

## CBSE Class 10 Maths Solutions

QUESTION PAPER CODE 30/1

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## EXPECTED ANSWER/VALUE POINTS

## SECTION A

- 1.
- $x = 3$
- is one root of the equation

$$\therefore 9 - 6k - 6 = 0$$

 $\frac{1}{2}$ 

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

 $\frac{1}{2}$ 

2. The required numbers are 2 and 4.

 $\frac{1}{2}$ 

HCF of 2 and 4 is 2.

 $\frac{1}{2}$ 

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

1

- 4.
- $a + 6(-4) = 4$

 $\frac{1}{2}$ 

$$\Rightarrow a = 28$$

 $\frac{1}{2}$ 

- 5.
- $\therefore \cos 67^\circ = \sin 23^\circ$

$$\therefore \cos^2 67^\circ - \sin^2 23^\circ = 0$$

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.

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

 $\frac{1}{2}$ 

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

 $\frac{1}{2}$ 

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

 $\frac{1}{2}$ This contradicts the given fact that  $\sqrt{2}$  is irrational.Hence  $5 + 3\sqrt{2}$  is an irrational number. $\frac{1}{2}$

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8.  $AB = DC$  and  $BC = AD$

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

1

Solving to get  $x = 22$  and  $y = 8$ .

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

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

$$= 3(1 + 2 + 3 + \dots + 8)$$

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

$$= 108$$

 $\frac{1}{2}$ 

1

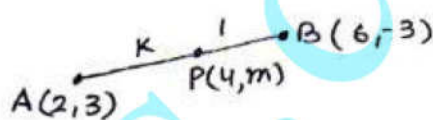
 $\frac{1}{2}$ 

10. Let  $AP : PB = k : 1$

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

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

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



1

 $\frac{1}{2}$  $\frac{1}{2}$ 

11. Total number of possible outcomes = 36

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

$$\text{Total number of doublets} = 6$$

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

(ii) Favourable outcomes are (4, 6) (5, 5) (6, 4) i.e., 3

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

 $\frac{1}{2}$  $\frac{1}{2}$  $\frac{1}{2}$ 

12. Total number of outcomes = 98

(i) Favourable outcomes are 8, 16, 24, ..., 96 i.e., 12

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

 $\frac{1}{2}$ 

1

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

$$= \frac{43}{49}$$

 $\frac{1}{2}$ 

## SECTION C

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

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

$$\therefore \text{ HCF of 404 and 96} = 2^2 = 4$$

$$\text{LCM of 404 and 96} = 101 \times 2^5 \times 3 = 9696$$

$$\text{HCF} \times \text{LCM} = 4 \times 9696 = 38784$$

$$\text{Also } 404 \times 96 = 38784$$

$$\text{Hence HCF} \times \text{LCM} = \text{Product of 404 and 96.}$$

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

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

$$\begin{aligned} \therefore p(x) &= (x - 2 - \sqrt{3})(x - 2 + \sqrt{3}) \times g(x) \\ &= (x^2 - 4x + 1)g(x) \end{aligned}$$

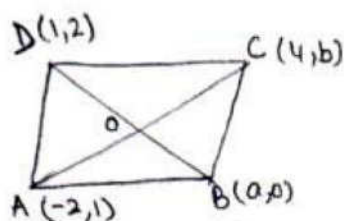
$$(2x^4 - 9x^3 + 5x^2 + 3x - 1) \div (x^2 - 4x + 1) = 2x^2 - x - 1$$

$$\begin{aligned} \therefore g(x) &= 2x^2 - x - 1 \\ &= (2x + 1)(x - 1) \end{aligned}$$

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  $1$

15.



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ABCD is a parallelogram

∴ diagonals AC and BD bisect each other

Therefore

Mid point of BD is same as mid point of AC

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

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

⇒ a = 1, b = 1. Therefore length of sides are  $\sqrt{10}$  units each.

OR

Area of quad ABCD = Ar  $\Delta$ ABD + Ar  $\Delta$ BCD

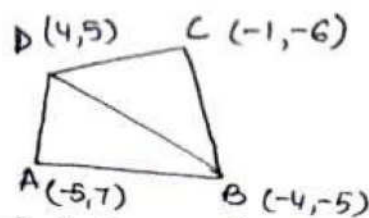
$$\text{Area of } \Delta\text{ABD} = \frac{1}{2} | (-5)(-5-5) + (-4)(5-7) + (4)(7+5) |$$

$$= 53 \text{ sq units}$$

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

$$= 19 \text{ sq units}$$

Hence area of quad. ABCD = 53 + 19 = 72 sq units



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

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

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

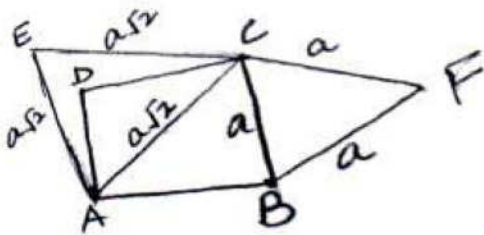
$$\Rightarrow x^2 + 600x - 500x - 300000 = 0$$

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

$$x \neq -600, \quad \therefore x = 500$$

Speed of plane = 500 km/hr

17.



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Let the side of the square be 'a' units

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

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

$$\text{Area of equilateral } \triangle BCF = \frac{\sqrt{3}}{4} a^2 \text{ sq.u} \quad \frac{1}{2}$$

$$\text{Area of equilateral } \triangle ACE = \frac{\sqrt{3}}{4} (\sqrt{2} a)^2 = \frac{\sqrt{3}}{2} a^2 \text{ sq.u} \quad 1$$

$$\Rightarrow \text{Area } \triangle BCF = \frac{1}{2} \text{ Ar } \triangle ACE \quad \frac{1}{2}$$

OR

Let  $\triangle ABC \sim \triangle PQR$ .

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

Given ar  $\triangle ABC = \text{ar } \triangle PQR$ 

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

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

$$\Rightarrow \text{Therefore } \triangle ABC \cong \triangle PQR. \text{ (sss congruence rule)} \quad 1$$

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

Correct proof 1

19.  $4 \tan \theta = 3$ 

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

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

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

$$= \frac{13}{11} \quad 1$$

OR

$$\tan 2A = \cot (A - 18^\circ)$$

$$\Rightarrow 90^\circ - 2A = A - 18^\circ$$

$$\Rightarrow 3A = 108^\circ$$

$$\Rightarrow A = 36^\circ$$

20. Radius of each arc drawn = 6 cm

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

$$\text{Area of four quadrants} = 3.14 \times 36 = 113.04 \text{ cm}^2$$

$$\text{Area of square ABCD} = 12 \times 12 = 144 \text{ cm}^2$$

$$\text{Hence Area of shaded region} = 144 - 113.04$$

$$= 30.96 \text{ cm}^2$$

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

$$\text{CSA of cylinder} = 2\pi rh$$

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

$$= 220 \text{ cm}^2$$

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

$$= 154 \text{ cm}^2$$

$$\text{Total surface Area of article} = 220 + 154$$

$$= 374 \text{ cm}^2$$

OR

$$\text{Radius of conical heap} = 12 \text{ m}$$

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

$$= 528 \text{ m}^3$$

$$\text{Area of canvas cloth required} = \pi rl$$

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

 $\frac{1}{2}$ 

$$\begin{aligned} \therefore \text{Area of canvas required} &= \frac{22}{7} \times 12 \times 12.5 \\ &= 471.4 \text{ m}^2 \end{aligned}$$

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.

$$\left. \begin{array}{l} \therefore \text{The speed of the boat upstream} = (18 - x) \text{ km/hr} \\ \text{and Speed of the boat downstream} = (18 + x) \text{ km/hr} \end{array} \right\} 1$$

As given in the question,

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

$$\Rightarrow x^2 + 48x - 324 = 0 \quad \frac{1}{2}$$

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

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

$$\therefore \text{Speed of the stream} = 6 \text{ km/hr.} \quad \frac{1}{2}$$

OR

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

$$\text{Therefore } \frac{63}{x} + \frac{72}{x+6} = 3 \quad 1\frac{1}{2}$$

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

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

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

$$\text{Original speed of train is } 42 \text{ km/hr.} \quad \frac{1}{2}$$

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

$$a - 3d, a - d, a + d, a + 3d. \quad \frac{1}{2}$$

By given conditions

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

$$\Rightarrow 4a = 32$$

$$\Rightarrow a = 8 \quad 1$$

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

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



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$$\Rightarrow d^2 = 4$$

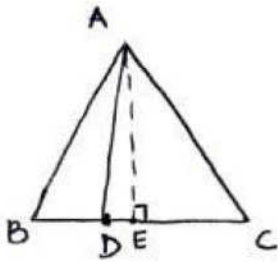
$$\Rightarrow d = \pm 2$$

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

 $\frac{1}{2}$ 

1

25.

Draw  $AE \perp BC$  $\triangle AEB \cong \triangle AEC$  (RHS congruence rule)

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

Let  $AB = BC = AC = x$ 

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

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

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

$$\left. \begin{array}{l} \text{Now } AB^2 = AE^2 + BE^2 \quad \dots(1) \\ \text{and } AD^2 = AE^2 + DE^2 \quad \dots(2) \end{array} \right\}$$

$$\text{From (1) and (2) } AB^2 - AD^2 = BE^2 - DE^2$$

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

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

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

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

OR

Given, to Prove, Construction and Figure

$$\frac{1}{2} \times 4 = 2$$

Correct Proof

2

26. Correct Construction of  $\triangle ABC$ 

2

Correct construction of similar to  $\triangle ABC$ .

2

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

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

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

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

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

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

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

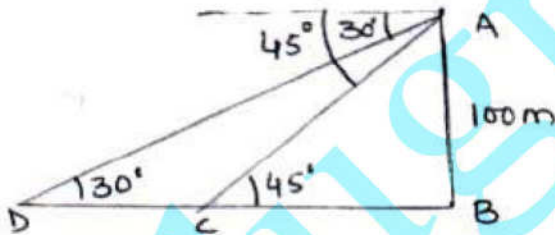
$$\text{where } l = \sqrt{24^2 + (15 - 5)^2} = 26 \text{ cm}$$

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

$$= 1711.3 \text{ cm}^2$$

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

29.



Figure

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

$$\tan 45^\circ = \frac{AB}{BC}$$

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

$$\Rightarrow AB = BC$$

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

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

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

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

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

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

30. Class	x	f	$\frac{30}{1}$ 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
23-25	24	4	96
		$\frac{40+f}{}$	$\frac{704+20f}{}$

For x  $\frac{1}{2}$  $\Sigma f$   $\frac{1}{2}$  $\Sigma fx$  1

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

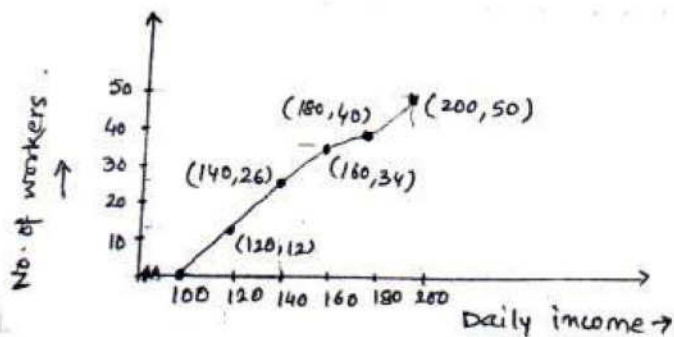
$$\Rightarrow 720 + 18f = 704 + 20f$$

$$\Rightarrow f = 8$$

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

 $1\frac{1}{2}$  $2\frac{1}{2}$