Maths

Term 1 CLASS 10 SET NO 1

## SECTION A

**MCQs**

**Q: 1** **$q$ is any rational number other than 0. Which of these is ALWAYS a rational number?**

**i) $\frac{10}{q}$ ii) $2q - 8$ iii) $q^9$ iv) $q^{1/2}$**

1. only (i)
2. only (i), (ii) and (iii)
3. only (i), (iii) and (iv)
4. all - (i), (ii), (iii) and (iv)

**Q: 2** **Which of these is the zero of $(4h + 86) - 2$?**

1. 21
2. -21
3. -22
4. $-\frac{86}{4}$

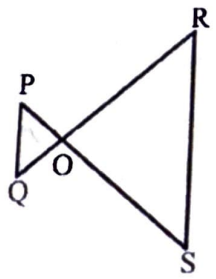
**Q: 3** **The zeroes of $5x^2 - 26x + (k + 2)$ are reciprocals of each other. Which of these is one of its ZEROES ?**

1. $-\frac{9}{5}$
2. $\frac{1}{5}$
3. 3
4. 1

**Q: 4** **Which of the following pairs of lines will intersect each other?**

1. $x = 0; y = 5$
2. $3x - 5y = 8; 6x - 10y = 1$
3. $4x + 6y = 10; 6x + 9y = 20$
4. $2y - 5x = 10; 10x - 4y = 5$

**Q: 5** **In the figure given below PQ || RS.**




**Which of these theorems can be used to prove that ΔPOQ and ΔSOR are similar?**

1. Side-Side-Side theorem
2. Side-Angle-Side theorem
3. Angle-Angle-Angle theorem
4. (none of these as ΔPQQ and ΔSOR are not similar)

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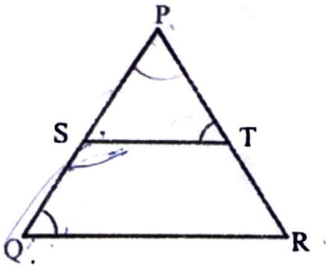
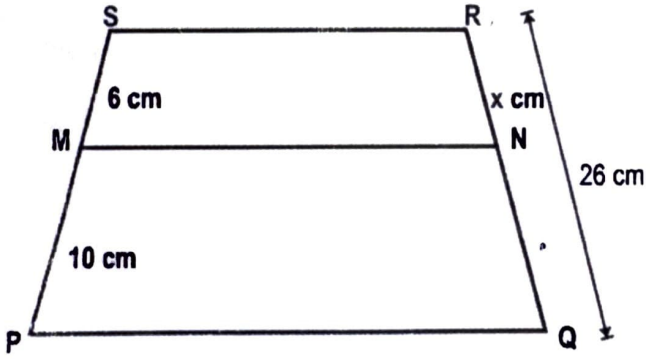
**Q: 6** **In the figure given below, ▲ PQR ~ ▲ PST. ∠PQR = ∠PTS = 70°.**




**What is ∠QPR?**

**1** 35°
**2** 40°
**3** 55°
**4** 60°

**Q: 7** **In the figure given below, SM = 6 cm, MP = 10 cm, RQ = 26 cm. Also RS, MN and PQ are parallel to each other.**




***(Note: Figure is not to scale.)***

**What is RN?**

**1** $\frac{39}{4}$ cm
**2** 11 cm
**3** 12 cm
**4** $\frac{65}{4}$ cm

**Q: 8** ***x*-axis divides the join of (2, -3) and (5, 6) in the ratio _____.**

**1** 1:2 **2** 2:1 **3** 2:5 **4** 5:2

**Q: 9** **The coordinates of the points of trisection of the line segment joining P(-9, 7) and Q(3, 1) are**

**1** (5, -5) and (3, 1)
**2** (5, -5) and (1, 3)
**3** (-5, 5) and (-1, 3)
**4** (-5, 5) and (3, -1)

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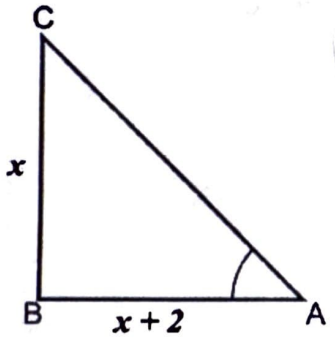
**Q: 10** **Which point(s) is/are at a distance of 10 units from the point (8, 2)?**

**i) (0, 8)**
**ii) (0, -4)**

**1** only i) **2** only ii) **3** both i) and ii) **4** neither i) nor ii)

**Q: 11** **In the triangle shown below, tan A = 0.75.**




*(Note: The figure is not to scale.)*

**What is cos A?**

**1** 0.8 **2** 0.6 **3** -0.6 **4** -0.8

**Q: 12** **Which of the following equations are correct?**

**i)** $(\sin\theta + \cos\theta)^2 = (1 + 2\sin\theta\cos\theta)$

**ii)** $\sqrt{(\sin^2\theta + \cos^2\theta)} = \sqrt{(sec^2\theta - \tan^2\theta)}$

**iii)** $\cos^2\theta\,(1 + \sin^2\theta) = 1 - \sin^4\theta$

**1** only i) **2** only ii) **3** only i) and ii) **4** all i), ii) and iii)

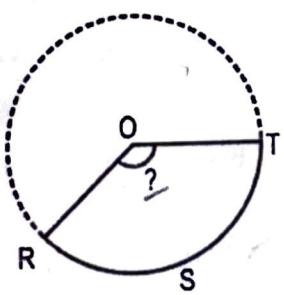
**Q: 13** **Shown here are a wrist watch and a tower clock.**

**Which of these will be the same for both the clocks?**

1. angle swept by the minute hand in 10 minutes
2. area of the portion swept by the minute hand in 10 minutes
3. circumference covered by the minute hand in 10 minutes
4. all of the above

**Q: 14** **In the circle shown below, O is the centre. RST is an arc of length 5π cm.**

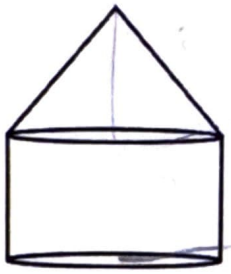
**The radius of the circle 9 cm.**




**What is the measure of ∠ROT (marked with a question mark in the figure)?**

1. 100°
2. 110°
3. 120°
4. 125°

**Q: 15** **A water tank is in the shape of a cylinder with a conical part on top. The cylindrical and conical parts have the same base diameter. The height of the conical part is equal to that of the cylindrical part.**



**(Volume of a cylinder = π × radius$^2$ × height, and Volume of a cone = 1/3 π × radius$^2$ × height)**

**The base of the cylinder has an area of 'Q' m$^2$, and its height is 'H' m. What is the volume of water that the entire tank can hold?**

1. 2 QH
2. 4/3 QH
3. 4/3 π Q$^2$ H
4. Cannot say without knowing the radius of the base.

**Q: 16** **A box contains 7 good, orange table tennis balls, 3 broken, orange table tennis balls, 6 good, yellow table tennis balls and 4 broken, yellow table tennis balls.**

**What is the probability that a ball that is picked randomly from the box is NOT a broken, yellow ball?**

1. $\frac{4}{20}$
2. $\frac{4}{16}$
3. $\frac{4}{7}$
4. $\frac{16}{20}$

The table below shows all the possible outcomes when two dice are thrown together.

| | | | | | |
|---|---|---|---|---|---|
| 1, 1 | 1, 2 | 1, 3 | 1, 4 | 1, 5 | 1, 6 |
| 2, 1 | 2, 2 | 2, 3 | 2, 4 | 2, 5 | 2, 6 |
| 3, 1 | 3, 2 | 3, 3 | 3, 4 | 3, 5 | 3, 6 |
| 4, 1 | 4, 2 | 4, 3 | 4, 4 | 4, 5 | 4, 6 |
| 5, 1 | 5, 2 | 5, 3 | 5, 4 | 5, 5 | 5, 6 |
| 6, 1 | 6, 2 | 6, 3 | 6, 4 | 6, 5 | 6, 6 |

Study the table and answer the following question.

**Q: 17** **What is the probability that the product of the two numbers appearing on the top of the dice is lesser than 14?**

1. $\frac{13}{36}$
2. $\frac{17}{36}$
3. $\frac{23}{36}$
4. $\frac{36}{36}$

**Q: 18 One card is drawn from a well-shuffled standard deck of 52 cards.**

**What is the probability that the card is a face card and a black card?**

**1** $\frac{3}{26}$ **2** $\frac{3}{13}$ **3** $\frac{4}{13}$ **4** $\frac{1}{2}$

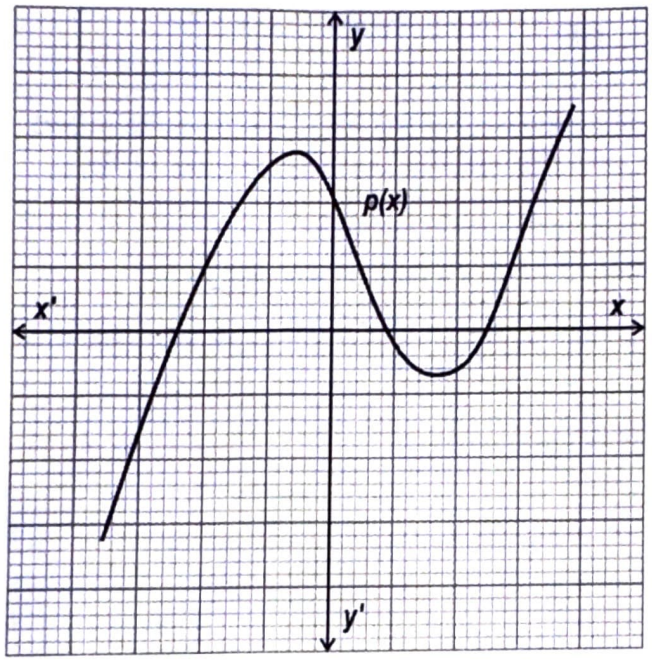
**Q: 19 Two statements are given below - one labelled Assertion (A) and the other labelled Reason (R). Read the statements carefully and choose the option that correctly describes statements (A) and (R).**

***Assertion (A)*** **: The value of sin θ always exceeds cos θ for $0° \leq \theta \leq 90°$.**

***Reason (R)*** **: The value of cos θ decreases as the value of θ increases in the interval [0°, 90°].**

**1** Both (A) and (R) are true and (R) is the correct explanation for (A).
**2** Both (A) and (R) are true but (R) is not the correct explanation for (A).
**3** (A) is false but (R) is true.
**4** (A) is true but (R) is false.

**Q: 20** **Shown below is a polynomial *p(x)*.**




**Based on the above information, two statements are given below - one labelled Assertion (A) and the other labelled Reason (R). Read the statements carefully and choose the option that correctly describes statements (A) and (R).**

***Assertion (A)* : *p(x)* has three zeroes.**

***Reason (R)* : The graph intersects positive x-axis at two points and positive *y* axis at one point.**

1. Both (A) and (R) are true and (R) is the correct explanation for (A).
2. Both (A) and (R) are true but (R) is not the correct explanation for (A).
3. (A) is true but (R) is false.
4. (A) is false but (R) is true.

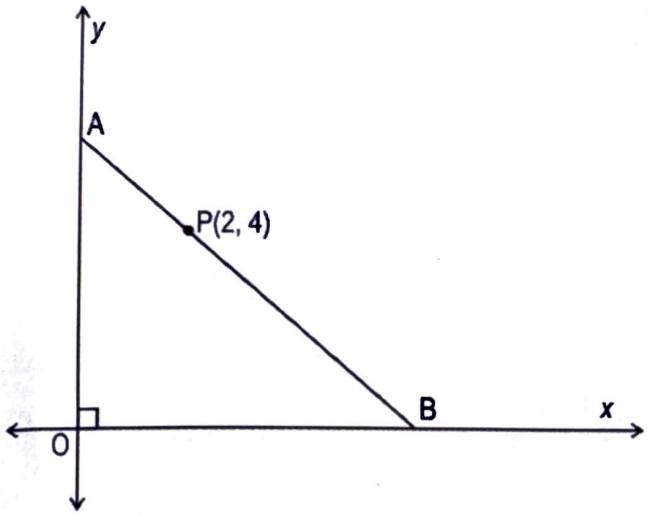
## SECTION B

**Very Short Answer**

**Q: 21** **Find the LCM of 60, 72 and 108 by prime factorisation method. Show your work.** **[2]**

**Q: 22** **Given that √5 is irrational, show by proof of contradiction that the sum of √5 and *k* where *k* is a rational number, is irrational. Show your steps.** **[2]**

**Q: 23** **In the coordinate plane given below, point P(2, 4) lies on the line segment AB such that AB = 3AP.** **[2]**



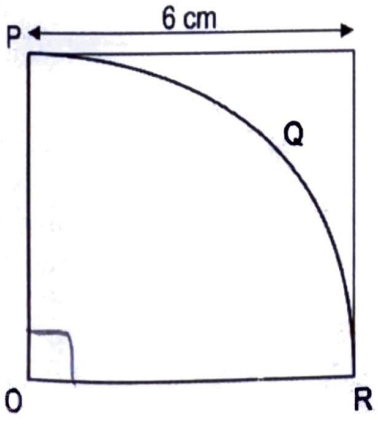

**Find the coordinates of A and B. Show your work.**

**Q: 24** **[2]**

$$\frac{27 \sin \theta - 8 \cos \theta}{27 \sin \theta + \cos \theta}$$

**If $\tan \theta = \frac{1}{3}$, evaluate the above expression. Show your steps.**

**Q: 25** **Shown below is a sector of a circle inscribed in a square of side length 6 cm.** **[2]**




***(Note: The figure is not to scale.)***

**Estimate the length of arc PQR. Show your work and give valid reasons.**

***(Note: Take π as 3.)***

## SECTION C

**Short Answer**

**Q: 26** **The greatest number that divides 305, 185, and 425 leaving a remainder of 5 in each case is of the form ( $p^2 \times 15$), where $p$ is an integer.** [3]

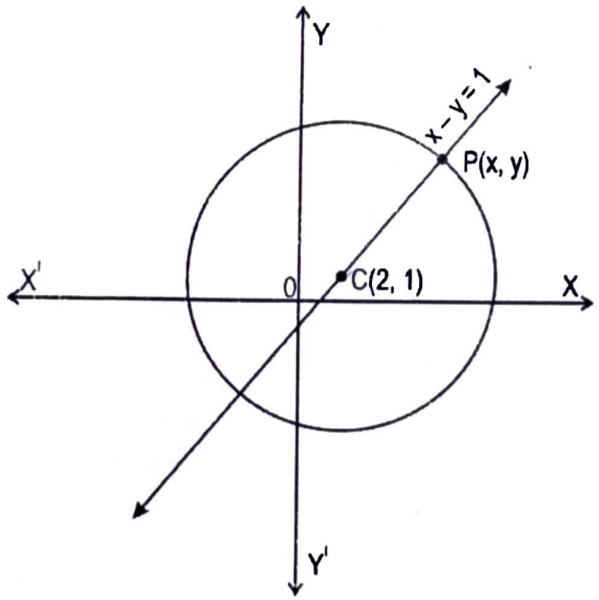
**Find the value of $p$. Show your steps.**

**Q: 27** **Solve the following pair of linear equations by graphical method.** [3]

$x - 5y = 3$
$x - 2y = 6$

**Show your work.**

**Q: 28** **A circle with radius 6 cm is drawn with C (2, 1) as the centre. A straight line, represented by the equation $x - y = 1$, passes through the centre of the circle intersecting the circle at a point P in the first quadrant.** [3]




***(Note: The figure is not to scale.)***

**Find the coordinates of P, expressing your answer in simplified radical form. Show your steps.**

Q: 29 Prove that [3]

$$\frac{\sqrt{cosec\ A + 1}}{\sqrt{cosec\ A - 1}} + \frac{\sqrt{cosec\ A - 1}}{\sqrt{cosec\ A + 1}} = 2\ sec\ A$$

Show your steps.

Q: 30 Evaluate: [3]

$$\frac{\sin 60° \times \cot 30° + \tan 45°}{\cos 0° + \text{cosec } 90° \times \sec 45°}$$

Show your steps.

Q: 31 Nandan carved the top portion of a wooden cuboid whose length, width and height were 70 cm, 70 cm and 140 cm respectively into a cylinder with both the diameter of the base and the height of the cylinder as 70 cm. He wanted to paint the outer surface of the resultant solid blue. [3]

i) Draw a rough diagram of the solid after carving and write the name of the solid that remains at the bottom portion of the original cuboid.

ii) Find the total surface area of the solid that needs to be painted in blue. Show your steps.

*(Note: Take π as $\frac{22}{7}$ .)*

## SECTION D

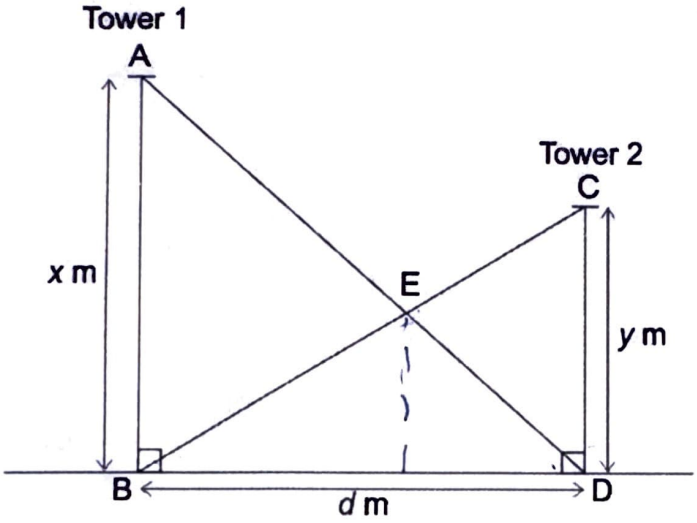
Long Answer

Q: 32 $f(x) = 2x^2 + nx + 102$ is a polynomial where $n$ is a real number. The zeroes of $f(x)$ are prime numbers. [5]

i) Write the factors of $f(x)$.
ii) Find the value of $n$.

Show your work and give valid reasons.

**Q: 33** **Two towers of heights *x* and *y* meters are positioned *d* meters apart. Ropes are extended from the top of one tower to the base of another tower and vice-versa as shown in the figure below.** [5]




**Find the height of point of intersection E above the ground in terms of *x* and *y*. Draw a rough figure and show your work.**

**Q: 34** **i) Prove that:** [5]

$$\frac{\sin^2 A}{1-\cot A} + \frac{\cos^2 A}{1-\tan A} = 1 + \sin A \cos A$$

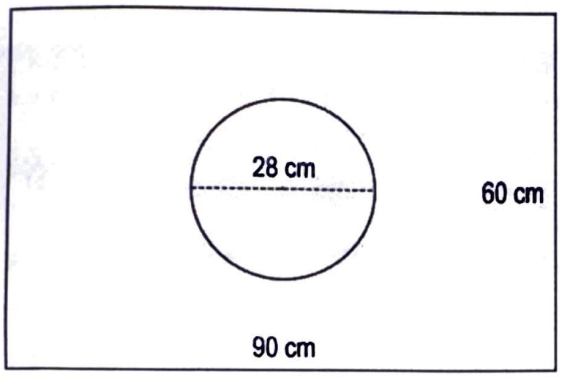
**ii) Examine whether the following statement is true or false.**

**"For B = 60°, the value of (sin B - cos B) is greater than the value of (1 - sin B cos B)."**

**Show your work with valid reason.**

***(Note: Use √3 as 1.73.)***

**Q: 35** **A rectangular table measuring 90 cm × 60 cm is designed for a game. In the center of the table, there is a circular target area with a diameter of 28 cm. A bead is randomly dropped onto the table, and it can land anywhere within the rectangular region.** **[5]**




**i) Find the probability that the bead lands inside the circular target area.**

**ii) If the circular target area is moved so that it touches one of the longer sides of the table, does the probability of the bead landing inside the circular target area change? Explain your reasoning.**

**iii) Find the probability that the bead lands outside the circle.**

**Show your work.**

***( Note: Take π as $\frac{22}{7}$ is needed. )***

## SECTION E

**Case Based questions**

**Answer the following questions based on the given information.**

Raman was at a food festival, trying out different food items. To keep track, he made a list of what he ate, along with the cost per item, shown below.

| Food item | Cost per item |
|---|---|
| Burger | Rs 50 |
| Momos | Rs 15 |
| Cookies | Rs 10 |
| Kebabs | Rs 10 |

- Raman ate 6 more momos than burgers.
- He ate the same number of burgers as kebabs.
- The number of cookies he ate was twice the number of kebabs he ate.

**Q: 36** **Raman spent Rs 120 on only cookies and kebabs.** [1]

**Frame two equations representing the relationship between the number of cookies and kebabs Raman bought and their prices. Show your work.**

**Q: 37** **If Raman spent Rs 135 only on Momos, then how many burgers did he eat? Show your work.** [1]

**Q: 38** **To take home, Raman bought some cookies and burgers for Rs 140. The number of burgers was half the number of cookies.**
**How many cookies and burgers did he buy to take home? Show your work.** [2]

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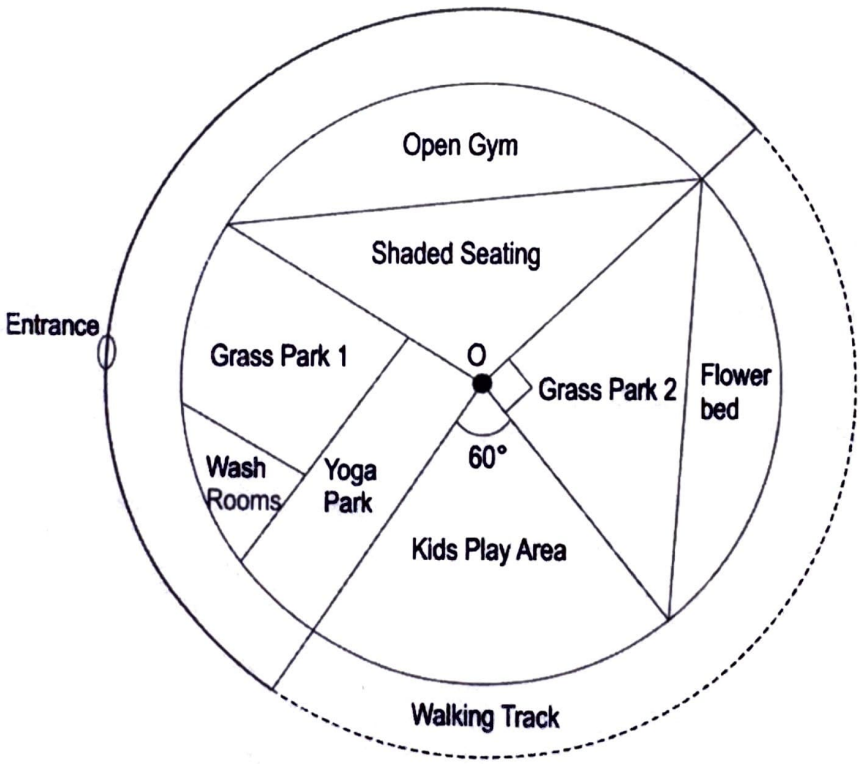
Answer the questions based on the given information.

Pune Municipal Corporation is planning to build a public garden in certain part of the city, the plan for which is depicted below.




*(Note: The fi gure is not to scale.)*

A fountain will be built at the centre of the garden depicted by O in the above figure. The distance between fountain and the inner circumference of the Walking Track will be 21 m. The width of the Walking Track will be 2.1 m. Palm trees will be planted along the outer circumference of the Walking Track depicted by dotted lines in the figure above.

**Q: 39** **Find the length of the outer circumference of the Walking Track to be covered by palm trees. Show your work.** [1]

***(Note: Take π as $\frac{22}{7}$ .)***

**Q: 40** **Find the angle of the sector comprising Open Gym and Shaded Seating if their combined area is 462 $m^2$. Show your work.** [1]

***(Note: Take π as $\frac{22}{7}$ .)***

**Q: 41** **Find the area of the Flowerbed in terms of π. Show your work.** [2]

**Answer the following questions based on the given information.**

Greenhouses are structures made to provide favourable growing conditions for crops and protect them from unfavourable weather and various pests. These are also called "glasshouses" as their walls and roof are usually transparent.

Fig. 1 below shows a hemispherical greenhouse that Gauri built in her garden using plastic sheets. She has used the plastic sheets only for the hemispherical dome and NOT for the ground. Gauri also wanted to re-pot some plants with fresh soil in new pots. She bought new pots which are a combination of cuboid and identical semi-cylinders at the ends, shown in Fig. 2.

**Fig.1: Greenhouse**

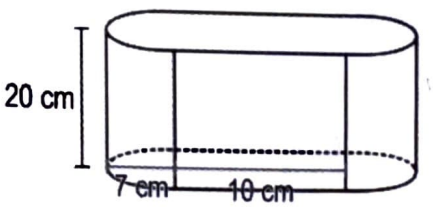



**Fig. 2: Gauri's new pot**

***(Note: Images are not to scale.)***

**Q: 42** **The base circular area enclosed by the greenhouse is 24 $m^2$.** [1]

**What is the total area of the plastic sheet Gauri used to build the greenhouse? Show your steps.**

**Q: 43** **State whether the following statement is true or false. Justify your answer.** [1]

**The volume of each of Gauri's new pots equals $(980\pi + 1400)\ cm^3$.**

**Q: 44** **If Gauri painted one of the new pots red on the outside, what is the total surface area she painted? Show your steps.** [2]

**( *Note: Use* $\pi$ *as* $\frac{22}{7}$ .)**

**End of Questions in Paper**