

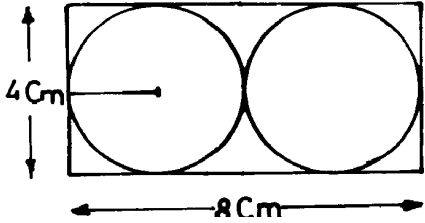
Sample Questions in Mathematics

1.	<p>If a and b are positive integers such that $a^b = 125$, then $(a - b)^{a + b - 4}$ is equal to</p> <p>1. 16 2. 25 3. 28 4. 30</p>
2.	<p>$5\sqrt{5} \times 5^3 \div 5^{-3/2} = 5^{a+2}$ then the value of a is equal to</p> <p>1. 4 2. 5 3. 6 4. 8</p>
3.	<p>An electric contractor purchases a certain amount of wire. 10% of which is stolen. After using 85% of the remainder, he had 54 m of the wire left. How much wire did he purchase?</p> <p>1. 300 m 2. 350 m 3. 375 m 4. 400 m</p>
4.	<p>x, y and z are three sums of money such that y is the simple interest on x. z is the simple interest on y for the same time and the same rate of interest. Then we have</p> <p>1. $x^2 = yz$ 2. $z^2 = xy$ 3. $y^2 = xz$ 4. $xyz = 1$</p>
5.	<p>A rectangular plank $\sqrt{2}$ meters wide is placed on a square lawn parallel to its diagonal as shown in the figure. What is the area of the plank?</p> <div style="text-align: center;"> </div> <p>1. 14 sq m 2. 12 sq m 3. $7\sqrt{2}$ sq m 4. $14\sqrt{2}$ sq m</p>

6.	<p>Two circular wheels of same radius 'r' centimeter are their central hubs at a distance of 'a' centimeter from one another. The minimum length (in cm) of the fan belt which will pass around both the wheels is</p> <p>1. $a + \frac{\pi r}{2}$ 2. $(a + \pi r) / 2$ 3. $2a + \pi r$ 4. $2(a + \pi r)$</p>
7.	<p>From a rectangular sheet of cardboard measuring 8 cm x 4 cm, two largest circular discs of same radius touching each other were cut off. What is the area (in cm²) of the remaining cardboard sheet?</p> <p>1. $32 - 8\pi$ 2. $32 - 4\pi$ 3. $32 - \pi$ 4. $32 - 2\pi$</p>
8.	<p>In which of the following cases a triangle ABC, with base BC given, can be constructed?</p> <p>1. $\angle B$ and $\angle C$ acute angles 2. $\angle B$ and $\angle C$ right angles 3. $\angle B$ and $\angle C$ obtuse angles 4. $\angle B$ obtuse and $\angle C$ right angles</p>
9.	<p>In the figure AF, BG, CH, DI, EJ are straight lines.</p> <p>What is the sum of $\angle A, \angle B, \angle C, \dots, \angle J$</p> <p>1. 600° 2. 720° 3. 900° 4. 360°</p>

Solution/Rationale for Mathematics Questions

Q. No.	Answer	Solution/Rationale
Q1.	1	$a^b = 125 \Rightarrow 5^3 = 125$ Then $(a-b)^{a+b-4} = (5-3)^{5+3-4} = 2^4 = 16$
Q2.	1	Given $5\sqrt{5} \times 5^3 \div 5^{-3/2} = 5^{a+2}$ $\text{LHS} = \frac{5 \times 5^{1/2} \times 5^3}{5^{-3/2}} = 5^{9/2} \times 5^{3/2} = 5^6$ Thus equating both the sides we have $A + 2 = 6 \Rightarrow a = 4$
Q3.	4	Let the total wire be equal to 'x' meters $\text{Lost} = \frac{x}{10} \text{ meters}$ $\text{Remainder} = x - \frac{x}{10} = \frac{9x}{10} \text{ metres}$ $\text{Wire used} = \frac{9x}{10} \times \frac{85}{100} = \frac{153}{200} x$ $\text{Remainder after use} = \frac{9x}{10} - \frac{153}{200} x = \frac{27}{200} x$ Thus $\frac{27}{200} x = 54$ Or $x^2 \frac{54 \times 200}{27} = 400 \text{ meters}$

Q4.	3	<p>Let 'r' be the rate % & 't' be the time then</p> $\frac{xrt}{100} = y \quad \& \quad \frac{yrt}{100} = z$ <p>Dividing y by z we have</p> $\frac{y}{z} = \frac{x}{y} \quad \text{i.e. } y^2 = xz$
Q5.	1	<p>$AD = \sqrt{2}$ by Pythagorus Theorem $AE = DE = 1$</p> <p>There by $BG = GC = 1$</p> <p>Again in triangle by Pythagorus Theorem</p> <p>Area of Plank = $7\sqrt{2} \times \sqrt{2} = 14sq.m.$</p>
Q6.	4	<p>Length of fan belt</p> $= AB + \text{Arc } BC + CD + \text{Arc } DA$ $= AB + CD + \text{Perimeter of the wheels}$ $a + a + 2\pi r = 2(a + \pi r)$
Q7.	1	<p>Portion left out</p> $32 - 8\pi$ 
Q8.	1	
Q9.	2	