CBSE Board
Class X Mathematics
Sample Paper 3 (Basic) – Solution

Section A

1. Correct option : C
Explanation:
HCF (26, 169) = 13
We know that HCF × LCM = Product of two numbers
$\Rightarrow 13 \times LCM = 26 \times 169$
$\Rightarrow LCM(26, 169) = 338$

2. Correct option : C
Explanation:
The arithmetic mean of 7, 8, x, 11, 14 is x.
$$\Rightarrow \frac{7+8+x+11+14}{5} = x$$
$$\Rightarrow \frac{40+x}{5} = x$$
$\Rightarrow 40 + x = 5x$
$\Rightarrow 4x = 40$
$\Rightarrow x = 10$

3. Correct option: C
Explanation:
Since tangent $\perp$ radius,
Using the Pythagoras theorem,
$\Rightarrow OP^2 + PQ^2 = OQ^2$
$\Rightarrow 3^2 + 4^2 = OQ^2$
$\Rightarrow OQ^2 = 25$
$\Rightarrow OQ = r = 5$ cm

4. Correct option : B
Explanation:
HCF (18, 25) = 1.
So, (18, 25) is a pair of co-primes.

5. Correct option : C
Explanation:
The probability of winning a game is 0.4, the probability of losing it is 1 – 0.4 = 0.6.

6. Correct option : D

Explanation:

$p(x) = x^2 - 2x - 3$

$\Rightarrow p(x) = x^2 - 3x + x - 3$

$\Rightarrow p(x) = x(x - 3) + (x - 3)$

$\Rightarrow p(x) = (x - 3)(x + 1)$

To find zeros of p(x) then

$\Rightarrow P(x) = 0$ i.e. $x = 3, 1$

7. Correct option : C

Explanation:

HCF of $(2^3 \times 3^2 \times 5)$, $(2^2 \times 3^3 \times 5^2)$ and $(2^4 \times 3 \times 5^3 \times 7)$ is $2^2 \times 3 \times 5 = 60$.

8. Correct option : A

Explanation:

If α, β are the zeros of the polynomial $f(x) = 2x^2 + 6x - 6$ then

$a = 2$, $b = 6$ and $c = -6$

$$\alpha + \beta = \frac{-b}{a} = \frac{-6}{2} = -3$$

$$\alpha\beta = \frac{c}{a} = \frac{-6}{2} = -3$$

Hence, $\alpha + \beta = \alpha\beta$

9. Correct option : B

Explanation:

The distance of a point (4, 7) from the x-axis is 7 units.

Since, the distance of a point from the x-axis is the y-coordinate of that point.

10. Correct option : B

Explanation:

The mid-point of the line segment joining the points A(-2, 8) and B(-6, -4) is

$$\left(\frac{-2-6}{2}, \frac{8-4}{2}\right) = (-4, 2)$$

11. The centroid of the triangle whose vertices are (-2, 3), (2, -1) and (4, 0) is $\underline{\left(\frac{4}{3}, \frac{2}{3}\right)}$.

Explanation:

The centroid of the triangle whose vertices are (-2, 3), (2, -1) and (4, 0) is

$$\left(\frac{-2+2+4}{3}, \frac{3-1+0}{3}\right) = \left(\frac{4}{3}, \frac{2}{3}\right)$$

12. If the system of equations kx – 5y = 2, 6x + 2y = 7 has no solution, then k = -15.

kx – 5y = 2, 6x + 2y = 7

$a_1 = k, b_1 = -5, c_1 = -2, a_2 = 6, b_2 = 2, c_2 = -7$

The condition for no solution is $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$

$$\frac{a_1}{a_2} = \frac{b_1}{b_2} \Rightarrow \frac{k}{6} = \frac{-5}{2} \Rightarrow k = -15$$

13. The value of $(1 - \cos^2\theta)\text{cosec}^2\theta$ is 1.

Explanation:

$(1 - \cos^2\theta)\text{cosec}^2\theta$

$= \sin^2\theta\,\text{cosec}^2\theta$ $\quad \because 1 - \cos^2\theta = \sin^2\theta$

$= 1$ $\quad \because \sin\theta = \frac{1}{\text{cosec}^2\theta}$

OR

The value of $\sin^2 29° + \sin^2 61°$ is 1.

Explanation:

$\sin^2 29° + \sin^2 61°$

$= \sin^2(90° - 61°) + \sin^2 61°$

$= \cos^2 61° + \sin^2 61°$ $\quad \because \sin(90° - \theta) = \cos\theta$

$= 1$ $\quad \because \cos^2\theta + \sin^2\theta = 1$

14. The value of $(\sec^2 60° - 1) = 3$

Explanation:

Sec 60° = 2

$\sec^2 60° - 1$

$= 2^2 - 1$

$= 4 - 1$

$= 3$

15. Corresponding sides of two similar triangles are in the ratio 1:3. If the area of the smaller triangle is 40 cm^2, the area of the larger triangle is 360 cm^2.

The ratio of the areas of two similar triangles is equal to the ratio of the squares of any two corresponding sides.

Let x be the area of the larger triangle.

$$\Rightarrow \left(\frac{1}{3}\right)^2 = \frac{40}{x} \Rightarrow x = 360\ cm^2$$

16. $2\sin\frac{x}{2} = 1$

$$\Rightarrow \sin\frac{x}{2} = \frac{1}{2}$$

$\Rightarrow \frac{x}{2} = 30° \quad \because \sin 30° = \frac{1}{2}$

$\Rightarrow x = 60°$

OR

$\sin(\theta + 36°) = \cos\theta$

$\Rightarrow \sin(\theta + 36°) = \sin(90° - \theta) \qquad \because \cos\theta = \sin(90° - \theta)$

$\Rightarrow \theta + 36° = 90° - \theta$

$\Rightarrow 2\theta = 54°$

$\Rightarrow \theta = 27°$

17. The areas of two circles are in the ratio 4:9.

Let r_1 and r_2 be the radii of two circles.

According to the question,

$$\Rightarrow \frac{\pi r_1^2}{\pi r_2^2} = \frac{4}{9}$$

$$\Rightarrow \frac{r_1^2}{r_2^2} = \frac{4}{9} \Rightarrow \frac{r_1}{r_2} = \frac{2}{3}$$

18. According to the question,

$P(A) = \frac{x}{12}$ and $P(A') = \frac{2}{3}$

We know that $P(A) + P(A') = 1$

$$\Rightarrow \frac{x}{12} + \frac{2}{3} = 1$$

$$\Rightarrow \frac{x+8}{12} = 1$$

$\Rightarrow x + 8 = 12$

$\Rightarrow x = 4$

19. The length of the hypotenuse of an isosceles right triangle whose one side is $4\sqrt{2}$ cm.

Since, it is right triangle using Pythagoras theorem,

$\text{Hypotenuse}^2 = \left(4\sqrt{2}\right)^2 + \left(4\sqrt{2}\right)^2 = 32 + 32 = 64$

Hypotenuse = 8 cm.

The length of the hypotenuse of an isosceles right triangle whose one side is $4\sqrt{2}$ cm is 8 cm.

20. $a = 2, d = 4, n = 40$

$$S_n = \frac{n}{2}\left[2a + (n-1)d\right]$$

$$S_{40} = \frac{40}{2}[2\times2+39\times4]$$

$$S_{40} = 20\times160 = 3200$$

Section B

21. S is the sample space.

n(S) = 5 red + 2 yellow + 3 white = 10

i. Let A be the event that selected rose is red.

n(A) = 5

Required probability = $\frac{n(A)}{n(S)} = \frac{5}{10} = \frac{1}{2}$

ii. Let B be the event that selected rose is yellow.

n(A) = 2

Required probability = $\frac{n(B)}{n(S)} = \frac{2}{10} = \frac{1}{5}$

22. A dice is thrown once. The sample space S = {1, 2, 3, 4, 5, 6}

n (S) = 6

i. Let A be the event that getting a prime number.

A = {2, 3, 5}

n(A) = 3

Required probability = $\frac{n(A)}{n(S)} = \frac{3}{6} = \frac{1}{2}$

ii. Let B be the event that getting a number lying between 2 and 5.

B = {3, 4}

n(B) = 2

Required probability = $\frac{n(B)}{n(S)} = \frac{2}{6} = \frac{1}{3}$

OR

A bag contains 6 orange flavoured candies and 4 lemon flavoured candies.

n(S) = 6 + 4 = 10

i. Let ‘A’ be the event that selecting orange flavoured candy.

Then n(A) = 6

P(A) = $\frac{n(A)}{n(S)} = \frac{6}{10} = \frac{3}{5}$

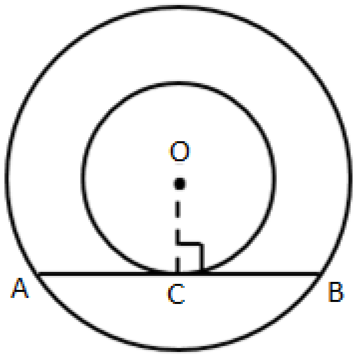
ii. Let ‘B’ be the event that selecting lemon flavoured candy.

Then n(B) = 4 ⇒ P(B) = $\frac{n(B)}{n(S)} = \frac{4}{10} = \frac{2}{5}$

23. Given : Two circles with the same centre O and AB is a chord of the larger circle touching the smaller circle at C.

To prove : AC = BC

Construction : Join OC.



AB is a tangent to the smaller circle at the point C and OC is the radius through C.

OC is perpendicular to AB

Since, the perpendicular drawn from the centre of a circle to a chord bisect the chord.

OC bisects AB.

Hence, AC = BC.

24. L.H.S = $\sqrt{\dfrac{1+\tan^2 A}{\cot^2 A+1}}$

$=\sqrt{\dfrac{\sec^2 A}{\operatorname{cosec}^2 A}}$ $\qquad \because\ 1+\tan^2 A=\sec^2 A \text{ and } \cot^2 A+1=\operatorname{cosec}^2 A$

$=\dfrac{\sec A}{\operatorname{cosec} A}$

$=\dfrac{\dfrac{1}{\cos A}}{\dfrac{1}{\sin A}}$

$=\dfrac{\sin A}{\cos A}=\tan A$ = R.H.S

Hence proved.

OR

$$\frac{5\cos^2 60° + 4\sec^2 30° - \tan^2 45°}{\sin^2 30° + \cos^2 30°}$$

$$= \frac{5\left(\frac{1}{2}\right)^2 + 4\left(\frac{2}{\sqrt{3}}\right)^2 - 1^2}{\left(\frac{1}{2}\right)^2 + \left(\frac{\sqrt{3}}{2}\right)^2}$$

$$= \frac{5\times\frac{1}{4} + 4\times\frac{4}{3} - 1}{\frac{1}{4} + \frac{3}{4}}$$

$$= \frac{\frac{5}{4} + \frac{16}{3} - 1}{1}$$

$$= \frac{15 + 64 - 12}{4}$$

$$= \frac{67}{4}$$

$$\Rightarrow \frac{5\cos^2 60° + 4\sec^2 30° - \tan^2 45°}{\sin^2 30° + \cos^2 30°} = \frac{67}{4}$$

25. Circumference of a circle = 242 m

$\Rightarrow 2\pi r = 242$

$\Rightarrow 2\times\frac{22}{7}\times r = 242$

$\Rightarrow r = 38.5$ m

Area of a circle = $\pi r^2 = \frac{22}{7}\times 38.5^2 = 4658.5\ m^2$

26. 1. The quadratic polynomials are $x^2 - 8x - 9$, $x^2 + 3x$, $x^2 + x + 1$, $x^2 + x + 2$

Hence, 4 students wrote linear polynomial.

2.

$$\begin{array}{r|l} & \quad\;\; x+1 \\ \hline x-9 & x^2 - 8x - 9 \\ & \underline{x^2 - 9x} \\ & \qquad\;\; x - 9 \\ & \qquad\;\; \underline{x - 9} \\ & \qquad\quad\;\; 0 \end{array}$$

Section C

27. $3y^2 + ky + 12 = 0$

$a = 3$, $b = k$ and $c = 12$

$\Rightarrow b^2 - 4ac = k^2 - 4 \times 3 \times 12 = k^2 - 144$

According to the question,

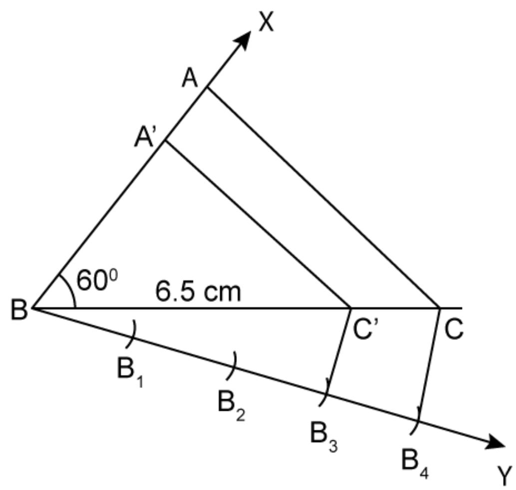
$\Rightarrow b^2 - 4ac = 0$

$\Rightarrow k^2 - 144 = 0$

$\Rightarrow k^2 = 144$

$\Rightarrow k = \pm 12$

28.



Steps of construction:

Step 1: Draw a line segment BC = 6.5 cm

Step 2: Draw an angle of 60° at B so that $\angle XBC = 60°$

Step 3: With centre B and radius 4.5 cm, draw an arc intersecting XB at A

Step 4: Join AC

ΔABC is the required triangle.

Step 5: Draw a line BY below BC which makes an acute angle CBY.

Step 6: Mark B_1, B_2, B_3 and B_4 at equal distances from B.

Such that $BB_1 = B_1B_2 = B_2B_3 = B_3B_4$

Step 7: Join CB_4

Step 8: Draw B_3C' parallel to CB_4

Step 9: Draw $C'A'$ parallel to CA through C' intersecting BA produced at A'

Δ A'BC' is the required similar triangle.

29. Sphere:

Radius of a sphere = r = $\frac{21}{2}$ cm

Volume of a sphere = $\frac{4}{3}\pi r^3 = \frac{4}{3}\times\pi\times\left(\frac{21}{2}\right)^3$

Cone:

Radius of cone = R = $\frac{7}{4}$ cm and h = 3 cm

Volume of 1 cone = $\frac{1}{3}\pi R^2 h = \frac{1}{3}\pi\left(\frac{7}{4}\right)^2\times 3$

Let n be the number of cones formed.

$$n = \frac{\frac{4}{3}\times\pi\times\left(\frac{21}{2}\right)^3}{\frac{1}{3}\pi\left(\frac{7}{4}\right)^2\times 3} = \frac{4}{3}\times\left(\frac{21}{2}\right)^3\times\left(\frac{4}{7}\right)^2 = 504$$

OR

R = 20 cm, r = 8 cm and h = 16 cm

$$\therefore\ l = \sqrt{h^2+(R-r)^2} = \sqrt{(16)^2+(20-8)^2}$$
$$= \sqrt{256+144}\text{cm} = 20\text{cm}$$

Total surface area of the container = $\pi l(R+r)+\pi r^2$

$$= \left[3.14\times20\times(20+8)+3.14\times8\times8\right]\text{cm}^2$$
$$= (3.14\times20\times28+3.14\times8\times8)\text{cm}^2$$
$$= (1758.4+200.96)\text{cm}^2$$
$$= 1959.36\ \text{cm}^2$$

Cost of the metal sheet used = $\text{Rs}\left(1959.36\times\frac{15}{100}\right) = \text{Rs.}293.90$

30. L.H.S = $\frac{\sin\theta}{1+\cos\theta}+\frac{1+\cos\theta}{\sin\theta}$

$$= \frac{\sin^2\theta+(1+\cos\theta)^2}{\sin\theta(1+\cos\theta)}$$

$$= \frac{\sin^2\theta+1+\cos^2\theta+2\cos\theta}{\sin\theta(1+\cos\theta)}$$

$$= \frac{1+1+2\cos\theta}{\sin\theta(1+\cos\theta)} \qquad \because\ \sin^2\theta+\cos^2\theta=1$$

$$= \frac{2+2\cos\theta}{\sin\theta(1+\cos\theta)}$$

$$= \frac{2(1+\cos\theta)}{\sin\theta(1+\cos\theta)}$$

$$= \frac{2}{\sin\theta}$$

$$= 2\operatorname{cosec}\theta = \text{R.H.S}$$

$$\Rightarrow \frac{\sin\theta}{1+\cos\theta} + \frac{1+\cos\theta}{\sin\theta} = 2\operatorname{cosec}\theta$$

OR

$$\text{L.H.S} = \sqrt{\frac{1-\sin\theta}{1+\sin\theta}}$$

$$= \sqrt{\frac{1-\sin\theta}{1+\sin\theta} \times \frac{1-\sin\theta}{1-\sin\theta}}$$

$$= \sqrt{\frac{(1-\sin\theta)^2}{1-\sin^2\theta}}$$

$$= \sqrt{\frac{(1-\sin\theta)^2}{\cos^2\theta}} \qquad \because 1-\sin^2\theta = \cos^2\theta$$

$$= \frac{1-\sin\theta}{\cos\theta}$$

$$= \frac{1}{\cos\theta} - \frac{\sin\theta}{\cos\theta}$$

$$= \sec\theta - \tan\theta = \text{R.H.S}$$

$$\Rightarrow \sqrt{\frac{1-\sin\theta}{1+\sin\theta}} = \sec\theta - \tan\theta$$

31.

2	336
2	168
2	84
2	42
3	21
	7

2	240
2	120
2	60
2	30
3	15
	5

2	96
2	48
2	24
2	12
2	6
	3

2	96
2	48
2	24
2	12
2	6
	3

$336 = 2\times2\times2\times2\times3\times7 = 2^4\times3\times7$

$240 = 2\times2\times2\times2\times3\times5 = 2^4\times3\times5$

$96 = 2\times2\times2\times2\times2\times3 = 2^5\times3$

$\text{H.C.F} = 2^4\times3 = 16\times3 = 48$

Each stack will contain 48 books.

Number of stacks of the same height

$= \frac{240}{48} + \frac{336}{48} + \frac{96}{48} = 5+7+2 = 14$

Hence, 14 stacks will be there.

OR

If possible let $\frac{5\sqrt{2}}{3}$ be rational.

Let its simplest form be $\frac{5\sqrt{2}}{3} = \frac{a}{b}$ where a and $b\neq0$ are positive integers having no common Factor other than 1. Then,

$\sqrt{2} = \frac{3a}{5b}$ ....(i)

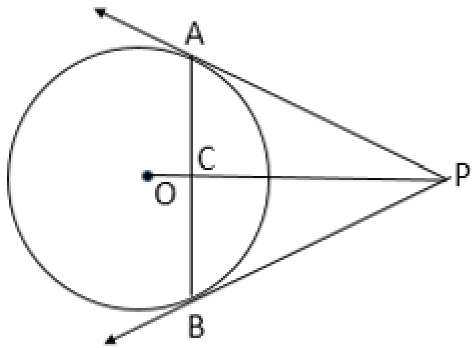
Since, 3a and 5b are non-zero integers, so $\frac{3a}{5b}$ is rational.

From (i) it follows that $\sqrt{2}$ is rational.

This contradicts the fact that $\sqrt{2}$ is an rational.

Hence, $\frac{5\sqrt{2}}{3}$ is irrational.

32.



Let AB be a chord of circle with centre O.

Let AP and BP be two tangents at A and B respectively.

Suppose the tangents meet at point P. Join OP.

Suppose OP meets AB at C.

Now, in ΔPCA and ΔPCB,

PA = PB ....(tangents from an external point are equal)

∠APC = ∠BPC ....(PC is the angle bisector of ∠ APB)

PC = PC ....(common)

Hence, ΔPAC ≅ ΔPBC ....(by SAS congruence criterion)

⇒ ∠PAC = ∠PBC ... C. A. C. T.

Hence it is proved that the tangents drawn at the end points of a chord of a circle make equal angles with the chord.

33. 2x + 3y = 4 and (k + 2)x + 6y = 3k + 2

$a_1 = 2$, $b_1 = 3$, $a_2 = k + 2$, $b_2 = 6$, $c_1 = -4$ and $c_2 = -(3k + 2)$

The given system of equations has infinitely many solutions if

$$\frac{a_1}{a_2}=\frac{b_1}{b_2}=\frac{c_1}{c_2}$$

$$\Rightarrow \frac{2}{k+2}=\frac{3}{6}=\frac{-4}{-(3k+2)}$$

$$\Rightarrow \frac{2}{k+2}=\frac{1}{2}=\frac{4}{3k+2}$$

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

$$\Rightarrow k+2=4 \Rightarrow k=2$$

Also,

$$\frac{1}{2}=\frac{4}{3k+2}$$

$$\Rightarrow 3k+2=8 \Rightarrow k=2$$

34. A(2, 2), B(4, 0), C(6, 2) and D(4, 4)

i. Teacher tells E to sit in the middle of the four students. Find the coordinates of the position where she can sit.

The coordinates of E are the mid-point of B(4, 4) and D(4, 0) i. e. $\left(\frac{4+4}{2},\frac{0+4}{2}\right)=(4,2)$

ii. The distance between A(2, 2) and C(6, 2) is $\sqrt{(2-6)^2+(2-2)^2}=\sqrt{16+0}=4$ units

iii. A and C students are at a equidistant from B as the coordinates of A, B, C and D forms a square.

Section D

35. More than series:

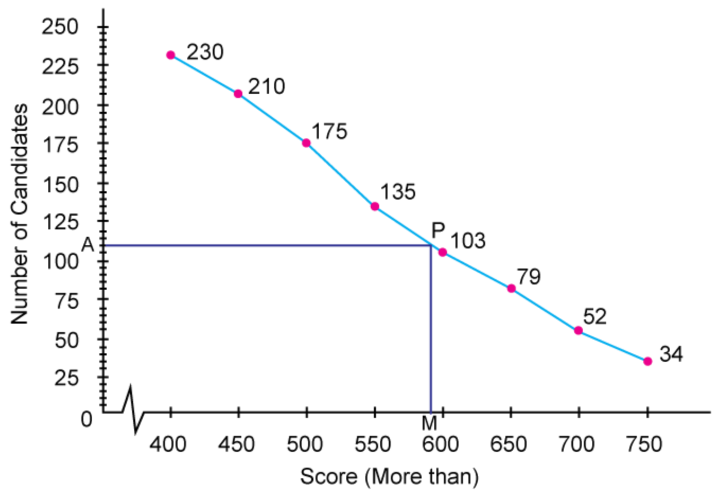
Score	No. of candidates
More than 400	230
More than 450	210
More than 500	175
More than 550	135
More than 600	103
More than 650	79
More than 700	52
More than 750	34

We plot the points (400, 230), (450, 210), (500, 175), (550, 135), (600, 103), (650, 79), (700, 52) and (750, 34).

Scale:

X-axis: 10 cm = 25 units of score

Y-axis: 1 cm = 25 candidates



Hence, $N = 230 \Rightarrow \frac{N}{2} = 115$

Take a point A(0, 115) on the Y-axis and draw AP||X-axis meeting the curve at P. Draw PM $\perp$ X-axis intersecting the X-axis at M.

Then, OM = 590

Hence, the median is 590.

OR

Let the assumed mean = 225 and h = 50.

Class	Frequency f_i	Mid-value x_i	$u_i = \left(\frac{x_i - A}{h}\right)$	$f_i u_i$	C.F.
100–150	6	125	-2	-12	6
150–200	7	175	-1	-7	13
200–250	12	225	0	0	25
250–300	3	275	1	3	28
300–350	2	325	2	4	30
	N = 30			$\Sigma f_i u_i = -12$	

(i) Mean = $A + h\left(\frac{\Sigma f_i u_i}{N}\right) = 225 + 50\left(\frac{-12}{30}\right) = 225 - 20 = 205$

(ii) $\frac{N}{2} = \frac{30}{2} = 15$

Cumulative frequency just after 15 is 25.

$\therefore$ Corresponding class interval is 200–250.

$\therefore$ Median class is 200–250.

Cumulative frequency c just before this class = 13

$$\text{So, } l = 200, f = 12, \frac{N}{2} = 15, h = 50, c = 13$$

$$\therefore \text{Median} = l + h\left(\frac{\frac{N}{2} - c}{f}\right) = 200 + 50\left(\frac{15-13}{12}\right)$$

$$= 200 + \frac{50 \times 2}{12} = 200 + \frac{25}{3} = 200 + 8.33 = 208.33$$

Hence, mean = 205 and median = 208.33.

36. Let the two consecutive natural numbers be x and x + 1.

According to the question,

$x^2 + (x + 1)^2 = 421$

$\Rightarrow x^2 + x^2 + 2x + 1 = 421$

$\Rightarrow 2x^2 + 2x - 420 = 0$

$\Rightarrow x^2 + x - 210 = 0$

$\Rightarrow x^2 + 15x - 14x - 210 = 0$

$\Rightarrow x(x + 15) - 14(x + 15) = 0$

$\Rightarrow (x + 15)(x - 14) = 0$

As x cannot be −15 hence, x = 14.

Hence, the required numbers are 14 and 15.

37. All two-digit odd positive numbers are 11, 13, 15, 17, ..., 99

This is an A.P. as the difference between two consecutive terms are same.

Here, a = 11, d = 2 and l = 99

$a_n = 99$

$\Rightarrow a_n = a + (n - 1)d$

$\Rightarrow 11 + (n - 1) \times 2 = 99$

$\Rightarrow 2(n - 1) = 88$

$\Rightarrow n - 1 = 44$

$\Rightarrow n = 45$

$$\text{Required sum} = \frac{n}{2}(a + l)$$

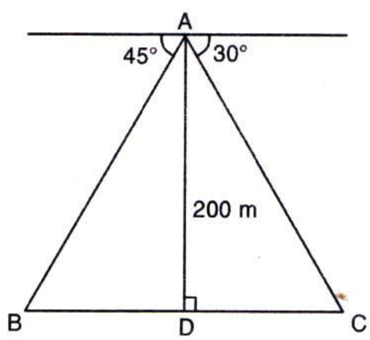
$$\text{Required sum} = \frac{45}{2}(11 + 99) = 2475$$

Hence, the required sum is 2475.

OR

Let the three parts are in A.P. are a – d, a and a + d.
According to the question,
$\Rightarrow a - d + a + a + d = 207$
$\Rightarrow 3a = 207$
$\Rightarrow a = 69$
Also, The product of a – d and a is 4623.
$(a - d)\, a = 4623$
$\Rightarrow (69 - d)\, 69 = 4623$
$\Rightarrow 69 - d = 67$
$\Rightarrow d = 2$
$a - d = 69 - 2 = 67$
$a = 69$
$a + d = 69 + 2 = 71$
The required three parts of 207 are 67, 69, 71.

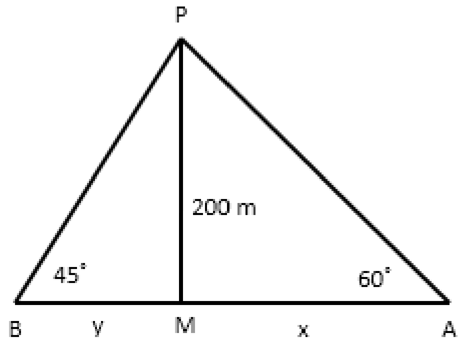
38. Let AD represent the light house.
Let the points B and C denote the ships based on the opposite sides of the light house.



$\angle ABD = \angle PAB = 45^\circ$ (interior alternate angle)
$\angle ACD = \angle QAC = 30^\circ$ (interior alternate angle)
$\therefore \tan 45^\circ = \frac{AD}{BD} \Rightarrow 1 = \frac{200}{BD} \Rightarrow BD = 200\text{ m}$
Also, $\tan 30^\circ = \frac{AD}{DC}$
$\Rightarrow \frac{1}{\sqrt{3}} = \frac{200}{DC} \Rightarrow DC = 200\sqrt{3}\text{ m}$
$\Rightarrow DC = 200 \times 1.732 = 346.4\text{ m}$
$\therefore BC = BD + DC = (200 + 346.4) \Rightarrow BC = 546.4\text{ m}$
Distance between two ships=546.4 m

OR

Let P be the position of the aeroplane and let A and B be two points on the two banks of a river such that the angles of depression at A and B are 60° and 45° respectively. Let AM = x meters and BM = y meters. We have to find AB.



In ΔAMP,

$\tan 60^\circ = \dfrac{PM}{AM}$

$\sqrt{3} = \dfrac{200}{x}$

$200 = \sqrt{3}\,x$

$x = \dfrac{200}{\sqrt{3}}$ …………(i)

In ΔBMP,

$\tan 45^\circ = \dfrac{PM}{BM}$

$1 = \dfrac{200}{y}$

$y = 200$…………..(ii)

$AB = x + y = \dfrac{200}{\sqrt{3}} + 200 = 200\left(\dfrac{1}{\sqrt{3}} + 1\right) = 315.4$ m

The width of the river is 315.4 m.

39. Diameter of the base of the cone = d = 6 cm

Radius of the base of the cone = r = 3 cm

Height of the cone = h = 4 cm

Slant height of the cone = $\sqrt{r^2 + h^2} = \sqrt{3^2 + 4^2} = 5$ cm

Curved surface area of the cone = $\pi r l$

$$= \frac{22}{7} \times 3 \times 5 = \frac{330}{7}\ \text{cm}^2$$

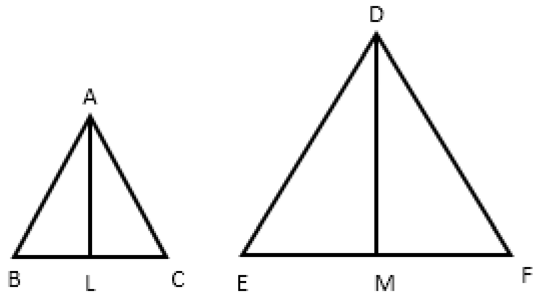
Radius of the hemisphere = 3 cm

Curved surface area of the hemisphere = $2\pi r^2 = 2 \times \dfrac{22}{7} \times 3 \times 3 = \dfrac{396}{7}$ cm^2

Surface area of the toy = Curved surface area of the cone + Curved surface area of the hemisphere

$= \dfrac{330}{7}$ cm^2 + $\dfrac{396}{7}$ cm^2 = 103.71 cm^2

40.



Given: Two triangles ABC and DEF in which ∠A = ∠D, ∠B = ∠E, ∠C = ∠F and AL perpendicular to BC and DM perpendicular to EF

To prove $\frac{BC}{EF} = \frac{AL}{DM}$

Proof:

Since equiangular triangles are similar,

$\Delta ABC \sim \Delta DEF$

$\frac{AB}{DE} = \frac{BC}{EF}$ ... (i)

In ΔALB and ΔDME,

$\angle ALB = \angle DME = 90^\circ$

$\angle B = \angle E$

$\Delta ALB \sim \Delta DME$ A–A criterion

$\frac{AB}{DE} = \frac{AL}{DM}$ ...(ii)

$\frac{BC}{EF} = \frac{AL}{DM}$ from (i) and (ii)

So, if the two triangles are equiangular, prove that the ratio of the corresponding sides is the same as the ratio of the corresponding altitudes.