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# CBSE
# Class IX Mathematics
# Term 2
# Sample Paper – 1 Solutions

**1)** An exterior angle of a triangle is 110° and the two interior opposite angles are equal. Each of these angles is

(A) 70°
(B) 55°
(C) 35°
(D) 110°

**Sol.** (B)

**2)** In ΔPQR, if $\angle R > \angle Q$, then

(A) $QR > PR$
(B) $PQ > PR$
(C) $PQ < PR$
(D) $QR < PR$

**Sol.** (B)

**3)** Two sides of a triangle are of lengths 7 cm and 3.5 cm. the length of the third side of the triangle cannot be

(A) 3.6 cm
(B) 4.1 cm
(C) 3.4 cm
(D) 3.8 cm

**Sol.** (C)

**4)** A rational number between 2 and 3 is

(A) 2.010010001..
(B) $\sqrt{6}$
(C) 5/2
(D) $4 - \sqrt{2}$

**Sol.** (C)

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**5)** In triangles ABC and DEF, $\angle A = \angle D$, $\angle B = \angle E$ and AB= EF, then are the two triangles congruent? If yes, by which congruency criterion?

(A) Yes, by AAS
(B) No
(C) Yes, by ASA
(D) Yes, by RHS

**Sol.** (B)

**6)** In ΔPQR, $\angle P = 70°$, $\angle R = 30°$, which side of this triangle is the longest? Give reasons for your answer.

(A) PQ
(B) QR
(C) PR
(D) PQ QR

**Sol.** (C)

$\angle = 180° - [70° + 30°] = 80°$ which is largest

∴ Longest side is PR

**7)** If a = 9-4√5, find the value of$a = \frac{1}{a}$.

(A) $8 - \sqrt{5}$
(B) $7 - \sqrt{5}$
(C) $-8 + \sqrt{5}$
(D) $7 - \sqrt{3}$

**Sol.** (A)

$a = 9 - 4\sqrt{5} \Rightarrow \frac{1}{a} = \frac{1}{9-4\sqrt{5}} = \frac{9+4\sqrt{5}}{81-80} = 9 + 4\sqrt{5}$

$\therefore a - \frac{1}{a} = 9 - 4\sqrt{5} - 9 - 4\sqrt{5} = 8 - \sqrt{5}$

**8)** If (x-3) and $x - \frac{1}{3}$ are both factors of $ax^2 + 5x + b$, then.

(A) a>b
(B) a<b
(C) a=b
(D) can't be said

**Sol.** (C)

Let $f(x) = ax^2 + 5x + b$

$f(3) = 0 \Rightarrow 9a + 15 + b = 0 \Rightarrow 9a + b = -15$ ….(i)

$f\left(\frac{1}{3}\right) = 0 \Rightarrow \frac{a}{9} + \frac{5}{3} + b = 0 \Rightarrow a + 9b = -15$ ……(ii)

$(i) = (ii) \Rightarrow a = b$

**9)** Find the value $x^3y^3 + 15xy - 125$ when x+y=5.

(A) 1

(B) -1

(C) 2

(D) 0

**Sol.** (D)

If $x + y = 5 \Rightarrow x + y + (-5) = 0$

$\therefore (x)^3 + (y)^3 + (-5)^3 = 3(x)(y)(-5)$

$\Rightarrow \quad x^3 + y^3 + 15xy = 125$

$\Rightarrow \quad x^3 + y^3 + 15xy - 125 = 0$

OR $\quad a + b + c = 6 \Rightarrow (2 - a) + (2 - b) + (2 - c) = 0$

$\therefore (2 - a)^3 + (2 - b)^3 + (2 - c)^3 = 3(2 - a)(2 - b)(2 - c)$

$\therefore (2 - a)^3 + (2 - b) + (2 - c)^3 - 3(2 - a)(2 - b)(2 - c) = 0$

**10)** In figure ABC is an equilateral triangle with coordinates of B and C as B(-3,0) and C(3,0) find the coordinates of the vertex A.

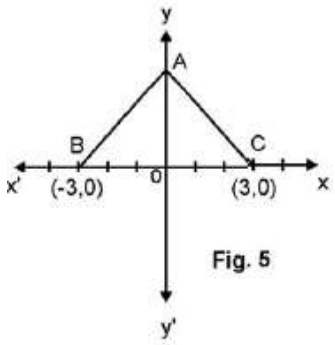


Fig. 5

(A) $3\sqrt{3}, 0$

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(B) $0, 3\sqrt{3}$
(C) $0, -3\sqrt{3}$
(D) 0, 0

**Sol.** (B)

AB=BC=AC=6 units as $\Delta ABC$ is equilateral

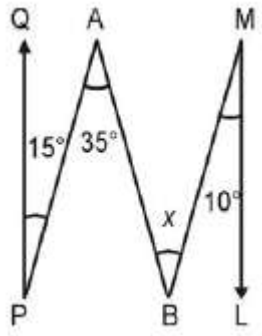
AO bisects base BC

$\Rightarrow$ OB=3 units

$\therefore OA^2=AB^2-OB^2=6^2-3^2=27 \Rightarrow OA=3\sqrt{3}$

$\therefore$ Coordinates of A are $\left(0, 3\sqrt{3}\right)$

**11)** In fig .6 QPIML and other angles are shown. Find the values of x.




(A) 45°
(B) 60°
(C) 30°
(D) 35°

**Sol.** (C)

Draw AD$\parallel$PQ, BE$\parallel$LM$\parallel$PQ

$\Rightarrow \angle PAD=15^\circ \Rightarrow \angle DAB=20^\circ$

$\Rightarrow \angle DAB=\angle ABE=20^\circ$ and $\angle EBM=\angle BML=10^\circ$

$\Rightarrow x=30^\circ$

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**12)** In fig. 7 QT ⊥ PR, $\angle TQR = 40^\circ$ and $\angle SPR = 30^\circ$. Find the values of x and y.

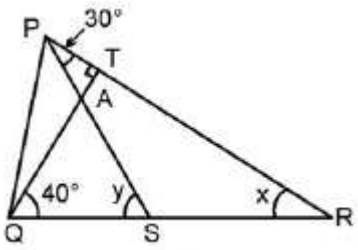

Fig. 7

(A) x = 50° , y = 80°
(B) x = 80°, y = 50°
(C) x = 60° , y = 70°
(D) x = 70 , y = 60°

**Sol.** (A)

In right triangle QTR, x = 90° -40° = 50°

Again y is the exterior angle of ΔPSR

$\Rightarrow y = 30^\circ + x = 50^\circ + 30^\circ = 80^\circ$

**13)** Find the area of a triangle two sides of which are 18 cm and 10 cm and the perimeter is 42 cm.
(A) $17\sqrt{11}\ cm^2$
(B) $19\sqrt{11}\ cm^2$
(C) $21\sqrt{11}\ cm^2$
(D) $23\sqrt{11}\ cm^2$

**Sol.** (C)

$S = \frac{42}{2} = 21$, lt a = 18 cm, b= 10 cm, c=42 –(28) =14 cm

$Ar(\Delta) = \sqrt{s(s-a)(s-b)(s-c)} = \sqrt{21(3)(11)7}$

$= 21\sqrt{11}\ cm^2$

**14)** Let p and q be the remainders, when the polynomials $x^3 + 2x^2 5ax - 7$ and $x^3 + ax^2 - 12x + 6$ are divided by $(x + 1)$ and $(x - 2)$ respectively. If $2p + q = 6$, find the value of a.
(A) 2
(B) -2
(C) -3

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(D) 3

**Sol.** (A)

Let $P(x) = x^3+2x^2-5ax-7$ and $Q(x) = x^3+ax^2-12x+6$

$P(-1) = p$ and $Q(2) = q$

$\therefore\ p=-1+2+5a-7 \Rightarrow p=5a-6$

$q=8+4a-24+6 \Rightarrow q=4a-10$

$2p+q=6 \Rightarrow 10a-12+4a-10=6$

$\Rightarrow 14a=28 \Rightarrow a=2$

**15)** Factorize $x^{12} - y^{12}$.

(A) $(x - y)(x^2+y^2+xy)(x +y)(x^2+y^2-xy)(x^2- y^2)(x^4+y^4-x^2y^2)$

(B) $(x - y)(x^2+y^2+xy)(x- y)(x^2+y^2-xy)(x^2+ y^2)(x^4-y^4-x^2y^2)$

(C) $(x -y)(x^2-y^2+xy)(x +y)(x^2+y^2-xy)(x^2+ y^2)(x^4+y^4-x^2y^2)$

(D) $(x - y)(x^2+y^2+xy)(x +y)(x^2+y^2-xy)(x^2+ y^2)(x^4+y^4-x^2y^2)$

**Sol.** (D)

$x^{12}-y^{12} = (x^6-y^6)(x^6+y^6)$

$= (x^3-y^3)(x^3+y^3)(x^2+y^2)(x^4+y^4-x^2y^2)$

$= (x-y)(x^2+y^2+xy)(x+y)(x^2+y^2-xy)(x^2+y^2)(x^4+y^4-x^2y^2)$

**16)** Find the value of C if the line $2x+3y + C = 0$ passes through origin.

(A) 0

(B) 2

(C) 1

(D) 3

**Sol.** (A)

$2x + 3y + c = 0$

The line passes through origin (0, 0)

$\therefore \quad 2 \times 0 + 3 \times 0 + c = 0$

$0 + 0 + c = 0$

$C = 0$

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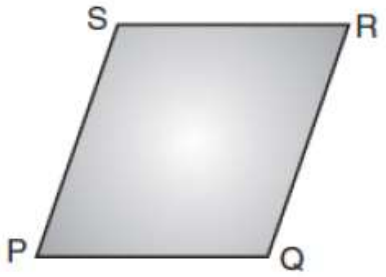
**17)** If PQRS is a parallelogram, then find the value of $\angle Q + \angle R$ and $\angle R + \angle S$

(A) 180° , 150°
(B) 180° , 180°
(C) 150° , 180°
(D) 30° , 150°

**Sol.** (B)

In ||gm, the sum of adjacent angle is 180°




$\therefore \quad \angle Q + \angle R = 180°$ ...(i)

And opposite angles are equal.

$\therefore \quad \angle Q = \angle S$

From (i), we get

$\angle S + \angle R = 180°$

**18)** There are 100 students in a class. 40 of them are girls. The average mark of the boys in science is 75% and that of the girls is 65%. Find the average marks of the class in science.

(A) 81%
(B) 51%
(C) 61%
(D) 71%

**Sol.** (D)

Girls = 40, Boys = 100 – 40 = 60 - Total marks for boys = 60 × 75 = 4500

Total marks for girls = 40 ×65 = 2600

Sum of class = 4500 + 2600 = 7100

Mean marks of the class = $\frac{7100}{100} = 71\%$

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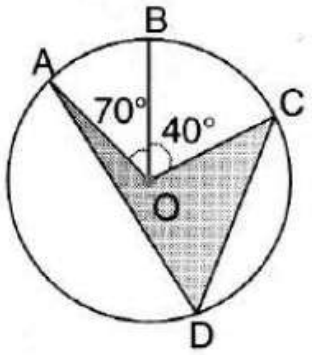
**19)** In the given figure, A, B and C are three points on a circle with centre O such that $\angle BOC = 40°$ and $\angle AOB = 70°$. If D is a point on the circle, find $\angle ADC$.

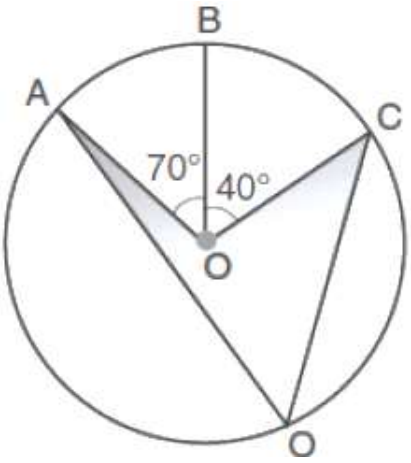



(A) 45°
(B) 65°
(C) 55°
(D) 85°

**Sol.** (C)

Given, A, B and C are three points on a circle with centre O, such that $\angle BOC = 40°$ and $\angle AOB = 70°$. Here, $\angle AOC = \angle AOB + \angle BOC$

$\therefore$ Arc ABC Makes $110°$ at the centre of the circle.




Then $\angle ADC = \frac{1}{2} \angle AOC$ (the angle subtended by an arc at the centre is double the angle subtended by it at any point of the circle)

$$= \frac{1}{2} \times 110° = 55°$$

$\therefore$ $\angle ADC = 55°$

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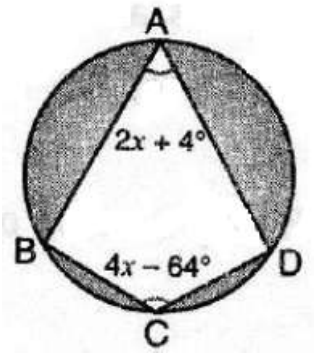
**20)** In the figure, find the value of x.




(A) 50°
(B) 40°
(C) 60°
(D) 70°

**Sol.** (B)

In a cyclic quadrilateral

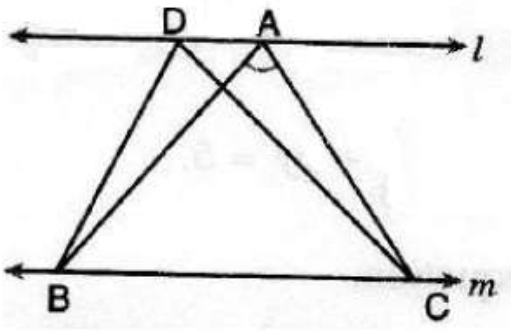
$$2c + 4° + 4x - 64 = 180°$$

$$6x - 60 = 180°$$

$$6x = 240°$$

$$x = 40°$$

**21)** In the given figure, ABC and DBC are triangles on the same base and between parallel lines. If AB = 3 cm, BC = 5 cm, $\angle A = 90°$, find area $\Delta DBC$.




(A) 6 $cm^2$

(B) 5 $cm^2$

(C) 4 $cm^2$

(D) 7 $cm^2$

**Sol.** (A)

Here AB = 3 cm, BC = 5 cm, $\angle A = 90°$

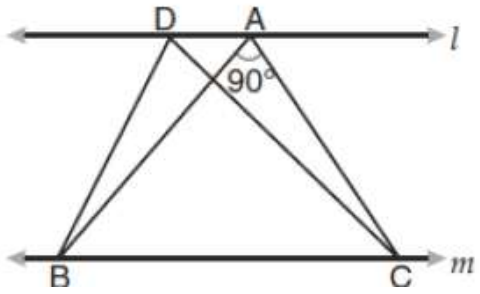
In right angled triangle ABC

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

$$(5)^2 = 3^2 + AC^2$$

$$AC^2 = 25 - 9 = 16$$

$$AC = 4 \text{ cm}$$




$\Delta ABC$ and $\Delta DBC$ are on the same base BC and Between same parallels l and m.

$\therefore$ $\text{ar (DBC)} = \text{ar (ABC)}$

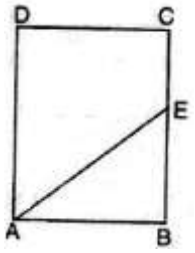
$$= \frac{1}{2} \times \text{base} \times \text{height}$$

$$= \frac{1}{2} \times AB \times AC$$

$$= \frac{1}{2} \times 3 \times 4$$

$$= 6 \text{ cm}^2.$$

**22)** ABCD is a parallelogram. If E is the mid-point of BC and AE is the bisector of $\angle A$. which of the following is correct




(A) $AB = \frac{1}{3} AD$

(B) $AB = \frac{1}{2} AD$

(C) $AB = \frac{1}{4} AD$

(D) $AB = \frac{1}{8} AD$

**Sol.** (B)

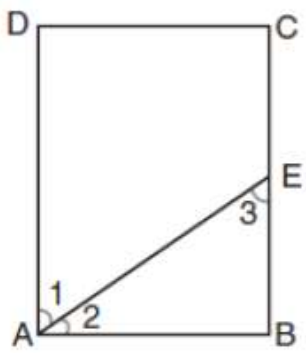
Here $\angle 1 = \angle 2$ (AE is angle bisector)

But $\angle 1 = \angle 3$ (Alternate angle as AD ‖ BC)

$\therefore$ $\angle 3 = \angle 2$

Hence, $BE = AB$ (side opposite to equal angles)

But $BE = \frac{1}{2} BC$, (E is the mid-point of BC)




$\therefore$ $AB = \frac{1}{2} BC$

And $BC = AD$ (opposite sides of ‖ gm)

$$AB = \frac{1}{2} AD$$

**23)** How many square metre of canvas is required for making a conical tent whose height is 3.5 m and the radius of the base is 12 m? $\left(\text{Use } \pi = \frac{22}{7}\right)$

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(A) 471.44 $cm^2$
(B) 471.45 $cm^2$
(C) 471.46 $cm^2$
(D) 471.43 $cm^2$

**Sol.** (D)

Height of cone (h) = 3.5 m

Radius of base (r) = 12 m

Slant height (l) = $\sqrt{h^2 - r^2} = \sqrt{(3.5)^2 + (12)^2}$

$= \sqrt{12.25 + 144}$

$= \sqrt{156.25} = 12.5$ cm

Area of canvas for making a conical tent = πrl

$= \frac{22}{7} \times 12 \times 12.5$

= 471.43 $cm^2$ (app.)

**24)** The volume of a sphere is $905\frac{1}{7}$ $cm^3$. Determine its diameter and its surface area. $\left(\text{Use } \pi = \frac{22}{7}\right)$

(A) $452\frac{3}{7}$
(B) $452\frac{2}{7}$
(C) $452\frac{4}{7}$
(D) $452\frac{1}{7}$

**Sol.** (C)

Volume of sphere = $\frac{4}{3}\pi r^3$

$905\frac{1}{7} = \frac{4}{3} \times \frac{22}{7} \times r^3$

$r^3 = \frac{6336}{7} \times \frac{7 \times 3}{4 \times 22} = \frac{288 \times 3}{4}$

$r^3 = 216 = (6)^3$

r = 6 cm

Diameter of sphere = 2r = 2 ×6 = 12 cm

Surface Area = $4\pi r^2 = 4 \times \frac{22}{7} \times 6 \times 6$

Surface Area = $4\pi r^2 = 4 \times \frac{22}{7} \times 6 \times 6$

$= \frac{3168}{7} = 452\frac{4}{7}\ \text{cm}^2$

**25)** Mahesh and Altaf, two students donated Rs. 95 towards the Prime Minister's Relief Fund. Write a linear equation in two variable for the above statement.

(A) x + y = 95
(B) x – y = 95
(C) –x + y = 95
(D) x + y = -95

**Sol.** (A)

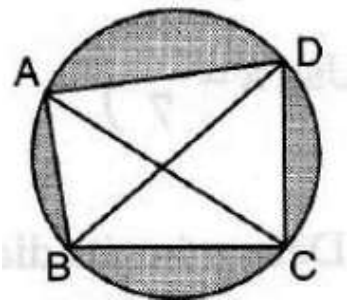
Let Mahesh donated the money = Rs. x

All of denoted the money = Rs. y

According to question,

$$x + y = 95$$

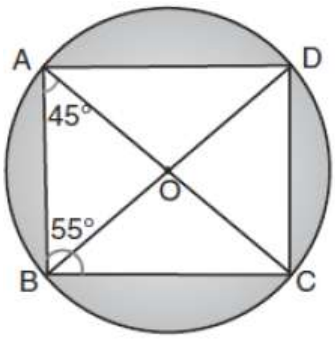
**26)** In the figure, ABCD is a cyclic quadrilateral in which AC and BD are diagonal. If $\angle ABC = 55°$ and $\angle BAC = 45°$, find $\angle BCA$.




(A) 70°
(B) 80°
(C) 60°
(D) 50°

**Sol.** (B)

In ΔABC,

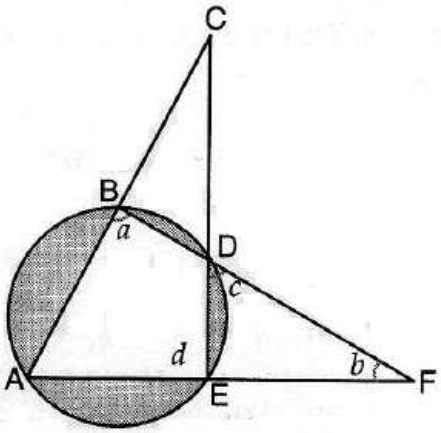



$\angle BAC + \angle ABC + \angle BCA = 180°$(Angle sum properity)

$45° + 55° + \angle BCA = 180°$

$\angle BCA = 180° - 100° = 80°$

**27)** In the given figure, $\angle BCD = 43°$ and $\angle BAE = 62°$. Find the value of a, b, c, d.




(A) $a = 13°, b = 105°, c = 62°, d = 75°$
(B) $a = 105°, b = 13°, c = 75°, d = 62°$
(C) $a = 105°, b = 62°, c = 13°, d = 75°$
(D) $a = 105°, b = 13°, c = 62°, d = 75°$

**Sol.** (D)

In ΔACE, $\angle BCD = 43°$ and $\angle BAE = 62°$

$43° + 62° + d = 180°$

$d = 180° - 105°$

$d = 75°$

$a + d = 180°$ (Opp. Angles of cyclic quad. Are supplementary)

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$$a + 75° = 180°$$

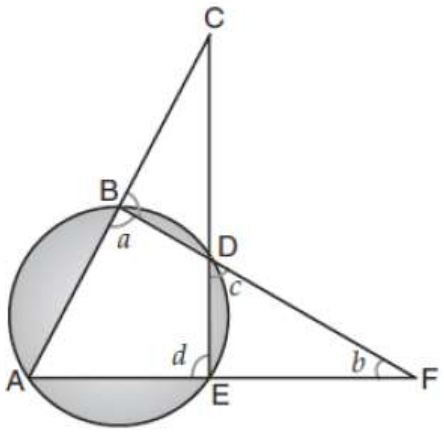
$$a = 105°$$

In ΔABF,

$$62° + 105° + b = 180°$$

$$b = 180° - 167°$$

$$b = 13°$$




In ΔDEF, $\angle DEF = 180° - 75° = 105°$

$$105° + 13° + c = 180°$$

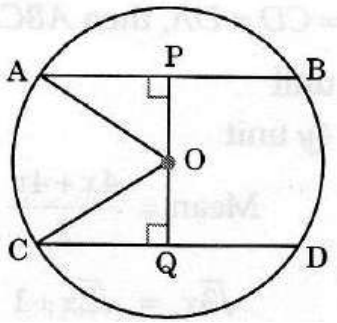
$$118° + c = 180°$$

$$c = 180° - 118°$$

$$c = 62°$$

$$a = 105°, b = 13°, c = 62°, d = 75°$$

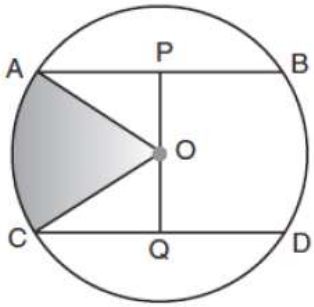
**28)** In the figure, O is the centre of the circle of radius 5 cm, OP$\perp$ AB, OQ $\perp$ CD, AB $\parallel$ CD, AB = 6 cm, CD = 8 cm. Determine PQ.




(A) 6
(B) 3
(C) 7
(D) 8

**Sol.** (C)

Since, perpendicular from the centre of the circle to a chord bisect the chord




$\therefore$ P and Q are the mid-points of AB and CD

$$AP = \frac{1}{2} AB = \frac{1}{2} \times 6 = 3 \text{ cm}$$

$$CQ = \frac{1}{2} CD = \frac{1}{2} \times 8 = 4 \text{ cm}$$

In right triangle OAP

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

$$5^2 = OP^2 + 3^2$$

$$OP^2 = 25 - 9$$

$$Op^2 = 16$$

$$OP = 4 \text{ cm}$$

In right $\Delta OCQ$

$$OC^2 = OQ^2 + CQ^2$$

$$5^2 = OQ^2 + 4^2$$

$$OQ^2 = 25 - 16$$

$$OQ^2 = 9$$

$$OQ = 3$$

$\therefore$ $PQ = OP + OQ = 4 + 3 = 7$ cm

**29)** A circus tent is in the form of a cone of height 15m and diameter 16 m. Find the length of the canvass needed to make the tent if the width of the canvass 2 m. (use $\pi = 3.14$)

(A) 213.52
(B) 213.42
(C) 213.53
(D) 213.54

**Sol.** (A)

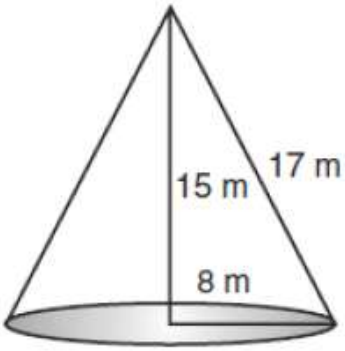
Height of conical tent (h) = 15 m

Radius (r) = $\frac{16}{2} = 8$ m

Slant height (l) = $\sqrt{h^2 + r^2}$

$= \sqrt{15^2 + 8^2} = \sqrt{225 + 64}$

$= \sqrt{289} = 17$ m



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Area of canvas = surface area of conical tent

$$l \times b = \pi rl$$

$$l \times 2 = 3.14 \times 8 \times 17$$

$$l = \frac{3.14 \times 8 \times 17}{2} = 213.52$$

**30)** $\frac{3}{4}$ th of cylindrical can contains milk. The height of the can is 1.4 m and radius is 0.4 m. This milk is poured into small cylindrical glasses of height 10 cm and radius 5 cm. How many small glasses are needed to empty the can?

(A) 672
(B) 671
(C) 673
(D) 674

**Sol.** (C)

Height of can (h) = 1.4 m = 140 cm

Radius (r) = 0.4 m = 40 cm

Volume of can = $\pi r^2 h = \frac{22}{7} \times 40 \times 40 \times 140$

$$= 2 \times 352000 \text{ cm}^3 = 704000 \text{ cm}^3$$

Volume of milk = $\frac{3}{4} \times$ volume of cylindrical can

$$= \frac{3}{4} \times 704000 = 528000 \text{ cm}^3$$

This milk is poured into some small cylindrical glasses whose height is 10 cm and radius 5 cm.

$\therefore$ No. of small glasses $= \frac{\text{Volume of milk}}{\text{VOlume of one small glass}}$

$$= \frac{528000}{\frac{22}{7} \times 5 \times 5 \times 10} = \frac{528000 \times 7}{22 \times 5 \times 5 \times 10}$$

$$= 672.$$