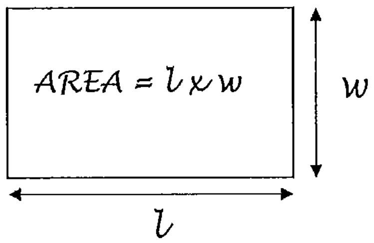
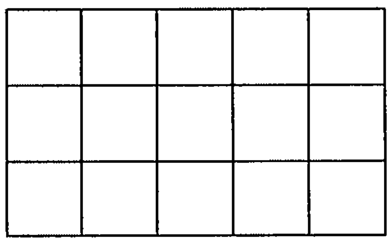
AREA

- Area is the amount of space that is inside a shape.
- Because it is an amount of space, it has to be measured in squares.
- If the shape is measured in cm, then the area would be measured in square cm or cm^2

Area of a Rectangle

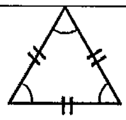
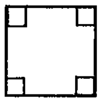
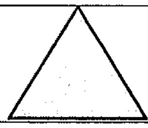
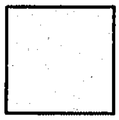
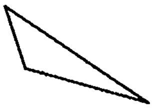
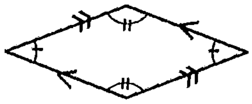
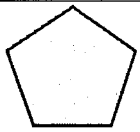
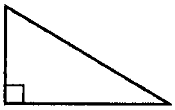
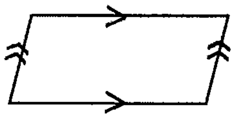
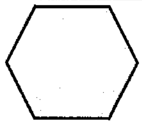
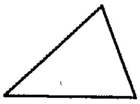
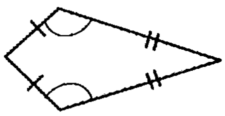
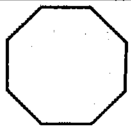
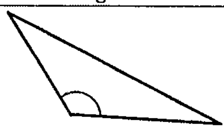
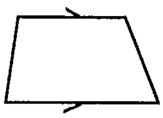
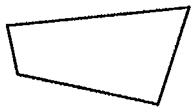
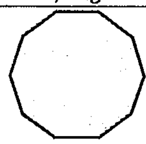


- If you are measuring the area of a rectangle, then the area will equal the length multiplied by the width.
- Or Area of a rectangle = length x width.
- The area of the rectangle below is 5 x 3 = 15 squares.



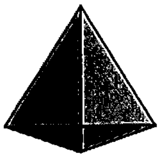
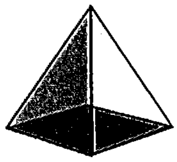
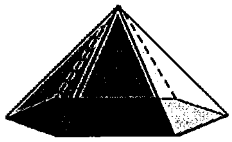
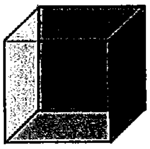
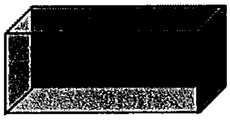
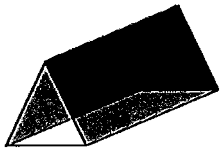
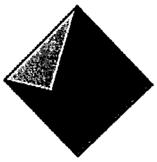
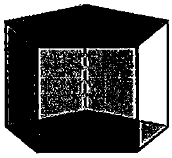
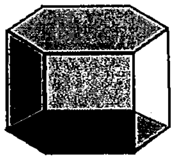
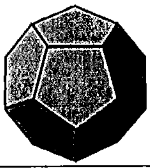
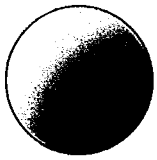
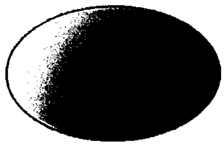
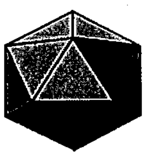
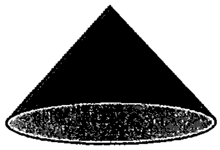
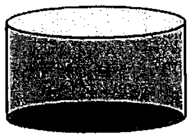
Name Date

GEOMETRY QUICK GUIDE 2: 2D SHAPES

TRIANGLES	QUADRILATERALS	REGULAR POLYGONS
		
Equilateral triangle All sides equal; interior angles 60°	**Square** All sides equal; all angles 90°	**Equilateral triangle** 3 sides; angle 60°
		
Isosceles triangle 2 sides equal; 2 congruent angles	**Rectangle** Opposite sides equal, all angles 90°	**Square** 4 sides; angle 90°
		
Scalene triangle No sides or angles equal	**Rhombus** All sides equal; 2 pairs of parallel lines; opposite angles equal	**Regular Pentagon** 5 sides; angle 108°
		
Right triangle 1 right angle	**Parallelogram** Opposite sides equal, 2 pairs of parallel lines	**Regular Hexagon** 6 sides; angle 120°
		
Acute triangle All angles acute	**Kite** Adjacent sides equal; 2 congruent angles	**Regular Octagon** 8 sides; angle 135°
	 	
Obtuse triangle 1 obtuse angle	**Trapezoid** 1 pair of parallel sides **Trapezium** No pairs of parallel sides	**Regular Decagon** 10 sides; angle 144°

Name Date

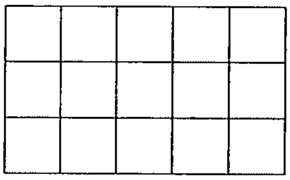
GEOMETRY QUICK GUIDE 3: 3D SHAPES

		
Tetrahedron Faces: 4; Edges: 6; Vertices: 4	Square pyramid Faces: 5; Edges: 8; Vertices: 5	Hexagonal pyramid Faces: 7; Edges: 12; Vertices: 7
		
Cube Faces: 6; Edges: 12; Vertices: 8	Cuboid Faces: 6; Edges: 12; Vertices: 8	Triangular prism Faces: 5; Edges: 9; Vertices: 6
		
Octahedron Faces: 8; Edges: 12; Vertices: 6	Pentagonal prism Faces: 7; Edges: 15; Vertices: 10	Hexagonal prism Faces: 8; Edges: 18; Vertices: 12
		
Dodecahedron Faces: 12; Edges: 30; Vertices 20	Sphere Faces: 0 or 1; Edges: 0; Vertices 0	Ellipsoid Faces: 0 or 1; Edges: 0; Vertices 0
		
Icosahedron Faces: 20; Edges: 30; Vertices: 12	Cone Faces: 1 or 2; Edges: 0 or 1; Vertices: 0 or 1	Cylinder Faces: 2 or 3; Edges: 0 or 2; Vertices: 0

Name Date

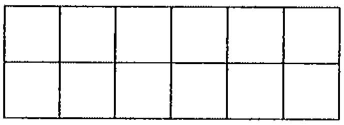
AREA SHEET 1

To find the area of a rectangle, simply count the number of cm squares inside the rectangle. The area of the shape below is 5 x 3 = 15 square cm.



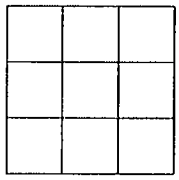
Work out the area of the following rectangles:

1)



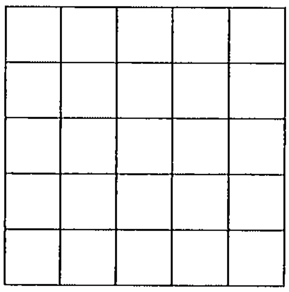
Area = _________ square cm

2)



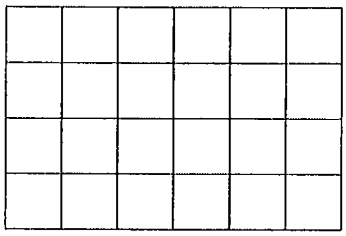
Area = _________ square cm

3)



Area = _________ square cm

4)



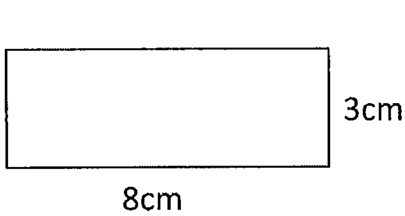
Area = _________ square cm

Name Date

AREA SHEET 3

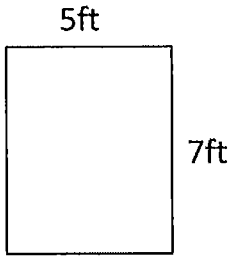
Work out the area of the following rectangles. They are not to scale.

1)



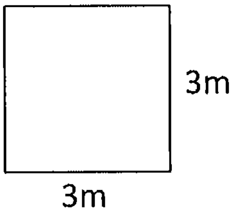
Area = ________ square cm

2)



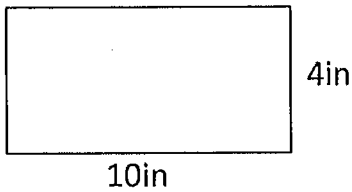
Area = ________ square ft

3)



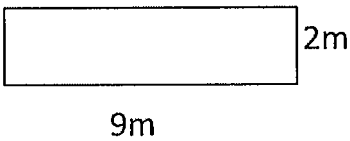
Area = ________ square m

4)



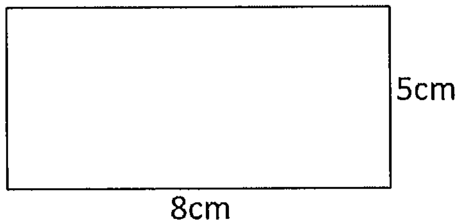
Area = ________ square in

5)



Area = ________ square m

6)



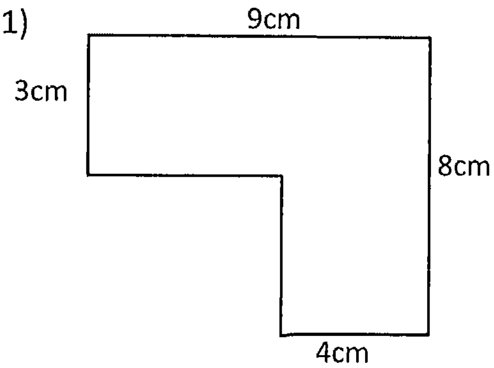
Area = ________ square cm

Name Date

AREA SHEET 6

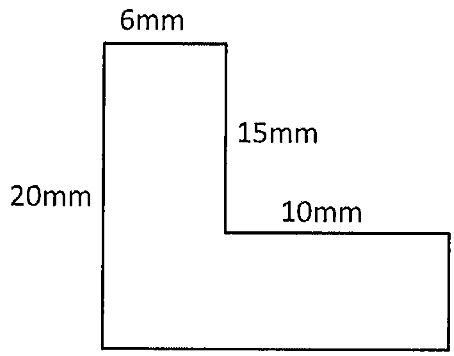
Work out the area of the following shapes by dividing them into rectangles. They are not to scale.

1)



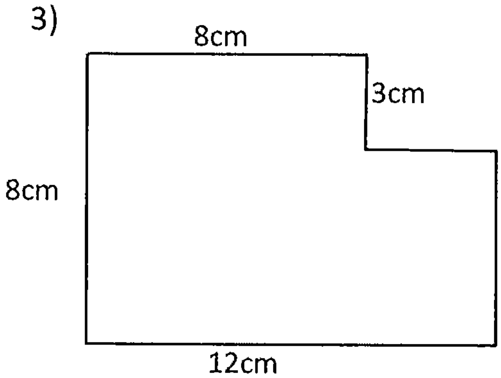
Area = ____________

2)



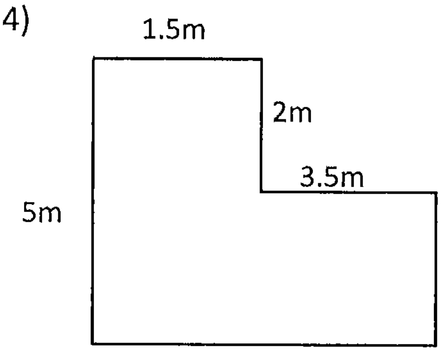
Area = ____________

3)



Area = ____________

4)



Area = ____________

Remember to write down the correct units.

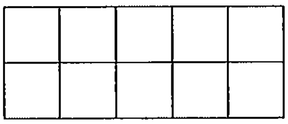
Name Date

AREA AND PERIMETER SHEET 1

Work out the area and perimeter of the following rectangles.

Each square on the sheet is 1 square cm. Remember **area** is the **number of squares inside**, and **perimeter** is the **distance round the outside** of the shape.

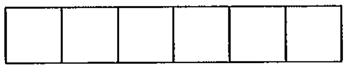
1)



Area = _________ square cm

Perimeter = _________ cm

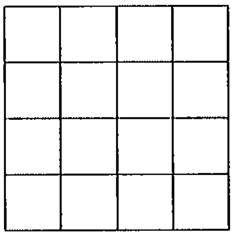
2)



Area = _________ square cm

Perimeter = _________ cm

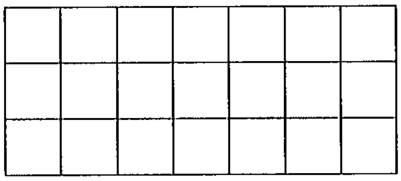
3)



Area = _________ square cm

Perimeter = _________ cm

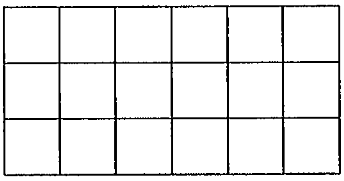
4)



Area = _________ square cm

Perimeter = _________ cm

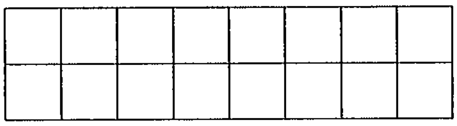
5)



Area = _________ square cm

Perimeter = _________ cm

6)



Area = _________ square cm

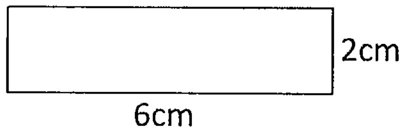
Perimeter = _________ cm

Name Date

AREA AND PERIMETER SHEET 2

Work out the area and perimeter of the following rectangles.
They are not to scale. Remember - **area inside** and **perimeter outside**.

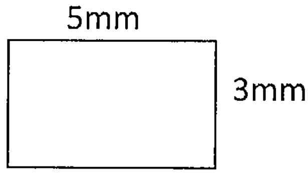
1)



Area = ________ square cm

Perimeter = ________ cm

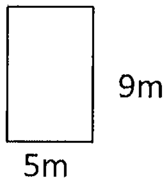
2)



Area = ________ square mm

Perimeter = ________mm

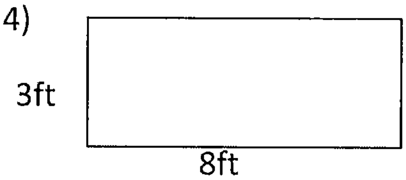
3)



Area = ________ square m

Perimeter = ________ m

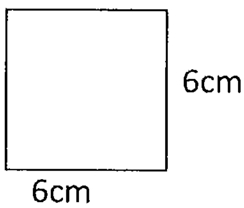
4)



Area = ________ square ft

Perimeter = ________ ft

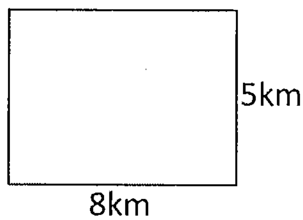
5)



Area = ________ square cm

Perimeter = ________ cm

6)



Area = ________ square km

Perimeter = ________ km

Name Date

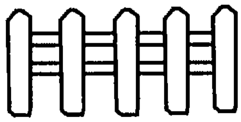
AREA & PERIMETER CHALLENGE 2

Captain Salamander has 12m of fencing that he wants to make into a rectangular pen to put in his garden to keep the predators out.

He wants to enclose the **biggest** area possible.

Draw 3 different pens that he could make.

Which pen has the biggest area?

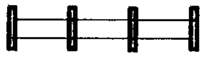
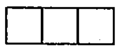
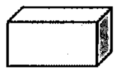


What if Captain Salamander had 20m of fencing instead of 12m?

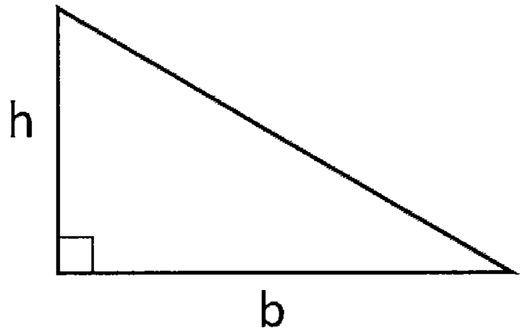
Name Date

AREA AND PERIMETER PROBLEM SOLVING 1B

Use the information to find out if the problem is an area problem or a perimeter problem. Underline the correct word then solve the problem! You need to answer the questions in order.

1)	Captain is building a rectangular rabbit enclosure for his pet rabbit. The enclosure measures 8m by 6m. How much fence does he need for the enclosure? *Area Perimeter* 	2)	Captain now build the enclosure for his pet rabbit. How much space will the rabbit have to run around in? *Area Perimeter* 
3)	Sally is buying tiles for her bathroom floor. Each tile is 1 foot by 1 foot. Her bathroom floor measures 12 feet by 7 feet. How many tiles will she need? *Area Perimeter* 	4)	Tyger is making a wooden box. The base measures 11cm by 4cm. What length of wood does he needs to go round all the sides? *Area Perimeter* 
5)	Frazer is buying paint to paint one of his walls. The wall measures 9 feet by 8 feet. A pot of paint will cover 70 square feet. Will it be enough to cover his wall? *Area Perimeter* 	6)	Frazer gets some masking tape to put around the edge of the wall he is painting. How much masking tape does he need? *Area Perimeter*

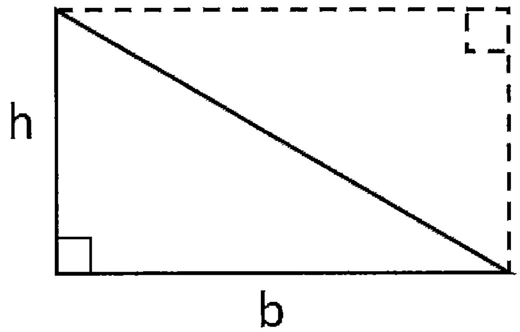
Area of a Right Triangle



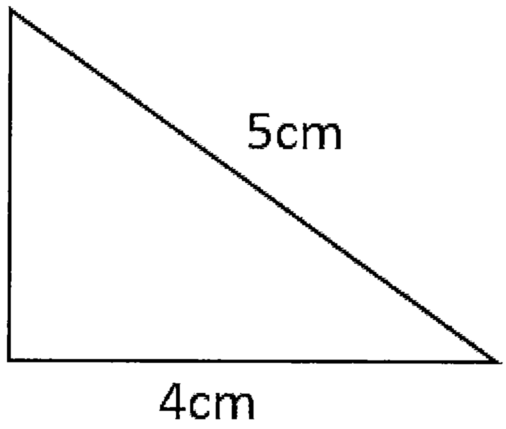
- To find the area of a any triangle, you simply need to multiply the base of the triangle by the perpendicular height and halve the answer.
- Because a right triangle has two perpendicular sides already, you simply need to multiply the two perpendicular sides together and halve the result.
- ***Area of a triangle = ½ x b x h***, where b is the length of the base and h is the perpendicular height of the triangle.

Area of a Right Triangle Explained

The reason that you simply need to multiply the two perpendicular sides together and halve the answer to find the area of a right triangle is quite straightforward to understand.



If you look at the triangle above, you will notice that the red dotted line that joins the triangle forms a rectangle.
The area of the right triangle is exactly half of this rectangle because it has been split into two identical (congruent) right triangles with the same area.
However, we can also see that the area of the rectangle has to be b x h (because to find the area of a rectangle, you multiply adjacent sides together).
The area of the right triangle is half of this rectangle so we have Area = ½ x b x h.



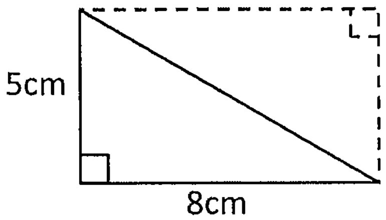
- So why is this example much harder?
- It is because we do not know the perpendicular height.
- To find the perpendicular height we can use Pythagoras' theorem because it applies to right triangles.
- So, if we call the missing side b, then Pythagoras' theorem gives us:
- $h^2 = a^2 + b^2$, where h is the hypotenuse and a and b are the other two sides.
- So, $5^2 = 4^2 + b^2$
- So, $25 = 16 + b^2$
- So, $b^2 = 25 - 16 = 9$
- So, b = 3cm.
- We can now find the area now we have found the perpendicular side.
- Area = ½ x 4 x 3 = ½ x 12 = 6 square cm or 6 cm^2

Name Date

RIGHT TRIANGLE AREA SHEET 1

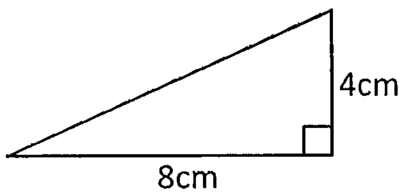
Work out the area of the following triangles by halving the area of the rectangle formed by its perpendicular sides. They are not to scale.

Example



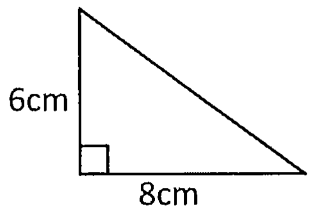
The area of the rectangle is 8 x 5 = 40cm^2.
The triangle is half the size of the rectangle so its area is ½ x 5 x 8 = 20cm^2.

1)



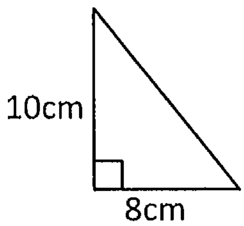
Area = ________ square cm (cm^2)

2)



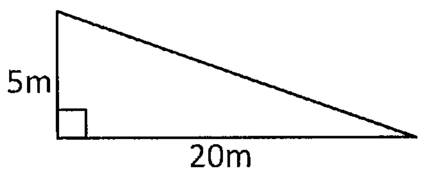
Area = ________ square cm (cm^2)

3)



Area = ________ square cm (cm^2)

4)



Area = ________ square m (m^2)

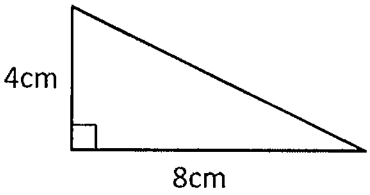
<u>Handy hint:</u>
The formula for the area of a triangle is
½ x base x (perpendicular) height

Name Date

TRIANGLE AREA SHEET 2

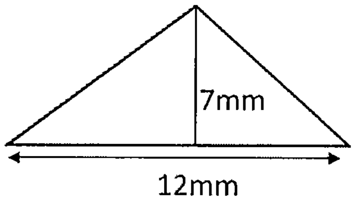
Work out the area of the following triangles. They are not drawn to scale.
Use the formula at the bottom of the page to help you.

1)



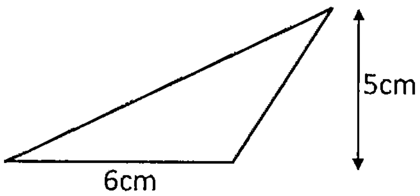
Area = ________ cm^2

2)



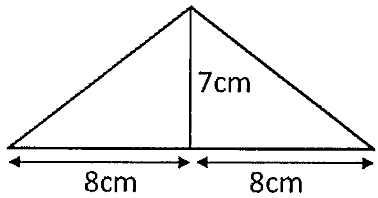
Area = ________

3)



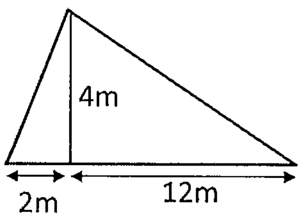
Area = ________

4)



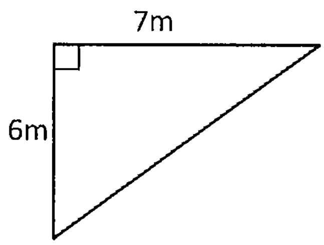
Area = ________

5)



Area = ________

6)



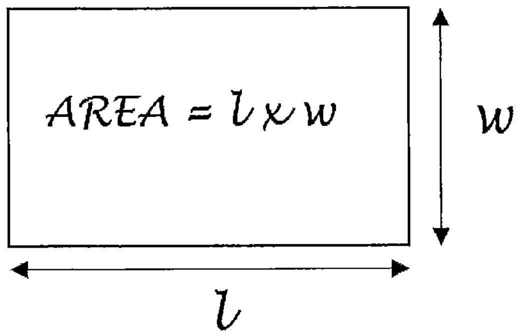
Area = ________

<u>Handy hint:</u>

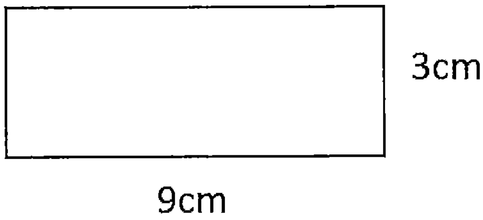
The formula for the area of a triangle is

½ x base x (perpendicular) height

Area of a Rectangle



- To find the area of a rectangle, you simply need to multiply the length by the width.
- Area of a rectangle = l x w, where l is the length and w is the width.

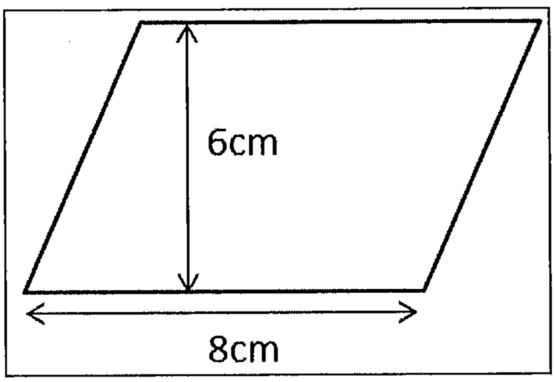


- In the example above, the area of the rectangle is 9 x 3 = 27 square cm or 27 cm^2

Area of a Parallelogram

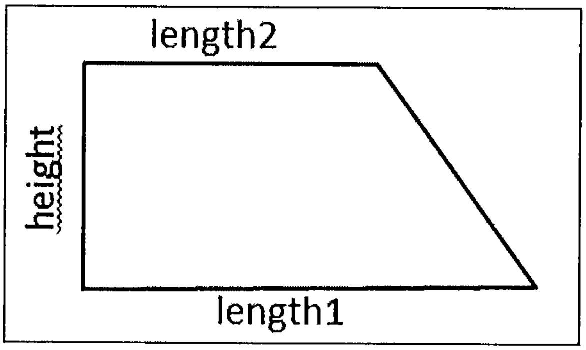
- If you are measuring the area of a parallelogram, then the area will be equal to the base multiplied by the perpendicular height.
- Or Area of a parallelogram = base x (perpendicular) height

Example



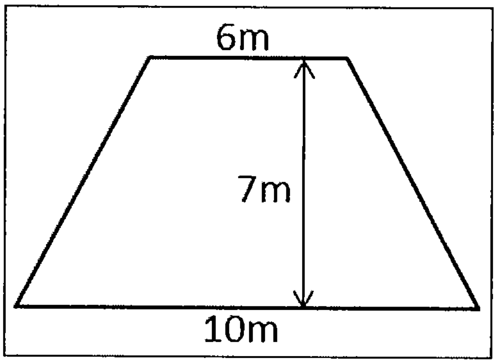
- In the example above, the area of the parallelogram is 8 x 6 = 48 square cm or 48 cm^2

Area of a Trapezoid (Trapezium UK)



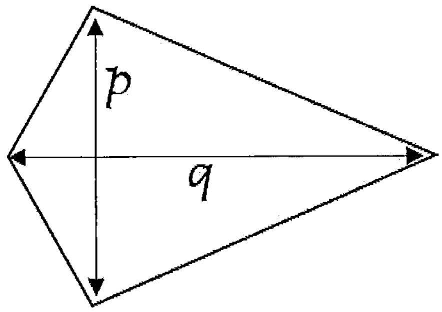
- If you are measuring the area of a trapezoid (called a trapezium in the UK) then the area will be ½ x (length of the two parallel sides added together) x height
- Or Area of a trapezoid = ½ x (length1 + length2) x height

Example



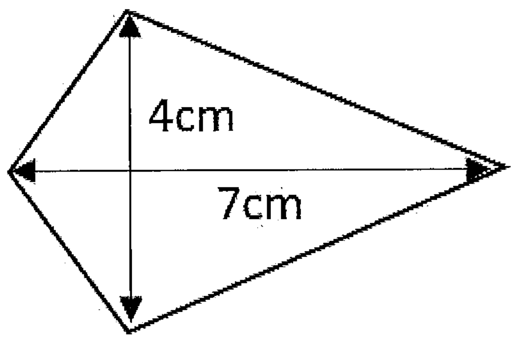
- In the example above, the area is ½ x (10 + 6) x 7 = 56 square m or 56 m^2

Area of a Kite



- If you are measuring the area of a kite, then you just need to multiply the lengths of the two diagonals.
- Area of a kite = ½ x p x q (where p and q are the lengths of the two diagonals)

Example



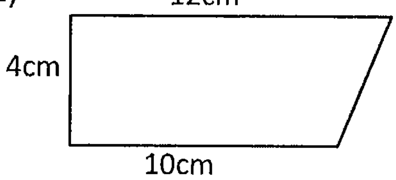
- In the example above, the area is ½ x 7 x 4 = 14 square cm or 14 cm^2

Name Date

QUADRILATERAL AREA SHEET 2

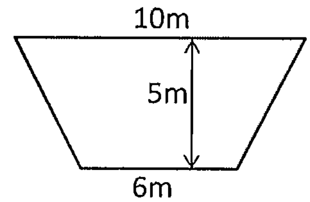
Find the area of these quadrilaterals by splitting them up into rectangles and triangles. They are not drawn to scale.

1)



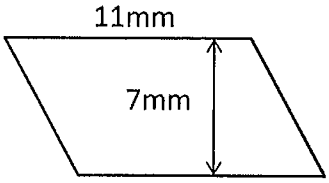
Area = ________

2)



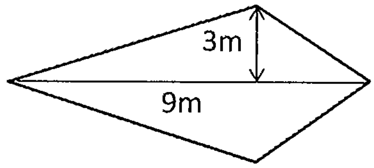
Area = ________

3)



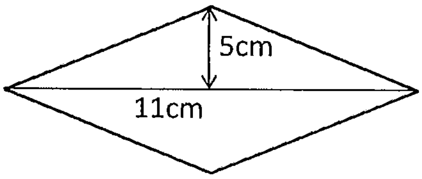
Area = ________

4)



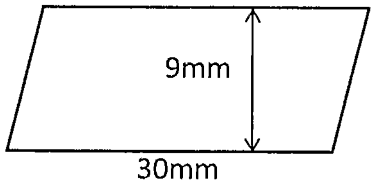
Area = ________

5)



Area = ________

6)



Area = ________

Handy hints:

Area of a parallelogram = *length x perpendicular height*

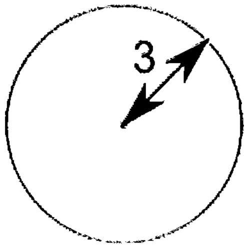
Area of a trapezium = ½ x (length1 + length2) x height

How to Calculate the Area

The area of a circle is:

π (Pi) times the Radius squared: $A = \pi r^2$
or, when you know the Diameter: $A = (\pi/4) \times D^2$
or, when you know the Circumference: $A = C^2 / 4\pi$

Example: What is the area of a circle with radius of 3 m ?



Radius = r = 3

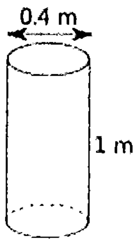
Area $= \pi r^2$
$= \pi \times 3^2$
$= 3.14159... \times (3 \times 3)$
$=$ **28.27 m^2** (to 2 decimal places)

Example: Max is building a house. The first step is to drill holes and fill them with concrete.

The holes are **0.4 m wide** and **1 m deep**, how much concrete should Max order for each hole?

The holes are circular (in cross section) because they are drilled out using an auger.

The diameter is 0.4m, so the Area is:



$$A = (\pi/4) \times D^2$$

$$A = (3.14159.../4) \times 0.4^2$$

$$A = 0.7854... \times 0.16$$

$$A = \mathbf{0.126\ m^2} \text{ (to 3 decimals)}$$

And the holes are 1 m deep, so:

$$\text{Volume} = 0.126\ m^2 \times 1\ m = \mathbf{0.126\ m^3}$$

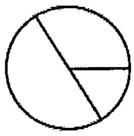
So Max should order 0.126 cubic meters of concrete to fill each hole.

Note: Max could have **estimated** the area by:

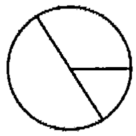
- 1. Calculating a square hole: $0.4 \times 0.4 =$ **0.16** $\mathbf{m^2}$
- 2. Taking 80% of that (estimates a circle): $80\% \times 0.16\ m^2 =$ **0.128** $\mathbf{m^2}$
- 3. And the volume of a 1 m deep hole is: **0.128** $\mathbf{m^3}$

Circumference and Area of Circles (A)

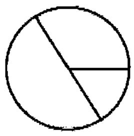
Find the circumference and area of each circle to one decimal place.



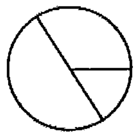
d = 7.9 cm



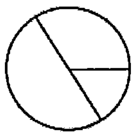
d = 6.3 cm



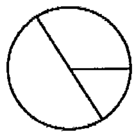
r = 7.3 cm



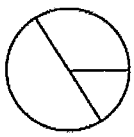
d = 5.5 cm



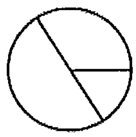
d = 9.5 mm



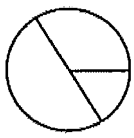
r = 1 yd



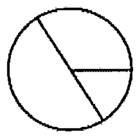
r = 9.7 m



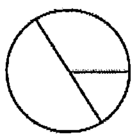
d = 7 m



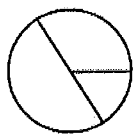
r = 0.5 m



r = 2.4 cm



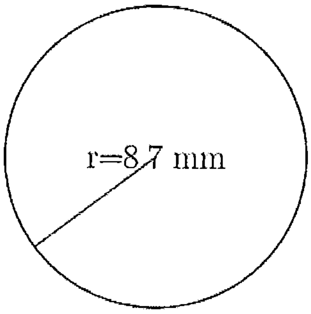
d = 0.9 mi



r = 8 in

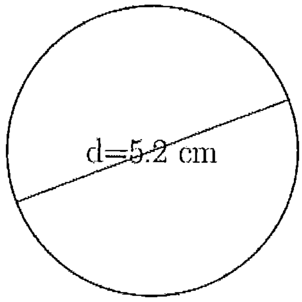
Area and Circumference of Circles (A)

Calculate the area and circumference of each circle.



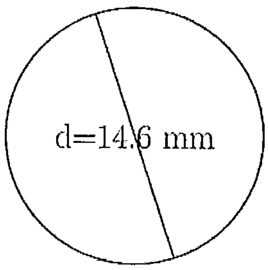
circumference = ____________

area = ____________



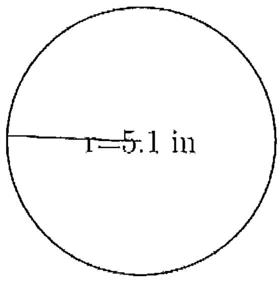
circumference = ____________

area = ____________



circumference = ____________

area = ____________



circumference = ____________

area = ____________