$\Rightarrow \quad x_1 + x_2 + x_3 = 17$

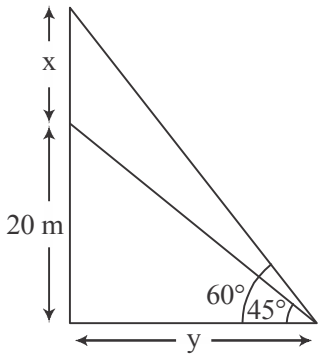
Similarly, $y_1 + y_2 + y_3 = 20$ $\quad 1$

$\therefore \quad x_1 = 17 - 6 = 11,\ x_2 = 17 - 16 = 1,\ x_3 = 17 - 12 = 5$ $\quad \frac{1}{2} + \frac{1}{2}$

Similarly, $y_1 = 12,\ y_2 = 2,\ y_3 = 6$

$\therefore \quad A(11, 12), B(1, 2), C(5, 6)$

19.



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

(i) $\quad \frac{20}{y} = \tan 45° = 1$

$\Rightarrow \quad y = 20$ $\quad \frac{1}{2}$

(ii) $\quad \frac{20 + x}{20} = \tan 60° = \sqrt{3}$ $\quad 1$

$\Rightarrow \quad x = 20(\sqrt{3} - 1)$

$= 20 \times .732 = 14.64$ m $\quad 1$

20. P(getting at least 2 Heads) $= \frac{4}{8} = \frac{1}{2}$ 2

(HHH, HHT, THH, HTH)

$\therefore$ P(losing) $= 1 - \frac{1}{2} = \frac{1}{2}$ 1

SECTION D

21. Cross multiplying after simplification, we get

$3[(x-1)(x-4) + (x-2)(x-3)] = 10(x-2)(x-4)$ 2

$4x^2 - 30x + 50 = 0$ or $2x^2 - 15x + 25 = 0$ 1

$(2x-5)(x-5) = 0$

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

22. Let son's age be x years $\Rightarrow$ Father age $= \frac{7}{2}x$ years $\frac{1}{2}$

$\therefore$ $x^2 + \left(\frac{7}{2}x\right)^2 = 1325$ 1

or $x^2 + \frac{49}{4}x^2 = 1325$ or $53x^2 = 5300$ $1+\frac{1}{2}$

or $x^2 = 100$ or $x = 10$ $\frac{1}{2}$

$\therefore$ Son's age = 10 years; Father's age = 35 years $\frac{1}{2}$

23. Here, a = 200, d = 50 1

$\therefore$ $S_{10} = \frac{10}{2}[400 + 9 \times 50] = 5 \times 850 = 4250$ 1

or total penalty = ₹ 4250 1

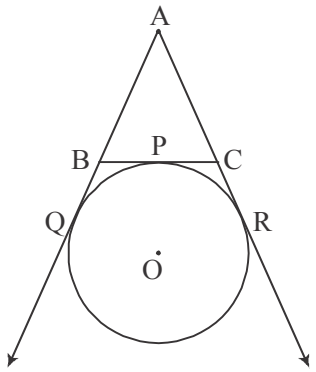
Value: Do your work in time to avoid penalty 1

or any other relevant value

24. Correctly stating Given, To Prove, Construction and Correct figure — 2

Correct Proof — 2

25.



Corect Figure — $\frac{1}{2}$

$AQ = AR$ ...(i) — $\frac{1}{2}$

$\left.\begin{aligned} AQ &= AB + BQ = AB + BP \\ AR &= AC + CR = AC + CP \end{aligned}\right\}$ ...(ii) — $1+\frac{1}{2}$

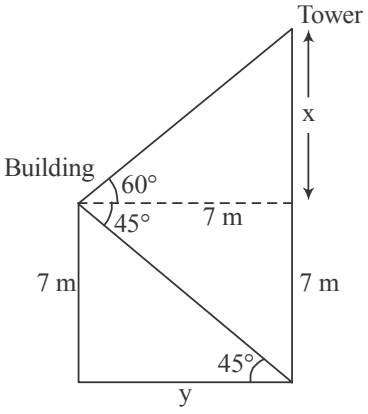
From (i) and (ii) we get

$2AQ = AB + AC + BP + PC = AB + BC + AC$ — 1

$\Rightarrow \quad AQ = \frac{1}{2}(\text{perimeter of } \Delta ABC)$ — $\frac{1}{2}$

26. Correct steps of construction — 4

27.



Correct Figure — $\frac{1}{2}$

(i) $\frac{7}{y} = \tan 45° = 1$

$\Rightarrow \quad y = 7$ — 1

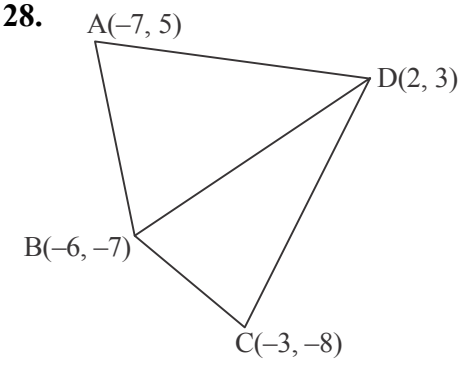
(ii) $\frac{x}{7} = \tan 60° = \sqrt{3}$

$\Rightarrow \quad x = 7\sqrt{3}$ — $1+\frac{1}{2}$

$\therefore$ Total Height of Tower $= 7(\sqrt{3}+1)$

or $7 \times 2.732 = 19.124$ m — 1

28.



$\text{ar(ADB)} = \frac{1}{2}[-7(-10) - 6(-2) + 2(5+7)] = \frac{1}{2} \times 106$

$= 53$ sq.u $\quad 1+\frac{1}{2}$

$\text{ar}[\Delta BCD] = \frac{1}{2}[-6(-11) - 3(10) + 2(1)] \quad 1+\frac{1}{2}$

$= 19$ sq.u.

$\therefore$ Ar(ABCD) = 72 sq. units $\quad 1$

29. $h = 16$ cm, $r_1 = 20$, $r_2 = 8$

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

$= \frac{1}{3} \times \frac{22}{7} \times 16[400 + 64 + 160]\,\text{cm}^3$ $\quad 1$

$= \frac{1}{3} \times \frac{22}{7} \times \frac{16 \times 624}{1000}$ litres $\quad 1$

$\therefore$ cost $= \frac{1}{3} \times \frac{\cancel{22}^{11}}{\cancel{7}} \times \frac{16 \times 624}{\cancel{1000}_{100}} \times \cancel{35}^{5} = ₹\,366.08$ $\quad 1$

30. Cards left = 49 $\quad \frac{1}{2}$

(i) $\text{P(red card)} = \frac{26}{49}$ $\quad 1$

(ii) $\text{P(Black Jack)} = \frac{1}{49}$

(iii) $\text{P(Red King)} = \frac{2}{49}$

(iv) $\text{P(10 of Heat)} = \frac{1}{49}$ $\quad \frac{1}{2}$

31. $r = 12$ cm, $\theta = 60°$

$\therefore$ Reqd. Area $= \pi r^2 \frac{\theta}{360} - \frac{1}{2} r^2 \sin 60°$ $1\frac{1}{2}$

$= \frac{22}{7} \times 144 \times \frac{1}{6} - \frac{1}{2} \times \frac{144 \times \sqrt{3}}{2}$ 1

$= \frac{528}{7} - 36\sqrt{3} = 75.43 - 36 \times 1.73$ 1

$= 75.43 - 62.28 = 13.15 \text{ cm}^2$ $\frac{1}{2}$