

Year 10 Term 1 Foundation (Unit 17)

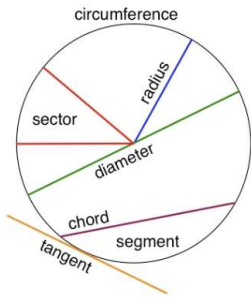
PERIMETER AND CIRCUMFERENCE

Key Concepts

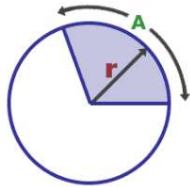
Parts of a circle

Circumference

of a circle is calculated by πd and is the distance around the circle.

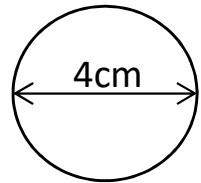


Arc length of a sector is calculated by $\frac{\theta}{360} \pi d$.



Calculate:

a) Circumference



$$C = \pi \times 4$$

$$= 4\pi$$

$$\text{or } = 12.57\text{cm}$$

b) Diameter when the circumference is 20cm

$$C = \pi \times d$$

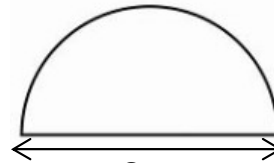
$$20 = \pi \times d$$

$$\frac{20}{\pi} = d$$

$$\text{Or } 6.37\text{cm}$$

Examples

c) Perimeter



$$P = \frac{\pi \times d}{2} + d$$

$$P = \frac{\pi \times 6}{2} + 6$$

$$P = 3\pi + 6$$

$$\text{Or } = 15.42\text{cm}$$

d) Arc length

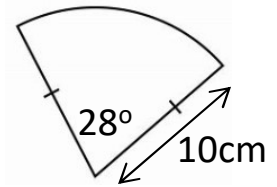
$$\text{Arc} = \frac{\theta}{360} \times \pi \times d$$

$$\text{Arc} = \frac{28}{360} \times \pi \times 2 \times 10$$

$$\text{Arc} = \frac{28}{360} \times \pi \times 20$$

$$\text{Arc} = \frac{14}{9} \pi$$

$$\text{Or } = 4.89\text{cm}$$

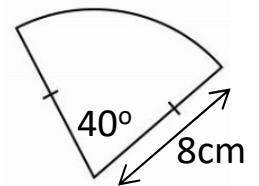


Key Words

Circle
Perimeter
Circumference
Radius
Diameter
Pi
Arc

Calculate:

- 1) The circumference of a circle with a diameter of 12cm
- 2) The diameter of a circle with a circumference of 30cm
- 3) The perimeter of a semicircle with diameter 15cm
- 4) The arc length of the diagram



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534, 535, 537,
538, 541, 544-545

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ANSWERS: 1) 12π or 37.7cm 2) $\frac{30}{\pi}$ or 9.54cm 3) 38.56cm 4) $\frac{9}{16}\pi$ or 5.59cm

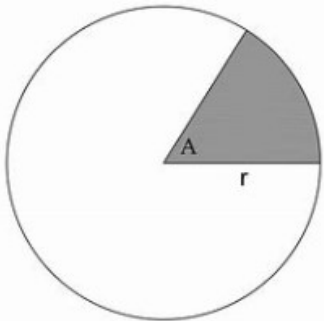
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AREA OF CIRCLES AND PART CIRCLES

Key Concepts

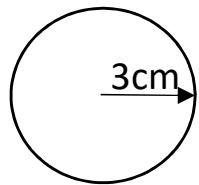
The **area** of a circle is calculated by πr^2

The **area of a sector** is calculated by $\frac{\theta}{360} \pi r^2$



Calculate:

a) **Area**



$$A = \pi \times 3^2$$

$$= 9\pi$$

$$\text{or } = 28.3\text{cm}^2$$

b) **Radius** when the area is 20cm^2

$$A = \pi \times r^2$$

$$20 = \pi \times r^2$$

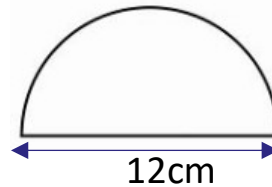
$$\frac{20}{\pi} = r^2$$

$$\sqrt{\frac{20}{\pi}} = r$$

$$\text{Or } 2.52\text{cm}$$

Examples

c) **Area**



$$P = \frac{\pi \times r^2}{2}$$

$$P = \frac{\pi \times 6^2}{2}$$

$$P = 18\pi$$

$$\text{Or } = 56.55\text{cm}^2$$

d) **Area of a sector**

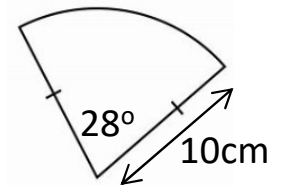
$$\text{Arc} = \frac{\theta}{360} \times \pi \times r^2$$

$$\text{Arc} = \frac{28}{360} \times \pi \times 10^2$$

$$\text{Arc} = \frac{28}{360} \times \pi \times 100$$

$$\text{Arc} = \frac{70}{9} \pi$$

$$\text{Or } = 24.43\text{cm}$$



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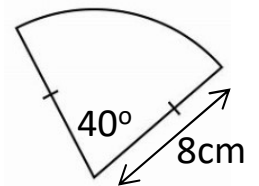
539, 540, 542-543, 546-547

Key Words

Circle
Area
Radius
Diameter
Pi
Sector

Calculate:

- 1) The area of a circle with a radius of 9cm
- 2) The radius of a circle with an area of 45cm^2
- 3) The area of a semicircle with diameter of 16cm
- 4) The area of the sector in the diagram



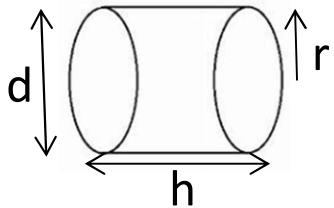
ANSWERS: 1) 81π or 254.47cm^2 2) $\sqrt{\frac{\pi}{45}}$ or 3.78cm 3) 32π or 100.53cm^2 4) $\frac{9}{64}\pi$ or 22.34cm^2

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VOLUME AND SURFACE AREAS OF CYLINDERS

Key Concepts

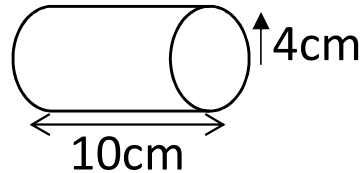
A **cylinder** is a **prism** with the cross section of a circle.



The **volume** of a cylinder is calculated by $\pi r^2 h$ and is the space inside the 3D shape

The **surface area** of a cylinder is calculated by $2\pi r^2 + \pi dh$ and is the total of the areas of all the faces on the shape.

From the diagram calculate:



a) **Volume**

$$V = \pi \times r^2 \times h$$

$$V = \pi \times 4^2 \times 10$$

$$V = 160\pi$$

$$\text{Or} = 502.65\text{cm}^3$$

Examples

b) **Surface Area** – You can use the net of the shape to help you

Area of two circles

$$= 2 \times \pi \times r^2$$

$$= 2 \times \pi \times 4^2$$

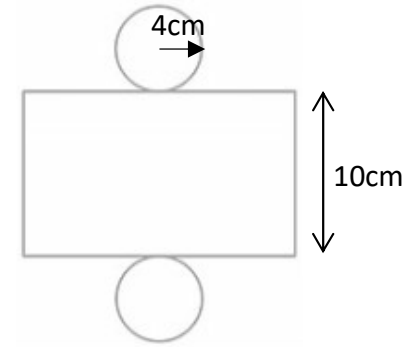
$$= 32\pi$$

Area of rectangle

$$= \pi \times d \times h$$

$$= \pi \times 8 \times 10$$

$$= 80\pi$$



$$\text{Surface Area} = 32\pi + 80\pi$$

$$= 112\pi$$

$$\text{or} = 351.86\text{cm}^3$$

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572, 586

Key Words

Cylinder

Surface Area

Radius

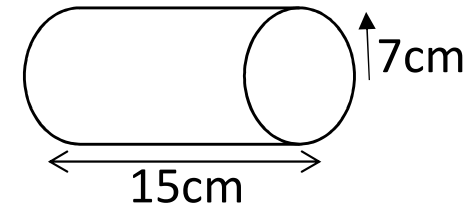
Diameter

Pi

Volume

Prism

Calculate the volume and surface area of this cylinder



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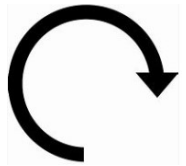
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REFLECTION AND ROTATION

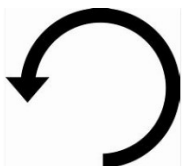
Key Concepts

A **reflection** creates a mirror image of a shape on a coordinate graph. The mirror line is given by an equation eg. $y = 2, x = 2, y = x$. The shape does not change in size.

A **rotation** turns a shape on a coordinate grid from a given point. The shape does not change size but does change orientation.



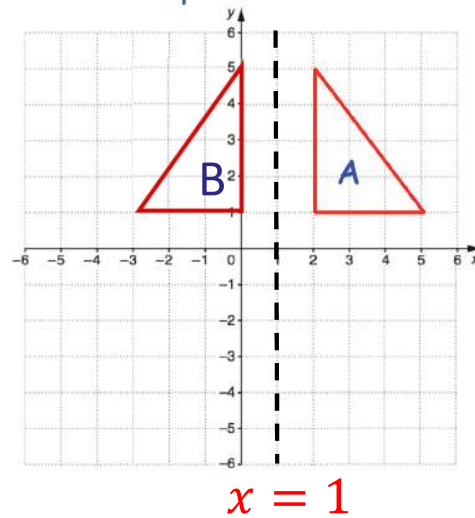
Clockwise



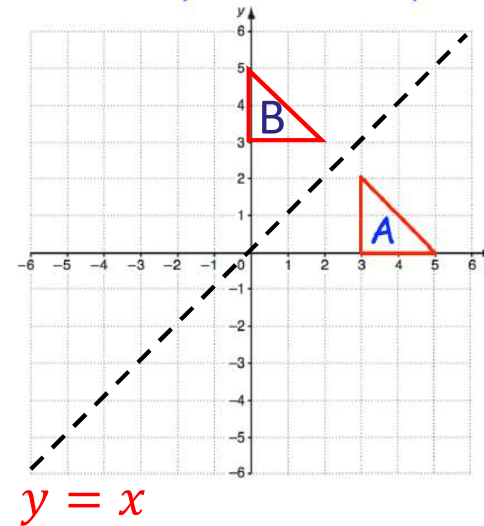
Anticlockwise

Examples

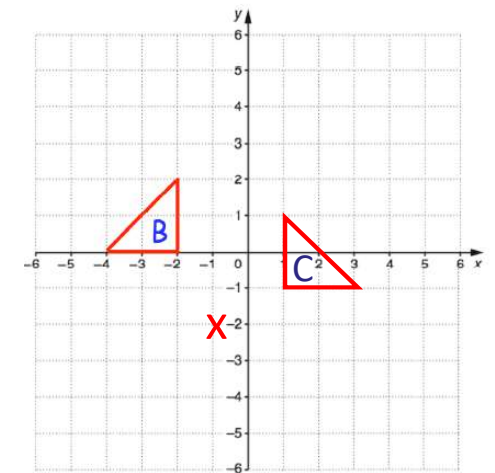
Reflect shape A in the line $x = 1$. Label it B.



Reflect shape A in the line $y = x$. Label it B.



Rotate shape B from the point $(-1, -2)$



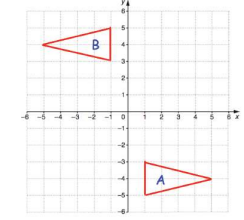
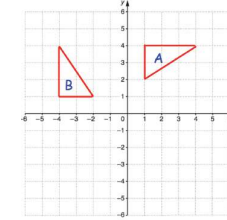
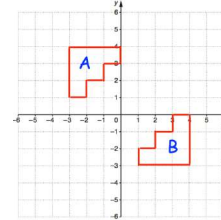
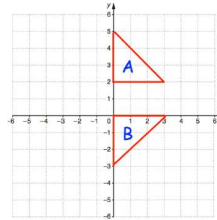
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639-641, 652,
653,654,648,649

Key Words

Rotate
Clockwise
Anticlockwise
Centre
Degrees
Reflect
Mirror image

Describe the **single** transformation you see on each coordinate grid from A to B:



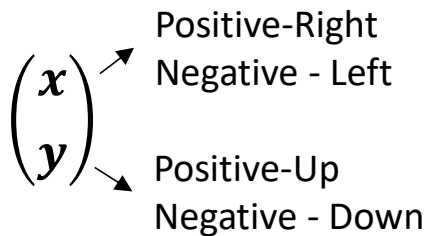
ANSWERS: a) reflection, $y = 1$ b) reflection $y = x$ c) rotation, centre $(0,0)$, 90° anticlockwise d) rotation, centre $(0,0)$, 180°

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TRANSLATION AND ENLARGEMENT

Key Concepts

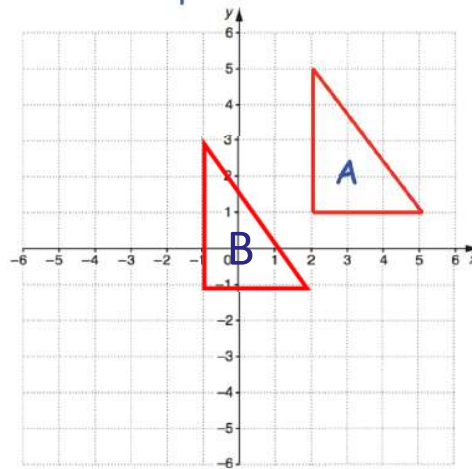
A **translation** moves a shape on a coordinate grid. Vectors are used to instruct the movement:



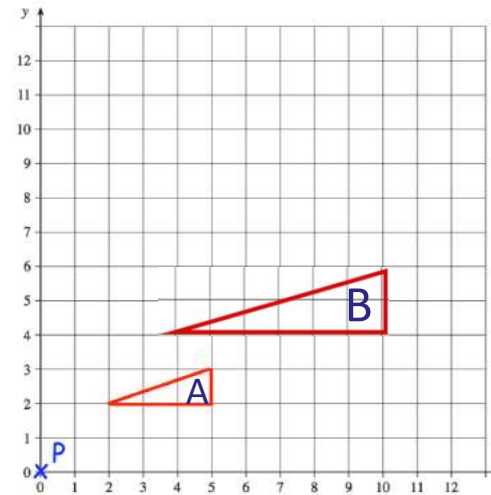
An **enlargement** changes the size of an image using a scale factor from a given point.

Examples

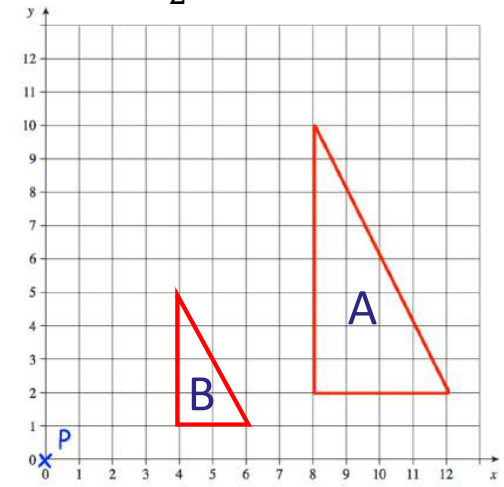
Translate shape A by $\begin{pmatrix} -3 \\ -2 \end{pmatrix}$.
Label it B



Enlarge shape A by scale factor 2 from point P.



Enlarge shape A by scale factor $\frac{1}{2}$ from point P.

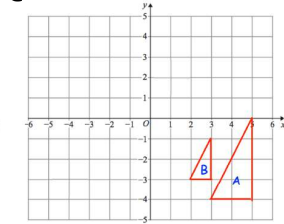
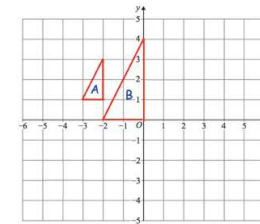
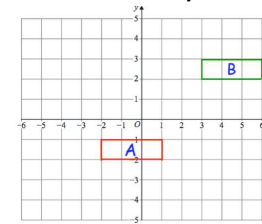
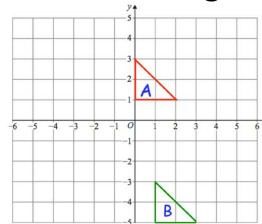


hegartymaths

637,638,650,
642-645, 651

Key Words
 Translation
 Enlargement
 Scale factor
 Centre
 Positive
 Negative

Describe the **single** transformation you see on each coordinate grid from A to B:



ANSWERS: a) translation $\begin{pmatrix} 1 \\ -2 \end{pmatrix}$ b) translation $\begin{pmatrix} -6 \\ -1 \end{pmatrix}$ c) enlarge, centre $(-4, 2)$ scale factor 2
 d) enlarge, centre $(1, -2)$ scale factor $\frac{1}{2}$