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Secondary School Certificate Examination

July 2017

Marking Scheme — Mathematics 530 [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.

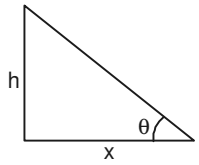
6. Separate Marking Scheme for all the three sets has been given.

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 530

EXPECTED ANSWER/VALUE POINTS

SECTION A

1. 

Here $x = h\sqrt{3}$

$\therefore \quad \tan\theta = \frac{h}{h\sqrt{3}} = \frac{1}{\sqrt{3}}$ $\frac{1}{2}$

Hence $\theta = 30°$ $\frac{1}{2}$

2. Total number of possible outcomes = 36

Number of favourable outcomes = 3 $\frac{1}{2}$

$\therefore \quad$ P(Sum is 10) $= \frac{3}{36}$ or $\frac{1}{12}$ $\frac{1}{2}$

3. Diameter of circle = 6 cm

$\therefore \quad$ radius of circle = 3 cm $\frac{1}{2}$

Area of circle $= \pi \times 3^2 = 9\pi$ cm^2 $\frac{1}{2}$

4. Perimeter of profactor $= 2r + \frac{22}{7}r = 36$ or $r\left(\frac{36}{7}\right) = 36$ $\frac{1}{2}$

$\Rightarrow \quad r = 7$ cm $\Rightarrow d = 14$ cm $\frac{1}{2}$

SECTION B

5. For roots to be equal

$D = 1 - 4ab = 0$ 1

$\Rightarrow \quad ab = \frac{1}{4}$ 1

6. Total number of cards = 52

(i) P(a king of red colour) = $\frac{2}{52}$ or $\frac{1}{26}$ 1

(ii) P(a face card) = $\frac{12}{52}$ or $\frac{3}{13}$ 1

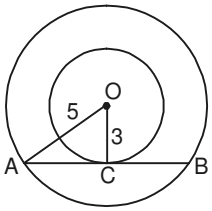
7. $\angle ABP = 90° - 10° = 80°$ $\frac{1}{2}$

$\therefore \quad \angle BAP = \angle ABP = 80°$ $\frac{1}{2}$

Using angle sum property

$\angle BPA = 180° - 160° = 20°$ 1

8.

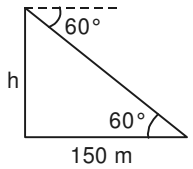


Correct Fig. $\frac{1}{2}$

$AC = \sqrt{25-9} = \sqrt{16} = 4$ cm 1

$\therefore \quad AB = 2 \times 4 = 8$ cm $\frac{1}{2}$

9.



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

$\tan 60° = \sqrt{3} = \frac{h}{150}$ 1

$\Rightarrow \quad h = 150\sqrt{3}$m $\frac{1}{2}$

10. Let the side of a cube be x units

Thus diameter of sphere = x

$\Rightarrow$ radius of sphere = $\frac{x}{2}$ units $\frac{1}{2}$

$\therefore \quad \frac{V_{cube}}{V_{sphere}} = \frac{x^3}{\frac{4}{3}\pi \times \frac{x^3}{8}} = \frac{8 \times 3 \times 7}{4 \times 22} = \frac{21}{11}$ $1\frac{1}{2}$

SECTION C

11. $2x^2 - 5x + 3 = 0$

or $x^2 - \frac{5}{2}x + \frac{3}{2} = 0$ $\frac{1}{2}$

$\Rightarrow \left(x - \frac{5}{4}\right)^2 - \frac{25}{16} + \frac{3}{2} = 0$ 1

$\Rightarrow \left(x - \frac{5}{4}\right)^2 = \frac{1}{16} = \left(\frac{1}{4}\right)^2$ $\frac{1}{2}$

$\Rightarrow x - \frac{5}{4} = \frac{1}{4} \Rightarrow x = \frac{3}{2}$ $\frac{1}{2}$

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

12. $\sqrt{3}x^2 - 2\sqrt{2}x - 2\sqrt{3} = 0$

$\Rightarrow \sqrt{3}x^2 - 3\sqrt{2}x + \sqrt{2}x - 2\sqrt{3} = 0$ 1

$\Rightarrow (\sqrt{3}x + \sqrt{2})(x - \sqrt{6}) = 0$ 1

$\Rightarrow x = \sqrt{6}, \frac{-\sqrt{2}}{\sqrt{3}}$ or $\frac{-\sqrt{6}}{3}$ $\frac{1}{2} + \frac{1}{2}$

13. $a + 7d = 37$ ...(i)

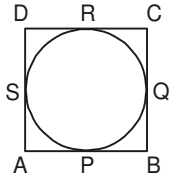
$a + 11d = 57$ ...(ii) 1

Solving (i) and (ii) to get

$d = 5$ and $a = 2$ $\frac{1}{2} + \frac{1}{2}$

$\therefore$ A.P. is 2, 7, 12, 17, ... 1

14.



$AP = AS$, $BP = BQ$, $CQ = CR$ and $DR = DS$ $\frac{1}{2}$

Therefore $AB + CD = (AP + PB) + (CR + DR)$

= (AS + BQ) + (CQ + DS)

= (AS + DS) + (BQ + CQ) $1\frac{1}{2}$

= (AD + BC)

or AB + CD = AD + BC

Here AB = CD and BC = AD

Hence 2AB = 2BC

$\Rightarrow$ AB = BC

or ABCD is a rhombus. 1

15. AS = $\sqrt{169-144} = \sqrt{25} = 5$ cm

1

$\Rightarrow$ AK = 5 cm

Now BT = $\sqrt{25-9} = \sqrt{16} = 4$ cm

1

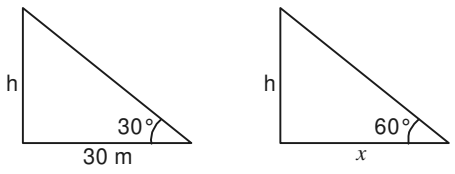
$\Rightarrow$ BK = 4 cm

Therefore PQ = PA + AK + KB + BQ

= 13 + 5 + 4 + 5

= 27 cm 1

16.



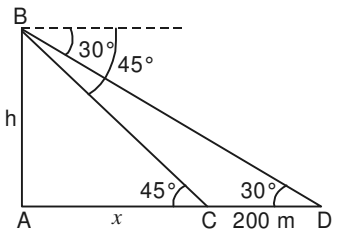
Correct Figure $\frac{1}{2}+\frac{1}{2}$

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

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

$\tan 60° = \sqrt{3} = \frac{h}{x}$

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

17. 

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

$\tan 45° = 1 = \frac{h}{x}$

$\Rightarrow \quad h = x \qquad ...(i)$ $\frac{1}{2}$

$\tan 30° = \frac{1}{\sqrt{3}} = \frac{h}{x+200}$

$\Rightarrow \quad \sqrt{3}h = x + 200 \qquad ...(ii)$ 1

Solving (i) and (ii) to get

$h = \frac{200}{\sqrt{3}-1} = 100(\sqrt{3}+1)$ $\frac{1}{2}$

$= 273$ cm $\frac{1}{2}$

18. Number of remaining cards = 40 $\frac{1}{2}$

(i) P(a black face card) $= \frac{0}{40} = 0$ $\frac{1}{2}$

(ii) P(a red card) $= \frac{20}{40}$ or $\frac{1}{2}$ 1

(iii) P(an ace) $= \frac{4}{40}$ or $\frac{1}{10}$ 1

19. Total number of white balls = x + 6 $\frac{1}{2}$

Total number of balls = 20 $\frac{1}{2}$

Prob (drawing a while ball) $= \frac{x+6}{20}$ 1

Therefore $\frac{x+6}{20} = \frac{1}{2}$ $\frac{1}{2}$

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

20. Radius OB = $\sqrt{400+400} = 20\sqrt{2}$ cm 1

Area of quadraut = $\frac{1}{4} \times 3.14 \times 800 = 628\ cm^2$ 1

Area of square = $400\ cm^2$ $\frac{1}{2}$

Hence area of shaded region = $(628 - 400)\ cm^2$

$= 228\ cm^2$ $\frac{1}{2}$

SECTION D

21. Volume of cuboid $66 \times 20 \times 27\ cm^3$.

Outer and inner radii = 5 cm and 4 cm respectively. 1

Volume of iron used in pipe = $\pi(25 - 16)h\ cm^3$. 2

Therefore $66 \times 20 \times 24 = \frac{22}{7} \times 9 \times h$

$\Rightarrow \quad h = 1260$ cm 1

22. Area of square = $16\ cm^2$ 1

Area of unshaded part = $\pi(1)^2 + \pi(1)^2 = 6.28\ cm^2$ 2

$\therefore$ Area of shaded part = $(16 - 6.28)\ cm^2$

$= 9.72\ cm^2$ 1

23. Area of $\Delta ABC = \frac{1}{2} \times 14 \times 7 = 49\ cm^2$ 1

Area of circle = $3.14 \times 49 = 153.86\ cm^2$ 1

Area of square = $14 \times 14 = 196 \text{ cm}^2$ $\frac{1}{2}$

$\therefore$ Area of shaded part = $(196 - 153.86 + 49) \text{ cm}^2$

$= 91.14 \text{ cm}^2$ $1\frac{1}{2}$

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

For correct proof 2

25. Here $r_1 = 33$ cm, $r_2 = 27$ cm and $l = 10$ cm

Total surface area = $\pi l(r_1 + r_2) + \pi r_1^2 + \pi r_2^2$ 1

$= \frac{22}{7} \times 10(33 + 27) + \frac{22}{7} \times (33)^2 + \frac{22}{7} \times (27)^2$ 1

$= \frac{22}{7}(600 + 1089 + 729)$ 1

$= 7599.42 \text{ cm}^2$ 1

26. Total number of cards = 100

(i) 2-digit prime number >79 are 83, 89, 97,

$\therefore$ P(2-digit prime number > 79) = $\frac{3}{100}$ 1

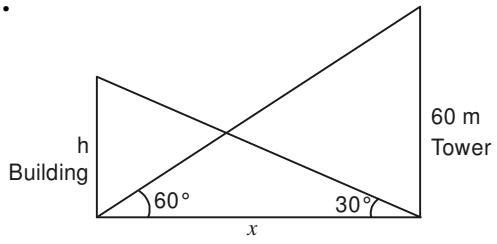
(ii) Required numbers are 7, 13, 19, 25, ..., 103.

P(a number which leaves remainder 1 when divided by 6) = $\frac{17}{100}$ $1\frac{1}{2}$

(iii) Number of composite numbers < 43 = 27

P(a composite number < 43) = $\frac{27}{100}$ $1\frac{1}{2}$

27. Correct Figure 1



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

$\Rightarrow \quad x = h\sqrt{3}$ ...(i) 1

$\tan 60° = \sqrt{3} = \frac{60}{x}$

$\Rightarrow \quad x = \frac{60}{\sqrt{3}}$ ...(ii) 1

Solving (i) and (ii) to get h = 20 m 1

28. Let the present age of son be x years

$\therefore$ The present age of father is x^2 years $\frac{1}{2}$

According to the equation

$8(x - 1) = x^2 - 1$ 1

$\Rightarrow \quad x^2 - 8x + 7 = 0$ $\frac{1}{2}$

$\Rightarrow \quad (x - 7)\,(x - 1) = 0$ $\frac{1}{2} + \frac{1}{2}$

$\Rightarrow \quad x = 8,\ x \neq 1$

Present age of son is 7 yrs. $\frac{1}{2}$

Present age of father is 49 yrs. $\frac{1}{2}$

29. Here a = 15, $S_{15} = 750$

$\Rightarrow \quad 750 = \frac{15}{2}[2\times 15 + 14d]$ $1\frac{1}{2}$

$\Rightarrow \quad 14d = 70$

$\Rightarrow$ $d = 5$ $1\frac{1}{2}$

$\therefore$ $a_{20} = a + 19d = 15 + 19 \times 5 = 110$ 1

30. $\angle PAB = 90° - \angle OAB$ 1

and $\angle PBA = \angle PAB$ 1

Using angle sum property

$\angle APB = 180° - 2(90° - \angle OAB)$ $1\frac{1}{2}$

$= 2\angle OAB$ $\frac{1}{2}$

31. Required two digit numbers are 10, 13, 16, ..., 97 1

Therefore $97 = 10 + (n - 1) \times 3$

$\Rightarrow$ $n = 30$ 1

Hence $S_{30} = \frac{30}{2}[2\times10 + 29\times3]$

$= 15 \times 107$

$= 1605$ 2