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Secondary School Certificate Examination

July 2017

Marking Scheme — Mathematics 30 (B) [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/B

EXPECTED ANSWER/VALUE POINTS

SECTION A

1. $\frac{4}{6}$ or $\frac{2}{3}$ 1

2. $x^2 + 5^2 = 13^2 \Rightarrow x = 12$ cm $\frac{1}{2}+\frac{1}{2}$

3. $\frac{1}{4}+\frac{k}{2}-\frac{5}{4} = 0 \Rightarrow k = 2$ $\frac{1}{2}+\frac{1}{2}$

4. $\frac{h}{120} = \frac{\sqrt{3}}{2} \Rightarrow h = 60\sqrt{3}$ m $\frac{1}{2}+\frac{1}{2}$

SECTION B

5. $4\sqrt{3}x^2 + 8x - 3x - 2\sqrt{3} = 0$ $\frac{1}{2}$

$4x(\sqrt{3}x + 2) - \sqrt{3}(\sqrt{3}x + 2) = 0$ $\frac{1}{2}$

$(4x - \sqrt{3})(\sqrt{3}x + 2) = 0 \Rightarrow x = \frac{\sqrt{3}}{4}, -\frac{2}{\sqrt{3}}$ or $\frac{-2\sqrt{3}}{3}$ 1

6. $t_1 = 7, t_2 = 10 \Rightarrow d = 3$ 1

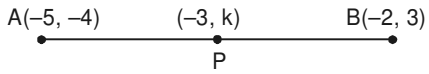
$S_5 = \frac{5}{2}[14 + 12] = 65$ 1

7. Let A(3, –2), B(4, 2), C(1, 4) and D(0, 0) be the vertices.

Mid-point of AC = (2, 1) 1

Mid-point of BD = (2, 1) $\frac{1}{2}$

$\Rightarrow$ ABCD is a parallelogram $\frac{1}{2}$

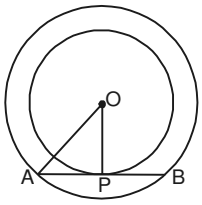
8. 

Let P divide AB in the ratio p : 1

$\therefore \quad \dfrac{-2p-5}{p+1} = -3 \Rightarrow p = 2$ 1

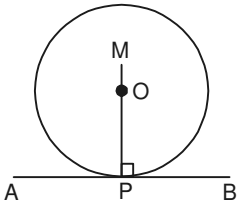
$\therefore$ The ratio is 2 : 1 $\frac{1}{2}$

$k = \dfrac{6-4}{3} = \dfrac{2}{3}$ $\frac{1}{2}$

9. 

OP $\perp$ AB 1

$\Rightarrow$ OP bisects AB 1

10. 

PM $\perp$ AB $\frac{1}{2}$

and OP $\perp$ AB $\frac{1}{2}$

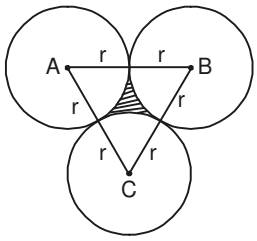
$\Rightarrow$ OP and OM must coincide 1

SECTION C

11. $\pi(36)^2 \times \dfrac{\theta}{360°} = 54\pi$ 1

$\Rightarrow \quad \theta = \dfrac{54 \times 360}{36 \times 36} = 15°$ 1

$l = 2\pi(36) \cdot \dfrac{15}{360} = 3\pi \text{ cm}$ 1

12. 

Area $\Delta ABC = \dfrac{\sqrt{3}}{4}(7)^2 = 21.22 \text{ cm}^2$ 1

Area of sectors $= 3 \times \dfrac{22}{7} \times \dfrac{7}{2} \times \dfrac{7}{2} \times \dfrac{1}{6}$

$= 19.25 \text{ cm}^2$ 1

$\therefore$ Shaded area = $(21.22 - 19.25)\ cm^2$

$= 1.97\ cm^2$ 1

13. For equal roots $\not{4}(k-1)^2 = \not{4}(k+1)^2$ $1\frac{1}{2}$

$\Rightarrow$ $k - 1 = \pm k + 1$ 1

$\Rightarrow$ $k = 0$ $\frac{1}{2}$

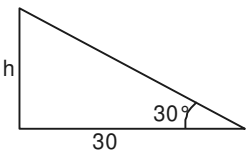
14. $a = 1,\ S_4 = \frac{1}{3}(S_8 - S_4)$ 1

$\Rightarrow$ $4S_4 = S_8$ $\frac{1}{2}$

$\therefore$ $\not{4}\left[\frac{4}{2}(2+3d)\right] = \frac{\not{8}}{\not{2}}[2+7d]$ 1

$\Rightarrow$ $4 + 6d = 2 + 7d$ or $d = 2$ $\frac{1}{2}$

15.



$\frac{h}{30} = \tan 30° = \frac{1}{\sqrt{3}}$ $1\frac{1}{2}$

$\Rightarrow$ $h = \frac{30}{\sqrt{3}} = 10\sqrt{3}\ m$ $1\frac{1}{2}$

16. Volume of hemi spherical tank = $\frac{2}{3} \times \frac{22}{7} \times 210 \times 210 \times 210\ cm^3$ $1\frac{1}{2}$

$\therefore$ Time taken by pipe to fill half the tank

$= \frac{1}{2} \cdot \frac{2}{3} \times \frac{22}{7} \times 210 \times 210 \times 210 \times \frac{1}{7000}\ sec$ 1

$= 1386$ sec or 23.1 min $\frac{1}{2}$

17. Let the point be (0, y) $\frac{1}{2}$

$\therefore$ $(-5)^2 + (-2 - y)^2 = (3)^2 + (2 - y)^2$ 1

or $25 + 4y = 9 - 4y$ or $8y = -16$

or $y = -2$ 1

$\therefore$ The point is $(0, -2)$ $\frac{1}{2}$

18. Multiplication to be perfect square-pairs of number are

(1, 1), (1, 4), (4, 1), (2, 2), (3, 3), (4, 4,), (5, 5), (6, 6): Their number is 8 2

$\therefore$ Probability $= \frac{8}{36}$ or $\frac{2}{9}$ 1

19. Volume of cylinder $= \left(\frac{\cancel{22}^{11}}{\cancel{7}} \times \frac{7}{\cancel{2}} \times \frac{7}{\cancel{2}} \times 44\right) \text{cm}^3 = 539 \text{ cm}^3$ 1

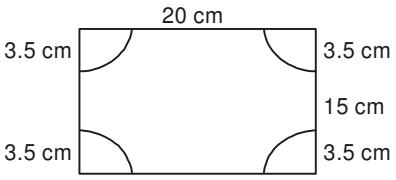
Volume of conical holes $= 2\left(\frac{1}{\cancel{3}} \times \frac{22}{\cancel{7}} \times \frac{21}{10} \times \frac{21}{10} \times 3\right) \text{cm}^3$ 1

$= 27.72 \text{ cm}^3$

$\therefore$ Volume of remaining solid $= (539 - 27.72) \text{ cm}^3$

$= 511.28 \text{ cm}^3$ 1

20.



Area of rectangle $= 20 \times 15 = 300 \text{ m}^2$ 1

Area cut off $= \frac{\cancel{22}^{11}}{\cancel{7}} \times \frac{7}{\cancel{2}} \times \frac{7}{2} = 38.5 \text{ m}^2$ 1

$\therefore$ Remaining area $= (300 - 38.5)$

$= 261.5 \text{ m}^2$ 1

SECTION D

21. The given equation can be simplified as

$(4 - 3x)(2x + 3) = 5x$ 1

or $8x + 12 - 6x^2 - 9x = 5x$ or $6x^2 + 6x - 12 = 0$ 2

$\Rightarrow$ $x^2 + x - 2 = 0, \Rightarrow x = 1, -2$ 1

22. The multiples of 7 which are less than 500 are

7, 14, 21, ..., 497 1

$\Rightarrow$ $497 = 7 + (n - 1)7 \Rightarrow n = 71$ $1\frac{1}{2}$

$S_{71} = \frac{71}{2}(7 + 497) = 71 \times 252 = 17892$ $1\frac{1}{2}$

23. Let the first prize be a

The A.P. is a, a – 50, a – 100, ... 1

$4000 = \frac{10}{2}[2a - 9 \times 50]$ 1

$\Rightarrow$ $800 = 2a - 450 \Rightarrow a = 625$ 1

$\therefore$ Prizes are 625, 575, 525, 475, 425, 375, 325, 275, 225, 175 1

Any relevant value

24. Correctly stated given, To prove, Const., and Correct figure 2

Correct Proof 2

25.

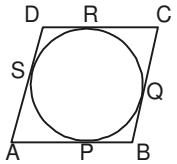


Fig. $\frac{1}{2}$

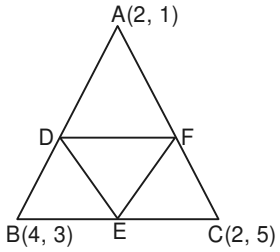
To prove AB + CD = AD + BC $1\frac{1}{2}$

Also AB = CD and AD = BC 1

$\Rightarrow$ AB = BC $\Rightarrow$ ABCD is a rhombus 1

26. Correct steps of construction 4

27.



Mid-points are

D(3, 2), E(3, 4), F(2, 3) 2

Ar(DEF)

$= \frac{1}{2}[3(1) + 3(1) + 2(-2)]$

2

$= \frac{1}{2}[6 - 4] = 1$ sq.unit

28. 1, 3, 5, ..., 35; Their number is 18 1

(i) Prime number less than 15 are 3, 5, 7, 11, 13 (5 in numbers)

$\therefore \quad P(\text{Prime} < 15) = \frac{5}{18}$ 1+1

(ii) $P(\text{divisible by 3 and 5}) = \underset{(15,\ 30)}{\frac{2}{18}} = \frac{1}{9}$ 1

29.

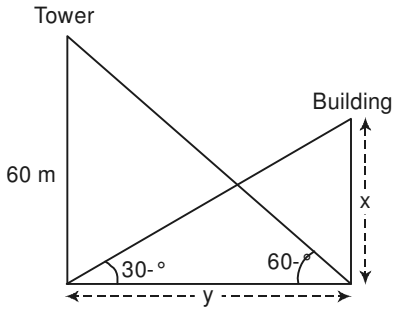


Fig. 1

(i) $\frac{x}{y} = \tan 30° = \frac{1}{\sqrt{3}} \Rightarrow y = \sqrt{3}x$ $1\frac{1}{2}$

(ii) $\frac{60}{\sqrt{3}x} = \tan 60° = \sqrt{3} \Rightarrow x = 20$ m $1\frac{1}{2}$

30. Sphere: Ext radius = 4 cm int. radius = 2 cm

Vol. of sphere $= \frac{4}{3}(4^3 - 2^3)\pi = \frac{4}{3}\pi \times 56$ cm^3 1+1

Let the height of cone be h

$\therefore \quad \frac{\cancel{4}}{\cancel{3}}(56\pi) = \frac{1}{\cancel{3}}\cancel{\pi}\ \cancel{4} \times 4 \times h$ 1

h = 14 cm 1

31. $V = 28.49 \text{ litres} = 28490 \text{ cm}^3$ $\frac{1}{2}$

$\therefore \quad 28490 = \frac{1}{3} \times \frac{22}{7} \times h = [28^2 + 21^2 + 28 \times 21]$ 2

$= \frac{22}{21} \times 1813\, h$

$\Rightarrow \quad h = \frac{\cancel{28490}^{\cancel{259010}\,5} \times \cancel{21}^{3}}{\cancel{22}^{\cancel{2}} \times \cancel{1813}^{\cancel{259}}} = 15 \text{ cm}$ $1\frac{1}{2}$