REVIEW EXERCISE

Four options are given against each statement. Encircle the correct option.

(i) If two polygons are similar, then:

(a) their corresponding angles

(b) Their areas are equal

(c) Their volumes are equal

(d) Their corresponding sides are equal

(ii) The ratio of the areas of two similar polygons is:

(a) Equal to the ratio of their perimeters

(b) Equal to the square of the ratio of their corresponding sides
(c) Equal to the cube of the ratio of their corresponding sides
(d) Equal to the sum of their corresponding sides

(iii) If the volume of two similar solids is $125cm^3$ and $27cm^3$, the ratio of their corresponding heights is _____

(a) 3:5 (b) 5:3
(c) 25:9 (d) 9:25

(iv) The exterior angle of regular pentagon is:

(a) 40° (b) 45°
(c) 60° (d) 72°

(v) A parallelogram has an area of $64cm^2$ and a similar parallelogram has an area of $144cm^2$. If a side of the smaller parallelogram is:

(a) 10cm (b) 12cm
(c) 18cm (d) 16cm

(vi) The total number of diagonals in a polygon with 9 sides is:

(a) 18 (b) 21
(c) 25 (d) 27

(vii) Two spheres are similar, and their radii are in the ratio 4:5. If the surface area of the larger sphere is $500\pi cm^2$, what is the surface area of the smaller sphere?

(a) $256\pi cm^2$ (b) $320\pi cm^2$
(c) $400\pi cm^2$ (d) $405\pi cm^2$

(viii) A regular polygon has an exterior angle of 30°. How many diagonal does the Polygon have?

(a) 54 (b) 90
(c) 72 (d) 108

(ix) In a regular hexagon, the ratio of the length of a diagonal to the side length is:

(a) $\sqrt{3}:1$ (b) 2:1
(c) 3:2 (d) 2:3

(x) A regular polygon has an interior angle of 165°. How many sides does it have?

(a) 15 (b) 16
(c) 20 (d) 24

Answer Key

1	a	**2**	b	**3**	b	**4**	d	**5**	c
6	d	**7**	c	**8**	a	**9**	b	**10**	d

Q.1 If the sum of the interior angles of a polygon is 1080°. How many sides does the polygon has?

Ans:

Sum of interior angles of a polygon
$= 180°$
Formula
Sum of interior angles of a polygon
$= (n-2)180°$
$1080 = 180n - 360$
$1080 + 360 - 180n$
$1440 = 180n$
$\frac{1440}{180} = n$
$n = 8$ sides

Q.2 Two similar bottles are such that one is twice as high as the other. What is the ratio of their surface areas and their capacities?

Ans:

$A_1 = 2\pi r(h+r)$
$A_2 = 2\pi(2r)(2h+2r)$
$\frac{A_2}{A_1} = \frac{2\pi(2r)(2h+2r)}{2\pi r(h+r)}$
$\frac{A_2}{A_1} = \frac{2(2h+2r)}{h+r}$
$\frac{A_2}{A_1} = \frac{4}{1}$
$v_1 = \pi r^2 h$
$v_2 = \pi(2r)^2(2h)$
$v_2 = \pi 4r^2(2h = 8\pi r^2 h)$
$\frac{v_2}{v_1} = \frac{8\pi r^2 h}{\pi r^2 h} = \frac{8}{1}$
$\frac{v_2}{v_1} = \frac{8}{1}$

Q.3 Each dimension of a model car is $\frac{1}{10}$ of the corresponding car dimension. Find the ratio of:

(a) The areas of their windscreens

Ans:

Let length $= x$
Width $= y$
The area of the original widescreen =

$\ell \times w$

$A_1 = x \times y = xy$

Length $= \frac{x}{10}$ width $= \frac{y}{10}$

The area of the model car screen

$= \frac{x}{10} \times \frac{y}{10}$

$A_2 = \frac{xy}{100}$

$\frac{A_2}{A_1} = \frac{xy}{100 \times xy} = \frac{1}{100}$

Area of original screen $= \frac{A_2}{A_1} = \frac{xy}{100}$

So, the ratio of the area of $= \frac{1}{100}$ wind screen

(b) The capacities of their boots

Ans:

Let length $= x$, width $= y$, height $= z$

The capacity of the original car boot

$= v_1 = x \times y \times z$

$v_1 = xyz$

Now length $= \frac{x}{10}$

Width $= \frac{y}{10}$

Height $= \frac{z}{10}$

$v_2 = \frac{x}{10} \times \frac{y}{10} \times \frac{z}{10} = \frac{xyz}{1000}$

$\frac{v_2}{v_1} = \frac{xyz}{1000 \times xyz} = \frac{1}{1000}$

(c) The widths of the cars

Ans:

$\frac{\text{Model car width}}{\text{Actual car width}} = \frac{1}{10}$

(d) The number of wheels they have

Ans:

Both the model cars and have 4 wheels

So, the ratio of the number of wheel

$= \frac{4}{4} = \frac{1}{1}$

Q.4 Three similar jugs have heights 8 cm, 12 cm and 16cm. If the smallest jug holds $\frac{1}{2}$ litre, find the capacities of the other two.

Ans:

Smallest jug $= h_1 = 8cm$

Volume $= v_1 = 0.5$ liter

Medium jug $= h_2 = 12cm$

Ratio of heights $= \frac{h_2}{h_1} = \frac{12}{8} = 1.5$

$\frac{v_2}{v_1} = \frac{h_2}{h_1}$

$v_2 = \frac{v_1 \times h_2}{h_1}$

Capacity

$v_2 = v_1 \times (1.5)^3 = 0.5 \times (1.5)^3 = 1.687$ liters

Largest jug

Height $= h_3 = 16cm$

Ratio of height $= \frac{h_3}{h_1} = \frac{16}{8} = \frac{2}{1}$

Capacity $v_3 = v_1 \times (2)^3$

$= 0.5 \times 8 = 4$ liters

Q.5 Three similar dirking glasses have heights 7.5 cm. 9 cm and 10.5 cm. If the tallest glass holds 343 millilitres, find the capacities of the other two.

Ans:

Tallest glass $= h_1 = 10.5cm$

Capacity $= v_1 = 343ml$

Medium glass $= h_2 = 9cm$

Ratio of height $= \frac{h_2}{h_1} = \frac{9}{10.5} = 0.86$

Capacity $= v_2 = v_1 \times (0.86)^3$

$= 343 \times (0.86)^3 = 218ml$

Shortest glass $= h_3 = 7.3cm$

Ratio of height $= \frac{h_3}{h_1} = \frac{7.5}{10.5} = 0.714$

Capacity $v_3 = v_1 (0.714)^3$

$= (343)(0.714)^3 = 125ml$

$$\frac{v_1}{v_2}=\left[\frac{7.5}{9}\right]^3$$

$$\frac{125}{v_2}=\frac{421.875}{729}$$

$$v_2=\frac{125\times729}{721.875}$$

$$v_2=216cm^3$$

Q.6 A toy manufacturer produces model cars which are similar in every way to the actual cars. If the ratio of the door area of the model to the door area of the car is 1 cm to 2500 cm, find:

(a) The ratio of their lengths

Ans:

$$\text{Area of ratio}=(\text{Length})^2$$

$$\sqrt{\frac{1}{250}}=\sqrt{(\text{length})^2}$$

$$\text{Length}=\frac{1}{50}$$

(b) The ratio of the capacities of their petrol tanks

Ans:

$$\text{Volume}=(\ell)^3$$

$$\text{Volume}=\left(\frac{1}{50}\right)^3$$

$$\text{Capacity of petrol tank}=\frac{1}{125000}$$

(c) The width of the model, if the actual car is 150 cm wide

Ans:

$$\text{Door area ratio}=\frac{1}{2500}$$

$$\text{Actual car width}=150cm$$

$$\text{Door area ratio}=\frac{\text{Model car area}}{\text{Actual car area}}$$

$$\frac{1}{2500}=\frac{\text{Model car area}}{\text{Actual car area}}$$

$$\text{Area}=\left(\frac{\text{length}}{\text{width}}\right)^2$$

$$\sqrt{\frac{1}{2500}}=\sqrt{\frac{(\text{length})^2}{(\text{width})^2}}$$

$$\frac{1}{50}=\frac{\text{length}}{\text{width}}$$

$$\text{Actual car width}=150\text{ cm}$$

$$\text{Model car width}=\frac{150}{50}=3cm$$

(d) The area of the rear window of the actual car if the area of the rear window of the model is $3cm^2$

Ans:

$$\text{Area of door}=\frac{1}{2500}cm$$

$$\text{Model car rear window area}=3cm^2$$

$$\text{Door area ratio}=\frac{\text{Model car area}}{\text{Actual car area}}$$

$$\frac{1}{2500}=\frac{\text{Model car area}}{\text{Actual car area}}$$

$$\frac{1}{2500}=3$$

$$\frac{1}{2500}=\frac{3}{\text{actual car area}}$$

$$\text{Actual car area}=3\times2500=7500cm^2$$

Q.7 The ratio of the areas of two similar labels on two similar jars of coffee is 144:1469. Find the ratio of

(a) The heights of the two jars

Ans:

$$\text{Area ratio}=\frac{144}{169}$$

$$\text{Area of ratio}=\left(\frac{\text{Height}}{\text{Width}}\right)^2$$

$$\sqrt{\frac{144}{169}}=\sqrt{\left(\frac{\text{Height}}{\text{Width}}\right)^2}$$

$$\text{Height}=\left(\frac{\text{Height}}{\text{Width}}\right)=\frac{12}{13}$$

$$\text{Height ratio of two jars}=\frac{12}{13}$$

(b) Their capacities

Ans:

$$\text{Area ratio}=\frac{144}{169}$$

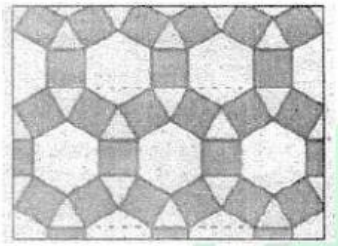
$$\text{Area ratio}=\left(\frac{\text{Height}}{\text{width}}\right)^2$$

$$\sqrt{\frac{144}{169}}=\sqrt{\left(\frac{\text{Height}}{\text{width}}\right)^2}$$

$$\frac{\text{Height}}{\text{width}} = \frac{12}{13}$$

$$\text{Capacity ratio} = \left[\frac{12}{13}\right]^3 = \frac{1728}{2197}$$

Q.8 **A tessellation of tiles on a floor has been made using a repeating pattern of a regular hexagon, six squares and six equilateral triangles. Find the total area of a single pattern with side length $\frac{1}{2}$ metre of each polygon.**



Ans:

$$\text{Length of each side} = \frac{1}{2}m = 0.5m$$

$$\text{Number of square} = 6$$

$$\text{Number of equilateral triangle} = 6$$

Number of hexagon = one

(i) **Finding area of 6 squares**

Area of 1 square

$$= \ell \times \ell = 0.5 \times 0.5 = 0.25m^2$$

$$\text{Area of 6 square} = 6 \times 0.25 = 1.5m^2$$

(ii) **Area of equilateral triangle** $= \frac{\sqrt{3}}{4}s^2$

$$= \frac{6\sqrt{3}}{4}(0.5)^2 = 0.6495 = 0.65m^2$$

(iii) **Finding the area of hexagon**

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

$$= \frac{6\sqrt{3}}{4}(0.5)^2 = 0.65m^2$$

Total area of tessellation

$$= (1.5 + 0.65 + 0.65) = 2.8m^2$$