# SOLUTIONS MATHEMATICS IGCSE P2 V4

**Q. No. 1:**

The ratio of girls to boys = Number of girls / Number of boys

Ratio of girls to boys = 12 / 15

Ratio of girls to boys = 4 / 5

So, the ratio of girls to boys in the group of pre-scholars is 4:5.

**Q. No. 2:**

Therefore, the length of the blue part can be expressed as the sum of $q$ and the non-overlapping parts of $p$ and $r$. If we denote the length of the blue part as $B$, we can write the following equation:

$$B = p - q + q + r - q$$

Simplifying this, we get:

$$B = p + r - q$$

So, the formula for the length of the blue part in terms of $p$, $q$, and $r$ is $p + r - q$.

**Q. No. 3:**

**a)** For the geometric sequence**:**

$$a_n = a_{n-1} \times 2$$

The common ratio r is 2.

To find the first five terms, we can use the recursive formula:

$$a_1 = 2$$

$$a_2 = a_1 \times 2 = 2 \times 2 = 4$$

$$a_3 = a_2 \times 2 = 4 \times 2 = 8$$

$$a_4 = a_3 \times 2 = 8 \times 2 = 16$$

$$a_5 = a_4 \times 2 = 16 \times 2 = 32$$

So, the first five terms are 2, 4, 8, 16, 32.

The explicit formula for a geometric sequence is

$$a_n = a_1 \times r^{n-1}$$

$$a_n = 2 \times 2^{n-1}$$

$$a_n = 2^n$$

**b)** For the geometric sequence:

$$a_n = a_{n-1} \times -3$$

The common ratio r is -3.

To find the first five terms, we can use the recursive formula:

$$a_1 = -3$$

$$a_2 = a_1 \times -3 = -3 \times -3 = 9$$

$$a_3 = a_2 \times -3 = 9 \times -3 = -27$$

$$a_4 = a_3 \times -3 = -27 \times -3 = 81$$

$$a_5 = a_4 \times -3 = 81 \times -3 = -243$$

So, the first five terms are -3, 9, -27, 81, and -243.

The explicit formula for a geometric sequence:

$$a_n = a_1 \times r^{n-1}$$

$$a_n = -3 \times (-3)^{n-1}$$

$$a_n = -3 \times (-3)^n$$

**Q. No. 4:**

**a)** The slope of each line by finding the change in cost over the change in days for each piece of equipment.

**b)** Use two points from each line to calculate the slope (rate) and then use one of the points to solve for the y-intercept (where the line crosses the y-axis when x=0). The general form of the equation for a line is, where the slope and is the y-intercept.

**Q. No. 5:**

**a)**

$$CD = \sqrt{AC^2 - AD^2}$$

$$\frac{AD}{AB} = \frac{AC}{BC}$$

We can solve for AD:

$$AD = \frac{AC \times AB}{BC}$$

Once we have AD, we can calculate CD using the Pythagorean th

Length of CD (AD): 10.4 cm

Length of CD: 7.8 cm

**b)**

The perimeter $P$ of triangle ABC is the sum of its sides:

$$P = AB + BC + AC$$

Perimeter of triangle ABC: 49 cm

**c)**

The area $A$ of a right triangle can be found using the formula:

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

Area of triangle ABC: 62.4 square cm

**Q. No. 6:**

**Shape a (Circle)**:

- Perimeter: 37.704 cm
- Area: 113.112 cm²

**Shape b (Semicircle)**:

- Perimeter: 20.567999999999998 cm
- Area: 25.136 cm²

**Shape c (Rectangle with Semicircle)**:

- Perimeter: 39.426 cm
- Area: 64.139 cm²

**Q. No. 7:**

**a)** The central angle is 180 degrees, and the area of the shaded sector is approximately 39.27 square centimetres.

**b)** The central angle is approximately 106.26020470831197 degrees. The area of the shaded sector is approximately 23.182380450040306 square centimetres.

**Q. No. 8:**

V is the volume of the cylinder, r is the radius, and h is the height of the cylinder.

The new volume is the original volume minus 3.

$$\pi r^2 h - 10\pi r^2 = \pi r^2 h - 3$$

$$10\pi r^2 = 3$$

$$r^2 = \frac{3}{10\pi}$$

$$r = \sqrt{\frac{3}{10\pi}}$$

$$r = \sqrt{\frac{3}{10} \cdot \frac{1}{\pi}}$$

$$r = \sqrt{\frac{3}{10}} \cdot \frac{1}{\sqrt{\pi}}$$

$$r = \frac{\sqrt{3}}{\sqrt{10}} \cdot \frac{1}{\sqrt{\pi}}$$

$$r = \frac{\sqrt{30}}{10\sqrt{\pi}}$$

**Q. No. 9:**

**a)**

$$7 \text{ cm}^3 \times 1000 \text{ mm}^3/\text{cm}^3 = 7000 \text{ mm}^3$$

**b)**

$$3 \text{ tonne} \times 1000 \text{ kg/tonne} = 3000 \text{ kg}$$

**c)**

$$0.6 \text{ g} \times 1000 \text{ mg/g} = 600 \text{ mg}$$

**Q. No. 10:**

**a)** The area of an equilateral triangle can be found using the formula:

$$\text{Area} = \frac{\sqrt{3}}{4} \times \text{side}^2$$

For an equilateral triangle with a side length of 6 cm:

$$\text{Area} = \frac{\sqrt{3}}{4} \times 6^2$$

$$\text{Area} = 9\sqrt{3}$$

**b)** The formula for the area of a regular hexagon is:

$$\text{Area} = \frac{3\sqrt{3}}{2} \times \text{side}^2$$

For a regular hexagon with a side length of 6 cm:

$$\text{Area} = \frac{3\sqrt{3}}{2} \times 6^2$$

$$\text{Area} = 54\sqrt{3}$$

**c)** The formula for the volume of a prism is:

Volume = Base Area × Height

$$\text{Base Area} = \frac{3\sqrt{3}}{2} \times 12^2$$

$$\text{Base Area} = 216\sqrt{3}$$

the volume of the prism:

$$\text{Volume} = 216\sqrt{3} \times 10$$

$$\text{Volume} = 2160\sqrt{3}$$

**Q. No. 11:**

**a)** The total number of possible outcomes is 6 × 6 × 6 = 216.

The probability of getting a total of 18 = $\frac{1}{216}$.

**b)** The possible combinations are (1,1,2), (1,2,1), and (2,1,1), so there are 3 favourable outcomes.

The probability of getting a total of 4 = $\frac{3}{216}$.

**c)** The possible combinations are (4,4,2), (4,2,4), (2,4,4), (5,3,2), (5,2,3), (3,5,2), (3,2,5), (2,5,3), and (2,3,5), so there are 9 favorable outcomes.

The probability of getting a total of 10 = $\frac{9}{216}$.

**d)** The only way to get a total of 15 is if each dice shows a 5, so there is only 1 favourable outcome.

The probability of getting a total of 15 = $\frac{1}{216}$.

**e)** The possible combinations are (1,2,4), (1,4,2), (2,1,4), (2,4,1), (4,1,2), (4,2,1), (1,3,3), (3,1,3), and (3,3,1), so there are 9 favorable outcomes.

The probability of getting a total of 7 = $\frac{9}{216}$.

**f)** There are 6 possible outcomes (1,1,1), (2,2,2), (3,3,3), (4,4,4), (5,5,5), and (6,6,6).

The probability of getting the same number on each dice = $\frac{6}{216}$.