CBSE Class 10 Maths Solutions

QUESTION PAPER CODE 30/1/1

EXPECTED ANSWERS/VALUE POINTS

SECTION - A

Q.No. Marks

1. $\frac{-9}{4}$ 2. 1 : 3 3. $\frac{21}{26}$ 4. 25° $1\times4=4$ m

SECTION - B

5. $\angle ABQ=\frac{1}{2}\angle AOQ=29^{\circ}$ 1 m

$\angle ATQ=180^{\circ}-(\angle ABQ+\angle BAT)=180^{\circ}-119^{\circ}=61^{\circ}$ 1 m

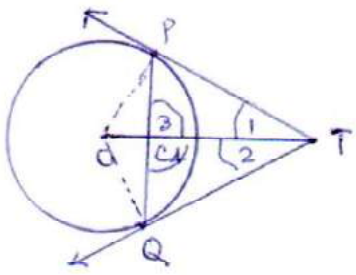
6. The given quadratic equation can be written as

$(4x^2-4a^2x+a^4)-b^4=0$ ½ m

or $(2x-a^2)^2-(b^2)^2=0$ 1 m

$\therefore\ (2x-a^2+b^2)(2x-a^2-b^2)=0$

$\Rightarrow\ x=\frac{a^2-b^2}{2},\ \frac{a^2+b^2}{2}$ ½ m

7. 

In Δs' TPC and TQC
TP = TQ
TC = TC
$\angle 1=\angle 2$ (TP and TQ are equally inclined to OT) 1 m

$\therefore\ \Delta$ TPC $\cong\Delta$ TQC

$\therefore$ PC = QC and $\angle 3=\angle 4$ ½ m

But $\angle 3 + \angle 4 = 180^\circ \Rightarrow \angle 3 = \angle 4 = 90^\circ$
$\therefore$ OT is the right bisector of PQ } ½ m

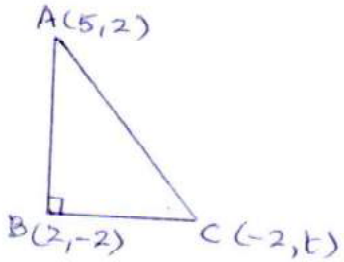
8. The given A.P. is 6, 13, 20, ---, 216

Let n be the number of terms, d = 7, a = 6 ½ m

$\therefore \quad 216 = 6 + (n-1).7 \Rightarrow n = 31$ ½ m

$\therefore$ Middle term is 16th ½ m

$\therefore \quad a_{16} = 6 + 15 \times 7 = 111$ ½ m

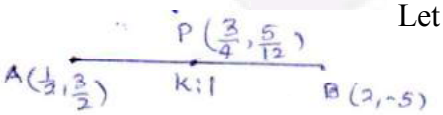
9. 

ABC is right triangle

$\therefore \quad AC^2 = BC^2 + AB^2$

$AB^2 = (5-2)^2 + (2+2)^2 = 25 \Rightarrow AB = 5$
$BC^2 = (2+2)^2 + (t+2)^2 = 16 + (t+2)^2$
$AC^2 = (5+2)^2 + (2-t)^2 = 49 + (2-t)^2$ } 1 m

$\therefore \quad 49 + (2-t)^2 = 41 + (t+2)^2$
$(t+2)^2 - (2-t)^2 = 8$
$4 \times 2t = 8 \Rightarrow t = 1$ } 1 m

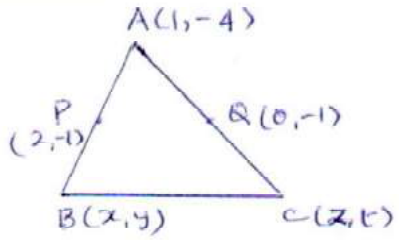
10. 

Let P divide AB in the ratio of k : 1 ½ m

$\therefore \quad \dfrac{2k + \frac{1}{2}}{k+1} = \dfrac{3}{4} \Rightarrow 8k + 2 = 3k + 3$
$\Rightarrow k = 1/5$ } 1 m

$\therefore$ Required ratio = 1 : 5 ½ m

SECTION - C

11. 

P is the mid-point of AB

$\therefore \quad x + 1 = 4 \Rightarrow x = 3$

similarly $y = 2 \Rightarrow B\ (3, 2)$ 1 m

similarly finding C (–1, 2) ½ m

$\therefore$ Area Δ ABC $= \frac{1}{2}[1(2-2)+3(2+4)-1(-4-2)] = \frac{1}{2} \times 24 = 12$ sq.u. 1½ m

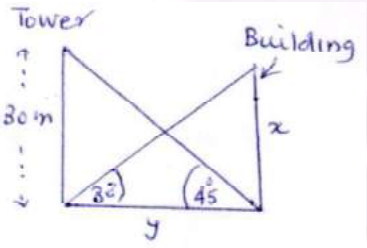
12. The given quadratic eqn. can be written as

$(k + 1)x^2 - 2(k - 1)x + 1 = 0$ 1 m

For equal roots $4(k-1)^2 - 4(k+1) = 0$ or $k^2 - 3k = 0$

$\Rightarrow k = 0, 3$ } 1 m

$\therefore$ Non-zero value of k = 3 : Roots are $\frac{1}{2}, \frac{1}{2}$ ½+½ m

13. 

Fiqure ½ m

(i) $\frac{30}{y} = \tan 45^\circ = 1 \Rightarrow y = 30$ 1 m

(ii) $\frac{x}{y} = \tan 30^\circ = \frac{1}{\sqrt{3}} \Rightarrow x = \frac{y}{\sqrt{3}} = \frac{30}{\sqrt{3}} = 10\sqrt{3}$ 1 m

$\therefore$ Height of building is $10\sqrt{3}$ m ½ m

14. Total possible out comes = 36

(i) The possible outcomes are (2, 3), (3, 2), (1, 4), (4, 1) : Number : 4 1 m

$\therefore$ Required Probability $= \frac{4}{36} = \frac{1}{9}$ ½ m

(ii) The possible outcomes are

(2, 2), (2, 4), (2, 6), (4, 2), (4, 4), (4, 6), (6, 2), (6, 4), (6, 6)

their number is 9 — 1 m

$\therefore$ Required Probability $= \frac{9}{36} = \frac{1}{4}$ — ½ m

15. Let a be the first term and d the common difference

$S_{12} = 6\,[2a + 11d] = 12a + 66d$ — 1 m

$S_8 = 4\,[2a + 7d] = 8a + 28d$ — ½ m

$S_4 = 2\,[2a + 3d] = 4a + 6d$ — ½ m

$3\,(S_8 - S_4) = 3\,(4a + 22d) = 12a + 66d = S_{12}$ — 1 m

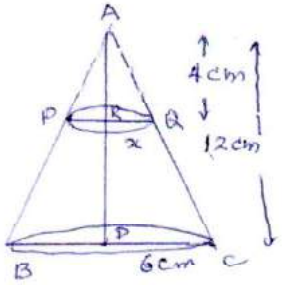
16. Let OA = OB = r

$\therefore \quad 40 = \frac{22}{7} \times \frac{r}{2} + \frac{22}{7} \times r + r \Rightarrow 280 = 40r$

$r = 7$ — 1 m

$\therefore$ shaded area $= \left(\frac{1}{2} \times \frac{22}{7} \times \frac{7}{2} \times \frac{7}{2} + \frac{1}{2} \times \frac{22}{7} \times 7 \times 7\right)\ cm^2$ — 1 m

$= \left(77 \times \frac{5}{4}\right)$ *or* $\frac{385}{4}\ cm^2 = 96\frac{1}{4}\ cm^2$ — 1 m

17. 

$\Delta ARQ \sim \Delta ADC$ — ½ m

$\therefore \quad \frac{x}{6} = \frac{4}{12} \Rightarrow x = 2$ — ½ m

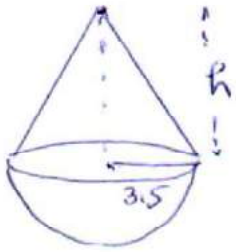
$QC = \sqrt{8^2 + 4^2} = 4\sqrt{5}$ — ½ m

Total surface area of frustum PQCB 1 m

$$= \pi \left[(6+2)\times 4\sqrt{5} + (6)^2 + (2)^2\right]$$

$$= \frac{22}{7}\left[32 \times 2.236 + 40\right] = \frac{22}{7}(111.552) = 22 \times 15.936 = 350.592$$ 1 m

18. Volume of solid wooden toy



$$166\frac{5}{6} = \frac{2}{3}\times\frac{22}{7}\times\frac{7}{2}\times\frac{7}{2}\times\frac{7}{2} + \frac{1}{3}\times\frac{22}{7}\times\frac{7}{2}\times\frac{7}{2}\times h$$

or $\frac{1001}{2} = \frac{11}{7}\times\frac{7}{2}\times\frac{7}{2}[7+h]$ 1 m

$\Rightarrow \quad 7 + h = \frac{1001\times 2}{22\times 7} = 13 \quad \Rightarrow \quad h = 6$ cm ½+½ m

Area of hemispherical part of toy $= \left(2\times\frac{22}{7}\times\frac{7}{2}\times\frac{7}{2}\right)$ cm^2

$= 77$ cm^2 ½ m

$\therefore$ Cost of Painting = Rs. (77×10) = Rs. 770 ½ m

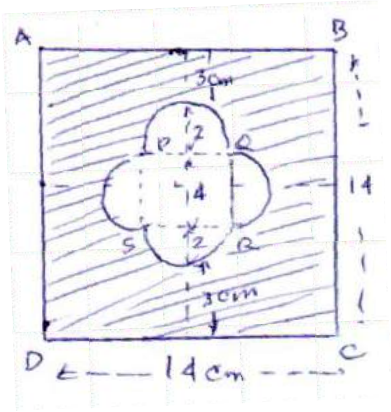
19. Total surfacearea of solid cuboidal block

$= 2\,(15 \times 10 + 10 \times 5 + 15 \times 5)$ cm^2 $= 550$ cm^2 1 m

Area of two circular bases $= 2\times\frac{22}{7}\times\frac{7}{2}\times\frac{7}{2} = 77$ cm^2 ½ m

Area of curved surface of cylinder $= 2\pi rh = 2\times\frac{22}{7}\times\frac{7}{2}\times 5 = 110$ cm^2 1 m

Reqd area = $(550 + 110 - 77)$ cm^2 $= 583$ cm^2 ½ m

20. 

Area of Sq. ABCD = 14^2 or 196 cm^2 ½ m

Area of Small Sq. = 4^2 or 16 cm^2 ½ m

Area of 4 semi circles $= \left[4.\frac{1}{2}3.14\,(2)^2\right] cm^2$
$= 25.12\ cm^2$ } 1 m

$\therefore$ Reqd. area $= (196 - 16 - 25.12)\ cm^2$
$= 154.88\ cm^2$ } 1 m

SECTION - D

21. Let the fraction be $\frac{x-3}{x}$ ½ m

By the given condition, new fraction $\frac{x-3+2}{x+2} = \frac{x-1}{x+2}$ ½ m

$\therefore \quad \frac{x-3}{x} + \frac{x-1}{x+2} = \frac{29}{20}$

$\Rightarrow \quad 20\left[(x-3)(x+2) + x(x-1)\right] = 29\left(x^2 + 2x\right)$

$= \quad 20\left(x^2 - x - 6 + x^2 - x\right) = 29x^2 + 58x$ } 1 m

or $11x^2 - 98x - 120 = 0$

or $11x^2 - 110x + 12x - 120 = 0$ 1 m

$(11x + 12)(x - 10) = 0 \quad \Rightarrow \quad x = 10$ 1 m

$\therefore$ The Fraction is $\frac{7}{10}$ 1 m

22. Money required for Ramkali for admission of daughter = Rs. 2500

A.P. formed by saving 1 m

(i) = 100, 120, 140, --- upto 12 terms

$$\text{Sum of AP (i)} = \frac{12}{2}[2\times100+11\times20] = 6[420]$$
$$= \text{Rs. } 2520$$

1½ m

$\therefore$ She can get her daughter admitted ½ m

Value : Small saving can fulfill your big desires or any else 1 m

23. $\frac{2}{x+1}+\frac{3}{2(x-2)} = \frac{23}{5x}$

or $5x[4(x-2)+3x+3] = 46(x+1)(x-2)$ 1½ m

$5x(7x-5) = 46(x^2-x-2) \Rightarrow 11x^2-21x-92=0$ 1 m

$\Rightarrow x = \frac{21\pm\sqrt{441+4048}}{22} = \frac{21\pm67}{22}$ 1 m

$= 4, \frac{-23}{11}$ ½ m

24. Correctly stated

Given, to Prove, Construction and correct figure 2 m

correct Proof 2 m

25. $PR = PQ \Rightarrow \angle PRQ = \angle PQR = \frac{(180-30)^\circ}{2} = 75^\circ$ 1 m

SR || QP and QR is a transversal $\Rightarrow \angle SRQ = 75^\circ$
$\therefore \angle ORQ = \angle RQO = 90^\circ - 75^\circ = 15^\circ$ 1 m

$\therefore \quad \angle QOR = (180 - 2\times 15)^\circ = 150^\circ \Rightarrow \quad \angle QSR = \ 75^\circ$ 1 m

$\angle RQS = 180^\circ - (\angle SRQ + \angle SQR) = 30^\circ$ 1 m

26. Correctly drawn ΔABC 1½ m

Correctly drawn a triangle similar to ΔABC of given scale factor 2½ m

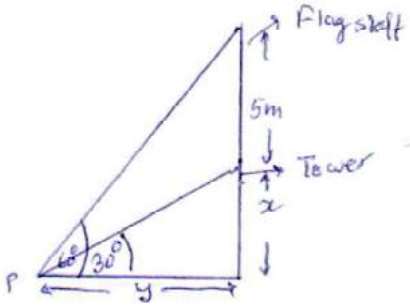
27. 

figure 1 m

Writing the trigonometric equations

(i) $\frac{x}{y} = \tan 30^\circ = \frac{1}{\sqrt{3}} \Rightarrow y = \sqrt{3}\, x$ 1 m

(ii) $\frac{x+5}{y} = \tan 60^\circ = \sqrt{3}$ *or* $\frac{x+5}{\sqrt{3}x} = \sqrt{3}$ 1½ m

$\Rightarrow \quad 3x = x + 5$

or $x = 2.5$

$\therefore$ Height of Tower = 2.5 m ½ m

28. (i) Numbers divisible by 2 or 3 from 1 to 20 are

2, 4, 6, 8, 10, 12, 14, 16, 18, 3, 9, 15, 20 Their number is 13 1 m

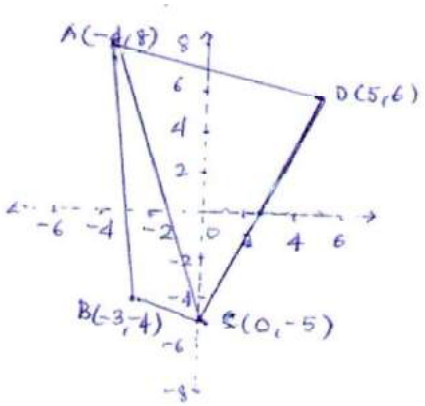
$\therefore$ Required Probability $= \frac{13}{20}$ 1 m

(ii) Prime numbers from 1 to 20 are 2, 3, 5, 7, 11, 13, 17, 19 : 8 in number 1 m

$\therefore$ Required Probability $= \frac{8}{20}$ or $\frac{2}{5}$ 1 m

29. Area ΔABC

$= \frac{1}{2}[-4(-4+5) - 3(-5-8) + 0(8+4)]$



$= \frac{1}{2}\left|-4+39\right| = \frac{35}{2}$ 1½ m

Area of Δ ACD

$= \frac{1}{2}\left[-4(-5-6)+0(6-8)+5(8+5)\right]$

$= \frac{109}{2}$ 1½ m

$\therefore$ Area of Qurd. ABCD $= \frac{35}{2}+\frac{109}{2} = 72$ sq.u. 1 m.

30. Volume of earth taken out after digging the well

$= \left(\frac{22}{7}\times 2\times 2\times 14\right)$ cu.m $= 176$ cu.m ..... (i) 1 m

Let x be the width of embankment formed by using (i)

Volume of embankment $= \frac{22}{7}\left[(2+x)^2-(2)^2\right]\times\frac{40}{100} = 176$ 1½ m

$\Rightarrow \quad x^2+4x-140=0 \quad \Rightarrow \quad (x+14)(x-10)=0$

$\Rightarrow \quad x = 10$ 1½ m

$\therefore$ Width of embankment = 10 m

31. Let x m be the internal radius of the pipe

Radius of base of tank = 40 cm = $\frac{2}{5}$ m

Level of water raised in the tank = 3.15 or $\frac{315}{100}$

2.52 km/hour $\Rightarrow$ 1.26 km in half hour = 1260 m 1 m

∴ Getting the equation

$$\pi \ x^2 . 1260 = \pi . \frac{2}{5} . \frac{2}{5} \times \frac{315}{100}$$ 1 m

$$\Rightarrow x^2 = \frac{4}{25} . \frac{315}{100} \times \frac{1}{1260} = \frac{1}{2500}$$

$$\Rightarrow x = \frac{1}{50} \text{ m} = 2 \text{ cm}$$ 1½

∴ Internal diameter of pipe = 4 cm ½ m