CBSE Board
Class X Mathematics
Sample Paper 5 (Basic) – Solution

Section A

1. Correct Option: C

Explanation:

Prime factorisation of 196

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

Exponents of 2 and 7 are 2 and 2 respectively.

$\therefore$ Sum of the exponents of the prime factors = 4

2. Correct Option: C

Explanation:

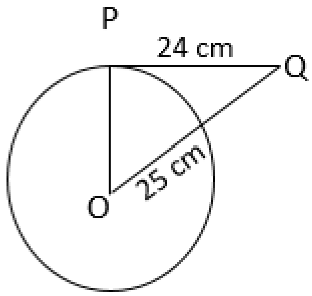
x_i	3	4	5	6	7	8	9
f_i	4	2	5	2	2	1	2

Here, the value 5 has the maximum frequency i. e. 5.

Hence, the mode is 5.

3. Correct Option: A

Explanation:



Here $\angle P = 90°$ ….. A tangent to a circle is perpendicular to the radius through the point of contact.

ΔPOQ is a right angled triangle.

By Pythagoras Theorem, we get

$OQ^2 = PQ^2 + OP^2$

$\Rightarrow OP^2 = 25^2 - 24^2 = 49$

$\Rightarrow OP = 7cm$

4. **Correct Option:** C

Explanation:

HCF(26, 169) × LCM(26, 169) = 26 × 169

⇒ 13 × LCM(26, 169) = 4394

⇒ LCM(26, 169) = 338

5. **Correct Option:** D

Explanation:

P(A) + P(not A) =1

⇒ 0.05 + P(not A) = 1

⇒ P(not A) = 1 – 0.05 = 0.95

6. **Correct Option:** A

Explanation:

If the curve does not touch the x-axis, then the polynomial does not have a zero.

7. **Correct Option:** A

Explanation:

The difference of two irrational numbers need not be an irrational number.

$(5+\sqrt{5}) - (1+\sqrt{5}) = 4$ (a rational number)

8. **Correct Option:** C

Explanation:

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

The remainder is 1.

9. **Correct Option:** D

Explanation:

Consider $x_1 = 3$, $y_1 = 4$, $x_2 = -1$, $y_2 = 2$, $x_3 = -2$, $y_3 = 3$

Area of the triangle = $\frac{1}{2}\left|3(2-3)-1(3-4)-2(4-2)\right|$

$$= \frac{1}{2}\left|3(-1)-1(-1)-2\times 2\right| = 3$$

10. Correct Option: A

Explanation:

Distance Formula = $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} = \sqrt{(0 - a)^2 + (b - 0)^2} = \sqrt{a^2 + b^2}$

11. If the distance between the points A (4, p) and B (1, 0) is 5, then the value(s) of p is/are $\boxed{\pm 4}$.

Explanation:

AB = 5

$\therefore AB^2 = 25$

$\therefore (4 - 1)^2 + (p - 0)^2 = 25$

$\therefore 9 + p^2 = 25$

$\therefore p^2 = 16$

$\therefore p = \pm 4$

12. The cost of a table is 3 times the cost of a chair. The total cost of 4 chairs and a table is Rs. 2100, then the cost of a table is equal to <u>Rs. 900</u>.

Explanation:

Let the cost of the table be Rs. x and the cost of the chair be Rs. y.

$x = 3y$

$x + 4y = 2100$

$\Rightarrow 7y = 2100$

$\Rightarrow \quad y = 300$

$x = 3(300) = 900$

Therefore the cost of a table is Rs. 900.

OR

The solution of a quadratic equation $x^2 + x - 2 = 0$ is equal to <u>x = 1, –2</u>.

Explanation:

$x^2 + x - 2 = 0$

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

$\Rightarrow (x + 2)(x - 1) = 0$

$\Rightarrow (x + 2) = 0$ or $(x - 1) = 0$

$\Rightarrow x = -2, 1$

13. If $\cot A = \frac{4}{5}$, then $\frac{\sin A + \cos A}{\sin A - \cos A} = \boxed{9}$.

Explanation:

$$\frac{\sin A + \cos A}{\sin A - \cos A} = \frac{1 + \frac{\cos A}{\sin A}}{1 - \frac{\cos A}{\sin A}} = \frac{1 + \frac{4}{5}}{1 - \frac{4}{5}} = \frac{\frac{9}{5}}{\frac{1}{5}} = 9$$

14. If A and B are acute angles such that sin A = cos B, then A + B = <u>90°</u> .

Explanation:

sin A = cos B …Given

$\therefore$ sin A = sin (90^o – B)   … since sin (90^o - x) = cos x

$\therefore$ A = 90^o – B

$\therefore$ A + B = 90^o

15. In an isosceles triangle ABC, $\angle C = 90^o$. If AB = 8 cm, then AC = <u>4√2 cm</u>.

Explanation:

ΔABC is an isosceles right-angled triangle.

AC = CB, non-opposite to $\angle C = 90^o$

By Pythagoras theorem, we get

$\Rightarrow AB^2 = AC^2 + CB^2$

$\Rightarrow 64 = 2AC^2$

$\Rightarrow AC = 4\sqrt{2}$ cm

16. sin 2A = cos 50°

$\Rightarrow$ sin 2A = cos (90° – 40°)

$\Rightarrow$ sin 2A = sin 40°

$\Rightarrow$ 2A = 40°

$\Rightarrow$ A = 20°

OR

$$\frac{\sin 75^\circ + \cos 15^\circ}{\sin 75^\circ}$$

$$= \frac{\sin 75^\circ + \sin 75^\circ}{\sin 75^\circ}$$

$$= \frac{2\sin 75^\circ}{\sin 75^\circ}$$

$$= 2$$

17. Diameter of the wheel = 35 cm

Circumference of the wheel = $\pi \times 35$ cm

$$= \frac{22}{7} \times 35 = 110 \text{ cm}$$

18. The number of face cards is 12, and the total number of cards is 52.

The probability of getting a face card is $\frac{12}{52} = \frac{3}{13}$

Probability of getting a non-face card = $1 - \frac{3}{13} = \frac{10}{13}$

19. If two triangles are similar, then their corresponding sides are proportional.

$$\frac{AB}{XY} = \frac{BC}{YZ}$$

$$\frac{11}{7} = \frac{22}{YZ}$$

$$YZ = 14 \text{ cm}$$

20.

a = 5, d = 8 – 5 = 3

By the n^{th} term formula,

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

So, $a_{28} = 5 + (28 - 1)3 = 5 + 81 = 86$

Section B

21.

Total number of possible outcomes of an experiment is 15.

The numbers which are divisible by 4 are 4, 8, 12 (i.e. 3).

Required probability = $\frac{3}{15} = \frac{1}{5}$

22.

Total number of bulbs is 5 + 6 = 11.

Working bulbs is 6.

Required probability = $\frac{6}{11}$

OR

Since the first card drawn is a king.

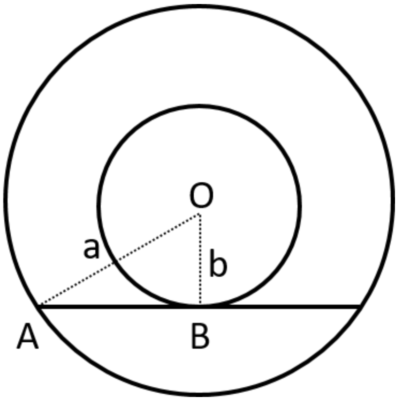
$\therefore$ There are 4 remaining cards and there are no remaining kings.

n(total outcomes) = 5

n(favourable outcomes) = 0

$P(\text{second card is a king}) = \frac{0}{5} = 0$

23.



It is given that a > b,

AB is the tangent to the smaller circle,

OB $\perp$ AB ..... (tangent $\perp$ radius)

So ΔABO is a right angled triangle

$\therefore AO^2 = AB^2 + BO^2$

$\therefore AB = \sqrt{a^2 - b^2}$

Now we know that the perpendicular drawn from the center to a chord bisects the chord.

So, the length of chord will be 2AB = $2\sqrt{a^2 - b^2}$

24.

Using $(a+b)^2 = a^2 + 2ab + b^2$ & $(a-b)^2 = a^2 - 2ab + b^2$, we get

$(\sin A + \cos A)^2 + (\sin A - \cos A)^2$

$= \sin^2 A + 2\sin A \cos A + \cos^2 A + \sin^2 A - 2\sin A \cos A + \cos^2 A$

$= 2(\sin^2 A + \cos^2 A)$

$= 2$ .... $\because \sin^2 A + \cos^2 A = 1$

OR

We know that, $\tan 30^\circ = \dfrac{1}{\sqrt{3}}$

$$\frac{2\tan 30^\circ}{1+\tan^2 30^\circ} = \frac{2\times\frac{1}{\sqrt{3}}}{1+\left(\frac{1}{\sqrt{3}}\right)^2} = \frac{\frac{2}{\sqrt{3}}}{1+\frac{1}{3}} = \frac{2}{\sqrt{3}}\times\frac{3}{4} = \frac{\sqrt{3}}{2}$$

25.

Let the breadth of the rectangle be x cm.
Length of the rectangle is 2x cm.
Area of the rectangle = Perimeter of the rectangle
$2x^2 = 2(x + 2x)$
$2x^2 = 6x$
$x^2 = 3x$
$x(x - 3) = 0$
$x \neq 0$; hence, $x = 3$.

Therefore, breadth of the rectangle is 3 cm.

26.

Degree	Name of the polynomial	Form of the polynomial
$\boxed{0}$	$\boxed{\text{Constant Polynomial}}$	$f(x) = a$, a is a constant
$\boxed{1}$	$\boxed{\text{Linear Polynomial}}$	$f(x) = ax + b, a \neq 0$
$\boxed{2}$	$\boxed{\text{Quadratic Polynomial}}$	$f(x) = ax^2 + bx + c, a \neq 0$
$\boxed{3}$	$\boxed{\text{Cubic Polynomial}}$	$f(x) = ax^3 + bx^2 + cx + d,$ $a \neq 0$

Section C

27.

Let α and β be the zeros of the polynomial $2x^3 - 4x - x^2 + 2$, where $\alpha = \sqrt{2}$ and $\beta = -\sqrt{2}$

$\therefore$ $\alpha + \beta = 0$ and $\alpha\beta = -2$

A polynomial whose roots are α and β is given by $x^2 - (\alpha + \beta)x + \alpha\beta$

$= x^2 - 0 \times x - 2$

$= x^2 - 2$

Divide $2x^3 - 4x - x^2 + 2$ by $x^2 - 2$

$$
\begin{array}{r|l}
 & \quad\quad\quad 2x - 1 \\
x^2 - 2 & 2x^3 - x^2 - 4x + 2 \\
 & \underline{2x^3 \quad\quad\; - 4x} \\
 & 0 \quad - x^2 \quad\quad + 2 \\
 & \underline{\quad\; - x^2 \quad\quad + 2} \\
 & \quad\quad\quad\quad\quad\; 0
\end{array}
$$

$\therefore$ $2x^3 - 4x - x^2 + 2 = (x^2 - 2)(2x - 1)$

Hence, the third zero is $\frac{1}{2}$.

28.

The steps of construction are as follows:

a. Taking any point O on the given plane as centre draw a circle of 6 cm radius. Locate a point P, 10 cm away from O. Join OP.

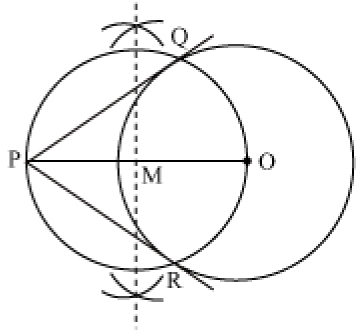
b. Bisect OP. Let M be the midpoint of PO.

c. Taking M as centre and MO as radius, draw a circle.

d. Let this circle intersect the circle drawn previously at points Q and R.

e. Join PQ and PR. PQ and PR are the required tangents.

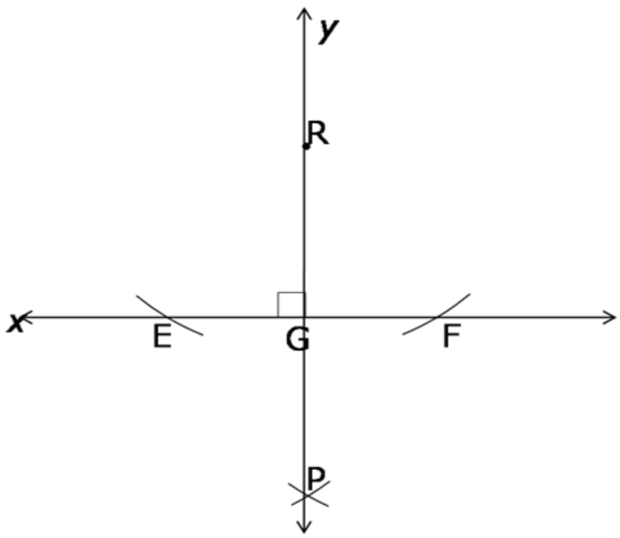
The length of tangents PQ and PR is 8 cm each.



OR

Steps of construction:

1. Draw line x. Take a point R outside the line.
2. Taking R as the centre, draw two arcs of circle cutting line x at points E and F.
3. Taking E and F as centres and the radius more than half of EF, draw two arcs one from each point intersecting each other at P below the line x and opposite to point R.
4. Draw the line y passing through points P and R. Hence, line $y \perp$ line x passing through point R.



29.

Since the diameter of the marble is 1.4 cm, radius $r = \frac{1.4}{2} = 0.7$ cm

$\therefore$ Volume of a marble, $V_{\text{marble}} = \frac{4}{3} \times \pi \times r^3 = \frac{4}{3} \times \pi \times (0.7)^3 \text{ cm}^3$

Level of water in the cylinder $= H = 5.6$ cm

Radius of cylinder $= R = \frac{7}{2} = 3.5$ cm

$\therefore$ Volume of the water increased in the cylinder,

$V_{\text{water increased}} = \pi \times R^2 \times H = \pi \times (3.5)^2 \times 5.6$

Thus, the number of marbles $= \frac{V_{\text{water increased}}}{V_{\text{marble}}}$

$$= \frac{\pi \times (3.5)^2 \times 5.6}{\frac{4}{3} \times \pi \times (0.7)^3}$$

$$= 3 \times 5 \times 5 \times 2$$

$$= 150$$

30.

$$\text{L.H.S} = \frac{\sin A - \sin B}{\cos A + \cos B} + \frac{\cos A - \cos B}{\sin A + \sin B}$$

$$= \frac{(\sin A - \sin B)(\sin A + \sin B) + (\cos A - \cos B)(\cos A + \cos B)}{(\cos A + \cos B)(\sin A + \sin B)}$$

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

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

$$= \frac{1 - 1}{(\cos A + \cos B)(\sin A + \sin B)} = 0 = \text{R. H. S}$$

Hence proved.

OR

i.

$\tan 1^\circ \tan 2^\circ \tan 3^\circ \ldots \tan 89^\circ$

$= (\tan 1^\circ \tan 89^\circ)(\tan 2^\circ \tan 88^\circ)(\tan 3^\circ \tan 87^\circ) \ldots \tan 45^\circ$

$= (\cot 89^\circ \tan 89^\circ)(\cot 88^\circ \tan 88^\circ)(\cot 87^\circ \tan 87^\circ) \ldots \times 1$

$\because \tan(90 - x) = \cot x$ and $\tan 45^\circ = 1$

$= 1 \times 1 \times 1 \ldots \times 1$
$= 1$

ii.

$\sin^2 45^\circ - \tan^2 60^\circ + \cos^2 90^\circ$

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

$$= \frac{1}{2} - 3$$

$$= \frac{-5}{2}$$

31. In the given pair, 963 > 657, thus let 963 = a and 657 = b.

Now by applying Euclid's division algorithm a = bq + r, we get

963 = 657×1 + 306

657 = 306 × 2 + 45

306 = 45 × 6+ 36

45 = 36 × 1 + **9**

36 = 9 × 4 + 0

Since in the above equation we get r = 0; therefore, 9 is the HCF of the given pair 963 and 657.

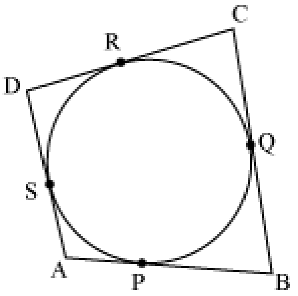
OR

$$\frac{129}{2^2 \times 5^7} = \frac{129}{312500}$$

$$\begin{array}{r|l} & 0.0004128 \\ 312500 & 1290000.00 \\ & -1250000 \\ \hline & 400000 \\ & -312500 \\ \hline & 875000 \\ & -625000 \\ \hline & 2500000 \\ & -2500000 \\ \hline & 0000 \end{array}$$

Hence, $\frac{129}{2^2 \times 5^7}$ =0.0004128

32.



It can be observed that:

DR = DS (tangents from point D)

CR = CQ (tangents from point C)

BP = BQ (tangents from point B)

AP = AS (tangents from point A)

Adding the above four equations,

DR + CR + BP + AP = DS + CQ + BQ + AS

(DR + CR) + (BP + AP) = (DS + AS) + (CQ + BQ)

CD + AB = AD + BC

33.

i. AB = $\sqrt{(6-3)^2+(7-4)^2} = \sqrt{9+9} = \sqrt{18} = 3\sqrt{2}$

BC = $\sqrt{(9-6)^2+(4-7)^2} = \sqrt{9+9} = \sqrt{18} = 3\sqrt{2}$

AC = $\sqrt{(9-3)^2+(4-4)^2} = \sqrt{36} = 6$

Since, AB = BC = $3\sqrt{2}$

Therefore, the three students A, B and C forms an isosceles triangle.

ii.

$$\text{Area of a } \Delta ABC = \frac{1}{2}\left|x_1(y_2-y_3)+x_2(y_3-y_1)+x_3(y_1-y_2)\right|$$

$$=\frac{1}{2}\times\left|3(7-4)+6(4-4)+9(4-7)\right|$$

$$=\frac{1}{2}\times\left|3\times 3+0+9\times -3\right|$$

$$=\frac{1}{2}\times\left|-18\right|$$

$$=9$$

34.

$0.2x + 0.3y = 1.3$ .... (i)
$0.4x + 0.5y = 2.3$ .... (ii)
From equation (i), we obtain:

$$x = \frac{1.3 - 0.3y}{0.2} \qquad \dots (iii)$$

Substituting this value in equation (ii), we obtain:

$$0.4\left(\frac{1.3 - 0.3y}{0.2}\right) + 0.5y = 2.3$$
$$2.6 - 0.6y + 0.5y = 2.3$$
$$2.6 - 2.3 = 0.1y$$
$$0.3 = 0.1y$$
$$y = 3$$

Substituting the value of *y* in equation (iii), we obtain:

$$x = \frac{1.3 - 0.3 \times 3}{0.2} = \frac{1.3 - 0.9}{0.2} = \frac{0.4}{0.2} = 2$$
$$\therefore x = 2, \; y = 3$$

Section D

35.

Let the base of the right triangle be x cm.
Its altitude = (x – 7) cm
From pythagoras theorem,

$$\text{Base}^2 + \text{Altitude}^2 = \text{Hypotenuse}^2$$
$$\therefore x^2 + (x - 7)^2 = 13^2$$
$$\Rightarrow x^2 + x^2 + 49 - 14x = 169$$
$$\Rightarrow 2x^2 - 14x - 120 = 0$$
$$\Rightarrow x^2 - 7x - 60 = 0$$
$$\Rightarrow x^2 - 12x + 5x - 60 = 0$$
$$\Rightarrow x(x - 12) + 5(x - 12) = 0$$
$$\Rightarrow (x - 12)(x + 5) = 0$$

Either x – 12 = 0 or x + 5 = 0, i.e., x = 12 or x = –5

Since sides are positive, x can only be 12.

Therefore, the base of the given triangle is 12 cm and the altitude of this triangle will be (12 – 7) cm = 5 cm.

36. The sum of the first n terms of an AP is given by

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

$$S_{12} = \frac{12}{2}\left[2a + (12-1)d\right] = 12a + 66d \quad \text{..... (i)}$$

$$S_8 = \frac{8}{2}\left[2a + (8-1)d\right] = 8a + 28d \quad \text{...... (ii)}$$

$$S_4 = \frac{4}{2}\left[2a + (4-1)d\right] = 4a + 6d \quad \text{..... (iii)}$$

To prove that $S_{12} = 3(S_8 - S_4)$

RHS = $3(S_8 - S_4)$

= $3[(8a + 28d) - (4a + 6d)]$ ... from (ii) and (iii)

= $3(4a + 22d)$

= $12a + 66d$

= S_{12} ...... from (i)

= LHS

Hence proved.

OR

11, 8, 5, 2, ...

First term (a) = 11

Common difference (d) = $a_n - (a_{n-1}) = 8 - 11 = -3$

Suppose that −150 is the n^{th} term of the given AP.

$\Rightarrow a_n = -150$

$\Rightarrow a + (n-1)d = -150$

$\Rightarrow 11 + (n-1)(-3) = -150$

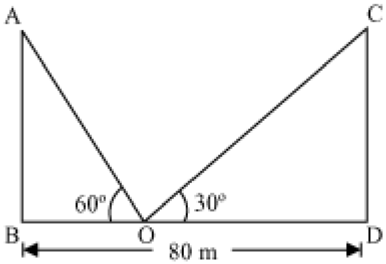
$\Rightarrow 11 - 3n + 3 = -150$

$\Rightarrow -3n = -150 - 14$

$\Rightarrow n = \dfrac{-164}{-3} = \dfrac{164}{3}$

Since n is not a natural number, therefore −150 is not a term of the given AP.

37.



Let AB and CD be the poles and O is the point on the road.

In ΔABO,

$$\frac{AB}{BO} = \tan 60^\circ$$
$$\frac{AB}{BO} = \sqrt{3}$$
$$BO = \frac{AB}{\sqrt{3}} \qquad \text{... (i)}$$

In ΔCDO,

$$\frac{CD}{DO} = \tan 30^\circ$$
$$\frac{CD}{80 - BO} = \frac{1}{\sqrt{3}}$$
$$CD\sqrt{3} = 80 - BO$$
$$CD\sqrt{3} = 80 - \frac{AB}{\sqrt{3}} \qquad \text{[From (i)]}$$
$$CD\sqrt{3} + \frac{AB}{\sqrt{3}} = 80$$

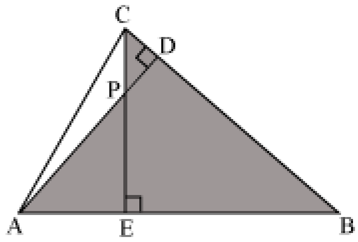
$$CD\left[\sqrt{3} + \frac{1}{\sqrt{3}}\right] = 80 \qquad \text{(Since, AB = CD)}$$
$$CD\left(\frac{3+1}{\sqrt{3}}\right) = 80$$
$$CD = 20\sqrt{3}$$
$$BO = \frac{AB}{\sqrt{3}} = \frac{CD}{\sqrt{3}} = \frac{20\sqrt{3}}{\sqrt{3}} = 20 \text{ m}$$

DO = BD – BO = 80 m – 20 m = 60 m

Thus, the height of the poles is $20\sqrt{3}$ m and the point between the poles is 20m and 60 m far from these poles.

38.

(i)



In ΔABD and ΔCBE

$\angle ADB = \angle CEB = 90°$

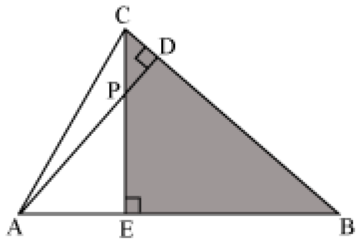
$\angle ABD = \angle CBE$ (common angle)

$\angle DAB = \angle ECB$ (remaining angle)

Therefore by AAA rule

$\Delta ABD \sim \Delta CBE$

(ii)



In ΔPDC and ΔBEC

$\angle PDC = \angle BEC = 90°$

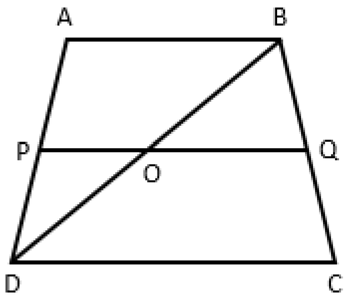
$\angle PCD = \angle BCE$ (common angle)

$\angle CPD = \angle CBE$

Therefore by AAA rule

$\Delta PDC \sim \Delta BEC$

OR



AB || DC and PQ || DC

Hence, AB || PQ || DC

In ΔABD,

PQ || AB

∴ PO || AB

$\frac{DP}{PA} = \frac{DO}{OB}$ ... (i) ∵ BPT

In ΔBDC,

PQ || DC

∴ OQ || DC

$\frac{DO}{OB} = \frac{CQ}{QB}$ ... (ii) ∵ BPT

$\frac{DP}{PA} = \frac{CQ}{QB}$ from (i) and (ii)

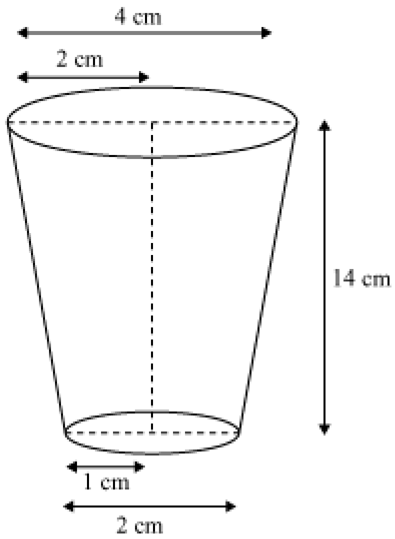
PD = 18 cm, BQ = 35 cm and QC = 15 cm

$\therefore \frac{18}{PA} = \frac{15}{35}$

$\therefore PA = \frac{18 \times 35}{15}$

$\therefore PA = 42$ cm.

39.



Radius (r_1) of upper base of glass $= \frac{4}{2} = 2\,\text{cm}$

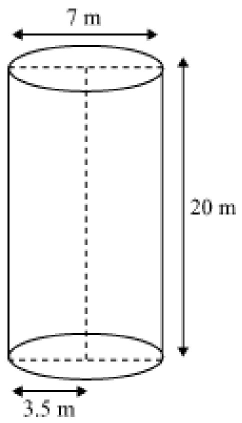
Radius (r_2) of lower base of glass $= \frac{2}{2} = 1\,\text{cm}$

Capacity of glass = Volume of frustum of a cone

$$= \frac{1}{3}\pi h\left(r_1^2 + r_2^2 + r_1 r_2\right)$$
$$= \frac{1}{3}\pi h\left[(2)^2 + (1)^2 + (2)(1)\right]$$
$$= \frac{1}{3} \times \frac{22}{7} \times 14\left[4 + 1 + 2\right]$$
$$= \frac{308}{3} = 102\frac{2}{3}\,\text{cm}^3$$

So, the capacity of the glass is $102\frac{2}{3}\,\text{cm}^3$.

OR



The shape of well will be cylindrical.

Depth (h) of well = 20m and Radius (r) of circular end of well = $\frac{7}{2}$m

Area of platform = length × breadth = 22 × 14 m^2.

Volume of soil dug from well will be equal to the volume of soil scattered on platform.

Volume of soil from well = volume of soil used to make such platform

$$\pi \times r^2 \times h = \text{Area of platform} \times \text{Height of platform}$$

$$\pi \times \left(\frac{7}{2}\right)^2 \times 20 = 22 \times 14 \times h$$

$$\therefore h = \frac{22}{7} \times \frac{49}{4} \times \frac{20}{22 \times 14} = \frac{5}{2} \text{ m}$$

$\therefore$ Height of the platform = 2.5 m

So, height of such platform will be 2.5m.

40.

Monthly consumption (in units)	**Number of consumers**
65 – 85	4
85 – 105	5
105 – 125	13
125 – 145	20
145 – 165	14
165 – 185	8
185 – 205	4

We may find class marks by using the relation

$$\text{Class mark} = \frac{\text{Upper class limit} + \text{lower class limit}}{2}$$

Taking 135 as assumed mean (a) we may find d_i, u_i, f_iu_i, according to step deviation method as following

Monthly consumption (in units)	Number of consumers (f_i)	x_i class mark	$d_i = x_i - 135$	$u_i = \frac{d_i}{20}$	f_iu_i
65 – 85	4	75	– 60	– 3	– 12
85 – 105	5	95	– 40	– 2	– 10
105 – 125	13	115	– 20	– 1	– 13
125 – 145	20	135	0	0	0
145 – 165	14	155	20	1	14
165 – 185	8	175	40	2	16
185 – 205	4	195	60	3	12
Total	68				7

From the table we may observe that

$$\sum f_iu_i = 7$$
$$\sum f_i = 68$$
$$\text{Class size } (h) = 20$$

$$\text{Mean } \bar{x} = a + \left(\frac{\sum f_iu_i}{\sum f_i}\right) \times h$$
$$= 135 + \frac{7}{68} \times 20$$
$$= 135 + \frac{140}{68}$$
$$= 137.058$$

Now from table it is clear that maximum class frequency is 20 belonging to class interval 125 – 145.

Modal class = 125 – 145

Lower limit (l) of modal class = 125

Class size (h) = 20

Frequency (f_1) of modal class = 20

Frequency (f_0) of class preceding modal class = 13

Frequency (f_2) of class succeeding the modal class = 14

$$\text{Mode} = l + \left(\frac{f_1 - f_0}{2f_1 - f_0 - f_2}\right) \times h$$

$$= 125 + \left[\frac{20 - 13}{2(20) - 13 - 14}\right] \times 20$$

$$= 125 + \frac{7}{13} \times 20$$

$$= 125 + \frac{140}{13} = 135.76$$

We know that

3 median = mode + 2 mean

= 135.76 + 2 (137.058)

= 135.76 + 274.116

= 409.876

Median = 136.625

So median, mode and mean of the given data are 136.625, 135.76 and 137.05 respectively.