CBSE Class 10 Maths Solutions

QUESTION PAPER CODE 30/1

EXPECTED ANSWER/VALUE POINTS

SECTION A

1. x = 3 is one root of the equation

$\therefore \quad 9 - 6k - 6 = 0$ ½

$\Rightarrow \quad k = \frac{1}{2}$ ½

2. The required numbers are 2 and 4. ½

HCF of 2 and 4 is 2. ½

3. $OP = \sqrt{x^2 + y^2}$ 1

4. $a + 6(-4) = 4$ ½

$\Rightarrow \quad a = 28$ ½

5. $\because \quad \cos 67° = \sin 23°$

$\therefore \quad \cos^2 67° - \sin^2 23 = 0$ 1

6. $\frac{\text{ar } \Delta ABC}{\text{ar } \Delta PQR} = \frac{AB^2}{PQ^2}$

$= \left(\frac{1}{3}\right)^2 = \frac{1}{9}$ 1

SECTION B

7. Let us assume $5 + 3\sqrt{2}$ is a rational number.

$\therefore \quad 5 + 3\sqrt{2} = \frac{p}{q}$ where $q \neq 0$ and p and q are integers. ½

$\Rightarrow \quad \sqrt{2} = \frac{p - 5q}{3q}$ ½

$\Rightarrow \quad \sqrt{2}$ is a rational number as RHS is rational ½

This contradicts the given fact that $\sqrt{2}$ is irrational.

Hence $5 + 3\sqrt{2}$ is an irrational number. ½

8. AB = DC and BC = AD

$$\left.\begin{array}{ll}\Rightarrow & x + y = 30 \\ \text{and} & x - y = 14\end{array}\right\}$$ 1

Solving to get $x = 22$ and $y = 8$. $\frac{1}{2}+\frac{1}{2}$

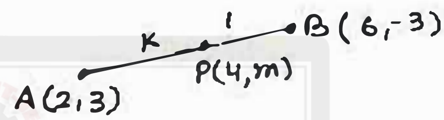
9. $S = 3 + 6 + 9 + 12 + \ldots + 24$

$= 3(1 + 2 + 3 + \ldots + 8)$ $\frac{1}{2}$

$= 3 \times \frac{8 \times 9}{2}$ 1

$= 108$ $\frac{1}{2}$

10. Let AP : PB = k : 1



$\therefore \quad \frac{6k + 2}{k + 1} = 4$ 1

$\Rightarrow$ k = 1, ratio is 1 : 1 $\frac{1}{2}$

Hence $m = \frac{-3 + 3}{2} = 0$ $\frac{1}{2}$

11. Total number of possible outcomes = 36

(i) Doublets are (1, 1) (2, 2) (3, 3) (4, 4) (5, 5) (6, 6)

Total number of doublets = 6 $\frac{1}{2}$

$\therefore$ Prob (getting a doublet) = $\frac{6}{36}$ or $\frac{1}{6}$ $\frac{1}{2}$

(ii) Favourable outcomes are (4, 6) (5, 5) (6, 4) i.e., 3 $\frac{1}{2}$

$\therefore$ Prob (getting a sum 10) = $\frac{3}{36}$ or $\frac{1}{12}$ $\frac{1}{2}$

12. Total number of outcomes = 98

(i) Favourable outcomes are 8, 16, 24, ..., 96 i.e., 12 $\frac{1}{2}$

$\therefore$ Prob (integer is divisible by 8) = $\frac{12}{98}$ or $\frac{6}{49}$ 1

(ii) Prob (integer is not divisible by 8) $= 1 - \frac{6}{49}$

$$= \frac{43}{49}$$ ½

SECTION C

13. $404 = 2 \times 2 \times 101 = 2^2 \times 101$

$96 = 2 \times 2 \times 2 \times 2 \times 2 \times 3 = 2^5 \times 3$

$\therefore$ HCF of 404 and 96 $= 2^2 = 4$ 1

LCM of 404 and 96 $= 101 \times 2^5 \times 3 = 9696$ 1

HCF $\times$ LCM $= 4 \times 9696 = 38784$

Also $404 \times 96 = 38784$

Hence HCF $\times$ LCM = Product of 404 and 96. 1

14. $p(x) = 2x^4 - 9x^3 + 5x^2 + 3x - 1$

$2 + \sqrt{3}$ and $2 - \sqrt{3}$ are zeroes of p(x)

$\therefore$ $p(x) = (x - 2 - \sqrt{3})(x - 2 + \sqrt{3}) \times g(x)$

$= (x^2 - 4x + 1)\, g(x)$ 1

$(2x^4 - 9x^3 + 5x^2 + 3x - 1) \div (x^2 - 4x + 1) = 2x^2 - x - 1$ 1

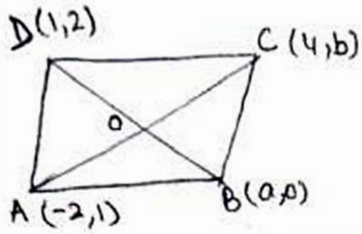
$\therefore$ $g(x) = 2x^2 - x - 1$

$= (2x + 1)(x - 1)$

Therefore other zeroes are $x = -\frac{1}{2}$ and $x = 1$

$\therefore$ Therefore all zeroes are $2 + \sqrt{3}, 2 - \sqrt{3}, -\frac{1}{2}$ and 1 1

15. ABCD is a parallelogram



$\therefore$ diagonals AC and BD bisect each other

Therefore

Mid point of BD is same as mid point of AC $\frac{1}{2}$

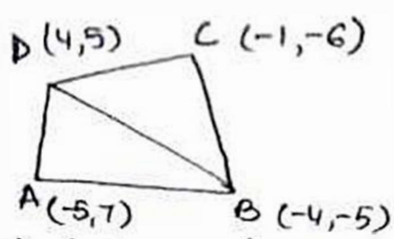
$\Rightarrow \left(\frac{a+1}{2}, \frac{2}{2}\right) = \left(\frac{-2+4}{2}, \frac{b+1}{2}\right)$ 1

$\Rightarrow \frac{a+1}{2} = 1$ and $\frac{b+1}{2} = 1$

$\Rightarrow$ a = 1, b = 1. Therefore length of sides are $\sqrt{10}$ units each. $\frac{1}{2}+1$

OR

Area of quad ABCD = Ar ΔABD + Ar ΔBCD $\frac{1}{2}$



Area of $\Delta ABD = \frac{1}{2}\left|(-5)(-5-5)+(-4)(5-7)+(4)(7+5)\right|$

= 53 sq units 1

Area of $\Delta BCD = \frac{1}{2}\left|(-4)(-6-5)+(-1)(5+5)+4(-5+6)\right|$

= 19 sq units 1

Hence area of quad. ABCD = 53 + 19 = 72 sq units $\frac{1}{2}$

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

$\therefore \quad \frac{1500}{x} - \frac{1500}{x+100} = \frac{30}{60}$ 1

$\Rightarrow \quad x^2 + 100x - 300000 = 0$

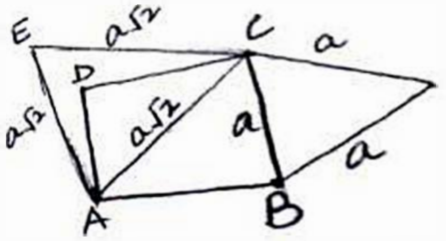
$\Rightarrow \quad x^2 + 600x - 500x - 300000 = 0$

$\Rightarrow \quad (x+600)(x-500) = 0$ 1

$x \neq -600, \quad \therefore x = 500$ $\frac{1}{2}$

Speed of plane = 500 km/hr $\frac{1}{2}$

17. Let the side of the square be 'a' units



$\therefore \quad AC^2 = a^2 + a^2 = 2a^2$

$\Rightarrow \quad AC = \sqrt{2}\,a$ units — 1

Area of equilateral $\Delta BCF = \frac{\sqrt{3}}{4}a^2$ sq.u — ½

Area of equilateral $\Delta ACE = \frac{\sqrt{3}}{4}(\sqrt{2}\,a)^2 = \frac{\sqrt{3}}{2}a^2$ sq.u — 1

$\Rightarrow \quad$ Area $\Delta BCF = \frac{1}{2}$ Ar ΔACE — ½

OR

Let $\Delta ABC \sim \Delta PQR$.

$$\therefore \quad \frac{\text{ar } \Delta ABC}{\text{ar } \Delta PQR} = \frac{AB^2}{PQ^2} = \frac{BC^2}{QR^2} = \frac{AC^2}{PR^2}$$ — 1

Given ar ΔABC = ar ΔPQR

$$\Rightarrow \quad \frac{AB^2}{PQ^2} = 1 = \frac{BC^2}{QR^2} = \frac{AC^2}{PR^2}$$ — 1

$\Rightarrow \quad AB = PQ,\ BC = QR,\ AC = PR$

$\Rightarrow \quad$ Therefore $\Delta ABC \cong \Delta PQR$. (sss congruence rule) — 1

18. Correct given, To prove, Figure, Construction — $\frac{1}{2} \times 4 = 2$

Correct proof — 1

19. $4 \tan\theta = 3$

$\Rightarrow \quad \tan\theta = \frac{3}{4}$

$\Rightarrow \quad \sin\theta = \frac{3}{5}$ and $\cos\theta = \frac{4}{5}$ — $\frac{1}{2} + \frac{1}{2}$

$$\therefore \quad \frac{4\sin\theta - \cos\theta + 1}{4\sin\theta + \cos\theta - 1} = \frac{4 \times \frac{3}{5} - \frac{4}{5} + 1}{4 \times \frac{3}{5} + \frac{4}{5} - 1}$$ — 1

$$= \frac{13}{11}$$ — 1

OR

tan 2A = cot (A – 18°)

$\Rightarrow$ 90° – 2A = A – 18° 1

$\Rightarrow$ 3A = 108° 1

$\Rightarrow$ A = 36° 1

20. Radius of each arc drawn = 6 cm ½

Area of one quadrant = $(3.14) \times \frac{36}{4}$

Area of four quadrants = 3.14 × 36 = 113.04 cm^2 1

Area of square ABCD = 12 × 12 = 144 cm^2 1

Hence Area of shaded region = 144 – 113.04

= 30.96 cm^2 ½

21. Total surface Area of article = CSA of cylinder + CSA of 2 hemispheres

CSA of cylinder = $2\pi rh$

$= 2 \times \frac{22}{7} \times 3.5 \times 10$

= 220 cm^2 1

Surface Area of two hemispherical scoops = $4 \times \frac{22}{7} \times 3.5 \times 3.5$

= 154 cm^2 1

Total surface Area of article = 220 + 154

= 374 cm^2 1

OR

Radius of conical heap = 12 m ½

Volume of rice = $\frac{1}{3} \times \frac{22}{7} \times 12 \times 12 \times 3.5\ m^3$

= 528 m^3 1

Area of canvas cloth required = πrl

$l = \sqrt{12^2 + (3.5)^2} = 12.5$ m ½

∴ Area of canvas required $= \frac{22}{7} \times 12 \times 12.5$

$= 471.4 \text{ m}^2$ 1

22.

Salary (in thousand Rs)	No. of persons (f)	cf
5–10	49	49
10–15	133	182
15–20	63	245
20–25	15	260
25–30	6	266
30–35	7	273
35–40	4	277
40–45	2	279
45–50	1	280

1

$\frac{N}{2} = \frac{280}{2} = 140$

Median class is 10–15

$$\text{Median} = l + \frac{h}{f}\left(\frac{N}{2} - C\right)$$

$= 10 + \frac{5}{133}(140 - 49)$ 1

$= 10 + \frac{5 \times 91}{133}$

$= 13.42$

Median salary is Rs 13.42 thousand or Rs 13420 (approx) 1

SECTION D

23. Let the speed of stream be x km/hr.

$\therefore$ The speed of the boat upstream = (18 – x) km/hr
and Speed of the boat downstream = (18 + x) km/hr } 1

As given in the question,

$$\frac{24}{18-x} - \frac{24}{18+x} = 1$$ 1

$\Rightarrow$ $x^2 + 48x - 324 = 0$ ½

$\Rightarrow$ $(x + 54)(x - 6) = 0$

$x \neq -54, \quad \therefore x = 6$ 1

$\therefore$ Speed of the stream = 6 km/hr. ½

OR

Let the original average speed of train be x km/hr.

Therefore $\frac{63}{x} + \frac{72}{x+6} = 3$ 1½

$\Rightarrow$ $x^2 - 39x - 126 = 0$ 1

$\Rightarrow$ $(x - 42)(x + 3) = 0$

$x \neq -3 \quad \therefore x = 42$ 1

Original speed of train is 42 km/hr. ½

24. Let the four consecutive terms of the A.P. be

a – 3d, a – d, a + d, a + 3d. ½

By given conditions

$(a - 3d) + (a - d) + (a + d) + (a + 3d) = 32$

$\Rightarrow$ $4a = 32$

$\Rightarrow$ $a = 8$ 1

and $\frac{(a-3d)(a+3d)}{(a-d)(a+d)} = \frac{7}{15}$ 1

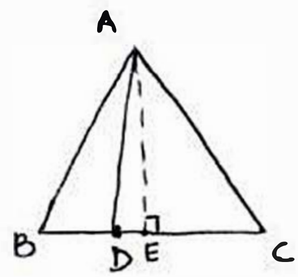
$\Rightarrow$ $8a^2 = 128d^2$

$\Rightarrow \quad d^2 = 4$ ½

$\Rightarrow \quad d = \pm 2$ 1

$\therefore$ Numbers are 2, 6, 10, 14 or 14, 10, 6, 2.

25.



Draw AE ⊥ BC

$\Delta AEB \cong \Delta AEC$ (RHS congruence rule)

$\therefore \quad BE = EC = \frac{1}{2}BC = \frac{1}{2}AB$ 1

Let AB = BC = AC = x

Now $BE = \frac{x}{2}$ and $DE = BE - BD$

$= \frac{x}{2} - \frac{x}{3}$

$= \frac{x}{6}$ 1

Now $AB^2 = AE^2 + BE^2$ ...(1)

and $AD^2 = AE^2 + DE^2$ ...(2) 1

From (1) and (2) $AB^2 - AD^2 = BE^2 - DE^2$

$\Rightarrow \quad x^2 - AD^2 = \left(\frac{x}{2}\right)^2 - \left(\frac{x}{6}\right)^2$

$\Rightarrow \quad AD^2 = x^2 - \frac{x^2}{4} + \frac{x^2}{36}$

$\Rightarrow \quad AD^2 = \frac{28}{36}x^2$ 1

$\Rightarrow \quad 9AD^2 = 7AB^2$

OR

Given, to Prove, Construction and Figure ½×4=2

Correct Proof 2

26. Correct Construction of ΔABC 2

Correct construction of similar to ΔABC. 2

27. LHS $= \frac{\sin A - 2\sin^3 A}{2\cos^3 A - \cos A}$

$$= \frac{\sin A(1-2\sin^2 A)}{\cos A(2\cos^2 A - 1)} \quad 1$$

$$= \frac{\sin A(1-2(1-\cos^2 A))}{\cos A(2\cos^2 A - 1)} \quad 1$$

$$= \tan A \frac{(2\cos^2 A - 1)}{(2\cos^2 A - 1)} \quad 1$$

$$= \tan A = \text{RHS} \quad 1$$

28. Here $r_1 = 15$ cm, $r_2 = 5$ cm and $h = 24$ cm

(i) Area of metal sheet = CSA of the bucket + area of lower end

$$= \pi l(r_1 + r_2) + \pi r_2^2 \quad 1$$

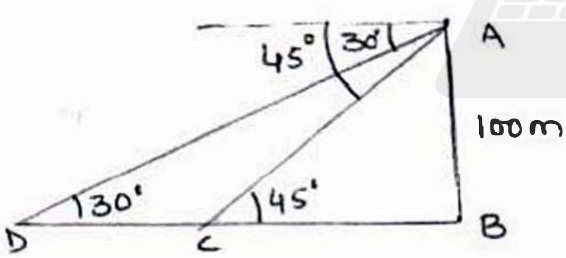
where $l = \sqrt{24^2 + (15-5)^2} = 26$ cm 1

$\therefore$ Surface area of metal sheet $= 3.14(26 \times 20 + 25)$ cm^2

$= 1711.3$ cm^2 1

We should avoid use of plastic because it is non-degradable or similar value. 1

29. Figure 1



Let AB be the tower and ships are at points C and D.

$$\tan 45° = \frac{AB}{BC}$$

$$\Rightarrow \frac{AB}{BC} = 1$$

$$\Rightarrow AB = BC \quad 1$$

Also $\tan 30° = \frac{1}{\sqrt{3}} = \frac{AB}{BC + CD}$

$$\Rightarrow \frac{1}{\sqrt{3}} = \frac{AB}{AB + CD} \quad 1$$

$$\Rightarrow AB + CD = \sqrt{3}AB$$

$$\Rightarrow CD = AB(\sqrt{3} - 1)$$

$$= 100 \times (1.732 - 1) \quad 1$$

$$= 73.2 \text{ m.}$$

30.

Class	x	f	fx		
11–13	12	3	36		
13–15	14	6	84		
15–17	16	9	144		
17–19	18	13	234		
19–21	20	f	20f		
21–23	22	5	110	For x	$\frac{1}{2}$
23–25	24	4	96	Σf	$\frac{1}{2}$
		40 +f	704 + 20f	Σfx	1

$$\text{Mean} = 18 = \frac{704 + 20f}{40 + f}$$ 1

$\Rightarrow$ $720 + 18f = 704 + 20f$

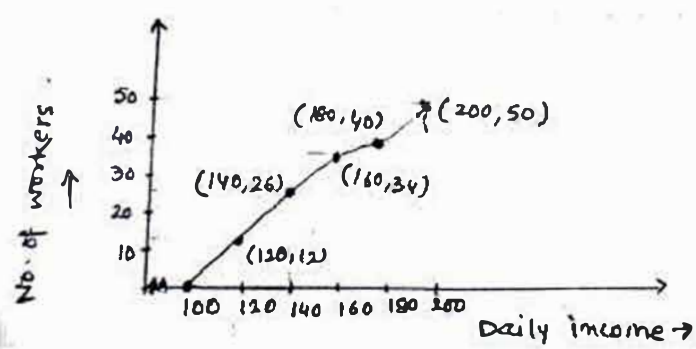
$\Rightarrow$ $f = 8$ 1

OR

Cumulative frequency distribution table of less than type is

Daily income	Cumulative frequency
Less than 100	0
Less than 120	12
Less than 140	26
Less than 160	34
Less than 180	40
Less than 200	50

$1\frac{1}{2}$



$2\frac{1}{2}$