Solution

Class 10 - Mathematics

2020-21 paper 8

Part-A

1. Prime factorization:
   360 = $2^3 \times 3^2 \times 5$

   OR

   The HCF of given numbers is
   $2 \times 2 \times 3 \times 5$ = 60
2. we have, $3x^2 + 2kx + 3 = 0$
   put, x = $\frac{-1}{2}$ (given)
   $\Rightarrow 3(\frac{-1}{2})^2 + 2k(\frac{-1}{2}) + 3 = 0$
   $\Rightarrow 3(\frac{1}{4})$ - k + 3 = 0
   $\Rightarrow \frac{3}{4}$ - k +3 = 0
   $\Rightarrow k = 3 + \frac{3}{4}$
   $\therefore k = \frac{15}{4}$
3. $12x + 17y = 53$............(i)
   and $17x + 12y = 63$.....(ii)
   Adding (i) and (ii), we get
   $29x + 29y = 116$
   $\Rightarrow$ x + y = 4
4. A tangent is a line that intersects a circle at only one point on its circumference. On the other hand, a secant is a line that cuts through a circle such that it touches at two points of the circumference.
   Therefore, a circle can have a maximum o**f two tangents parallel to a secant.**
5. We know that nth term is: a_n= a + (n-1) d
   Here, a_n = 64
   $\therefore$ 64 = a + (n -1) d
   $\Rightarrow$ 64 = 4 + (n-1)3
   $\Rightarrow$ 60 = (n - 1)3
   $\Rightarrow$ 20 = n - 1
   $\Rightarrow$ n = 21
   So, 64 is the 21st term of the given A.P.

   OR

   Sequence is 4,9,14,19, ...
   Clearly, the given sequence is an A.P. with first term a = 4 and common difference d = 5
   Let 124 be the nth term of the given sequence.
   Then, a_n = 124
   ⇒ a+(n-1) d = 124
   ⇒ 4+(n-1) x 5 = 124
   ⇒ 4 + 5n - 5 = 124
   ⇒ 5n-1 = 124
   ⇒ 5n = 124 + 1
   ⇒ 5n = 125
   ⇒ n = 125/5
   ⇒n=25
   Hence, 25th term of the given sequence 4,9,14,19, ... is 124.
6. $a_n = a + (n-1)d$; $a_k = a + (k-1)d$
   Now, $a_n - a_k = [a + (n-1)d] - [a + (k-1)d] = (n-1)d - (k-1)d = (n-1-k+1)d$
   $\Rightarrow a_n - a_k = (n-k)d$ ...(1)

Here $a_{11} = 5$, $a_{13} = 79$

Taking n = 13, k = 11, eq. (1) becomes

$a_{13} - a_{11} = (13 - 11)d \Rightarrow 79 - 5 = 2d \Rightarrow d = 37$

7. $(2x-1)(x-3)=(x+4)(x-2)$

$\Rightarrow 2x^2-7x+3=x^2+2x-8$

$\Rightarrow x^2-9x+11=0$

This is of the form $ax^2 + bx + c = 0$, where a = 1, b = -9 and c = 11.

Hence, the given equation is a quadratic equation.

OR

We have, x = 4 and x = -3.

Then,

x - 4 = 0 and x + 3 = 0

$\Rightarrow (x - 4)(x + 3) = 0$

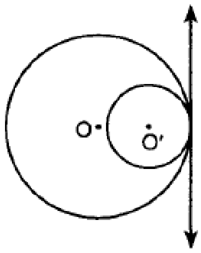
$\Rightarrow x^2 + 3x - 4x - 12 = 0$

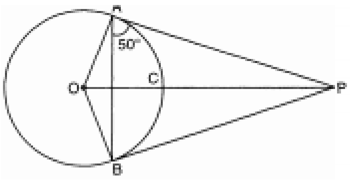
$\Rightarrow x^2 - x - 12 = 0$

This is the required quadratic equation

8. 1 common tangent can be drawn to two circles touching internally

Figure:



9. 

Since, AO is the radius and AP is the tangent from an external point P

Therefore, $\angle OAP=90^0$ (Theorem: Tangents and radius are always perpendicular to each other at point of contact)

$\Rightarrow \angle OAB=90^\circ-50^\circ$

$\Rightarrow \angle OAB=40^\circ$

$\angle OAB=\angle OBA=40^\circ$ (OA and OB are radii)

$\therefore \angle AOB+40^\circ+40^\circ=180^\circ$

$\angle AOB=180^\circ-80^\circ=100^\circ$

Hence $\angle AOB=100^\circ$

OR

Given,PQ is a tangent at a point C to circle with centre O and $\angle CAB=30^o$.

Join OC.

$\therefore OA=OC$ [$\because$ radii of a circle]

$\Rightarrow \angle OCA=\angle OAC$ [$\because$ angles opposite to equal sides of a triangle are equal]

$\Rightarrow \angle OCA=30^o\ [\angle OAC=30^o]$...(i)

A tangent is perpendicular to the radius at the point of contact.

$\therefore OC\perp PQ$

$\Rightarrow \angle OCP=90^o$

$\Rightarrow \angle OCA+\angle PCA=\angle OCP$

$\Rightarrow \angle OCA+\angle PCA=90^o$

$\Rightarrow 30^o+\angle PCA=90^o$ [$\because$Using Eq(i)]

$\Rightarrow \angle PCA=90^o-30^o$

$\Rightarrow \angle PCA=60^o$

10. From figure,
DE || BC
Therefore, by Thales theorm ,we have,
$\frac{AD}{AB}$ = $\frac{AE}{AC}$
AC = $\frac{AE \times AB}{AD}$
= $\frac{AE \times (AD+DB)}{AD}$
= $\frac{8 \times (6+9)}{6}$
= $\frac{8 \times 15}{6}$
= 20
11. Here, a_n = $\frac{3n-2}{4n+5}$
Therefore, a_7 = $\frac{3 \times 8-2}{4 \times 8+5} = \frac{22}{37}$
and a_8 = $\frac{3 \times 8-2}{4 \times 8+5} = \frac{22}{37}$
12. Given equation is
$sinx + cosx = 1$ ...(i)
Since x = 30,
Therefore, value of sin30 = $\frac{1}{2}$
By substituting the value of sinx in (i) we get
cosy = $\frac{1}{2}$
cos60 = $\frac{1}{2}$
Therefore cosy = cos 60
$\Rightarrow$ y = 60.
13. We have,
$\frac{\cos 37^\circ}{\sin 53^\circ}$
$= \frac{\cos(90^\circ - 53^\circ)}{\sin 53^\circ}$
$= \frac{\sin 53^\circ}{\sin 53^\circ}$.[Since, Cos (90°- A) = SinA].
= 1.
14. Let the radius of both sphere & cone be r.
Let the height of the cone be h.
Volume of sphere = $\frac{4}{3}\pi r^3$
and volume of cone = $\frac{1}{3}\pi r^2 h$
ATQ, $\frac{4}{3}\pi r^3 = \frac{1}{3}\pi r^2 h$ (given, volumes are equal)
Or, 4r = h
So, Height of cone = 4r
Diameter of sphere = 2r
diameter of sphere : height of cone = 2r : h = 2r : 4r = 1 : 2
15. The given A.P is 20, 17, 14, 11, ...
First term, a = 20
Common difference, d = - 3
nth term of the A.P, a_n = a + (n - 1)d = 20 + (n - 1) $\times$ (- 3)
$\therefore$ 35th term of the A.P, a_{35} = 20 + (35 - 1) $\times$ (-3) = 20 - 102 = - 82
16. Total number of out comes with numbers 2 to 101, n(s) = 100
Let E_2 = Event of selecting a card which is a square number
= {4, 9, 16, 25, 36, 49, 64, 81, 100}
= {$(2)^2,(3)^2,(4)^2,(5)^2,(6)^2,(7)^2,(8)^2,(9)^2,(10)^2$}
= n(E_2) = 9
Hence, required probability = $\frac{n(E_2)}{n(S)} = \frac{9}{100}$

OR

Given: A card is drawn at random from a pack of 52 cards
To find: Probability of the following
Total number of cards = 52
Total number of red cards = 26
We know that, probability $= \frac{\text{Number of favourable event}}{\text{Total number of event}}$
Hence probability of getting a red cards = $\frac{26}{52} = \frac{1}{2}$

17. i. (b) A(1, 7), B(4, 2), C(-4, 4)
Distance travelled by Seema, AC = $\sqrt{[-4-1]^2+[4-7]^2} = \sqrt{34}$ units
Distance travelled by Aditya, BC = $\sqrt{[-4-4]^2+[4-2]^2} = \sqrt{68}$ units
$\therefore$ Aditya travels more distance
ii. (d) By using mid-point formula,
Coordinates of D are $\left(\frac{1+4}{2}, \frac{7+2}{2}\right) = \left(\frac{5}{2}, \frac{9}{2}\right)$
iii. $\text{ar}(\Delta\text{ABC}) = \frac{1}{2}$[1(2 - 4) + 4(4 - 7) - 4(7 - 2)]
= 17 sq. units
iv. (b) (-4, 4)
v. (d) (4, 2)

18. i. (c) DE
ii. (b) 1.6 m
iii. (a) 4.8 m
iv. (c) Angle B and Angle E are common
v. (d) lamp-post, the girl

19. i. (c) 43
ii. (c) 60
iii. (b) Median
iv. (c) 80
v. (c) 31

20. i. (b) CSA of cylindrical portion + CSA of the conical portion
ii. (a) $\pi r^2\left(\frac{1}{3}r+h\right)$ cubic units
iii. (c) ₹ 11088
iv. (c) ₹ 332640
v. (d) 2:1

Part-B

21. Clearly, the required number divides (245 - 5) = 240 and (1037 - 5) = 1032 exactly.
So, the required number is HCF of (240, 1032).

2	240
2	120
2	60
2	30
3	15
	5

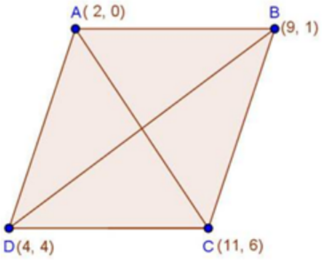
2	1032
2	516
2	258
3	129
	43

Now $240 = 2\times2\times2\times2\times3\times5 = \left(2^4\times3\times5\right)$
and $1032 = 2\times2\times2\times3\times43 = \left(2^3\times3\times43\right)$
$\therefore$ HCF (240, 1032)= $\left(2^3\times3\right)$
HCF (240, 1032) = 24
Hence, the largest number which divides 245 and 1037, leaving remainder 5 is 24.

22. Let A $\rightarrow$ (1, 5)
B $\rightarrow$ (2, 3)
C $\rightarrow$ (-2, -11)
Then $AB = \sqrt{(2-1)^2+(3-5)^2} = \sqrt{1+4} = \sqrt{5}$

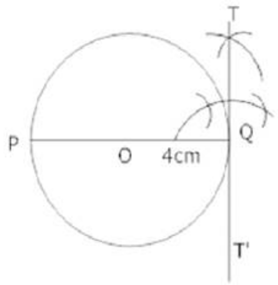
$BC = \sqrt{(-2-2)^2 + (-11-3)^2} = \sqrt{(-4)^2 + (-14)^2}$
$= \sqrt{16+196} = \sqrt{212}$
$CA = \sqrt{[1-(-2)]^2 + [5-(-11)]^2} = \sqrt{(3)^2 + (16)^2}$
$= \sqrt{9+256} = \sqrt{265}$
We see that
AB + BC ≠ CA
BC + CA ≠ AB
and CA + AB ≠ BC
Hence, the given points are not collinear.

OR



Let A(2, 0), B(9, 1), C(11, 6) and D(4, 4) be the given points.
Coordinates of mid-point of AC are $\left(\frac{11+2}{2}, \frac{6+0}{2}\right) = \left(\frac{13}{2}, 3\right)$
Coordinates of mid-point of BD are $\left(\frac{9+4}{2}, \frac{1+4}{2}\right) = \left(\frac{13}{2}, \frac{5}{2}\right)$
Since, coordinates of mid-point of AC $\neq$ coordinates of mid-point of BD.
So, ABCD is not a parallelogram, Hence, it is not a rhombus.

23. The given polynomial is p(y) = $2y^2 + 7y + 5$
Here a = 2 , b = 7 , c = 5
α, β are two zeroes
So sum of the zeroes = $\alpha + \beta$ = $\frac{-b}{a}$ = $\frac{-7}{2}$
Product of zeroes = $\alpha\beta$ = $\frac{c}{a}$ = $\frac{5}{2}$.
Now just put the values
$\alpha + \beta + \alpha\beta$ = $(\alpha + \beta) + \alpha\beta$
= $\frac{-7}{2}$ + $\frac{5}{2}$
= $\frac{-2}{2}$ = -1
So the value of $\alpha + \beta + \alpha\beta$ is -1.

24. 

Steps of construction:
i. Draw a circle of radius 4 cm.
ii. Draw diameter POQ.
iii. Construct. $\angle PQT = 90^\circ$
iv. Produce PQ to T', then TQT' is the required tangent at the point Q.

25. L.H.S = $\sec^4\theta - \sec^2\theta$
= $\sec^2\theta (\sec^2\theta - 1)$
= $\sec^2\theta (\tan^2\theta)$ [$\because 1 + tan^2\theta = sec^2\theta$ or $tan^2\theta = sec^2\theta - 1$]

= (1+ $\tan^2\theta$) $\tan^2\theta$ = $\tan^2\theta$ + $\tan^4\theta$ = R.H.S

Hence proved.

OR

We have,

$2\left(\frac{\cos 58^\circ}{\sin 32^\circ}\right)-\sqrt{3}\left(\frac{\cos 38^\circ cosec 52^\circ}{\tan 15^\circ \tan 60^\circ \tan 75^\circ}\right)$

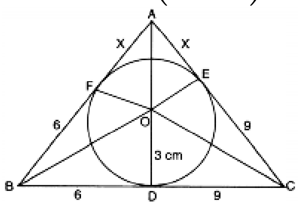
$=2\left\{\frac{\cos(90^\circ-32^\circ)}{\sin 32^\circ}\right\}-\sqrt{3}\left\{\frac{\cos 38^\circ cosec(90^\circ-38^\circ)}{\tan 15^\circ \tan 60^\circ \tan(90^\circ-15^\circ)}\right\}$

$=2\left(\frac{\sin 32^\circ}{\sin 32^\circ}\right)-\sqrt{3}\left\{\frac{\cos 38^\circ \sec 38^\circ}{\tan 15^\circ \times\sqrt{3}\times\cot 15^\circ}\right\}$

$[\because\ \cos(90-\theta)=\sin\theta\ ,\ \cos ec\,(90-\theta)=sec\theta,\ \tan(90-\theta)=cot\theta\ ]$

$=2-\sqrt{3}\left\{\frac{\cos 38^\circ\times\frac{1}{\cos 38^\circ}}{\tan 15^\circ\times\sqrt{3}\times\frac{1}{\tan 15^\circ}}\right\}=2-\frac{\sqrt{3}}{\sqrt{3}}=2-1=1\left[sec\theta=\frac{1}{\cos\theta},\ cot\theta=\frac{1}{\tan\theta}\right]$

therefore, $2\left(\frac{\cos 58^\circ}{\sin 32^\circ}\right)-\sqrt{3}\left(\frac{\cos 38^\circ cosec 52^\circ}{\tan 15^\circ \tan 60^\circ \tan 75^\circ}\right)=1$

26. 

Let, AF = AE = x

ar $\triangle$ABC = ar$\triangle$AOB + ar$\triangle$BOC + ar$\triangle$AOC

ar $\triangle$ABC = $\frac{1}{2}(15)(3)+\frac{1}{2}(6+x)(3)+\frac{1}{2}(9+x)(3)$

$\frac{1}{2}[15+6+x+9+x].3=54$

45 + 3x - 54

x = 3

$\therefore$ AB = 9 cm, AC = 12 cm

and BC = 15 cm.

27. $P(x)=x\left(8x^3+27\right)$

$=x(2x+3)\left(4x^2-6x+9\right)$ Using identity $a^3+b^3=(a+b)\left(a^2+b^2-ab\right)$

$Q(x)=2x^2\left(2x^2+6x+3x+9\right)$

$=2\times x^2[2x(x+3)+3(x+3)]$

$=2\times x^2\times(x+3)(2x+3)$

Common on factors: x, $(2x+3)$

Uncommon on factors: $\left(4x^2-6x+9\right)$ and $2,x,(x+3)$

$\therefore \text{LCM of } P(x) \text{ and } Q(x)=2\times x^2(x+3)(2x+3)\left(4x^2-6x+9\right)$

28. The given equation is:

$\frac{1}{2x-3}+\frac{1}{x-5}=\frac{10}{9}$

$\Rightarrow \frac{x-5+2x-3}{(2x-3)(x-5)}=\frac{10}{9}$

$\Rightarrow \frac{3x-8}{(2x-3)(x-5)}=\frac{10}{9}$

$\Rightarrow$ 27x - 72 = 10[(2x - 3) (x - 5)] (By cross multiplication method)

$\Rightarrow$ 27x - 72 = 10[2x^2 - 10x - 3x + 15]

$\Rightarrow$ 27x - 72 = 10[2x^2 - 13x + 15]

$\Rightarrow$ 27x - 72 = 20x^2 - 130x + 150

$\Rightarrow$ 20x^2 - 157x + 222 = 0

Here , a = 20, b = -157, c = 222

Therefore, by quadratic formula we have:

$x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$

$\Rightarrow x=\frac{157\pm\sqrt{(-157)^2-4(20)(222)}}{40}$

$\Rightarrow x = \frac{157 \pm \sqrt{24649-17760}}{40}$

$\Rightarrow x = \frac{157 \pm \sqrt{6889}}{40}$

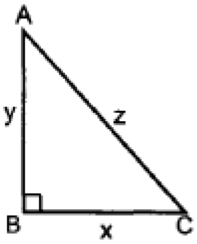
$\Rightarrow x = \frac{157 \pm 83}{40}$

$\Rightarrow x = \frac{157+83}{40}$ or $x = \frac{157-83}{40}$

$\Rightarrow$ x = 6 or x = $\frac{37}{20}$

OR

Let shortest side be x units and other side be y units



Hypotenuse = z units

As per given condition

The perimeter of right-angled triangle is five times the length of its shortest side.

So, x + y + z = 5x

$\Rightarrow$y + z= 4x

$\Rightarrow$ z = 4x - y ...(i)

The numerical value of the area of the triangle is 15 times the numerical value of the length of the shortest side.

So, area of the rectangle is = 15x

$\Rightarrow \frac{1}{2}$x·y = 15x

$\Rightarrow$ y = 30 ....(ii)

Using Pythagoras Theorem, we get

$z^2 = x^2 + y^2$

$\Rightarrow (4x - y)^2 = x^2 + y^2$ [from (i)]

$\Rightarrow (4x - 30)^2 = x^2 + (30)^2$ [Using (ii)]

$\Rightarrow 16x^2 - 240x + 900 = x^2 + 900$

$\Rightarrow 15x^2 - 240x = 0$

$\Rightarrow$15x(x - 16) = 0

$\Rightarrow$x = 0(rejecting) or x = 16

$\therefore$x = 16

$\therefore$length of the shortest side = 16 units

length of other side = 30 units

length of hypotenuse z = 4 $\times$ 16 - 30 = 34 units

29. $p(y) = 7y^2 - \frac{11}{3}y - \frac{2}{3} = \frac{1}{3}(21y^2 - 11y - 2)$

$= \frac{1}{3}(21y^2 - 14y + 3y - 2)$

$= \frac{1}{3}[7y(3y - 2) + 1(3y - 2)]$

$= \frac{1}{3}[(7y + 1)(3y - 2)]$

$\therefore$ Zeroes are $\frac{2}{3}, -\frac{1}{7}$

Sum of Zeroes = $\frac{2}{3} - \frac{1}{7} = \frac{11}{21}$

$\frac{-b}{a} = \frac{11}{21}$

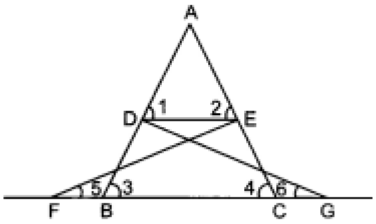
$\therefore$ sum of zeroes = $\frac{-b}{a}$

Product of Zeroes = $(\frac{2}{3})(-\frac{-1}{7}) = -\frac{2}{21}$

$\frac{c}{a} = -\frac{2}{3}(\frac{1}{7}) = -\frac{2}{21}$

$\therefore$ Product = $\frac{c}{a}$

30. Given: $\triangle \mathrm{FEC} \cong \triangle \mathrm{GBD}$ and $\angle 1 = \angle 2$



To prove: $\triangle \mathrm{ADE} \sim \triangle \mathrm{ABC}$

Proof: In $\Delta \mathrm{ADE}, \quad \angle 1 = \angle 2$ (Given)

$\Rightarrow$ AE = AD ....(i) (sides opposite to equal angles are equal)

Also, $\Delta \mathrm{FEC} \cong \Delta \mathrm{GBD}$ (Given)

$\Rightarrow$ BD = EC (by CPCT) ....(ii)

$\angle 3 = \angle 4$ [By CPCT]

Also AE + EC = AD + BD

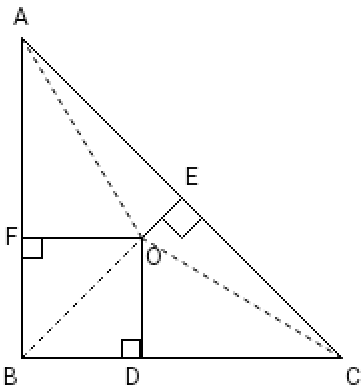
AC = AB ....(iii)

Dividing (i) and (iii), we get

$\frac{AD}{AB} = \frac{AE}{AC}$ and $\angle A = \angle A$ (common)

$\therefore \quad \triangle ADE \sim \triangle ABC$ (SAS similarity)

OR



In right triangles $\triangle$ODB and $\triangle$ODC, we have

$OB^2 = OD^2 + BD^2$ [Using Pythagoras Theorem]

and, $OC^2 = OD^2 + CD^2$

Subtracting them, we get

$\therefore OB^2 - OC^2 = (OD^2 + BD^2) - (OD^2 + CD^2)$

$\Rightarrow OB^2 - OC^2 = BD^2 - CD^2$ ...(i)

Similarly, we have

$OC^2 - OA^2 = CE^2 - AE^2$ ....(ii) [Using Pythagoras Theorem In $\triangle$AOE and $\triangle$COE]

and, $OA^2 - OB^2 = AF^2 - BF^2$ ...(iii) [Using Pythagoras Theorem In $\triangle$ AOF and $\triangle$BOF]

Adding (i), (ii) and (iii), we get

$(OB^2 - OC^2) + (OC^2 - OA^2) + OA^2 - OB^2) = (BD^2 - CD^2) + (CE^2 - AE^2) +(AF^2 - BF^2)$

$\Rightarrow (BD^2 + CE^2 + AF^2) - (AE^2 + CD^2 + BF^2) = 0$

$\Rightarrow AF^2 + BD^2 + CE^2 = AE^2 + BF^2 + CD^2$

Hence Proved

31. Side of square $= 6\ units$

Since A and B are the mid-point of KL and LM,

$KA = AL = LB = BM = 3 units$

$\therefore$Area of square = $6 \times 6 = 36\ sq.units$

Area of $\triangle$AJB = area of square - area of $\triangle$AKJ - area of $\triangle$BMJ - Area of $\triangle ALB$

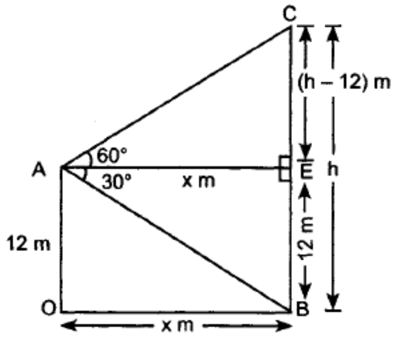
$=36 - \frac{1}{2} \times 6 \times 3 - \frac{1}{2} \times 3 \times 3 - \frac{1}{2} \times 6 \times 3$

$=36 - 9 - 4.5 - 9$

=13.5 $square\ units$

Probability that the point will be chosen from the interior of $\triangle$AJB $= \frac{\text{Area } \Delta JAB}{\text{Area of square}} = \frac{13.5}{36} = \frac{135}{360} = \frac{3}{8}$.

32. A is the position of the man, OA = 12 m, BC is cliff.



BC = h m and CE = (h - 12)m

Let $\text{AE} = \text{OB} = x$ m

In right angled triangle AEB,

$\frac{\text{AE}}{\text{BE}} = \cot 30^\circ \Rightarrow \text{AE} = 12 \times \sqrt{3}$

$= 12 \times 1.732\text{m} = 20.78\text{m}$

$\therefore$ Distance of ship from cliff = 20.78 m.

In right angled triangle AEC,

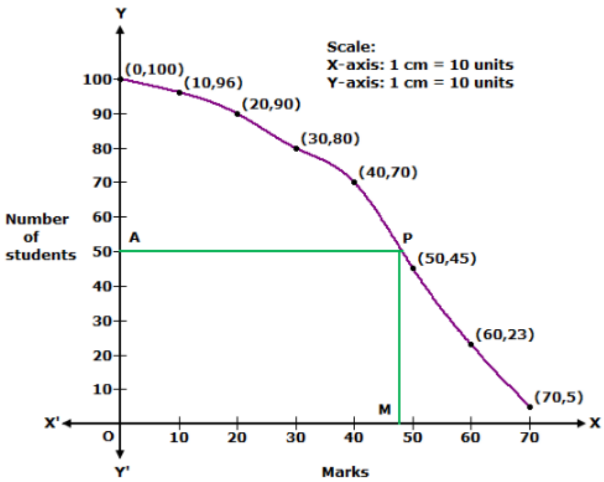
$\frac{CE}{AE} = \tan 60^\circ \Rightarrow \frac{h-12}{12\sqrt{3}} = \sqrt{3}$

$h - 12 = 36 \Rightarrow h = 48\text{m}$

33.

Marks	Cumulative Frequency
More than 0	100
More than 10	96
More than 20	90
More than 30	80
More than 40	70
More than 50	45
More than 60	23
More than 70	5

We plot the points (0, 100), (10, 96), (20, 90), (30, 80), (40, 70), (50, 45), (60, 23) and (70, 5) to get the 'more than type' ogive as follows:



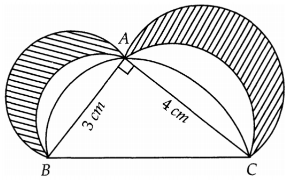
At y = 50, affix A.

Through A, draw a horizontal line meeting the curve at P.

Through P, a vertical line is drawn which meets OX at M.

OM = 47 units

Hence, median marks = 47

34. 

In $\triangle ABC, \angle A = 90^\circ$, AB = 3 cm, and AC = 4 cm

$BC^2 = AB^2 + AC^2$

$BC = \sqrt{AB^2 + AC^2}$

$= \sqrt{3^2 + 4^2}$

$= \sqrt{9 + 16}$

$= \sqrt{25}$

= 5 cm.

Area of semicircle with radius $\frac{3}{2}$cm + area semi circle with radius $\frac{4}{2}$cm = (area semicircle with radius $\frac{5}{2}$cm - area $\triangle ABC$)

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

$= \frac{\pi}{2}\left(\frac{25}{4}\right) - 3 \times 2$

$= \left(\frac{25}{8}\pi - 6\right) \mathrm{cm}^2$

Area of shaded region

$= \frac{\pi}{2}\left(\frac{3}{2}\right)^2 + \frac{\pi}{2}(2)^2 - \left[\frac{25}{8}\pi - 6\right] \mathrm{cm}^2$

$= \frac{\pi}{2}\left[\frac{9}{4} + 4 - \frac{25}{4}\right] + 6$

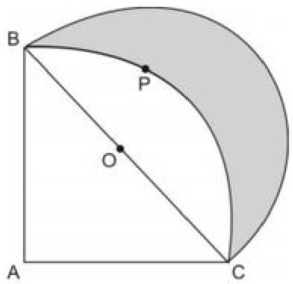
$= \frac{\pi}{2}\left[\frac{9}{4} + \frac{16-25}{4}\right] + 6$

$= \frac{\pi}{2}\left[\frac{9}{4} - \frac{9}{4}\right] + 6$

$= \frac{\pi}{2}[0] + 6$

= 6 cm^2

OR



Given, radius of the quadrant AB = AC = 14 cm

$BC^2 = AB^2 + AC^2$

$BC^2 = 14^2 + 14^2$

$\therefore \quad BC = \sqrt{14^2 + 14^2} = 14\sqrt{2}\mathrm{cm}$

$\therefore$ radius of semicircle = $7\sqrt{2}\mathrm{cm}$

Area of semicircle =$\frac{1}{2} \times \pi r^2$

$= \frac{1}{2} \times \frac{22}{7} \times \left(7\sqrt{2}\right)^2$

$= \frac{1}{2} \times \frac{22}{7} \times 7\sqrt{2} \times 7\sqrt{2}$

$= 11 \times \sqrt{2} \times 7\sqrt{2}$

$= 11 \times 7 \times 2$

= 154 cm^2

Area of segment BPCO $= \frac{\pi r^2 \theta}{360^\circ} - \frac{1}{2}\sin\theta r^2$

$= r^2\left(\frac{\pi\theta}{360} - \frac{1}{2}\sin\theta\right)$

$= 14 \times 14\left(\frac{22}{7} \times \frac{90}{360} - \frac{1}{2}\sin 90^{\circ}\right)$
$= 14 \times 14 \times \frac{2}{7}$
$= 56\ \text{cm}^2$

Hence, area of shaded region = 56 cm^2

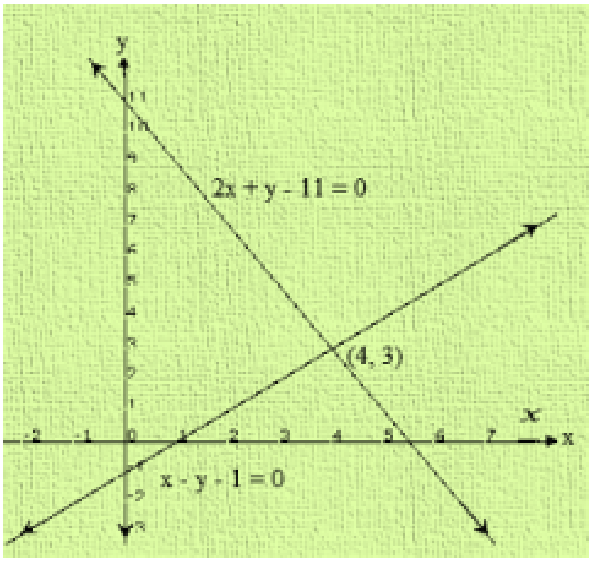
35. We have, $2x + y - 11 = 0$ *and* $x - y - 1 = 0$
Now, $2x + y = 11$
$\Rightarrow y = 11 - 2x$
When $y = 4 \Rightarrow x = 3$
When $y = -5 \Rightarrow x = 1$
Thus, we have the following table giving points on the line $2x + y = 11$

x	4	5
y	3	1

Now, $x - y = 1$
$\Rightarrow y = x - 1$
When $x = 2 \Rightarrow y = 1$
When $x = 3 \Rightarrow y = 2$
Thus, we have the following table giving points on the line $x - y = 1$

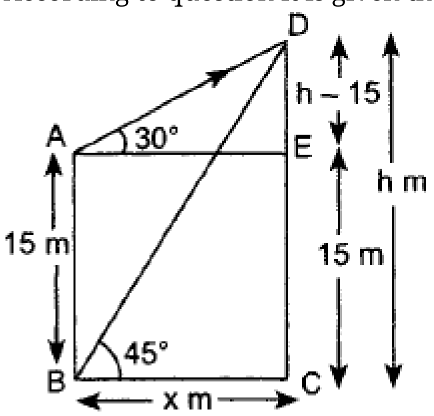
x	2	3
y	1	2

The graph of the given linear equations is:



Clearly, two intersect at (4, 3)
Hence, x = 4 and y = 3 is the solution of the given system of equations.
We also observe that the lines represented by 2x + y = 11 and x - y = 1 meet y - axis at (0, 11) and (0, - 1) respectively.

36. According to question it is given that a building AB of height 15 m and tower CD of h meter respectively.



Angle of elevation ∠DAE = 30^o

Angle of elevation ∠DBC = 45^o

To find: BC and CD

Proof: In right △DEA, using Pythagoras theorem

$\frac{DE}{x} = \tan 30^\circ$ (∵ AE = BC = x)

$\Rightarrow \quad \frac{h-15}{x} = \frac{1}{\sqrt{3}}$

$\Rightarrow \quad h - 15 = \frac{x}{\sqrt{3}}$ ....(i)

In right △DCB, by Pythagoras theorem

$\frac{h}{x} = \tan 45^\circ$

$\Rightarrow \quad h = x$.....(ii)

Putting the value of h in equation (i)

x-15 = $\frac{x}{\sqrt{3}}$ [from (i)]

$\Rightarrow \quad 15 = x - \frac{x}{\sqrt{3}}$

$\Rightarrow \quad 15 = \left(1 - \frac{\sqrt{3}}{3}\right) x$

$\Rightarrow \quad 15 = \left(\frac{3-\sqrt{3}}{3}\right) x$

$\Rightarrow \quad 45 = (3 - 1.732)x$

$\Rightarrow \frac{45}{1.268} = x$

x = 35.49

Thus h = 35.49 m