# QUESTION PAPER CODE 430/1/2
# EXPECTED ANSWER/VALUE POINTS

## SECTION A

**Q. Nos. 1 to 10 are multiple choice questions. Select the correct option.**

**1. The graph of a polynomial is shown in Fig. 1, then the number of its zeroes is**

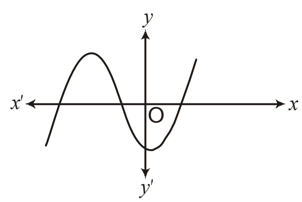


**Fig.1**

**(a) 3** **(b) 1** **(c) 2** **(d) 4**

**Sol.** (a) 3 1

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**2. 225 can be expressed as**

**(a)** $5 \times 3^2$ **(b)** $5^2 \times 3$ **(c)** $5^2 \times 3^2$ **(d)** $5^3 \times 3$

**Sol.** (c) $5^2 \times 3^2$ 1

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**3. Probability that a number selected at random from the numbers 1, 2, 3, ..., 15 is a multiple of 4 is**

**(a)** $\frac{4}{15}$ **(b)** $\frac{2}{15}$ **(c)** $\frac{1}{15}$ **(d)** $\frac{1}{5}$

**Sol.** (d) $\frac{1}{5}$ 1

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**4.** $2.\overline{35}$ **is**

**(a) an integer** **(b) a rational number**

**(c) an irrational number** **(d) a natural number**

**Sol.** (b) a rational number 1

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**5. The median and mode respectively of a frequency distribution are 26 and 29. Then its mean is**

**(a) 27.5** **(b) 24.5** **(c) 28.4** **(d) 25.8**

**Sol.** (b) 24.5 1

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**6. HCF of 144 and 198 is**

**(a) 9** **(b) 18** **(c) 6** **(d) 12**

**Sol.** (b) 18 1

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**7. If the distance between the points A(4, p) and B(1, 0) is 5 units, then the value (s) of p is (are)**

**(a) 4 only** **(b) –4 only** **(c) ±4** **(d) 0**

**Sol.** (c) ±4 1

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**8. The area of a triangle with vertices A(5, 0), B(8, 0) and C(8, 4) in square units is**

**(a) 20** **(b) 12** **(c) 6** **(d) 16**

**Sol.** (c) 6 1

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**9. The sum and product of the zeroes of a quadratic polynomial are 3 and – 10 respectively. The quadratic polynomial is**

**(a)** $x^2 - 3x + 10$ **(b)** $x^2 + 3x - 10$

**(c)** $x^2 - 3x - 10$ **(d)** $x^2 + 3x + 10$

**Sol.** (c) $x^2 - 3x - 10$ 1

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**10. From an external point Q, the length of tangent to a circle is 12 cm and the distance of Q from the centre of circle is 13 cm. The radius of circle (in cm) is**

**(a) 10** **(b) 5** **(c) 12** **(d) 7**

**Sol.** (b) 5 1

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**In Q. Nos. 11 to 15, fill in the blanks.**

**11. If** $\tan(A + B) = \sqrt{3}$ **and** $\tan(A - B) = \frac{1}{\sqrt{3}}$, **A > B, then the value of A is _______.**

**Sol.** 45° 1

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**12. The perimeters of two similar triangle are 25 cm and 15 cm respectively. If one side of the first triangle is 9 cm, then the corresponding side of second triangle is _______.**

**Sol.** $\frac{27}{5}$ cm or 5.4 cm 1

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**13. If the equations kx – 2y = 3 and 3x + y = 5 represent two intersecting lines at unique point, then the value of k is _______.**

**Sol.** $\neq -6$ 1

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**OR**

**If quadratic equation** $3x^2 - 4x + k = 0$ **has equal roots, then the value of k is _______.**

**Sol.** $\frac{4}{3}$ 1

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**14. If the point C(k, 4) divides the line segment joining two points (A(2, 6) and B(5, 1) in ratio 2 : 3, the value of k is _______.**

**Sol.** $\frac{16}{5}$ 1

**OR**

**If points A(–3, 12), B(7, 6) and C(x, 9) are collinear, then the value of x is _______.**

**Sol.** 2 1

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**15. The value of $\sin^2 65° + \sin^2 25°$ is _______.**

**Sol.** 1 1

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**In Q. Nos. 16 to 20, answer the following.**

**16. The nth term of an AP is (7 – 4n), then what is its common difference?**

**Sol.** $T_1 = 3,\ T_2 = -1$ $\frac{1}{2}$

$d = -4$ $\frac{1}{2}$

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**17. If a pair of dice is thrown once, then what is the probability of getting a sum of 8?**

**Sol.** Favourable outcomes are

(3, 5); (4, 4); (5, 3); (2, 6); (6, 2) i.e., 5 $\frac{1}{2}$

$P(\text{Sum } 8) = \frac{5}{36}$ $\frac{1}{2}$

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**18. The areas of two circles are in the ratio 9 : 4, then what is the ratio of their circumferences?**

**Sol.** $\frac{r_1^2}{r_2^2} = \frac{9}{4} \Rightarrow \frac{r_1}{r_2} = \frac{3}{2}$ $\frac{1}{2}$

$\therefore \frac{2\pi r_1}{2\pi r_2} = \frac{3}{2}$ or $3:2$ $\frac{1}{2}$

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**19. If 5 tan θ = 3, then what is the value of $\left(\frac{5\sin\theta - 3\cos\theta}{4\sin\theta + 3\cos\theta}\right)$?**

**Sol.** $\frac{5\tan\theta - 3}{4\tan\theta + 3}$ $\frac{1}{2}$

$= 0$ $\frac{1}{2}$

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**20. $\Delta ABC$ is isosceles with AC = BC. If $AB^2 = 2AC^2$, then find the measure of $\angle C$.**

**Sol.** $AB^2 = AC^2 + BC^2$ $\frac{1}{2}$

$\therefore \angle C = 90°$ $\frac{1}{2}$

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## SECTION B

**Q. Nos, 21 to 26 carry two marks each.**

**21. Prove that $\sqrt{\frac{1-\sin\theta}{1+\sin\theta}} = \sec\theta - \tan\theta$.**

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

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

**OR**

**Prove that $\frac{\tan^2\theta}{1+\tan^2\theta} + \frac{\cot^2\theta}{1+\cot^2\theta} = 1$.**

L.H.S. = $\frac{\tan^2\theta}{\sec^2\theta} + \frac{\cot^2\theta}{\operatorname{cosec}^2\theta}$ 1

$= \sin^2\theta + \cos^2\theta$

$= 1$ 1

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**22. Two different dice are thrown together, find the probability that the sum of the numbers appeared is less than 5.**

**Sol.** Total number of possible outcomes = 36

Favourable outcomes are = (1, 1); (1, 2); (1, 3); (2, 1); (2, 2)

(3, 1) i.e. 6 1

P(sum of numbers less than five) = $\frac{6}{36}$ or $\frac{1}{6}$ 1

**OR**

**Find the probability that 5 Sundays occur in the month of November of a randomly selected year.**

Number of days of November = 30

= 4 weeks + 2 days 1

P(5 sundays) = $\frac{2}{7}$ 1

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**23. A bag contains 5 red balls and some blue balls. If the probability of drawing a blue ball at random from the bag is three times that of a red ball find the number of blue balls in the bag.**

**Sol.** Let number of blue balls = x

Total balls = 5 + x $\frac{1}{2}$

P(blue ball) = $\frac{x}{5+x}$ and P(Red balls) = $\frac{5}{5+x}$ 1

$\therefore \quad \frac{x}{5+x} = \frac{3(5)}{5+x}$

$\Rightarrow \quad x = 15$

$\therefore$ No. of blue balls = 15 $\frac{1}{2}$

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**24. Divide the polynomial ($9x^2 + 12x + 10$) by ($3x + 2$) and write the quotient and the remainder.**

**Sol.**

$$\begin{array}{r|l} & 3x+2 \\ \hline 3x+2 & 9x^2+12x+10 \\ & \underline{-9x^2 \mp 6x} \\ & \quad 6x+10 \\ & \quad \underline{-6x \mp 4} \\ & \quad\quad 6 \end{array}$$ 1

Quotient = 3x + 2, Remainder = 6 $\frac{1}{2}+\frac{1}{2}$

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**25. In Fig. 4, a circle touches all the four sides of a quadrilateral ABCD. If AB = 6 cm, BC = 9 cm and CD = 8 cm, then the find length of AD.**

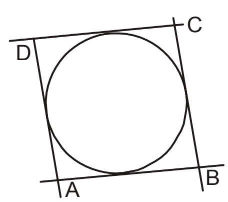


**Fig. 4**

**Sol.** The sides of quadrilateral touches a circle

AB + DC = BC + AD 1

6 + 8 = 9 + AD

$\Rightarrow$ AD = 5 cm 1

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**26. A road which is 7 m wide surrounds a circular park whose circumference is 88 m. Find the area of the road.**

**Sol.** Let r be radius of circular park

$\frac{44}{7} \times r = 88$

$\Rightarrow$ r = 14 m $\frac{1}{2}$

radius of outer circle = 21 m $\frac{1}{2}$

Area of road = $\pi(21)^2 - \pi(14)^2$ $\frac{1}{2}$

$= \frac{22}{7} \times 35 \times 7 = 770 \text{ m}^2$ $\frac{1}{2}$

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**SECTION C**

**Q. Nos. 27 to 34 carry 3 marks each.**

**27. Draw a circle of radius 4 cm. From a point 7 cm away from the centre of circle. Construct a pair of tangents to the circle.**

**Sol.** Constructing the circle of given radius 1

Constructing the tangents 2

**OR**

**Draw a line segment of 6 cm and divide it in the ratio 3 : 2.**

Drawing line segment of length 6 cm. 1

Dividing it in the ratio 3 : 2. 2

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**28. Prove that (1 + tan A – sec A) × (1 + tan A + sec A) = 2 tan A**

**Sol.** L.H.S. $= (1 + \tan A)^2 - \sec^2 A$ 1

$= 1 + \tan^2 A + 2 \tan A - \sec^2 A$ 1

$= \sec^2 A + 2\tan A - \sec^2 A$

$= 2 \tan A$ = R.H.S. 1

**OR**

**Prove that** $\dfrac{\text{cosec}\,\theta}{\text{cosec}\,\theta - 1} + \dfrac{\text{cosec}\,\theta}{\text{cosec}\,\theta + 1} = 2\sec^2\theta$

L.H.S. $= \dfrac{\text{cosec}\,\theta(\text{cosec}\,\theta + 1) + \text{cosec}\,\theta(\text{cosec}\,\theta - 1)}{\text{cosec}^2\theta - 1}$ 1

$= \dfrac{2\,\text{cosec}^2\theta}{\cot^2\theta}$ 1

$= 2\sec^2\theta$ = R.H.S. 1

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**29. Given that $\sqrt{3}$ is an irrational number, show that $(5 + 2\sqrt{3})$ is an irrational number.**

**Sol.** Let $(5 + 2\sqrt{3}) = x$, where x is a rational number $\frac{1}{2}$

$\Rightarrow \sqrt{3} = \dfrac{x - 5}{2}$ 1

L.H.S. is an irrational and R.H.S. is a rational number. 1

It is a contradiction

$\therefore$ Our assumption is wrong

$\therefore$ $5 + 2\sqrt{3}$ is a irrational number. $\frac{1}{2}$

**OR**

**An army contingent of 612 members is to march behind an army band of 48 members in a parade. The two groups are to march in the same number of columns. What is the maximum number of columns in which they can march?**

$612 = 2^2 \times 3^2 \times 17$ 1

$48 = 2^4 \times 3$ 1

HCF $(612, 48) = 2^2 \times 3$

$= 12$ $\frac{1}{2}$

Number of column = 12 $\frac{1}{2}$

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**Read the following passage carefully and then answer the questions given at the end.**

**30.** **To conduct Sports Day activities, in your rectangular shaped school ground ABCD, lines have been drawn with chalk powder at a distance of 1 m each. 100 flower pots have been placed at a distance of 1 m from each other along AD, as shown in Fig. 5. Niharika runs $\frac{1}{4}$th the distance AD on the 2nd line and posts a green flag. Preet runs $\frac{1}{5}$th the distance AD on the eighth line and posts a red flag.**

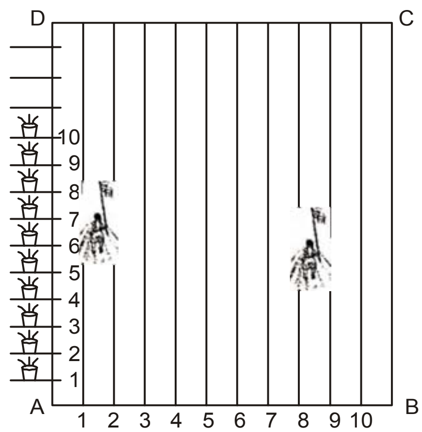


**Fig. 5**

**(i) What is the distance between the two flags?**

**(ii) If Rashmi has to post a blue flag exactly half way between the line segment joining the two flags, where should she post the blue flag?**

**Sol.** Coordinate of green flag = (2, 25) $\frac{1}{2}$

Coordinate of Red flag = (8, 20) $\frac{1}{2}$

(i) Distance between the flags = $\sqrt{(-6)^2 + (5)^2}$

$= \sqrt{61}$ units 1

(ii) Mid point between = (5,22.5) 1

green and Red flag

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**31.** **Solve graphically: 2x + 3y = 2, x – 2y = 8**

**Sol.** Correct graph of 2x + 34 = 2 1

Correct graph of x – 2y = 8 1

Point of intersection = (4, –2)

or x = 4, y = – 2 1

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**32. Prove that the tangent at any point of a circle is perpendicular to the radius through the point of contact.**

**Sol.** Correct fig., given, to prove $1\frac{1}{2}$

Correct proof $1\frac{1}{2}$

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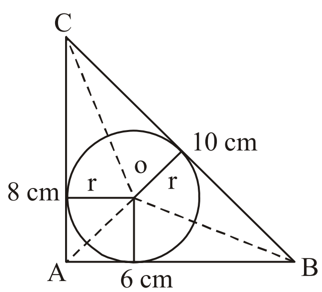
**33. A right triangle ABC, right angled at A, is circumscribing a circle. If AB = 6 cm and BC = 10 cm, find the radius of the circle.**

**Sol.**




Correct figure $\frac{1}{2}$

$CA = \sqrt{(10)^2 - (6)^2}$

$= 8$ cm $\frac{1}{2}$

Area $\Delta ABC = \frac{8 \times 6}{2} = 24\ cm^2$ $\frac{1}{2}$

ar $\Delta AOC$ + ar $\Delta AOB$ + ar $\Delta BOC$ = 4r + 3r + 5r = 12r 1

$\therefore$ 12r = 24 $\Rightarrow$ r = 2 cm $\frac{1}{2}$

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**34. Find the zeroes of the quadratic polynomial $x^2 + 7x + 10$, and verity the relationship between the zeroes and the coefficients.**

**Sol.** $x^2 + 7x + 10 = (x + 5)(x + 2)$

zeroes are –5, –2 1

Relation between zeroes

Sum of zeroes = –5 – 2 = –7, $\frac{-b}{a} = \frac{-7}{1}$ $\frac{1}{2}+\frac{1}{2}$

Product of zeroes = 10, $\frac{c}{a} = \frac{10}{1}$ $\frac{1}{2}+\frac{1}{2}$

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## SECTION D

**Q. Nos. 35 to 40 carry 4 marks each.**

**35. Find the mean of the following data:**

| **Classes** | **0 – 20** | **20 – 40** | **40 – 60** | **60 – 80** | **80 – 100** | **100 – 120** |
|---|---|---|---|---|---|---|
| **Frequency** | **20** | **35** | **52** | **44** | **38** | **31** |

**Sol.**

| x | f | fx |
|---|---|---|
| 10 | 20 | 200 |
| 30 | 35 | 1050 |
| 50 | 52 | 2600 |
| 70 | 44 | 3080 |
| 90 | 38 | 3420 |
| 110 | 31 | 3410 |
| | 220 | 13760 |

Correct Table 2

$\therefore \quad \text{Mean} = \dfrac{\Sigma fx}{\Sigma f} = \dfrac{13760}{220}$ or 62.54 2

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**36. In Fig. 6, DEFG is a square in a triangle ABC right angled at A.**

**Prove that**

**(i) ΔAGF ~ ΔDBG**

**(ii) ΔAGF ~ ΔEFC**

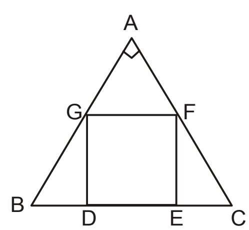
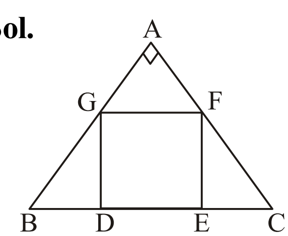



**Fig.6**

**In an obtuse ΔABC (∠B is obtuse), AD is perpendicular to CB produced. Then prove that $AC^2 = AB^2 + BC^2 + 2BC \times BD$.**

**Sol.**




GF || DE (DEFG is square)

$\therefore \angle AGF = \angle ABC$ (Corresponding angles) $\frac{1}{2}$

$\therefore \angle A = \angle GDB = 90°$

$\therefore \Delta AGF \sim \Delta DBG$ (By AA similarity) $1\frac{1}{2}$

Again DEFG being a square $\angle AFG = \angle ACB$ (corresponding angles) $\frac{1}{2}$

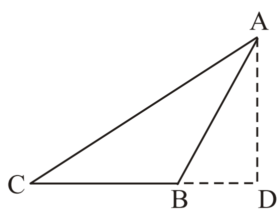
$\therefore \angle A = \angle CEF$ (each 90°)

$\Delta AGF \sim \Delta EFC$ (By AA similarity) $1\frac{1}{2}$

OR

**In an obtuse $\Delta ABC$ ($\angle B$ is obtuse), AD is perpendicular to CB produced. Then prove that $AC^2 = AB^2 + BC^2 + 2BC \times BD$.**

**Sol.** In rt $\Delta ADC$ Correct figure 1




$AC^2 = AD^2 + CD^2$ $\frac{1}{2}$

$= AD^2 + (CB + BD)^2$ 1

$= AD^2 + BD^2 + CB^2 + 2CB.BD$ 1

$= AB^2 + CB^2 + 2CB \, . \, BD$ $\because \Delta$ ABD is rt angled $\frac{1}{2}$

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**37. If 4 times the 4th term of an AP is equal to 18 times the 18th term, then find the 22nd term.**

**Sol.** Let first term be a and common difference = d

$\therefore$ $4(a + 3d) = 18(a + 17d)$ 1

$\Rightarrow$ $a = -21d$ 1

22nd term $= a + 21d$ 1

$= -21d + 21d$

$= 0$ 1

**OR**

**How many terms of the AP : 24, 21, 18, ... must be taken so that their sum is 78?**

Let the number of term be n, $d = -3$ $\frac{1}{2}$

$\therefore \frac{n}{2}[48 + (n-1)(-3)] = 78$ 1

$\Rightarrow n^2 - 17n + 52 = 0$ 1

$(n - 13)(n - 4) = 0$ 1

$\Rightarrow n = 13$ or $4$

$\therefore$ Number of terms = 4 or 13 $\frac{1}{2}$

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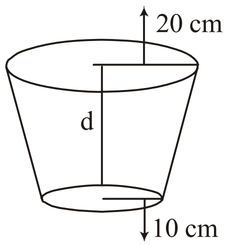
**38. An open metal bucket is in the shape of a frustum of cone of height 21 cm with radii of its lower and upper ends are 10 cm and 20 cm respectively. Find the cost of milk which can completely fill the bucket at the rate of ₹ 40 per litre.**

**Sol.**




Volume of Bucket $= \frac{\pi}{3}[400 + 100 + 200] \times 21$

$= 4900 \times \frac{22}{7} = 15400 \text{ cm}^3$ 2

Volume of milk $= \frac{15400}{1000} = 15.4$ litres 1

Cost of milk = ₹ 15.4 × 40 = ₹ 616 1

**OR**

**A solid is in the shape of a cone surmounted on a hemisphere. The radius of each of them being 3.5 cm and the total height of the solid is 9.5 cm. Find the volume of the solid.**

Volume of hemisphere $= \frac{2}{3}\pi r^3$

$= \frac{2}{3} \times \frac{22}{7} \times \left(\frac{7}{2}\right)^3$

$= \frac{539}{6} \text{ cm}^3$ $1\frac{1}{2}$

Height of cone = (9.5 – 3.5) cm = 6 cm $\frac{1}{2}$

Volume of cone $= \frac{1}{3}\pi r^2 h$

$= \frac{1}{3} \times \frac{\cancel{22}^{11}}{\cancel{7}} \times \frac{\cancel{7}}{\cancel{2}} \times \frac{7}{2} \times 6 = 77 \text{ cm}^3$ 1

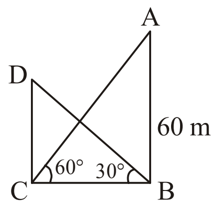
Total volume of solid

$= \frac{539}{6} + \frac{77}{1}$

$= \frac{539 + 462}{6} = \frac{1001}{6} \text{ cm}^3$ or $166.83 \text{ cm}^3$ 1

**39. The angle of elevation of the top of a building from the foot of a tower is 30°. The angle of elevation of the top of the tower from the foot of the building is 60°. If the tower is 60 m high, find the height of the building.**

**Sol.**




$\frac{AB}{BC} = \tan 60°$ Correct figure 1

$\frac{60}{BC} = \sqrt{3}$

$\Rightarrow BC = \frac{60}{\sqrt{3}}$ or $20\sqrt{3}$ m 1

Again, $\frac{DC}{CB} = \tan 30°$ 1

$\frac{DC}{20\sqrt{3}} = \frac{1}{\sqrt{3}}$

$\Rightarrow DC = 20$ m

Height of building = 20 m 1

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**40. The difference of two natural is 5 and the difference of their reciprocals is $\frac{1}{10}$. Find the numbers.**

**Sol.** Let two natural numbers be = x + 5, x $\frac{1}{2}$

$\therefore \frac{1}{x} - \frac{1}{x+5} = \frac{1}{10}$ 1

$\Rightarrow \frac{5}{x^2+5x} = \frac{1}{10}$

$\Rightarrow x^2 + 5x - 50 = 0$ 1

$\Rightarrow (x + 10)(x - 5) = 0$ 1

$\Rightarrow x = -10$ (not possible)

or $x = 5$

The numbers are 10 and 5. $\frac{1}{2}$

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