CBSE Board

Class X Mathematics

Sample Paper 1 (Standard) – Solution

Section A

1. Correct option : C
Explanation:
Euclid's division lemma states that for two positive integers a and b, there exist unique integers q and r such that $a = bq + r$, where $0 \le r < b$.

2. Correct option : D
Explanation:
x, x + 3, x + 6, x + 9 and x + 12 is 10.
Sum of the numbers = $x + x + 3 + x + 6 + x + 9 + x + 12 = 5x + 30$
Mean = 10
$\Rightarrow \frac{5x+30}{5} = 10$
$\Rightarrow 5x + 30 = 50$
$\Rightarrow 5x = 20$
$\Rightarrow x = 4$

3. Correct option : C
Explanation:
LCM × HCF = product of the integers
$\Rightarrow 36 \times 2 = 18a$
$\Rightarrow a = 4$

4. Correct option : C
Explanation:
$3x + 5y = 0$ and $kx + 10y = 0$
Condition for the system of equations to have non-zero solutions,
$\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$
$a_1 = 3, a_2 = k, b_1 = 5, b_2 = 10$
$\Rightarrow \frac{3}{k} = \frac{5}{10}$
$\Rightarrow k = 6$

5. Correct option : A
Explanation:
Consider, $A = 0°$

LHS = Sin 2A = 0
RHS = 2sin A = 0
Hence, sin 2A = 2sinA for A = 0°

6. Correct option : B
Explanation:
$\cos 1° \cos 2° \cos 3° \ldots\ldots \cos 180°$
$= \cos 1° \cos 2° \cos 3° \ldots \cos 90° \ldots \cos 180°$
$= 0 \qquad \because \cos 90° = 0$

7. Correct option : B
Explanation:
$x\sin(90-\theta)\cot(90-\theta) = \cos(90-\theta)$
$\Rightarrow x \cos\theta \tan\theta = \sin\theta$
$\Rightarrow x \sin\theta = \sin\theta$
$\Rightarrow x = 1$

8. Correct option : D
Explanation:
$(a\cos\theta + b\sin\theta, 0)$ and $(0, a\sin\theta - b\cos\theta)$

Distance = $\sqrt{(a\cos\theta+b\sin\theta)^2+(b\cos\theta-a\sin\theta)^2}$

$= \sqrt{a^2\cos^2\theta+b^2\sin^2\theta+2ab\sin\theta\cos\theta+b^2\cos^2\theta+a^2\sin^2\theta-2ab\sin\theta\cos\theta}$

$= \sqrt{a^2+b^2}$

9. Correct option : A
Explanation:
Using distance formula

$\sqrt{(4-1)^2+p^2}=5$

$\Rightarrow 9+p^2=25$

$\Rightarrow p^2=16 \Rightarrow p=\pm 4$

10. Correct option : C
Explanation:

$\left(\frac{3-7+10}{3},\frac{-5+4-k}{3}\right)=(k,-1)$

$\Rightarrow \left(2,\frac{-1-k}{3}\right)=(k,-1)$

$\Rightarrow k = 2$

11. The volume of the given figure is $\frac{1}{3}\pi h\left(r^2+R^2+rR\right)$.

12. Let α and β are the roots of the given quadratic equation.

According to the question, $\alpha = 2$ ...(i)

$x^2 + 3x + k$

Comparing with $ax^2 + bx + c$, we get $a = 1$, $b = 3$, $c = k$

$\alpha+\beta=-3$ and $\alpha\beta=k$

From (i) $2+\beta=-3 \Rightarrow \beta=-5$

$\alpha\beta=k \Rightarrow k=-10$

OR

Let α,β and γ are the zeros of the given polynomial.

$a = 2$, $b = 6$, $c = -4$, $d = 9$

$$\alpha\beta\gamma=\frac{-d}{a}=\frac{-9}{2}$$

The product of two zeros of the polynomial $f(x) = 2x^3 + 6x^2 - 4x + 9$ is 3.

$$3\gamma=\frac{-9}{2} \Rightarrow \gamma=\frac{-3}{2}$$

13. $\frac{AB}{DE}=\frac{BC}{EF}=\frac{CA}{FD}=\frac{3}{4}$

$$\Rightarrow \frac{A(\Delta ABC)}{A(\Delta DEF)}=\left(\frac{3}{4}\right)^2=\frac{9}{16}$$

14. The nth term of an A.P., the sum of whose n terms is S_n is $S_n - S_{n-1}$.

15. The word is MOBILE.

The vowels in the words are O, I, E and the total number of words are 6.

The required probability = 3/6 = ½

16. $196 = 2^2 \times 7^2$

The sum of the exponents of the prime factors in the prime factorization of 196 is 4.

17. The equal sides of an isosceles right triangle is $4\sqrt{2}$ cm.

$$\text{Hypotenuse} = \sqrt{\left(4\sqrt{2}\right)^2+\left(4\sqrt{2}\right)^2}=\sqrt{64}=8\,\text{cm}$$

18. In ΔOTP,

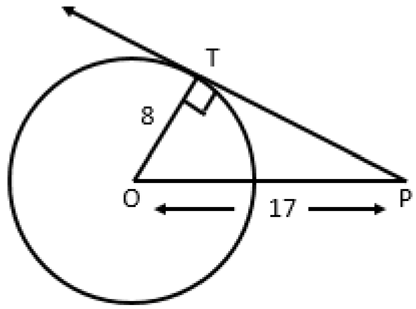
$\Rightarrow OP^2 = OT^2 + TP^2$ $\quad\because$ OT is perpendicular to the tangent

$\Rightarrow TP^2 = OP^2 - OT^2$

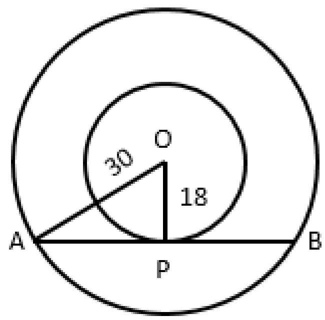
$\Rightarrow TP^2 = 17^2 - 8^2$

$\Rightarrow TP^2 = 289 - 64 = 225$

$\Rightarrow TP = 15$ cm



OR



Let O be the centre of the concentric circles of radii 30 cm and 18 cm respectively.
Let AB be a chord of the larger circle touching the smaller circle at P.
Then AP = PB and
OP is perpendicular to AB.
Using Pythagoras theorem in triangle OPA,

$\Rightarrow OA^2 = OP^2 + AP^2$

$\Rightarrow 30^2 = 18^2 + AP^2$

$\Rightarrow AP^2 = 576$

$\Rightarrow AP = 24$ cm

$\Rightarrow AB = 2AP = 48$ cm

19. -26, -24, -22,....to 36 terms

$\Rightarrow a = -26, d = 2$ and $n = 36$

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

$\Rightarrow S_{36} = \frac{36}{2}\left[2\times(-26)+(36-1)\times 2\right]$

$\Rightarrow S_{36} = 18(-52 + 70)$

$\Rightarrow S_{36} = 324$

20. $x^2 + 4x + k = 0$

$\Rightarrow a = 1, b = 4, c = k$

The equation $x^2 + 4x + k = 0$ has real and distinct roots i.e. $b^2 - 4ac > 0$

$\Rightarrow b^2 - 4ac = 4^2 - 4k = 16 - 4k$

$\Rightarrow 16 - 4k > 0$

$\Rightarrow 4k < 16$

$\Rightarrow k < 4$

Section B

21. $870 = 225 \times 3 + 195$

$225 = 195 \times 1 + 30$

$195 = 30 \times 6 + 15$

$30 = 15 \times 2 + 0$

$\therefore$ HCF (870, 225) = 15

OR

HCF (26, 169) = 13 ..... given

We know that,

HCF × LCM = Product of numbers

$$\Rightarrow \text{LCM} = \frac{169 \times 26}{13}$$

$\Rightarrow$LCM = 338

22. It is known that radius is perpendicular to the tangent at the point of contact.

Therefore, $m\angle OAT = 90^{o}$.

In ΔOAT,

$$\cos 30^\circ = \frac{AT}{OT}$$

$$\Rightarrow \frac{\sqrt{3}}{2} = \frac{AT}{OT}$$

$$\Rightarrow AT = \frac{\sqrt{3}}{2} \times OT = \frac{\sqrt{3}}{2} \times 4 = 2\sqrt{3} \text{ cm}$$

OR

Let AB be the diameter of the given circle, and let PQ and RS be the tangent lines drawn to the circle at points A and B respectively.

Since tangent at a point to a circle is perpendicular to the radius through the point of contact.

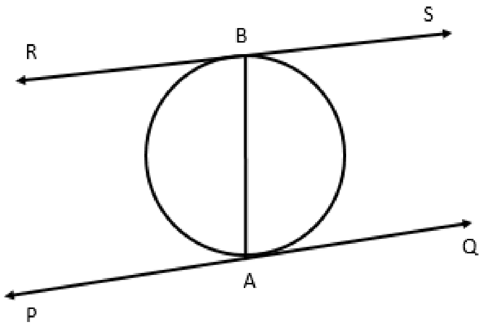
Therefore, AB is perpendicular to both PQ and RS.

$\Rightarrow \angle PAB = 90^\circ$ and $\angle ABS = 90^\circ$

$\Rightarrow \angle PAB = \angle ABS$

But, these are a pair of alternate interior angles.

Therefore, PQ is parallel to RS.



23. There are 10 ribs in an umbrella.

The area between two consecutive ribs subtends an angle of $\frac{360°}{10} = 36°$ at the centre of the assumed flat circle.

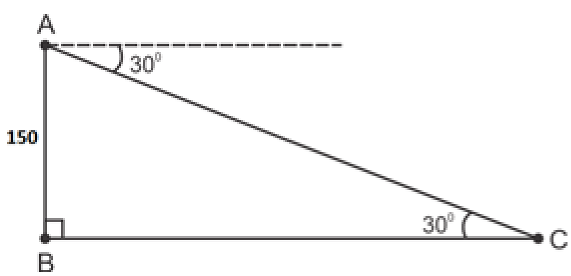
Area between two consecutive ribs of circle $= \frac{36°}{360°} \times \pi r^2$

$$= \frac{36°}{360°} \times \frac{22}{7} \times (40)^2$$

$$= \frac{1}{10} \times \frac{22}{7} \times 40 \times 40$$

$$= 502.86 \text{ cm}^2$$

24. Let AB be the tower and BC be distance between tower and car.



In ΔABC,

$$\tan 30° = \frac{AB}{BC}$$

$$\Rightarrow \frac{1}{\sqrt{3}} = \frac{150}{BC}$$

$$\therefore BC = 150\sqrt{3} \text{ m}$$

Hence, distance between the tower and car is $150\sqrt{3}$.

25. According to the question,

$n(S) = 20$

1. Let A be the event that getting a number is divisible by 2 or 3.

$A = \{6, 12, 18\}$

$\therefore n(A) = 3$

$$\therefore P(A) = \frac{n(A)}{n(S)} = \frac{3}{20}$$

2. Let B be the event that getting a prime number.

$B = \{2, 3, 5, 7, 11, 13, 17, 19\}$

$\therefore n(B) = 8$

$$\therefore P(B) = \frac{n(B)}{n(S)} = \frac{8}{20} = \frac{2}{5}$$

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

Let a be the area of smaller and A be the area of the larger triangle.

$$\frac{a}{A} = \left(\frac{2}{3}\right)^2 = \frac{4}{9}$$

$$\Rightarrow \frac{48}{A} = \frac{4}{9}$$ $\because$ Area of smaller triangle = 48 cm^2

$\Rightarrow A = 108$ cm^2

Section C

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

$$= \frac{\left(\sqrt{\sec\theta - 1}\right)^2 + \left(\sqrt{\sec\theta + 1}\right)^2}{\left(\sqrt{\sec\theta + 1}\right)\left(\sqrt{\sec\theta - 1}\right)}$$

$$= \frac{\sec\theta - 1 + \sec\theta + 1}{\sqrt{\sec^2\theta - 1}}$$

$$= \frac{2\sec\theta}{\sqrt{\tan^2\theta}}$$

$$= \frac{2\sec\theta}{\tan\theta}$$

$$= 2 \times \frac{1}{\cos\theta} \times \frac{\cos\theta}{\sin\theta}$$

$$= 2\operatorname{cosec}\theta$$

$$= \text{R.H.S.}$$

OR

$$\frac{\cos 70^\circ}{\sin 20^\circ}+\frac{\cos 59^\circ}{\sin 31^\circ}-8\sin^2 30^\circ$$

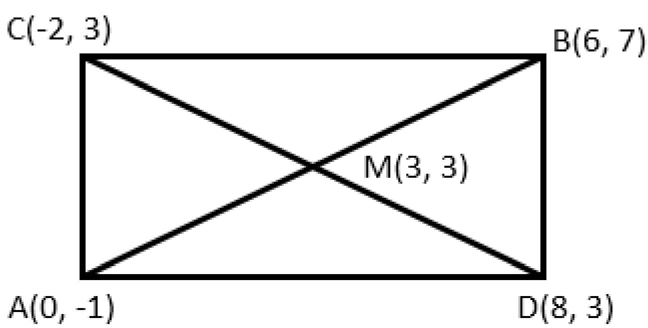
$$=\frac{\sin(90^\circ\text{-}70^\circ)}{\sin 20^\circ}+\frac{\sin(90^\circ\text{-}59^\circ)}{\sin 31^\circ}-8\left(\frac{1}{2}\right)^2$$

$$=\frac{\sin 20^\circ}{\sin 20^\circ}+\frac{\sin 31^\circ}{\sin 31^\circ}-8\times\frac{1}{4}=1+1-2=0 \qquad \text{Since, } \cos\theta=\sin(90^\circ-\theta)$$

28. The co-ordinates of the mid-point of AB is given by

$$\left(\frac{0+6}{2},\frac{-1+7}{2}\right)=(3,3)$$

The co-ordinates of the mid-point of CD are given by $\left(\frac{-2+8}{2},\frac{3+3}{2}\right)=(3,3)$



$\therefore$ Diagonals AB and CD bisect each other at the point M(3, 3).
By distance formula,
$AD^2 = (8 - 0)^2 + (3 + 1)^2 = 64 + 16 = 80$
$DB^2 = (6 - 8)^2 + (7 - 3)^2 = 4 + 16 = 20$
Also,
$AB^2 = (6 - 0)^2 + (7 + 1)^2 = 36 + 64 = 100$
Clearly, $AD^2 + DB^2 = AB^2$
Hence the park is rectangular.
Its area $= AD\times DB=\sqrt{80}\times\sqrt{20}=\sqrt{1600}=40$ sq. km
Yes, as the P.M. of my country, I will try my best to make a policy of creating green parks and gardens in every village. This will help in reducing global warming and help slow down climatic change.

29. Given equations are $2x + 3y = 7$; $(a - b)x + (a + b)y = 3a + b - 2$
The given system of equations will have infinite number of solutions, if

$$\frac{2}{a-b}=\frac{3}{a+b}=\frac{7}{3a+b-2}$$

Consider, $\dfrac{2}{a-b}=\dfrac{3}{a+b}$

$\Rightarrow 2a+2b=3a-3b$

$\Rightarrow a=5b \quad ....(i)$

Consider, $\dfrac{3}{a+b}=\dfrac{7}{3a+b-2}$

$\Rightarrow 9a+3b-6=7a+7b$

$\Rightarrow 2a-4b=6$

$\Rightarrow 2(5b)-4b=6 \quad ....[\text{From (i)}]$

$\Rightarrow 6b=6 \Rightarrow b=1$

$\Rightarrow a=5b=5\times 1=5$

Hence, $a=5$ and $b=1$

30. To obtain minimum number of rooms, we need to accommodate maximum number of participants.

In each room we should have same number of participants belonging to the same subject.

Thus, we have to find the HCF of 60, 84 and 108

$60=2^2\times 3\times 5$

$84=2^2\times 3\times 7$

$108=2^2\times 3^3$

$\text{HCF}(60,\ 84,\ 108)=2^2\times 3=12$

So, in each room 12 participants can be seated.

$$\text{Number of rooms required}=\frac{\text{Total number of participants}}{12}=\frac{60+84+108}{12}=21$$

31. Let the required point $P=(x,0)$

and the required ratio $=k:1$

Here $m_1=k$ and $m_2=1$

$x_1=3,\ x_2=-2,\ y_1=-3$ and $y_2=7$

By the Section formula,

$$(x,0)=\left[\frac{k(-2)+1(3)}{k+1},\frac{k(7)+1(-3)}{k+1}\right]$$

$$\Rightarrow (x,0)=\left[\frac{-2k+3}{k+1},\frac{7k-3}{k+1}\right]$$

$$\Rightarrow x=\frac{-2k+3}{k+1} \text{ and } 0=\frac{7k-3}{k+1}$$

$$\therefore\ 7k-3=0\Rightarrow k=\frac{3}{7}$$

Substituting in $x=\frac{-2k+3}{k+1}$, we get

$$x=\frac{-2\left(\frac{3}{7}\right)+3}{\frac{3}{7}+1}\Rightarrow x=1.5$$

$$\text{Ratio}(k:1)=\frac{3}{7}:1=3:7$$

Point of division on x-axis = (1.5,0)

32.

CI	50-60	60-70	70-80	80-90	90-100	100-110	Total
f_i	5	3	4	p	2	13	27 + p
x_i	55	65	75	85	95	105	
$f_i x_i$	275	195	300	85p	190	1365	2325+ 85p

$$\text{Mean}=\frac{\sum f_i x_i}{\sum f_i}$$

$$\Rightarrow 86=\frac{2325+85p}{27+p}$$

$$\Rightarrow 86p+2322=2325+85p$$

$$\Rightarrow p=3$$

OR

Total outcomes of a dice (1, 2, 3, 4, 5, 6) = 6

(i) Favourable outcomes (3) = 1

$$\therefore \quad \text{Probability}=\frac{\text{Favourable outcomes}}{\text{Total outcomes}}=\frac{1}{6}$$

(ii) Favourable outcomes (1, 3, 5) = 3

$\therefore \quad \text{Probability} = \dfrac{\text{Favourable outcomes}}{\text{Total outcomes}} = \dfrac{3}{6} = \dfrac{1}{2}$

(iii) Favourable outcomes (2, 3, 4, 5, 6) = 5

$\therefore \quad \text{Probability} = \dfrac{\text{Favourable outcomes}}{\text{Total outcomes}} = \dfrac{5}{6}$

33. Let $a - d$, a and $a + d$ be three terms in A.P.

According to the question,

$a - d + a + a + d = 3$

$3a = 3 \Rightarrow a = 1$

$(a - d)(a)(a + d) = -8$

$a(a^2 - d^2) = -8$

Putting the value of a = 1, we get,

$1 - d^2 = -8$

$d^2 = 9$ or $d = \pm 3$

Thus, the required three terms are −2, 1, 4 or 4, 1, −2.

OR

3, 8, 13, 18,…, 498,..

$a = 3$, $d = 8 - 3 = 5$ and $t_n = 498$

$t_n = a + (n - 1)d$

$498 = 3 + (n - 1) \times 5$

$498 - 3 = (n - 1) \times 5$

$495 = 5(n - 1)$

$n - 1 = 99$

$n = 100$

Hence, 100^{th} term of the given series is 498.

34. Let $f(x) = 2x^2 - 3x + p$

If $f(a) = 0$, then it is said that a is a zero of $f(x)$.

Given, 3 is a zero of $f(x)$.

$\therefore f(3) = 0$

$2(3)^2 - 3(3) + p = 0$

$18 - 9 + p = 0$

$p = -9$

$\therefore f(x) = 2x^2 - 3x - 9$

$= 2x^2 - 6x + 3x - 9$

$= 2x(x - 3) + 3(x - 3)$

$= (x - 3)(2x + 3)$

Thus, the other zero of $f(x)$ is $\dfrac{-3}{2}$.

Section D

35. It is given that $\angle A = 105°$, $\angle C = 30°$.

Using angle sum property of triangle, we get, $\angle B = 45°$

Steps of construction:

i. Draw a line segment BC = 6 cm.

ii. At B, draw a ray AX making an angle of 45° with BC.

iii. At C, draw a ray CY making an angle of 30° with BC. Let the two rays meet at point A.

iv. Below BC, make an acute $\angle CBZ$.

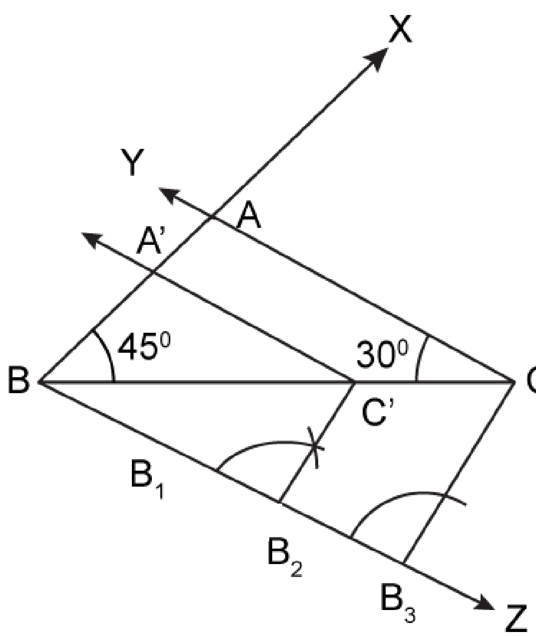
v. Along BZ, mark off three points B_1, B_2, B_3 such that $BB_1 = B_1B_2 = B_2B_3$.

vi. Join B_3C.

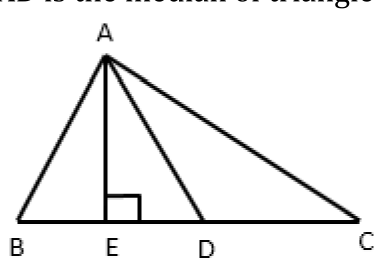
vii. From B_2, draw $B_2C' \parallel B_3C$.

viii. From C′, draw $C'A' \parallel CA$, meeting BA at the point A′.

ix. Then A′BC′ is the required triangle.



36. AD is the median of triangle ABC since D is the mid-point of BC.



$\Rightarrow BD = DC = \frac{BC}{2}$ ....(i)

In right ΔAEB,

$AB^2 = AE^2 + BE^2$ (Pythagoras theorem)

$\Rightarrow AB^2 = (AD^2 - DE^2) + (BD - DE)^2$

$\Rightarrow AB^2 = AD^2 - DE^2 + \left(\frac{BC}{2} - DE\right)^2$ ....(From (i))

$\Rightarrow AB^2 = AD^2 - DE^2 + \frac{BC^2}{4} + DE^2 - 2\left(\frac{BC \times DE}{2}\right)$

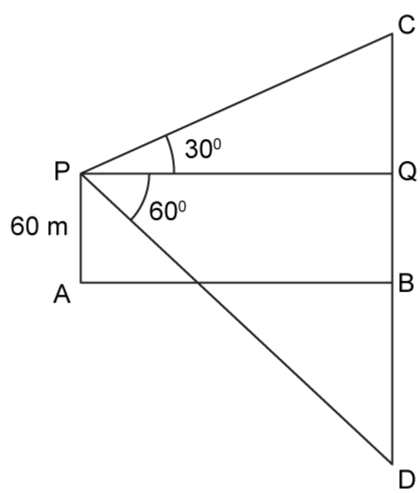
$\Rightarrow AB^2 = AD^2 - BC \times DE + \frac{BC^2}{4}$ (Hence proved)

37. Let C be the cloud and D be its reflection. Let the height of the cloud be H metres.

BC = BD = H

BQ = AP = 60 m.

Therefore CQ = H − 60 and DQ = H + 60



In ΔCQP,

$\frac{PQ}{CQ} = \cot 30°$

$\Rightarrow \frac{PQ}{H-60} = \sqrt{3}$

$\Rightarrow PQ = (H - 60)\sqrt{3}$ m ....(i)

In ΔDQP,

$\frac{PQ}{DQ} = \cot 60°$

$\Rightarrow \frac{PQ}{H+60} = \frac{1}{\sqrt{3}}$

$\Rightarrow PQ = \frac{(H+60)}{\sqrt{3}}$ ....(ii)

From (i) and (ii),

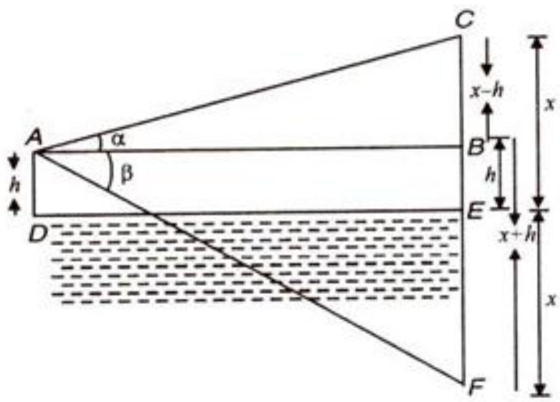
$$(H-60)\sqrt{3} = \frac{(H+60)}{\sqrt{3}}$$

$\Rightarrow 3H - 180 = H + 60$

$\Rightarrow H = 120$

Thus, the height of the cloud is 120 m.

OR



Let height of the cloud above water level be = x

Then, BC = x – h and BF = x + h

$$\frac{BC}{AB} = \tan\alpha$$

$\Rightarrow \quad x - h = AB \tan\alpha \quad$ ...(i)

and $\quad x + h = AB \tan\beta \quad$ ...(ii)

Dividing (i) by (ii), $\dfrac{x-h}{x+h} = \dfrac{\tan\alpha}{\tan\beta}$,

use Componendo – Dividendo to get x

$$\frac{x-h+x+h}{x-h-x-h} = \frac{\tan\alpha + \tan\beta}{\tan\alpha - \tan\beta}$$

$$\frac{2x}{-2h} = \frac{(\tan\beta+\tan\alpha)}{-(\tan\beta-\tan\alpha)} \text{ or } x = h\frac{(\tan\beta+\tan\alpha)}{(\tan\beta-\tan\alpha)}$$

38. Diameter of graphite = 1 mm = 0.1 cm

Therefore, radius of graphite = $\dfrac{0.1}{2}$ = 0.05 cm

Length of pencil = 10 cm

Volume of graphite = $\pi r^2 h = \dfrac{22}{7} \times (.05)^2 \times 10 = 0.0785$ cm^3

Therefore, weight of graphite = volume × density = 0.0785 × 2.3 = 0.180 gm

Diameter of the pencil = 0.7 cm

Therefore, radius of the pencil = 0.35 cm

Therefore, volume of the pencil = $\pi R^2 h = \frac{22}{7} \times (0.35)^2 \times 10 = 3.85 \text{ cm}^3$

Therefore, volume of wood = Volume of pencil – Volume of graphite

$= (3.85 - 0.0785) \text{ cm}^3$

$= 3.771 \text{ cm}^3$

Weight of wood = Volume × density = $3.771 \times 0.6 = 2.2626$ gm

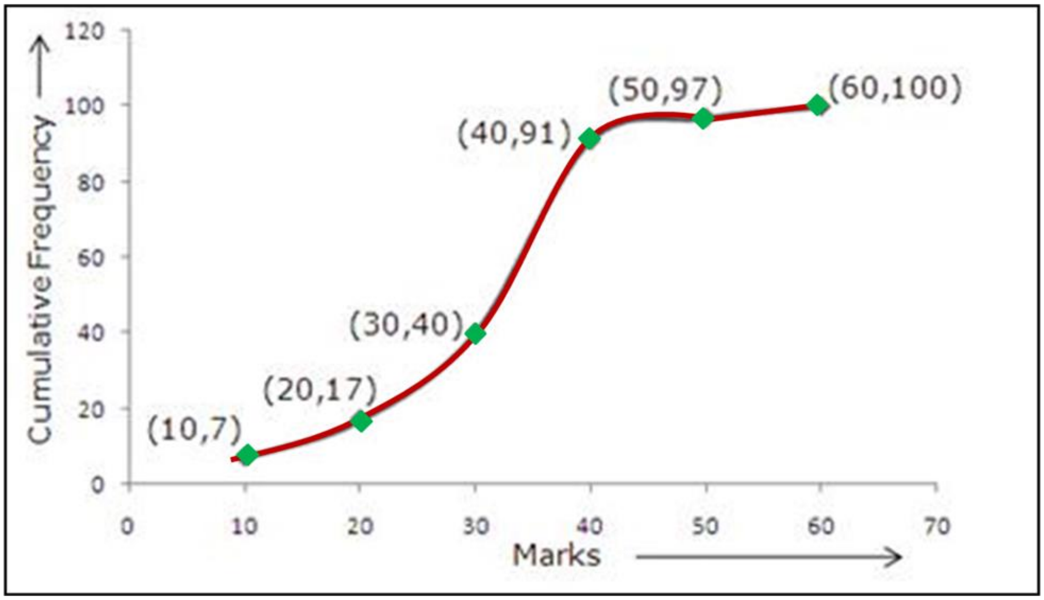
39. We first prepare the cumulative frequency distribution table as given below:

Marks	No. of students	Marks less than	Cumulative frequency
0-10	7	10	7
10-20	10	20	17
20-30	23	30	40
30-40	51	40	91
40-50	6	50	97
50-60	3	60	100

Now, we mark the upper class limits along x-axis by taking a suitable scale and the cumulative frequencies along the y-axis by taking a suitable scale.

Thus, we plot the points (10, 7), (20, 17), (30, 40), (40, 91), (50, 97) and (60, 100).

Join the plotted points by a free hand to obtain the required ogive.



OR

x_i	f_i	f_ix_i
3	6	18
5	8	40
7	15	105
9	p	9p
11	8	88
13	4	52
	$\sum f_i = 41 + p$	$\sum f_ix_i = 303 + 9p$

$$\sum f = 41 + p,\ \sum fx = 303 + 9p$$

$$\text{Mean} = \frac{\sum fx}{\sum f}$$

$$\Rightarrow 7.5 = \frac{303 + 9p}{41 + p}$$

$$\Rightarrow\ 7.5\,(41 + p) = 303 + 9p$$

$$\Rightarrow 307.5 + 7.5p = 303 + 9p$$

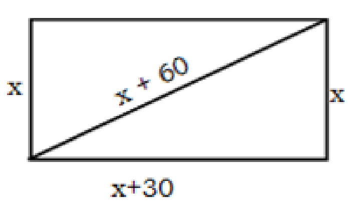
$$\Rightarrow 4.5 = 1.5p$$

$$\Rightarrow\ p = 3$$

40. Let the shorter side be x metres.

$\Rightarrow$ Diagonal = (x + 60) metres

$\Rightarrow$ Longer side = (x + 30) metres



By applying Pythagoras theorem,

$(x + 30)^2 + x^2 = (x + 60)^2$

$\Rightarrow x^2 + 60x + 900 + x^2 = x^2 + 3600 + 120x$

$\Rightarrow x^2 - 60x - 2700 = 0$

$\Rightarrow x^2 - 90x + 30x - 2700 = 0$

$\Rightarrow x(x - 90) + 30(x - 90) = 0$

$\Rightarrow (x - 90)(x + 30) = 0$

$\Rightarrow x = 90$ or $x = -30$

But, side cannot be negative.

So, x = 90 = shorter side

$\Rightarrow$ Longer side = x + 30 = 90 + 30 = 120 m

Thus, shorter side = 90 m, longer side = 120 m

OR

Let the speed of the boat in still water be x kmph, then

Speed of the boat downstream = (x + 2) kmph

And the speed of the boat upstream = (x − 2) kmph

Time taken to cover 8 km downstream = $\frac{8}{(x+2)}$ hrs

Time taken to cover 8 km upstream = $\frac{8}{(x-2)}$ hrs

Total time taken = $\frac{5}{3}$ hrs

$$\frac{8}{(x+2)}+\frac{8}{(x-2)}=\frac{5}{3}\Rightarrow\frac{1}{x+2}+\frac{1}{x-2}=\frac{5}{24}$$

$$\Rightarrow\frac{x-2+x+2}{(x+2)(x-2)}=\frac{5}{24}\Rightarrow\frac{2x}{x^2-4}=\frac{5}{24}$$

$$\Rightarrow 5x^2-20-48x=0$$

$$\Rightarrow 5x^2-48x-20=0$$

$$\Rightarrow 5x^2-50x+2x-20=0$$

$$\Rightarrow 5x(x-10)+2(x-10)=0$$

$$\Rightarrow (x-10)(5x+2)=0$$

$$\Rightarrow x=10 \text{ or } x=\frac{-2}{5}$$

$$\Rightarrow x=10 \ (\text{speed cannot be negative})$$

Then the speed of the boat in still water is 10 kmph.