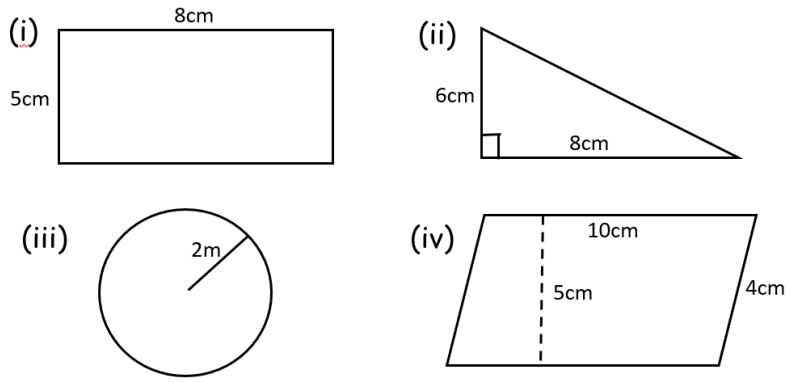
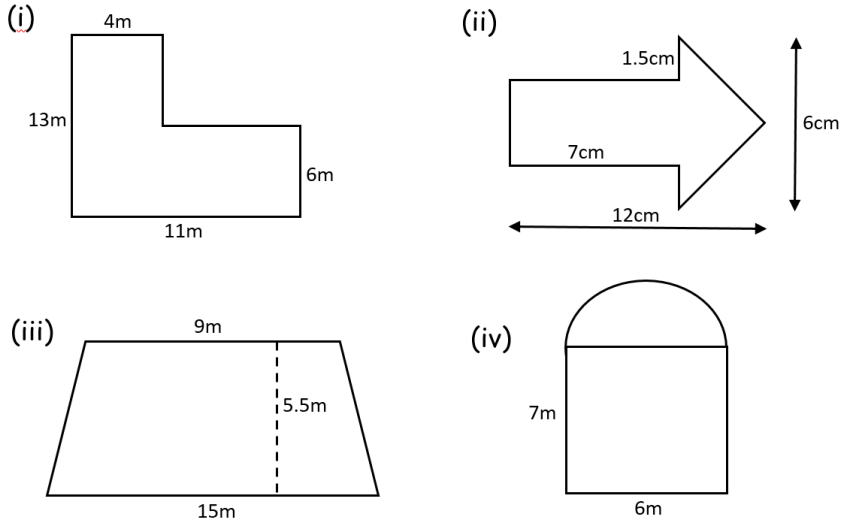
Revision Sheet 6: Perimeter/Area/Volume

Q1. Area/Volume – The Basics (2nd Year Perimeter/Area/Volume – Unit 3)

a) Find the area **and** perimeter of the following shapes. Make sure and include the correct units. Use π = 3.14 where necessary.

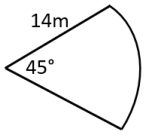


b) Find the area **and** perimeter of the following shapes. Make sure and include the correct units. Use π = 3.14 where necessary.



c) The area of a parallelogram is equal to 52 m^2. If the length of the base is 13m, calculate it's perpendicular height.

d) Find the area of the sector shown on the right.
Take $\pi = \frac{22}{7}$.



e) Draw the net for a cuboid of length 8cm, width 6cm and height 3cm.

f) A box in the shape of a cuboid has dimensions 20cm, 30cm and 18cm. Calculate the volume of the box in litres.

g) A map has a scale of 1:500000. If the distance between two towns on a map is 3.4cm. What is the actual distance between the towns?

h) Calculate the volume and the total surface area of a cylinder of height 7m and radius 2m in terms of π.

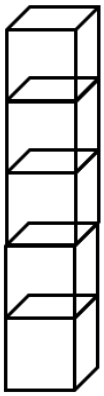
i) Find the volume and surface area of a sphere of radius 5cm. Take π = 3.14.

j) Find the volume and total surface area of a cone of vertical height 9cm and diameter 4cm. Take π = 3.14.

k) The surface area of a sphere is 36π cm^2. Find the volume of the sphere in terms of π.

Q2. Area/Volume – A bit trickier

a) i) Find the volume of a cube of side length 8cm.
ii) If 5 of the cubes are stacked on top of each other, what is the volume of the shape?
iii) Calculate the exposed surface area including the base.
iv) A manufacturer wants to distribute the shapes in boxes of 12. Draw a sketch of a possible box that could be used showing its dimensions.



b) Rain is collected in a rectangular container of length 88cm, width 42cm and height 6cm. When the container is full, it is poured into an empty cylinder of radius 21cm. The depth of the water in the cylinder is h cm. Find the value of h. Use $\pi = \frac{22}{7}$.

c) A cylindrical metal pipe has an external diameter of 6m and an internal diameter of 4m. The pipe is 1m long. Taking π = 3.14, find
i) the volume of the pipe in m^3
ii) the mass of the pipe, in kg, if 1m^3 of the metal has a mass of 9kg.

d) A sphere of radius 8cm has the same volume as a cylinder of height 12cm. Find the length of the radius. Write your answer in the form $\frac{a\sqrt{2}}{3}$.

e) Three tennis balls of radius 3cm fit exactly into a cylindrical can. Find, in terms of π, the volume of the can not occupied by the balls.

f) Nine solid metal spheres, each of radius 1.5cm, are dropped into a cylinder partly filled with water. If the spheres are totally immersed, find the increase in the height of the water if the radius of the cylinder is 3cm.

g) The volume of a cone is $\frac{512\pi}{3}$ cm^3. The height of the cone and its radius are equal. Find the length of the radius.

Q3. Extra Challenge and Problem Solving

a) John has twelve square tiles of side length 10cm. The tiles must be laid edge-to-edge.
i) How can John arrange the twelve tiles so that the resulting shape has the greatest possible perimeter?
ii) How can John arrange the twelve tiles so that the resulting shape has the smallest possible perimeter?

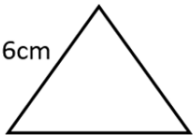
b) Meabh has a counter device on her bike which counts the number of revolutions her wheel has made. Her wheels are 40cm in diameter.

i) Meabh cycles to her grandmother's house. The counter reads 1989. How far away does her grandmother live?

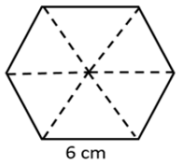
ii) How many revolutions does her wheel have to make to travel 1km? Give both your answers correct to the nearest whole number.

c) A window wiper on a car is 15cm long and can rotate through an angle of 170°. Calculate how much of a windscreen the wiper can clean, correct to two decimal places.

d) i) Find the area of an equilateral triangle of side length 6cm.

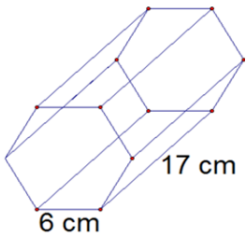


ii) A hexagon is made up of 6 equilateral triangles as shown. Calculate the area of the hexagon.



iii) Now calculate the volume of the hexagonal prism shown on the right.

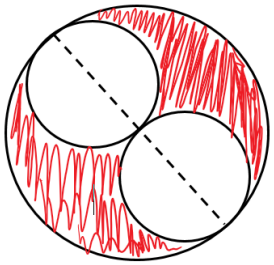
iv) Calculate the surface area of the prism



e) i) Calculate the angle of rotation when the big hand on a clock moves from the 12 to the 5.

ii) How far along the outer edge of the clock does the hand trace out moving from 12 to 5, if the hand is 4cm long?

f) The large circle has an area of 132.67cm^2. What is the area of the shaded region? Use π = 3.14 where necessary. Write down any assumptions you are making before carrying out your calculations.



g) The height of a cylinder is equal to the length of its diameter. The curved surface area of the cylinder is 100π cm^2. Calculate the height.

h) A shape is made by joining a hemisphere of radius r to a cone of radius r. The height of the cone is 2r. Find an expression, in terms of r and π, for the volume of the shape.

i) i) Calculate the volume of a cylinder of height 7cm and radius 2cm, correct to the nearest cm^3.

ii) Water flows through the pipe of internal radius 2cm at a rate of 7cm^3/sec into an empty rectangular tank that is 1.2m long, 1.1m wide and 30cm high. How long, in minutes, will it take to fill the tank?

Revision Sheet 6 Solutions:

Q1.

a) i) Area = $40cm^2$, Perimeter = 26cm ii) Area = $24cm^2$, Perimeter = 24cm

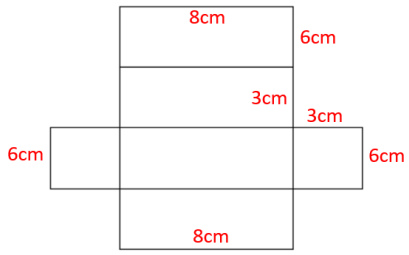
iii) Area = $12.56cm^2$, Perimeter = 12.56cm iv) Area = $50cm^2$, Perimeter = 28cm

b) i) Area = $94m^2$, Perimeter = 48m ii) Area = $36cm^2$, Perimeter = 31.66cm

iii) Area = $66m^2$, Perimeter = 36.52m iv) Area = $56.13m^2$, Perimeter = 29.42m

c) Height = 4m d) Area = $77m^2$

e)



f) 10.8 litres g) 17km h) Volume = $28\pi\ m^3$, TSA = $36\pi\ m^2$

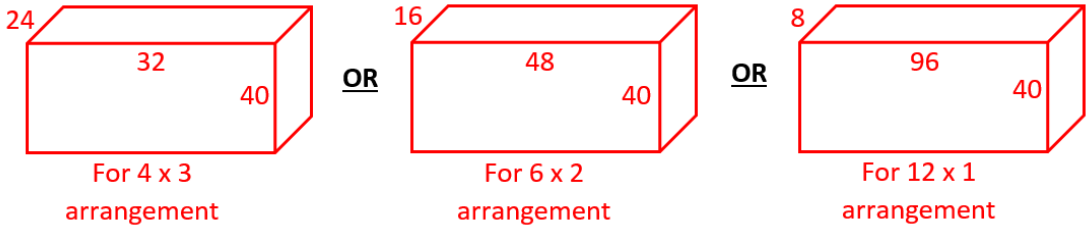
i) Volume = $523.3cm^3$, SA = $314cm^2$ j) Volume = 37.68 cm^3, TSA = $70.46cm^2$

k) Volume = $36\pi\ cm^3$

Q2.

a) i) Volume = $512cm^3$ ii) Volume = $2560cm^3$ iii) Surface Area = $1664cm^2$

iv)

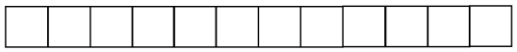


b) h = 16cm

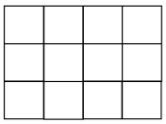
c) i) Volume = $15.7m^3$ ii) Mass = 141.3kg d) Radius = $\frac{16\sqrt{2}}{3}$ cm e) Volume = $54\pi\ cm^3$

f) Height = 4.5cm g) Radius = 8cm

Q3.

a) i) 

Greatest Perimeter = 260cm

ii) 

Smallest Perimeter = 140cm

b) i) 2.5km ii) 796 revolutions c) 333.63cm^2

d) i) 15.59cm^2 ii) 93.54 cm^2 iii) 1590.18 cm^3 iv) 799.08cm^2

e) i) 150° ii) 10.47cm

f) 66.33 cm^2 (Assuming the two smaller circles are the exact same size, and the dotted line shown is the diameter of the larger circle)

g) Height = 5cm h) Volume = $\frac{4}{3}\pi r^3$ i) i) Volume = 88cm^3 ii) 75 mins