Solutions of Question Paper Code: 30/1/1

Section A

Multiple Choice Questions

1. (*b*)

Let $p(x) = x^2 + 3x + k.$

Since 2 is one of the zero of $p(x)$,

$$p(2) = 0$$

$$\Rightarrow \quad 2^2 + 3(2) + k = 0$$

$$\Rightarrow \quad 4 + 6 + k = 0$$

$$\Rightarrow \quad k = -10.$$

2. (*c*) Factors of a prime number are 1 and the number itself.

3. (*a*) $x^2 + 5x + 6$ is the polynomial in which sum of zeros is -5 and product of zeros is 6.

4. (*d*)

$x + y - 4 = 0$ and $2x + ky = 3$ has no solution, when

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

$$\Rightarrow \quad k = 2.$$

5. (*c*)

Here, $12 = 2^2 \times 3$

$21 = 3 \times 7$

$15 = 3 \times 5$

So, HCF = 3; LCM = $2^2 \times 3 \times 5 \times 7$, *i.e.*, 420.

6. (*a*)

Since $2x$, $(x + 10)$ and $(3x + 2)$ are the three consecutive terms of an A.P.,

$$2(x + 10) = 2x + (3x + 2)$$

$$\Rightarrow \quad 2x + 20 = 5x + 2$$

$$\Rightarrow \quad 3x = 18$$

$$\Rightarrow \quad x = 6.$$

7. (*c*)

Here, $a = p$ and $d = q$. Then,

$$a_{10} = a + 9d = p + 9q.$$

8. (*c*)

Distance between the given points

$$= \sqrt{(a\cos\theta + b\sin\theta - 0)^2 + (0 - a\sin\theta + b\cos\theta)^2}$$

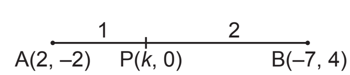
$$= \sqrt{a^2\cos^2\theta + b^2\sin^2\theta + 2ab\cos\theta\sin\theta + a^2\sin^2\theta + b^2\cos^2\theta - 2ab\sin\theta\cos\theta}$$

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

9. (*d*)

Here, $\mathrm{P}(k, 0) = \left(\frac{-7+4}{3}, \frac{4-4}{3}\right)$, *i.e.*, $(-1, 0)$

$$\Rightarrow \quad k = -1.$$



10. (*a*)

Given points are collinear, means

$$3(p + 5) + 5(-5 - 1) + 7(1 - p) = 0$$

i.e., $3p + 15 - 30 + 7 - 7p = 0$

i.e., $4p = -8$

i.e., $p = -2.$

Fill in the blanks.

11. 10

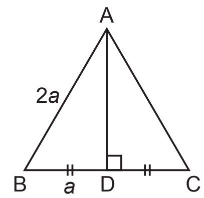
$$\left[\begin{aligned} \text{Here,}\quad BC &= BQ + QC \\ &= BP + CR && (\because\ BQ = BP,\ QC = CR) \\ &= 3 + (11 - AR) && (\because\ CR = AC - AR) \\ &= 14 - AR \\ &= 14 - AP && (\because\ AR = AP) \\ &= 14 - 4 = 10. \end{aligned}\right]$$

12. $\frac{1}{9}$

$$\left[\frac{ar(\Delta ABC)}{ar(\Delta PQR)} = \frac{AB^2}{PQ^2} \Rightarrow \frac{ar(\Delta ABC)}{ar(\Delta PQR)} = \left(\frac{1}{3}\right)^2 = \frac{1}{9}.\right]$$

13. $\sqrt{3}a$

$$\left[\begin{aligned} \text{Altitude}\quad AD &= \sqrt{AB^2 - BD^2} \\ &= \sqrt{4a^2 - a^2} \\ &= \sqrt{3a^2} \\ &= \sqrt{3}a. \end{aligned}\right]$$



14. 2

$$\left[\begin{aligned} &\frac{\cos 80^\circ}{\sin 10^\circ} + \cos 59^\circ \operatorname{cosec} 31^\circ \\ &= \frac{\cos(90^\circ - 10^\circ)}{\sin 10^\circ} + \cos(90^\circ - 31^\circ) \operatorname{cosec} 31^\circ \\ &= \frac{\sin 10^\circ}{\sin 10^\circ} + \sin 31^\circ \operatorname{cosec} 31^\circ \\ &= 1 + 1 = 2. \end{aligned}\right]$$

15. 1

$$\left[\sin^2\theta + \frac{1}{1+\tan^2\theta} = \sin^2\theta + \frac{1}{\sec^2\theta} = \sin^2\theta + \cos^2\theta = 1.\right]$$

OR

1

$$\left[\begin{aligned} (1 + \tan^2\theta)(1 - \sin\theta)(1 + \sin\theta) &= (1 + \tan^2\theta)(1 - \sin^2\theta) \\ &= \sec^2\theta \cdot \cos^2\theta = 1. \end{aligned}\right]$$

Very Short Answer Questions

16. Let h be the length of the rod.

Then, its shadow is $\sqrt{3}\,h$.

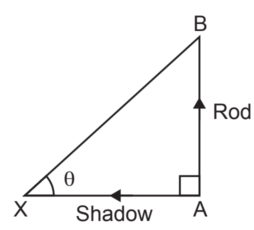
If θ is the angle of elevation, then

$$\tan\theta = \frac{AB}{AX} = \frac{h}{\sqrt{3}h}$$

$$\Rightarrow \quad \tan\theta = \frac{1}{\sqrt{3}}$$

$$\Rightarrow \quad \theta = 30^\circ$$

Hence, the angle of elevation is 30°.



17. Let the heights of two cones be h and $3h$; and their base radii be $3r$ and r.

Then, $$V_1 : V_2 = \frac{1}{3}\pi(3r)^2(h) : \frac{1}{3}\pi(r)^2(3h)$$

$$= 9 : 3$$

or $$= 3 : 1$$

Hence, ratio of their volumes is 3 : 1.

18. Of the 26 letters of English alphabets, 21 letters are consonants.

So, required probability = $\frac{21}{26}$.

19. All possible outcomes are 1, 2, 3, 4, 5 and 6.

Favourable outcomes are 1 and 2.

So, required probability = $\frac{2}{6}$, *i.e.*, $\frac{1}{3}$.

OR

Probability of losing a game = 1 – P(winning a game)

$= 1 - 0.07 = 0.93.$

20. The mean of first n natural numbers is $\frac{n(n+1)}{2n}$, *i.e.*, $\frac{n+1}{2}$

Equating $\frac{n+1}{2}$ to 15, we get $n = 29$.

Section B

21. $(a-b)^2$, (a^2+b^2) and $(a+b)^2$ will be in A.P., if

$$2(a^2+b^2) = (a-b)^2 + (a+b)^2$$

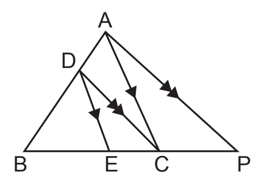
i.e.,

$$2(a^2+b^2) = a^2+b^2-2ab+a^2+b^2+2ab$$

$$= 2(a^2+b^2), \text{ which is true}$$

Hence, $(a-b)^2$, (a^2+b^2) and $(a+b)^2$ are in A.P.

22. Consider Δs BDE and BAC.



Here, DE || AC.

So, $$\frac{BD}{DA} = \frac{BE}{EC} \quad ...(1)$$

Consider Δs BDC and BAP.

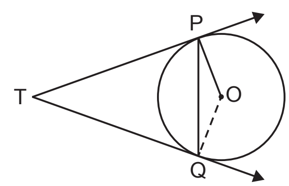
Here, DC || AP.

So, $$\frac{BD}{DA} = \frac{BC}{CP} \quad ...(2)$$

From (1) and (2), we have $\frac{BE}{EC} = \frac{BC}{CP}$.

OR

Join OQ.



In ΔPOQ, $\angle OPQ = \angle OQP$ [$\because$ OP = OQ = radii]

$\Rightarrow$ $\angle POQ = 180° - 2\angle OPQ$ ...(1)

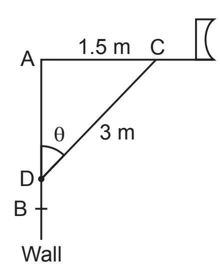
Further, TPOQ is a cyclic quadrilateral.

So, $\angle POQ = 180° - \angle PTQ$

$\Rightarrow$ $180° - 2\angle OPQ = 180° - \angle PTQ$ [By (1)]

$\Rightarrow$ $2\angle OPQ = \angle PTQ$ or $\angle PTQ = 2\angle OPQ$.

23. From the figure, $\sin\theta = \frac{AC}{DC} = \frac{1.5}{3} = \frac{1}{2}$



$\Rightarrow$ $\theta = 30°$

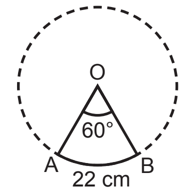
(*i*) So, $\tan\theta = \tan 30° = \frac{1}{\sqrt{3}}$.

(*ii*) $\sec\theta + \operatorname{cosec}\theta$

$= \sec 30° + \operatorname{cosec} 30°$

$= \frac{2}{\sqrt{3}} + 2 = \frac{6+2\sqrt{3}}{3}$.

24. Let the radius of the circle be '*r*' cm.



Then, $$\overset{\frown}{AB} = \frac{60}{360} \times 2 \times \frac{22}{7} \times r = 22$$

$\Rightarrow$ $$r = 21 \text{ cm}$$

Thus, the radius of the circle is 21 cm.

25. All possible outcomes are –3, –2, –1, 0, 1, 2 and 3.

Favourable outcomes are –2, –1, 0, 1 and 2. [As $x^2 \leq 4$]

So, required probability = $\frac{5}{7}$.

26.

Class	*Frequency (f)*	*Class Mark (x)*	*Product (fx)*
3–5	5	4	20
5–7	10	6	60
7–9	10	8	80
9–11	7	10	70
11–13	8	12	96
Total	$\Sigma f = 40$		$\Sigma fx = 326$

So, $$\text{Mean} = \frac{\Sigma fx}{\Sigma f} = \frac{326}{40} = 8.15.$$

OR

The maximum frequency is 12 for the class 60–80.

So, the modal class is 60–80.

For this class, $l = 60$, $h = 20$, $f_1 = 12$, $f_0 = 10$ and $f_2 = 6$.

So, $$\text{Mode} = l + \frac{f_1 - f_0}{2f_1 - f_0 - f_2} \times h$$

$$= 60 + \frac{12 - 10}{24 - 10 - 6} \times 20$$

$$= 60 + \frac{40}{8}$$

$$= 60 + 5 = 65$$

Thus, mode is 65.

Section C

27. Let α, β be the zeros of $f(x) = ax^2 + bx + c$. Then,

$$\alpha + \beta = -\frac{b}{a} \quad \text{and} \quad \alpha\beta = \frac{c}{a}.$$

Now, $$\frac{1}{\alpha} + \frac{1}{\beta} = \frac{\alpha + \beta}{\alpha\beta} = \frac{\frac{-b}{a}}{\frac{c}{a}} = -\frac{b}{c}$$

$$\frac{1}{\alpha} \cdot \frac{1}{\beta} = \frac{1}{\alpha\beta} = \frac{1}{\frac{c}{a}} = \frac{a}{c}$$

So, the required polynomial is $cx^2 + bx + a$.

OR

$$\begin{array}{r|l} & x-2 \\ \hline -x^2+x-1 & -x^3+3x^2-3x+5 \\ & -x^3+\ \ x^2-x \\ & +\quad -\quad\ + \\ \hline & \quad 2x^2-2x+5 \\ & \quad 2x^2-2x+2 \\ & \quad -\quad +\quad - \\ \hline & \qquad\qquad 3 \\ \hline \end{array}$$

Here,

$$\begin{aligned} \text{Dividend} &= -x^3+3x^2-3x+5 \\ \text{Divisor} &= -x^2+x-1 \\ \text{Quotient} &= x-2 \\ \text{Remainder} &= 3 \end{aligned}$$

Now,

Divisor × Quotient + Remainder

$$\begin{aligned} &= (-x^2+x-1)(x-2)+3 \\ &= -x^3+x^2-x+2x^2-2x+2+3 \\ &= -x^3+3x^2-3x+5 \\ &= \text{Dividend} \end{aligned}$$

Hence, division algorithm is verified.

28. $2y - x = 8$

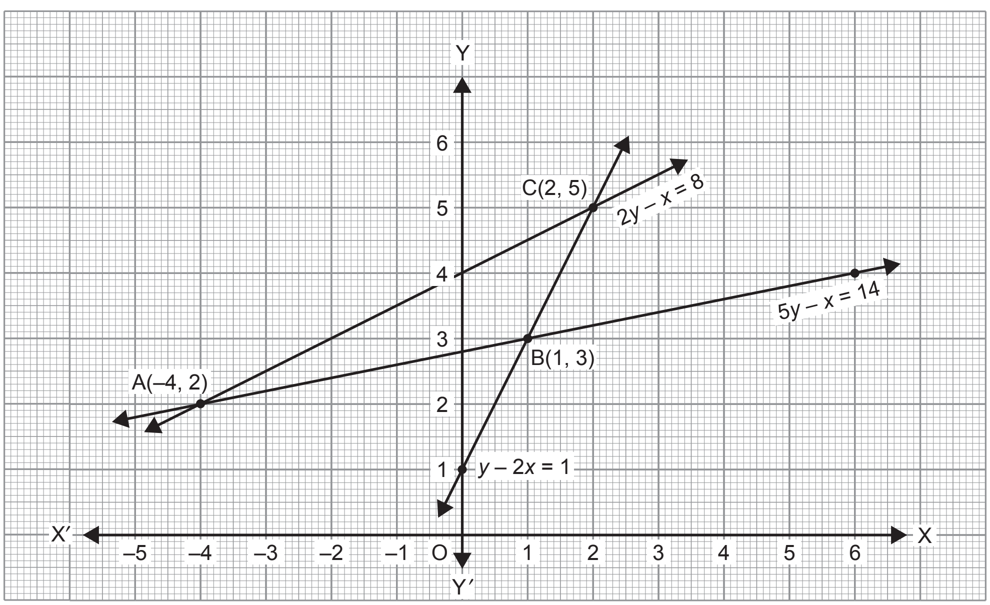
x	0	2
y	4	5

$5y - x = 14$

x	1	6
y	3	4

$y - 2x = 1$

x	0	1
y	1	3



Vertices of ΔABC are A(–4, 2), B(1, 3) and C(2, 5).

OR

Let α, β, γ be the zeros of $p(x) = x^3 - 3x^2 - 10x + 24$.

Take $\alpha = 4$. Then,

$$\alpha + \beta + \gamma = 4 + \beta + \gamma = 3 \quad \Rightarrow \quad \beta + \gamma = -1 \qquad \text{...(1)}$$

and $$\alpha\beta\gamma = -24 \text{ or } 4\beta\gamma = -24 \quad \Rightarrow \quad \beta\gamma = -6 \qquad \text{...(2)}$$

From (1) and (2), we get

$$(\beta - \gamma)^2 = (\beta + \gamma)^2 - 4\beta\gamma$$
$$= (-1)^2 - 4(-6)$$
$$= 1 + 24 = 25$$

$\Rightarrow$ $\beta - \gamma = \pm 5$

Now, $\beta + \gamma = -1$ and $\beta - \gamma = 5$ give $\beta = 2$ and $\gamma = -3$.

and $\beta + \gamma = -1$ and $\beta - \gamma = -5$ give $\beta = -3$ and $\gamma = 2$.

So, the other two zeros are 2 and –3.

29. Let the original speed of the aircraft be x km/h.

Time taken for distance of 600 km is $\frac{600}{x}$ hours.

Time taken for same distance with speed $(x - 200)$ km/h is $\frac{600}{x-200}$ hours.

As per the question,

$$\frac{600}{x-200} - \frac{600}{x} = \frac{1}{2} \qquad \left[\because\ 30 \text{ minutes} = \frac{1}{2}\text{hour}\right]$$

$\Rightarrow$ $$600\left[\frac{x - x + 200}{x(x-200)}\right] = \frac{1}{2}$$

$\Rightarrow$ $$x(x - 200) = 240000$$

$\Rightarrow$ $$x^2 - 200x - 240000 = 0$$

$\Rightarrow$ $$(x - 600)(x + 400) = 0$$

$\Rightarrow$ $$x - 600 = 0 \qquad [\because\ x + 400 = 0 \text{ is rejected.}]$$

$\Rightarrow$ $$x = 600$$

Thus, the original speed of the aircraft is 600 km/h.

So, the original duration of flight = $\frac{600}{600}$ hours, *i.e.*, 1 hour.

30. Area of ΔPQR = $\frac{1}{2}|-5(-5 - 5) - 4(5 - 7) + 4(7 + 5)|$ sq units

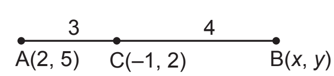
$$= \frac{1}{2}|50 + 8 + 48| \text{ sq units}$$

$$= \frac{1}{2} \times 106 \text{ sq units}$$

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

OR

Since C divides AB in the ratio 3 : 4, we have



$$C\left(\frac{3x+8}{7}, \frac{3y+20}{7}\right)$$

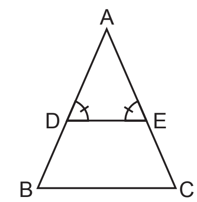
i.e., $$C\left(\frac{3x+8}{7}, \frac{3y+20}{7}\right) = (-1, 2)$$

$\Rightarrow$ $$\frac{3x+8}{7} = -1 \quad \text{and} \quad \frac{3y+20}{7} = 2$$

$\Rightarrow$ $$x = -5 \quad \text{and} \quad y = -2$$

Thus, coordinates of B are (–5, –2).

31. Consider Δs ADE and ABC.



Here, $\dfrac{AD}{DB} = \dfrac{AE}{EC}$ [Given]

or $\dfrac{DB}{AD} = \dfrac{EC}{AE}$

or $1 + \dfrac{DB}{AD} = 1 + \dfrac{EC}{AE}$

or $\dfrac{AD + DB}{AD} = \dfrac{AE + EC}{AE}$

or $\dfrac{AB}{AD} = \dfrac{AC}{AE}$ or $\dfrac{AB}{AC} = \dfrac{AD}{AE}$

and $\angle A = \angle A$ [Common]

So, by SAS Similarity Criterion, $\Delta ADE \sim \Delta ABC$

$\Rightarrow$ $\angle D = \angle B$ and $\angle E = \angle C$

Since $\angle D = \angle E$, we get

$\angle B = \angle C$

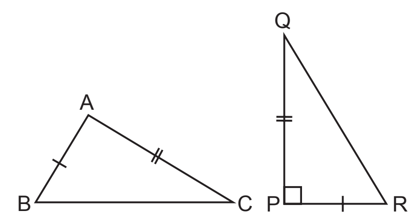
$\therefore$ In ΔABC, $AB = AC$

Hence, ΔABC is an isosceles triangle.

32. Given: In ΔABC, $BC^2 = AB^2 + AC^2$

To Prove: $\angle BAC = 90°$

Construction: Construct a ΔPQR, right-angled at P such that $PQ = AB$ and $PR = AC$.



Proof: Since ΔPQR is a right triangle, right-angled at P.

$QR^2 = PQ^2 + PR^2$ [By Pythagoras' Theorem]

$= AB^2 + AC^2$ [By construction]

But $BC^2 = AB^2 + AC^2$ [Given]

So, $QR^2 = BC^2$, or $QR = BC$

Now, in ΔABC and ΔPQR,

$PQ = AB$, $PR = AC$ and $QR = BC$

So, by SSS Congruence Criterion, we have $\Delta PQR \cong \Delta ABC$

Hence, $\angle P = \angle A$

i.e., $\angle BAC = 90°$. **(Proved)**

33. It is given that $\sin\theta + \cos\theta = \sqrt{3}$

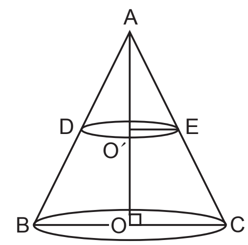
$\Rightarrow$ $(\sin\theta + \cos\theta)^2 = 3$

$\Rightarrow$ $1 + 2\sin\theta\cos\theta = 3$

$\Rightarrow$ $\sin\theta\cos\theta = 1$ ...(1)

Hence,
$$\tan\theta + \cot\theta = \frac{\sin\theta}{\cos\theta} + \frac{\cos\theta}{\sin\theta}$$
$$= \frac{\sin^2\theta + \cos^2\theta}{\sin\theta\cos\theta}$$
$$= \frac{1}{\sin\theta\cos\theta}$$
$$= \frac{1}{1} \quad \text{[By (1)]}$$
$$= 1$$

34. From the figure, $AO' = \frac{1}{2} AO$



Also, $O'E \parallel OC$

So, $\Delta AO'E \sim \Delta AOC$

$$\Rightarrow \qquad \frac{AO'}{AO} = \frac{O'E}{OC} \Rightarrow \frac{O'E}{OC} = \frac{1}{2}$$

$$\Rightarrow \qquad O'E = 2 \text{ cm.} \qquad [\because \quad OC = 4 \text{ cm}]$$

Thus, volume of cone ADE $(V_1) = \frac{1}{3}\pi(2)^2 h = \frac{4}{3}\pi h$

and volume of cone ABC $(V_2) = \frac{1}{3}\pi(4)^2(2h) = \frac{32}{3}\pi h$

$\Rightarrow$ Volume of the frustum DBCE = Volume of cone ABC – Volume of cone ADE

$$= \frac{\pi h}{3}(32 - 4)$$

$$= \frac{28}{3}\pi h$$

Thus, the ratio of volumes of two parts $= \frac{4}{3}\pi h : \frac{28}{3}\pi h$

$$= 1 : 7.$$

Section D

35. Let 'a' be any positive integer. Then, it is of the form

$5p$ or $5p + 1$ or $5p + 2$ or $5p + 3$ or $5p + 4$.

Case 1: When $a = 5p$

$\Rightarrow \quad a^2 = 25p^2 = 5(5p^2) = 5q$, where $q = 5p^2$

Case 2: When $a = 5p + 1$

$\Rightarrow \quad a^2 = 25p^2 + 10p + 1 = 5(5p^2 + 2p) + 1 = 5q + 1$, where $q = 5p^2 + 2p$

Case 3: When $a = 5p + 2$

$\Rightarrow \quad a^2 = 25p^2 + 20p + 4 = 5(5p^2 + 4p) + 4 = 5q + 4$, where $q = 5p^2 + 4p$

Case 4: When $a = 5p + 3$

$\Rightarrow \quad a^2 = 25p^2 + 30p + 9 = 5(5p^2 + 6p + 1) + 4 = 5q + 4$, where $q = 5p^2 + 6p + 1$

Case 5: When $a = 5p + 4$

$\Rightarrow \quad a^2 = 25p^2 + 40p + 16 = 5(5p^2 + 8p + 3) + 1 = 5q + 1$, where $q = 5p^2 + 8p + 3$

Thus, square of any positive integer cannot be of the form $5q + 2$ or $5q + 3$, for any integer n.

OR

Let n, $n + 1$ and $n + 2$ be three consecutive positive integers.

Also, we know that a positive integer n is of the form $3q$, $3q + 1$ or $3q + 2$.

Case I: When $n = 3q$

Here n is clearly divisible by 3.

But $(n + 1)$ and $(n + 2)$ are not divisible by 3.

[When $(n + 1)$ is divided by 3, remainder is 1 and when $(n + 2)$ is divided by 3, the remainder is 2.]

Case II: When $n = 3q + 1$

Here, $n + 2 = 3q + 3 = 3(q + 1)$

Clearly, $n + 2$ is divisible by 3.

But n and $(n + 1)$ are not divisible by 3.

Case III: When $n = 3q + 2$

Here, $n + 1 = 3q + 3 = 3(q + 1)$

Clearly, $(n + 1)$ is divisible by 3.

But n and $(n + 2)$ are not divisible by 3.

Hence, one of every three consecutive positive integers is divisible by 3.

36. Let 'a' be the first term and 'd' be the common difference of the A.P. Then,

$a - 3d, a - d, a + d, a + 3d$ are four consecutive terms of the A.P.

As per the question,

$(a - 3d) + (a - d) + (a + d) + (a + 3d) = 32 \quad \Rightarrow \quad 4a = 32, \text{ or } a = 8$ ...(1)

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

$$\Rightarrow \quad \frac{a^2 - 9d^2}{a^2 - d^2} = \frac{7}{15}$$

$$\Rightarrow \quad 15a^2 - 135d^2 = 7a^2 - 7d^2$$

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

Using (1), we have

$$8 \times 8^2 = 128d^2$$

$$\Rightarrow \quad d^2 = 4 \quad \text{or} \quad d = \pm 2$$

Thus, the four numbers are 2, 6, 10 and 14.

OR

In the given A.P., $a = 1$ and $d = 3$.

Let A.P. contain 'n' terms. Then, $a_n = x$

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

$$\Rightarrow \quad 1 + 3(n - 1) = x$$

$$\Rightarrow \quad n = \frac{x+2}{3}$$

Further, $$S = \frac{n}{2}[\text{first term} + \text{last term}]$$

$$= \frac{x+2}{3 \times 2}(1 + x)$$

$$\Rightarrow \quad (x + 1)(x + 2) = 1722$$

or $$x^2 + 3x - 1720 = 0$$

$$\Rightarrow \quad x^2 + 43x - 40x - 1720 = 0$$

$$\Rightarrow \quad x(x + 43) - 40(x + 43) = 0$$

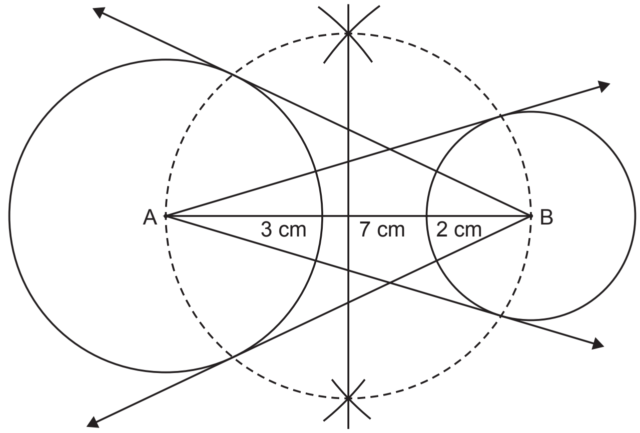
$$\Rightarrow \quad (x + 43)(x - 40) = 0$$

$$\Rightarrow \quad x - 40 = 0 \qquad [\because \; x + 43 = 0 \text{ is rejected}]$$

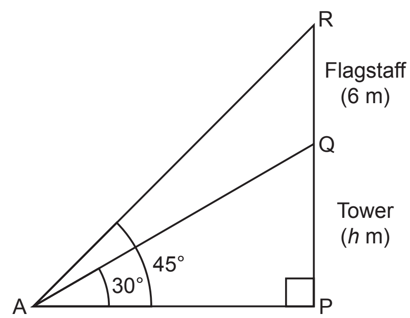
$$\Rightarrow \quad x = 40$$

Thus, $x = 40$.

37.



38. In right ΔAPQ,



$$\frac{PQ}{AP} = \tan 30°$$

$$\Rightarrow \quad \frac{h}{AP} = \frac{1}{\sqrt{3}}$$

$$\Rightarrow \quad AP = \sqrt{3}h \quad ...(1)$$

In right ΔAPR,

$$\frac{PR}{AP} = \tan 45°$$

$$\Rightarrow \quad \frac{h+6}{AP} = 1$$

$$\Rightarrow \quad AP = h + 6 \quad ...(2)$$

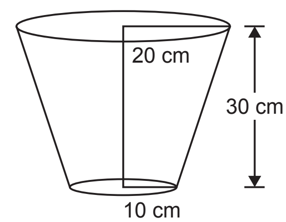
From (1) and (2), we have $h + 6 = \sqrt{3}h$

$$\Rightarrow \quad \left(\sqrt{3}-1\right)h = 6$$

$$\Rightarrow \quad h = \frac{6}{1.73-1} \text{ or } 8.22 \text{ m}$$

Thus, the height of the tower is 8.22 metres.

39. Capacity of the bucket $= \frac{1}{3}\pi h(r_1^2 + r_2^2 + r_1r_2)$ cu units



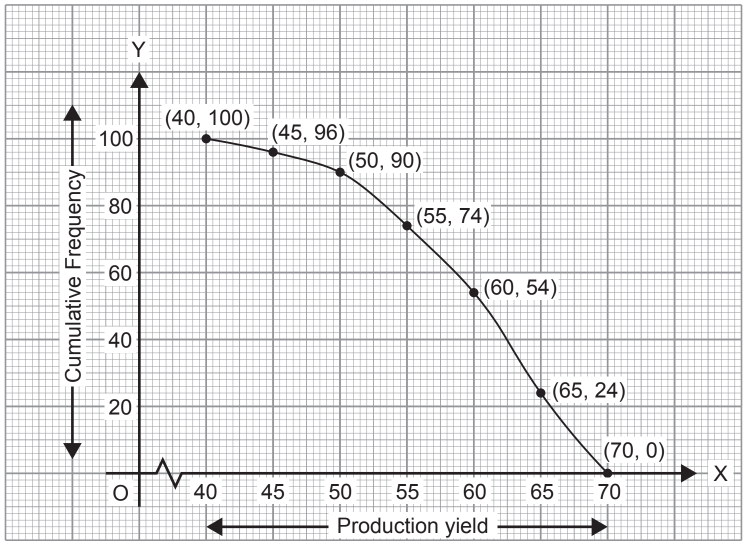
$$= \frac{1}{3}\pi(30)[10^2 + 20^2 + (10)(20)] \text{ cu cm}$$

= 22000 cu cm; or 22 litres

Cost of milk = ₹ (40 × 22), *i.e.*, ₹ 880.

40. 'More than type' cumulative frequency distribution is as follows:

Production yield (per hectare)	*Cumulative Frequency*
More than or equal to 40	100
More than or equal to 45	96
More than or equal to 50	90
More than or equal to 55	74
More than or equal to 60	54
More than or equal to 65	24
More than or equal to 70	0



OR

Class	*Frequency*	*Cumulative Frequency*
0–100	2	2
100–200	5	7
200–300	x	$7 + x$
300–400	12	$19 + x$
400–500	17	$36 + x$
500–600	20	$56 + x$ ← Median Class
600–700	y	$56 + x + y$
700–800	9	$65 + x + y$
800–900	7	$72 + x + y$
900–1000	4	$76 + x + y$

It is given that $\Sigma f = N = 100$.

So, $76 + x + y = 100$

$\Rightarrow \quad x + y = 24$ ...(1)

Also, it is given that median is 525.

So, the median class is 500–600.

For this class, $l = 500$, $h = 100$, $\frac{N}{2} = 50$, $c = 36 + x$ and $f = 20$

So, $$\text{Median} = l + \frac{\frac{N}{2} - c}{f} \times h$$

gives $$525 = 500 + \frac{50 - (36 + x)}{20} \times 100$$

$\Rightarrow \quad 5(14 - x) = 25$

$\Rightarrow \quad 14 - x = 5$

$\Rightarrow \quad x = 9$

From (1), $y = 15$

Thus, $x = 9$ and $y = 15$.