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Book 7

Key Stage 3 - Ages 11+

Measurement in Mathematics Series

**Practical measuring activities for the
classroom.**

Written by Gerry Westenberg. Illustrated by Rod Jefferson.

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Email: info@readyed.com.au Website: www.readyed.net

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Introduction - Overview of Topics

This book is designed to be used in conjunction with your mathematics programme. The activities follow the curriculum appropriate to students working at this level.

The book covers the following concepts:

Length

- Measure to the nearest millimetre, centimetre and metre.
- Complete calculations using kilometres/miles.
- Find the perimeter of polygons.
- Find the diameter and circumference of circles.
- Relate the measurement of length to other measures.

Area

- Complete measure (informal) of various regions.
- Complete measure (informal) of triangular regions.
- Calculate the area of rectangles.
- Understand the relationship between the area of triangles and rectangles.
- Understand the relationship between hectares and square metres.
- Relate the measurement of area to other measures.

Volume/Capacity

- Measure in litres and millilitres.
- Measure volume by displacement.
- Make 3D shapes using cubes.
- Measure the volume of 3D models.
- Measure the capacity of containers.
- Cubic measures: Build a model using cubic metres.
 Understand the relationship between cubic metres
 and cubic centimetres.
 Develop the understanding of volume in cubic metres.
- Relate the measurement of volume to other measures.

Mass

- Measure mass in kilograms and grams.
- Undertake the suspension and projection of objects.
- Measure mass using suspension and projection.
- Relate the measurement of mass to other measures.

Time

- Complete activities and calculations based on calendars.
- Understand, use and construct timelines.
- Understand the seasons and planetary motion.
- Demonstrate knowledge of geographical position.
- Read time clocks.
- Measure time in minutes and seconds.
- Calculate the conversion of time units.

Measuring Distances

	Home	School	Supermarket	Friend	Cousin
Home	0	3	2.4	1.3	6
School	3	0	0.64	3.8	9.55
Supermarket	2.4	0.64	0	6.37	7.32
Friend	1.3	3.8	6.37	0	8.4
Cousin	6	9.55	7.32	8.4	0

All distances given in miles (m).

Using the above table, find the distance Jared would travel if he went:

(**Example:** If Jared went from school, to his cousin's house, then the supermarket and then home, he would have travelled $9.55 + 7.32 + 2.4 = 19.27$ m.)

a) From home to his cousin's house via school.

b) From home to school, then to his friend's house, the supermarket and then home again.

c) From school to the supermarket and then home.

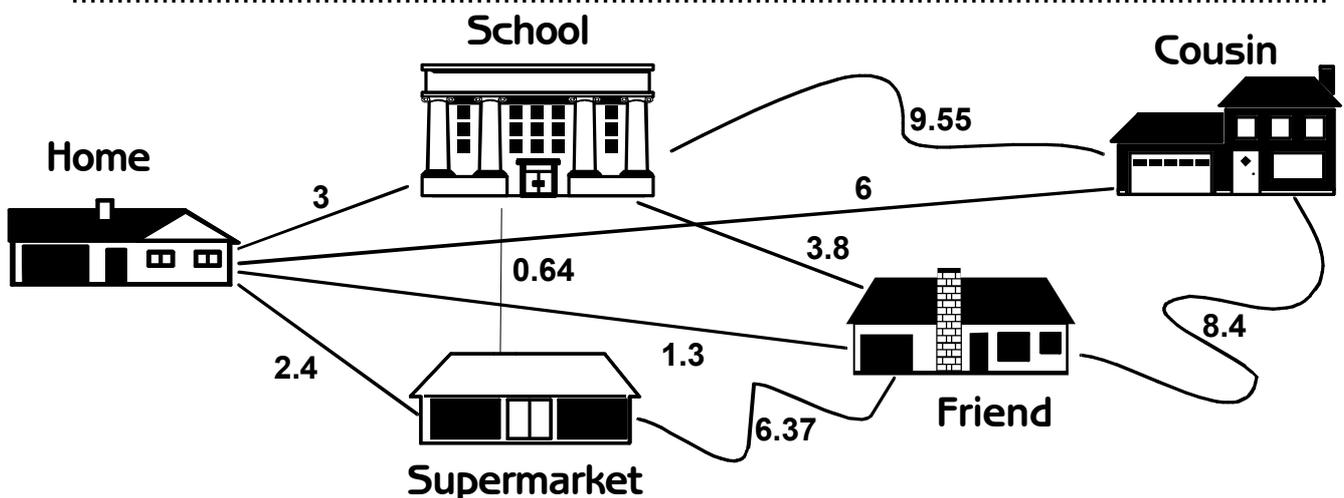
d) From his cousin's to the supermarket, then return to his cousin's and finally home.

e) What would be the shortest distance to visit all the destinations, starting and finishing at home? Write down the route and the distance.

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Shapes: Perimeter of Polygons

Match the number of sides to the shape.

Number of sides	Shape
3	octagon
9	triangle
7	decagon
10	quadrilateral
6	pentagon
8	hexagon
4	nonagon
5	septagon

1. Find the perimeter of the following shapes:

a) a regular hexagon, side length 10 cm.

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b) a regular octagon, side length 7 m.

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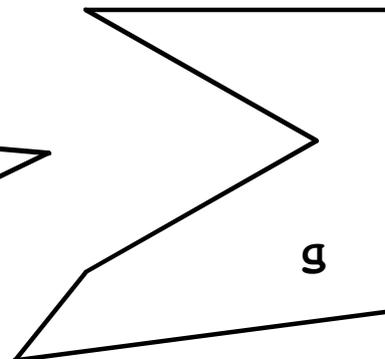
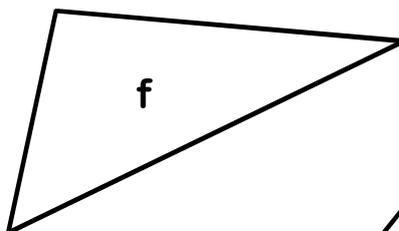
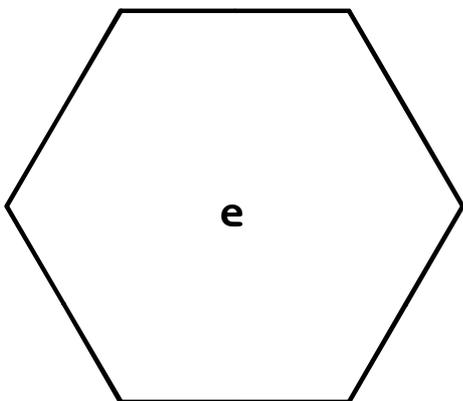
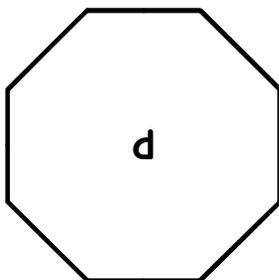
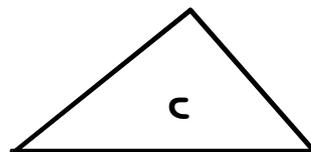
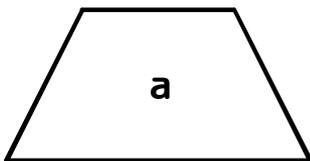
c) a quadrilateral of side lengths 4 cm, 5 cm, 6 cm, 8 cm.

d) a regular septagon of side length 8 km.

.....

e) a pentagon of side lengths 4 mm, 6 mm, 5 mm, 4 mm, 3 mm.

2. Find the perimeter in mm of each of these polygons.



List the shapes in order of perimeter length. Start with the object with the longest perimeter.

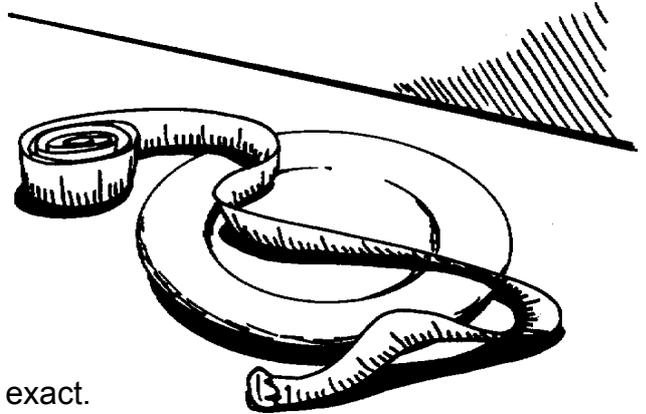
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Circles Again

The diameter of a circle can be found by dividing the circumference by π .

So if the circumference of a plate is 45 cm, what is the diameter? Round your answer to two decimal places.

D (diameter)	=	$\frac{\text{Circumference (C)}}{\pi}$
	=	$\frac{45}{3.14}$
	=	14.33 cm



Remember, π is not exactly 3.14, so the answer is not exact.

Try these. Work out the answer to the nearest decimal point.

1. The circumference of a wheel is 250 cm. What is the diameter?

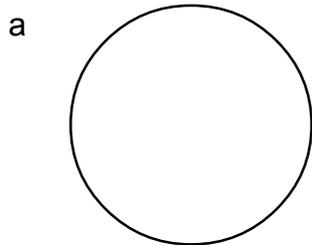
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2. A frisbee has a circumference of 34 cm. Will it fit into a square box with sides of 8 cm?

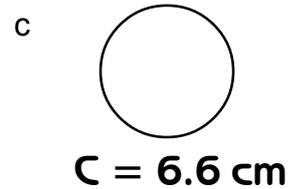
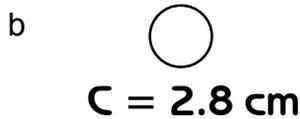
Why or why not?

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3. Find the diameter of these circles to the nearest tenth of a centimetre:



C = 12 cm



a) b) c)

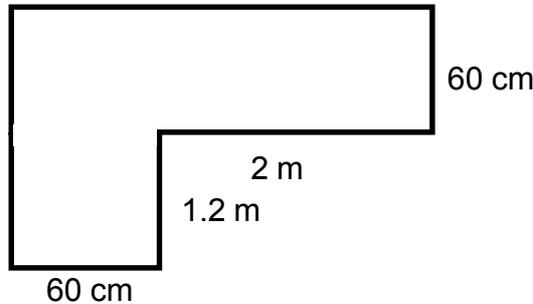
4. Find the missing measurements to the nearest tenth of a centimetre:

Object	Diameter	Circumference
a Clockface		78.2 cm
b Frisbee	16 cm	
c Hoop	50 cm	
d Plate		98 cm

What's the Cost?

The cost of pine wood laminate is £2.50 per metre.

- I wish to put this laminate around the edge of a table top. The dimensions are 2.4 m x 1.2 m.
How much will it cost me to edge the table?
- How much will it cost to edge the bench top below?

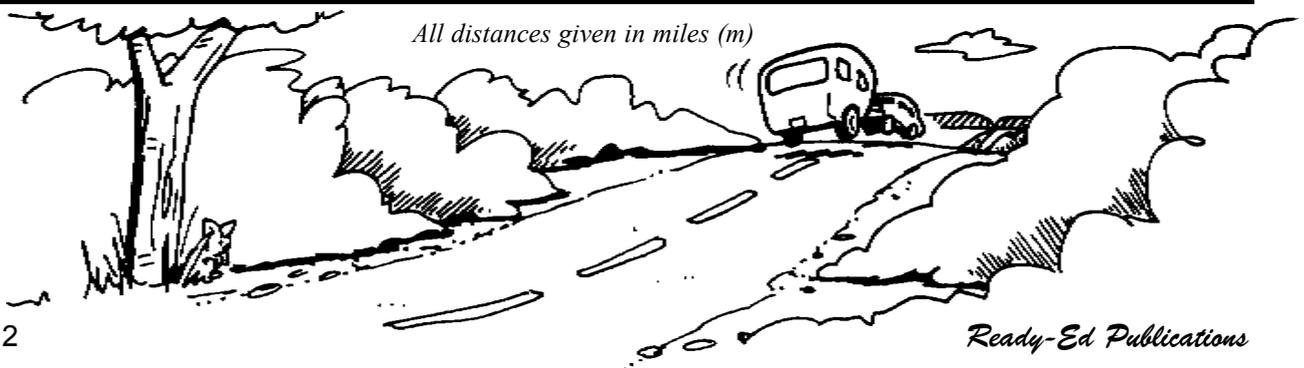


It costs Paul £2.70 to drive 10 miles. Using the table below, calculate the costs of the following trips:

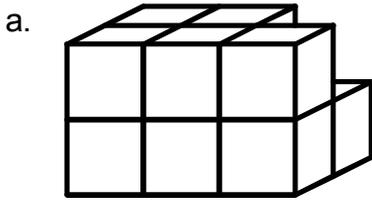
- London to Glasgow
- Manchester to Newcastle
- Glasgow to Bristol
- Newcastle to London
- Birmingham to Glasgow

	London	Bristol	Birmingham	Manchester	Glasgow	Newcastle
London	0	118	120	181	403	278
Bristol	118	0	87	180	382	300
Birm'ham	120	87	0	93	290	205
Manchester	181	180	93	0	220	141
Glasgow	403	382	290	220	0	156
Newcastle	278	300	205	141	156	0

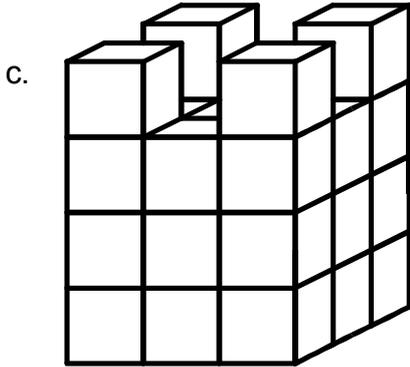
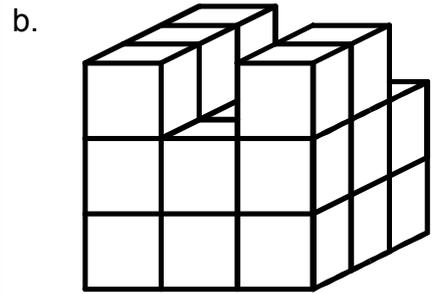
All distances given in miles (m)



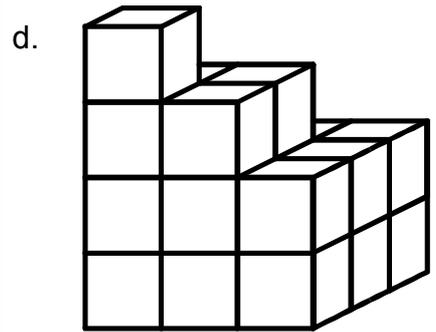
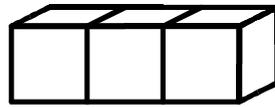
Cubes



What is volume and surface area? I'm glad you asked. A simple explanation is that volume is the number of blocks used to make the shape, and the surface area is the number of sides that can actually be seen (including the bottom).



For example, if you make this shape, it would have a volume of 3 cubes and a surface area of 14 squares.



1. Use the shapes to complete the table below. (Remember that the models are made with 1 cm cubes.)

Model	Volume	Surface Area
a.		
b.		
c.		
d.		

2. How many different models can you make:

a. using 5 cubes?

b. using 9 cubes?



Add the models made from 5 cubes to the table below.

Model	Volume	Surface Area

Which shapes have the greatest volume and least surface area?