



Dear Grade 8's

You should already be finished with the previous work placed on the website.

We set up a work schedule for each week in June to keep your MATH up to date during lockdown.

Please complete each worksheet for each day in your exercise book and mark your work using the memo given. We will check it in class once classes resume.

Remember to do all calculations on how you got your answers.

Read up about the work for the day in your textbook.

It will only take a few minutes a day.

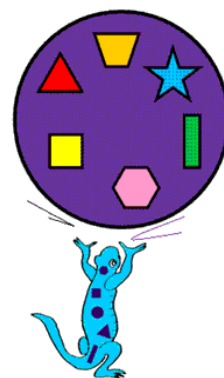
We know we can count on you Grade 8's.

See you soon

From your Grade 8 Math Teachers

The only way
to learn
mathematics
is to do
mathematics.

PAUL HALMOS



Measurements: Perimeter and Area

Date	Topics and Worksheets	Parental guidance
Monday– 22 June	Perimeter (p3-4)	Please check if work is done. This includes: 1. Information for topic of the day read from the textbook. 2. Worksheets given done. 3. Use Memorandum (p16-17) to check correctness of answers.
Tuesday - 23 June	Perimeter Worksheet (p5)	
Wednesday - 24 June	Conversions (p6)	
Thursday - 25 June	Area 1 (p7-9)	
Friday - 26 June	Area 2 (p10-12)	
Bonus day!!	Fun for the weekend!! (p13-15)	



Measurement: Perimeter

Perimeter and area of shapes:

The perimeter is the distance around the outermost border of something. Area is the size of a flat surface of something. In this chapter, you will learn to use different formulae to calculate the perimeter and area of squares, rectangles and triangles.

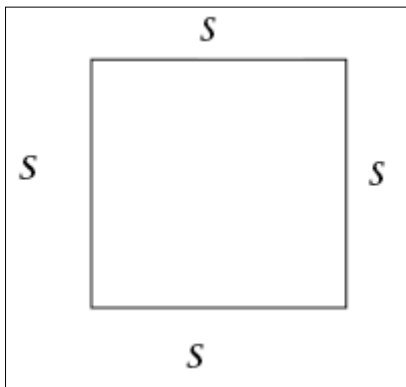
You will solve problems using these formulae, and you will also learn how to convert between different units of area.

Perimeter of polygons:

The perimeter of a shape is the total distance around the shape, or the lengths of its sides added together. Perimeter (P) is measured in units such as millimetres (mm), centimetres (cm) and metres (m).

Perimeter formulae

If the sides of a square are all s units long:



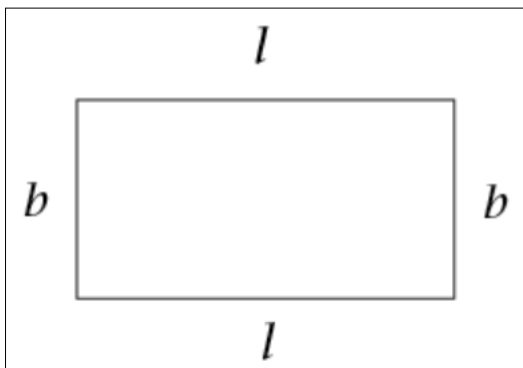
Perimeter of square

$$P=s+s+s+s$$

$$P=4 \times s$$

$$P=4s$$

If the length of a rectangle is l units and the breadth (width) is b units:



Perimeter of rectangle

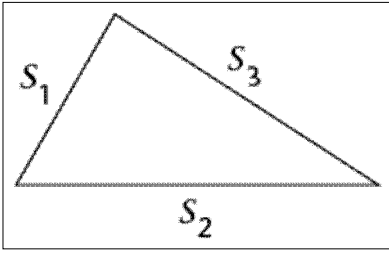
$$P=l+l+b+b$$

$$P=2 \times l+2 \times b$$

$$P=2(l+b)$$

Measurement: Perimeter

A triangle has three sides, so:



Perimeter of triangle:

$$P = s_1 + s_2 + s_3$$

 Now try it yourself. Answer and show all the calculations in your exercise book.

APPLYING PERIMETER FORMULAE

1. Calculate the perimeter of a square if the length of one of its sides is 17,5 cm.

2. One side of an equilateral triangle is 32 cm. Calculate the triangle's perimeter.

3. Calculate the length of one side of a square if the perimeter of the square is 7,2 m. (Hint: $4s = ?$
Therefore $s = ?$)

4. Two sides of a triangle are 2,5 cm each. Calculate the length of the third side if the triangle's perimeter is 6,4 cm.

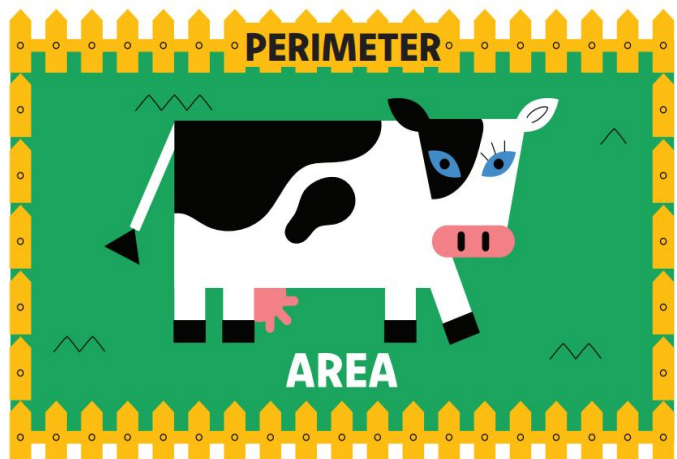
5. A rectangle is 40 cm long and 25 cm wide. Calculate its perimeter.

6. Calculate the perimeter of a rectangle that is 2,4 m wide and 4 m long.

7. The perimeter of a rectangle is 8,88 m. How long is the rectangle if it is 1,2 m wide?

8. Do the necessary calculations in your exercise book in order to complete the table. (All the measurements refer to rectangles.)

	Length	Breadth	Perimeter
(a)	74 mm	30 mm	
(b)	25 mm		90 mm
(c)		1,125 cm	6,25 cm
(d)	5,5 cm		22 cm
(e)	7,5 m	3,8 m	
(f)		2,5 m	12 m



Perimeter Worksheet

 Now try it yourself. Answer and show all the calculations in your exercise book.

Keep in mind:

All units are centimeters (cm).

The triangles are isosceles triangles (two sides are equal).

In the rectangles opposite sides are equal.

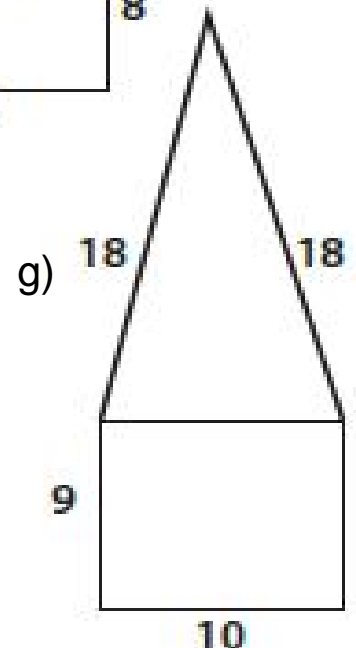
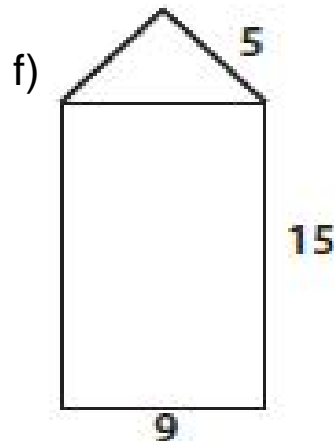
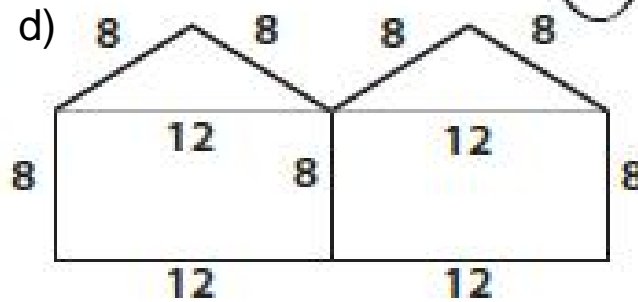
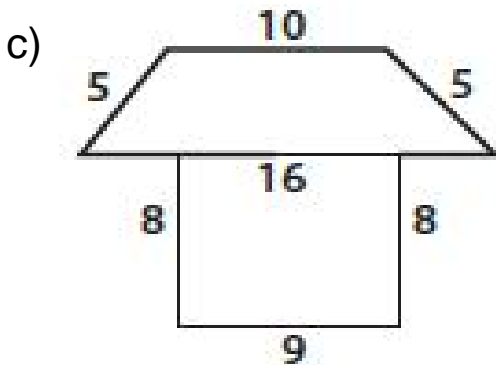
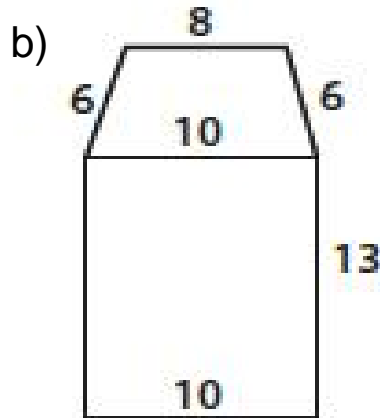
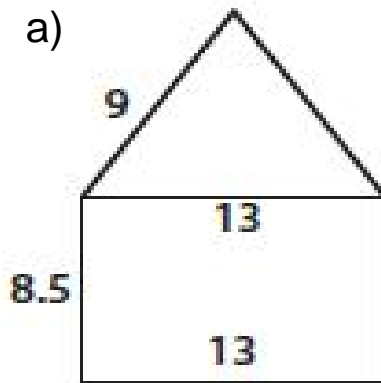
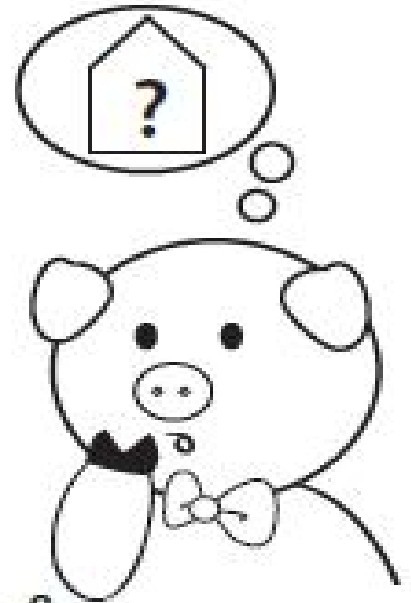
Use only the outside measurements.

Piggy's House Hunting: Find the Perimeter

Piggy needs to find a house with the largest perimeter.

Help Piggy by finding the perimeter of each house.

Then color the largest one.

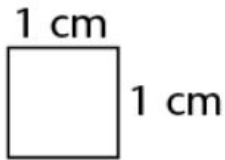


Measurement: Conversions

CONVERSION OF UNITS

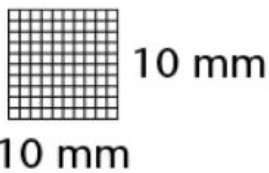
The figure below shows a square with sides of 1 cm. The area of the square is one square centimetre (1 cm²).

How many squares of 1 mm by 1 mm (1 mm²) would fit into the 1 cm² square? ____ Complete: 1 cm² = ____ mm²



To change cm² to mm²:

$$\begin{aligned} 1 \text{ cm}^2 &= 1 \text{ cm} \times 1 \text{ cm} \\ &= 10 \text{ mm} \times 10 \text{ mm} \\ &= 100 \text{ mm}^2 \end{aligned}$$



Similarly, to change mm² to cm²:

$$\begin{aligned} 1 \text{ mm}^2 &= 1 \text{ mm} \times 1 \text{ mm} \\ &= 0,1 \text{ cm} \times 0,1 \text{ cm} \\ &= 0,01 \text{ cm}^2 \end{aligned}$$

We can use the same method to convert between other square units too. Complete:

From m² to cm²: $1 \text{ m}^2 = 1 \text{ m} \times 1 \text{ m}$ $= \text{_____ cm} \times \text{_____ cm}$ $= \text{_____ cm}^2$	From cm² to m²: $1 \text{ cm}^2 = 1 \text{ cm} \times 1 \text{ cm}$ $= 0.01 \text{ m} \times 0.01 \text{ m}$ $= \text{_____ m}^2$
---	---

So, to convert between m², cm² and mm² you do the following:

- cm² to mm² → multiply by 100
- m² to cm² → multiply by 10000
- mm² to cm² → divide by 100
- cm² to m² → divide by 10000

 **Now try it yourself. Answer and show all the calculations in your exercise book.**

1. a. $15 \text{ m}^2 = \text{_____ cm}^2$

b. $5 \text{ cm}^2 = \text{_____ mm}^2$

c. $20 \text{ cm}^2 = \text{_____ m}^2$

d. $20 \text{ mm}^2 = \text{_____ cm}^2$

2. a. $25 \text{ m}^2 = \text{_____ cm}^2$

b. $240\,000 \text{ cm}^2 = \text{_____ m}^2$

c. $460,5 \text{ mm}^2 = \text{_____ cm}^2$

d. $0,4 \text{ m}^2 = \text{_____ cm}^2$

e. $12\,100 \text{ cm}^2 = \text{_____ m}^2$

f. $2,295 \text{ cm}^2 = \text{_____ mm}^2$

Measurement: Area 1

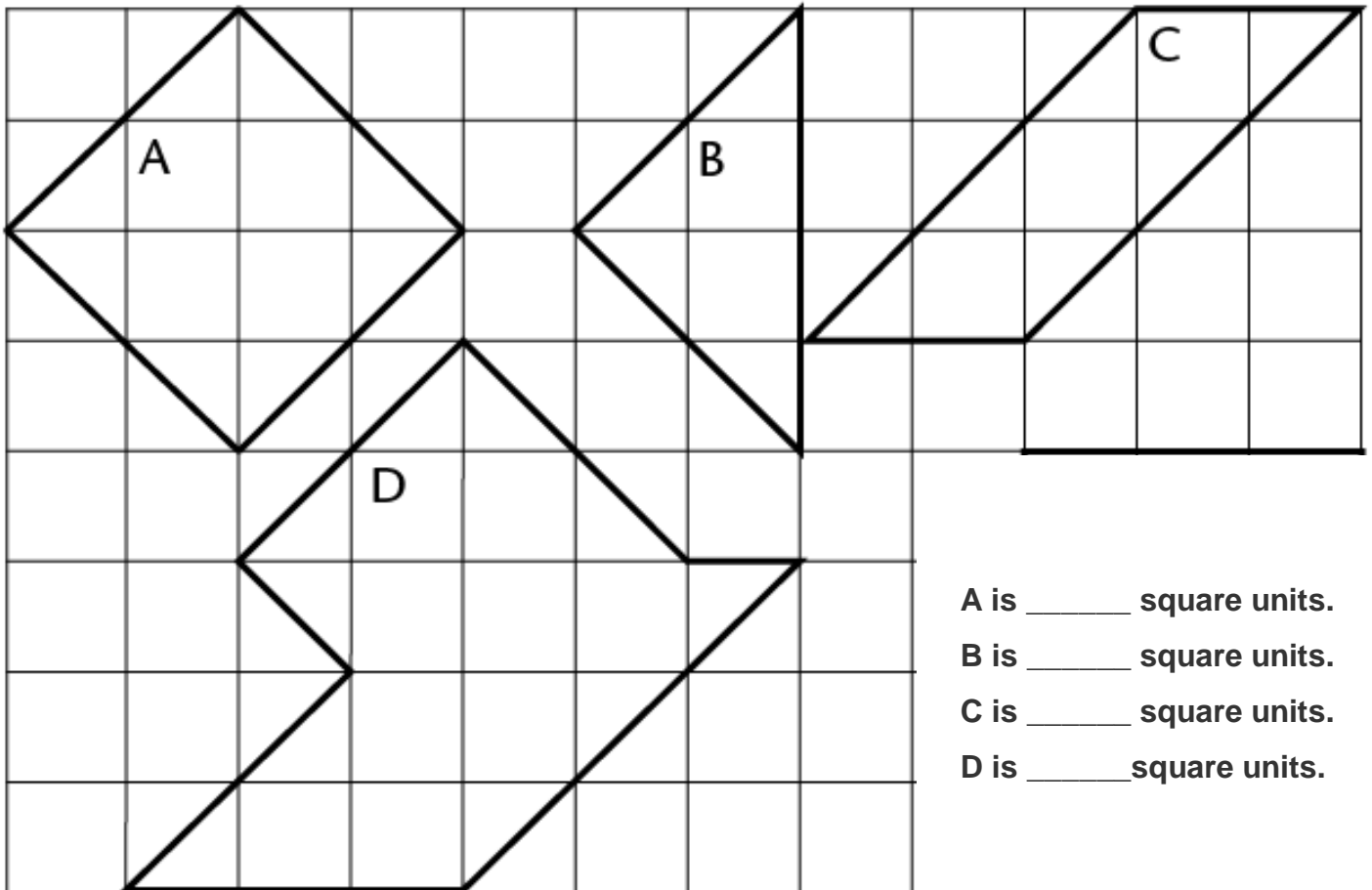
Area and square units

The area of a shape is the size of the flat surface surrounded by the border (perimeter) of the shape. Usually, area (A) is measured in square units, such as square millimetres (mm²), square centimetres (cm²) and square metres (m²).

 Now try it yourself. Answer and show all the calculations in your exercise book.

SQUARE UNITS TO MEASURE AREA

1. Write down the area of figures A to D below by counting the square units.
(Remember to add halves or smaller parts of squares.)



Measurement: Area 1

FORMULAE: AREA OF RECTANGLES AND SQUARES

In the rectangle below:

$$\begin{aligned}\text{Number of squares} &= \text{Squares along the length} \times \text{Squares along the breadth} \\ &= 6 \times 4 \\ &= 24\end{aligned}$$

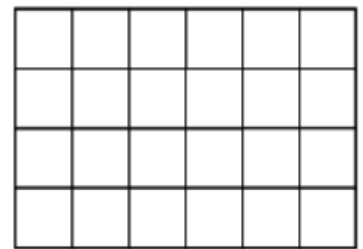
$$\begin{aligned}\text{Area of rectangle} &= \text{Length of rectangle} \times \text{Breadth of rectangle} \\ A &= l \times b\end{aligned}$$

where A is the area in square units, l is the length and b is the breadth)

$$\begin{aligned}\text{Area of square} &= \text{Length of side} \times \text{Length of side} \\ A &= l \times l \\ &= l^2\end{aligned}$$

where A is the area in square units, and l is the length of a side)

$l = 6$ squares



$b = 4$ squares

The units of the values used in the calculations must be the same. Remember:

- $1 \text{ m} = 100 \text{ cm}$ and $1 \text{ cm} = 10 \text{ mm}$
- $1 \text{ cm}^2 = 1 \text{ cm} \times 1 \text{ cm} = 10 \text{ mm} \times 10 \text{ mm} = 100 \text{ mm}^2$
- $1 \text{ m}^2 = 1 \text{ m} \times 1 \text{ m} = 100 \text{ cm} \times 100 \text{ cm} = 10\,000 \text{ cm}^2$
- $1 \text{ mm}^2 = 1 \text{ mm} \times 1 \text{ mm} = 0,1 \text{ cm} \times 0,1 \text{ cm} = 0,01 \text{ cm}^2$
- $1 \text{ cm}^2 = 1 \text{ cm} \times 1 \text{ cm} = 0,01 \text{ m} \times 0,01 \text{ m} = 0,0001 \text{ m}^2$

Examples

1. Calculate the area of a rectangle with a length of 50 mm and a breadth of 3 cm. Give the answer in cm^2 .

Solution:

$$\begin{aligned}\text{Area of rectangle} &= l \times b \\ &= (50 \times 30) \text{ mm}^2 && \text{or } A = (5 \times 3) \text{ cm}^2 \\ &= 1500 \text{ mm}^2 && \text{or } = 15 \text{ cm}^2\end{aligned}$$

2. Calculate the area of a square bathroom tile with a side of 150 mm.

Solution:

$$\begin{aligned}\text{Area of square tile} &= l \times l \\ &= (150 \times 150) \text{ mm}^2 \\ &= 22500 \text{ mm}^2\end{aligned}$$

The area is therefore $22\,500 \text{ mm}^2$ (or 225 cm^2).

Measurement: Area 1

Examples

3. Calculate the length of a rectangle if its area is 450 cm^2 and its width is 150 mm.

Solution:

$$\text{Area of rectangle} = l \times b$$

$$450 = l \times 15$$

$$30 \times 15 = l \times 15$$

$$30 = l$$

$$\text{or } 450 \div 15 = l$$

$$30 = l$$

The length is therefore 30 cm (or 300 mm).

 **Now try it yourself. Answer and show all the calculations in your exercise book.**

APPLYING THE FORMULAE

1. Calculate the area of each of the following shapes:

a. a rectangle with sides of 12 cm and 9 cm

b. a square with sides of 110 mm (answer in cm^2)

c. a rectangle with sides of 2,5 cm and 105 mm (answer in mm^2)

2. A rugby field has a length of 100 m (goal post to goal post) and a breadth of 69 m.

a. What is the area of the field (excluding the area behind the goal posts)?

b. What would it cost to plant new grass on that area at a cost of $\text{R}45/\text{m}^2$?

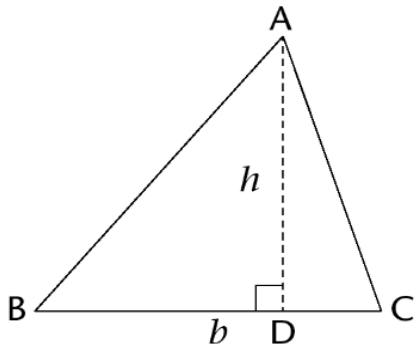
c. Another unit for area is the hectare (ha). It is mainly used for measuring land. The size of 1 ha is the equivalent of $100\text{m} \times 100\text{m}$. Is a rugby field greater or smaller than 1 ha? Explain your answer.

Measurement: Area 2 - Triangles

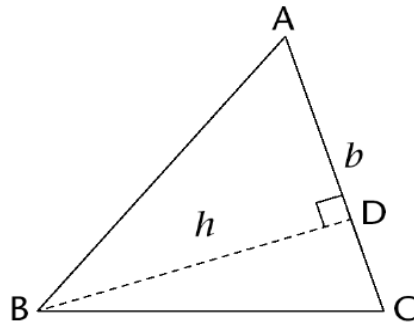
Area of triangles

HEIGHTS AND BASES OF A TRIANGLE

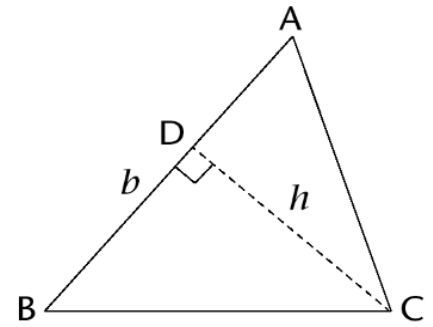
The **height** (h) of a triangle is a perpendicular line segment drawn from a vertex to its opposite side. The opposite side, which forms a right angle with the height, is called the **base** (b) of the triangle. Any triangle has three heights and three bases.



$AD = \text{height}$
 $BC = \text{base}$

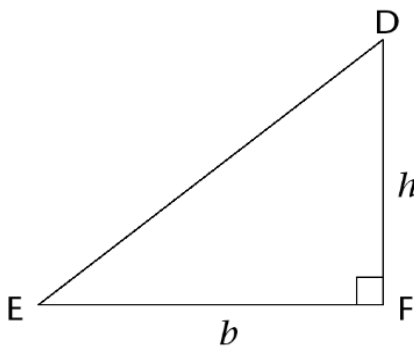


$BD = \text{height}$
 $AC = \text{base}$

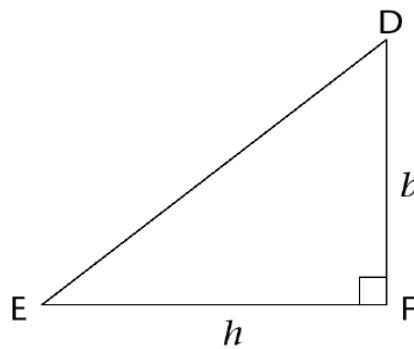


$CD = \text{height}$
 $AB = \text{base}$

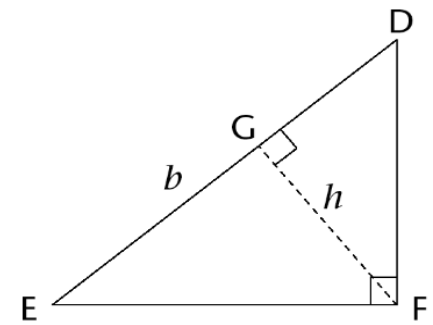
In a right-angled triangle, two sides are already at right angles:



$DF = \text{height}$
 $EF = \text{base}$

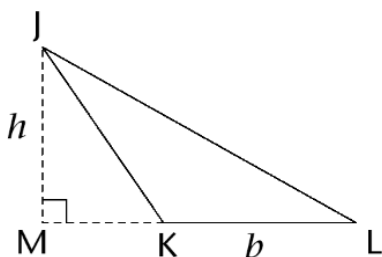


$EF = \text{height}$
 $DF = \text{base}$

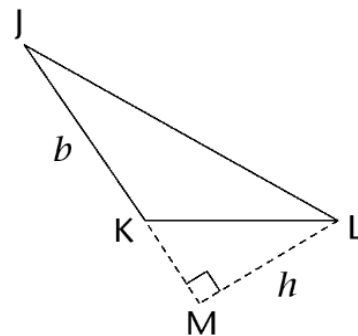


$FG = \text{height}$
 $DE = \text{base}$

Sometimes a base must be extended outside of the triangle in order to draw the perpendicular height. This is shown in the first and third triangles below. Note that the extended part does not form part of the base's measurement:



$JM = \text{height}$
 $KL = \text{base}$

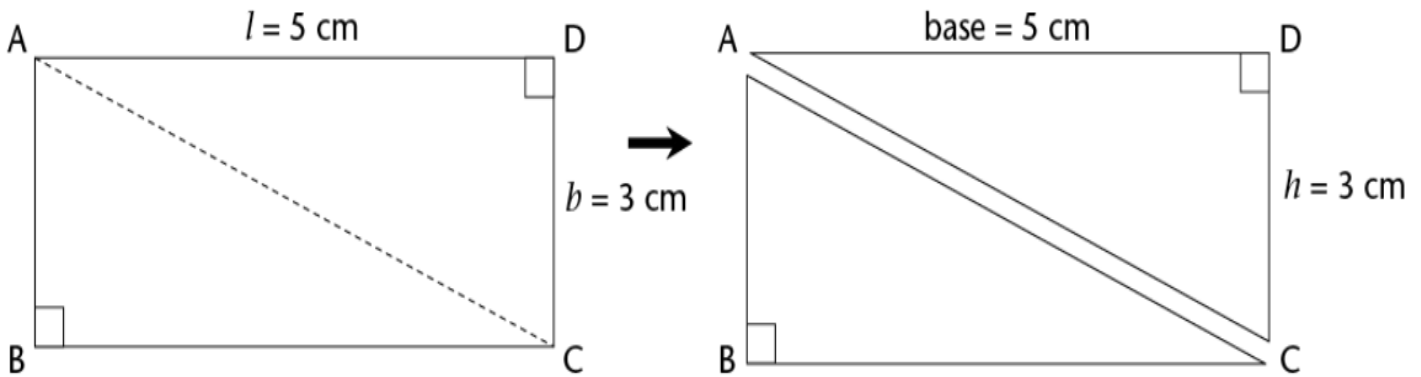


$LM = \text{height}$
 $JK = \text{base}$

Measurement: Area 2 - Triangles

FORMULA: AREA OF A TRIANGLE

ABCD is a rectangle with length = 5 cm and breadth = 3 cm. When A and C are joined, it creates two triangles that are equal in area: $\triangle ABC$ and $\triangle ADC$.



Area of rectangle = $l \times b$ or (base x perpendicular height)

$$\begin{aligned}\text{Area of } \triangle ABC \text{ (or } \triangle ADC) &= \frac{1}{2} (\text{Area of rectangle}) \\ &= \frac{1}{2} (l \times b) \text{ or (base x perpendicular height)}\end{aligned}$$

In rectangle ABCD, AD is its length and CD is its breadth.

But look at $\triangle ADC$. Can you see that AD is a base and CD is its height?

So instead of saying:


Area of $\triangle ADC$ or any other triangle = $\frac{1}{2} (l \times b)$ or (base x perpendicular height)

we say:

$$\begin{aligned}\text{Area of a triangle} &= \frac{1}{2} (\text{base} \times \text{height}) \\ &= \frac{1}{2} (b \times h)\end{aligned}$$

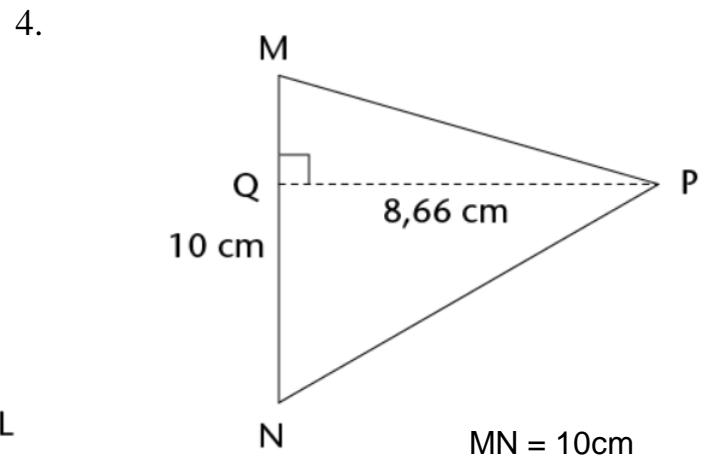
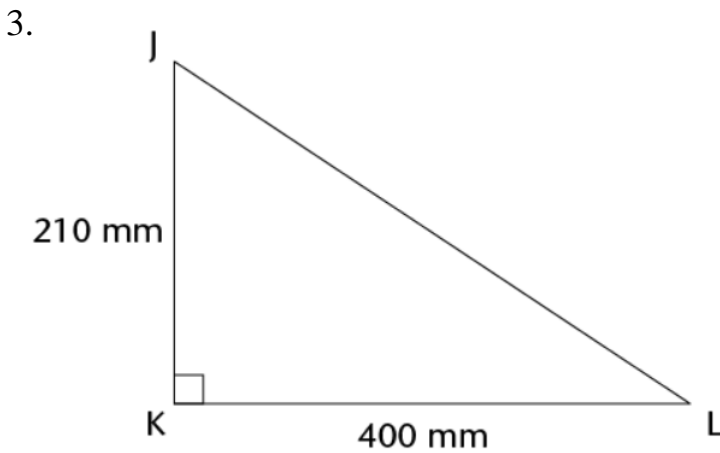
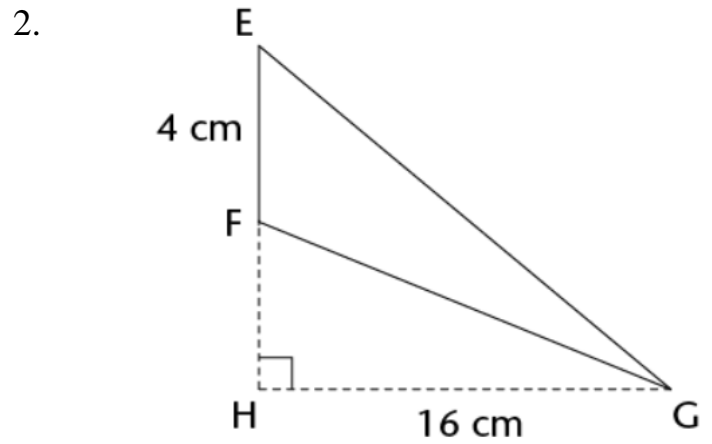
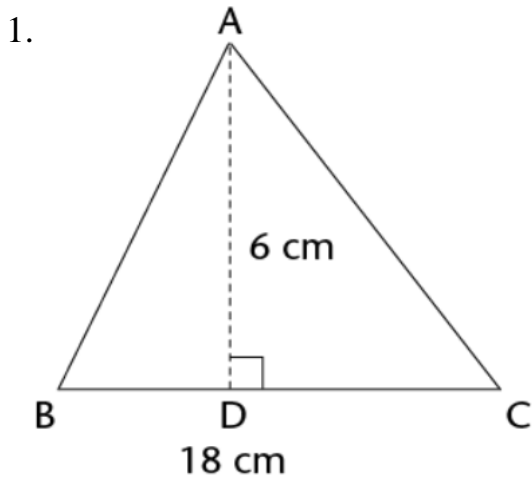
In the formula for the area of a triangle, b means 'base' and not 'breadth', and h means perpendicular heights.

Measurement: Area 2 - Triangles

 Now try it yourself. Answer and show all the calculations in your exercise book.

APPLYING THE AREA FORMULA

Use the formula to calculate the areas of the following triangles: $\triangle ABC$, $\triangle EFG$, $\triangle JKL$ and $\triangle MNP$.

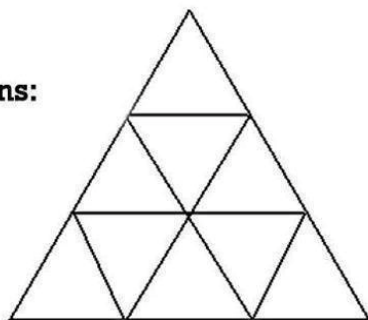


Interesting:

How many Triangles are there??
Let's see how smart are you?

Options:

- 1) 9
- 2) 12
- 3) 10
- 4) 11
- 5) 13

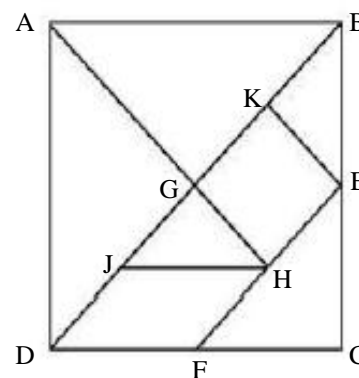


Fun for the weekend!!

We are going to create our very own tangram set. You will need some paper and if you like, you can colour in or decorate your set afterwards. You are going to create 7 shapes. Read through of the instructions carefully and make sure you follow them so that your tangrams will make sense later on.

- a) On your piece of paper construct a square with sides that are 17cm in length, label the corners A, B, C and D.
- b) Bisect line BC and CD, label the points E and F respectively.
Bisect means to cut in half, therefore $BE = EC$ and $DF = FC$
- c) Connect points E and F to form a triangle ($\triangle EFC$).
- d) Draw a diagonal from B to D.
- e) Bisect the right angle \hat{DAB} . Draw this line from point A to intersect with BD and EF. Call the point on BD G and the point on EF H.
- f) Draw a line parallel to DF from point H and intersecting with line BD. Call this point J.
- g) Draw a line perpendicular to BG that intersects with point E. Label the point on BG K.
- h) To check that you have drawn the tangram set correctly make sure you have the following:

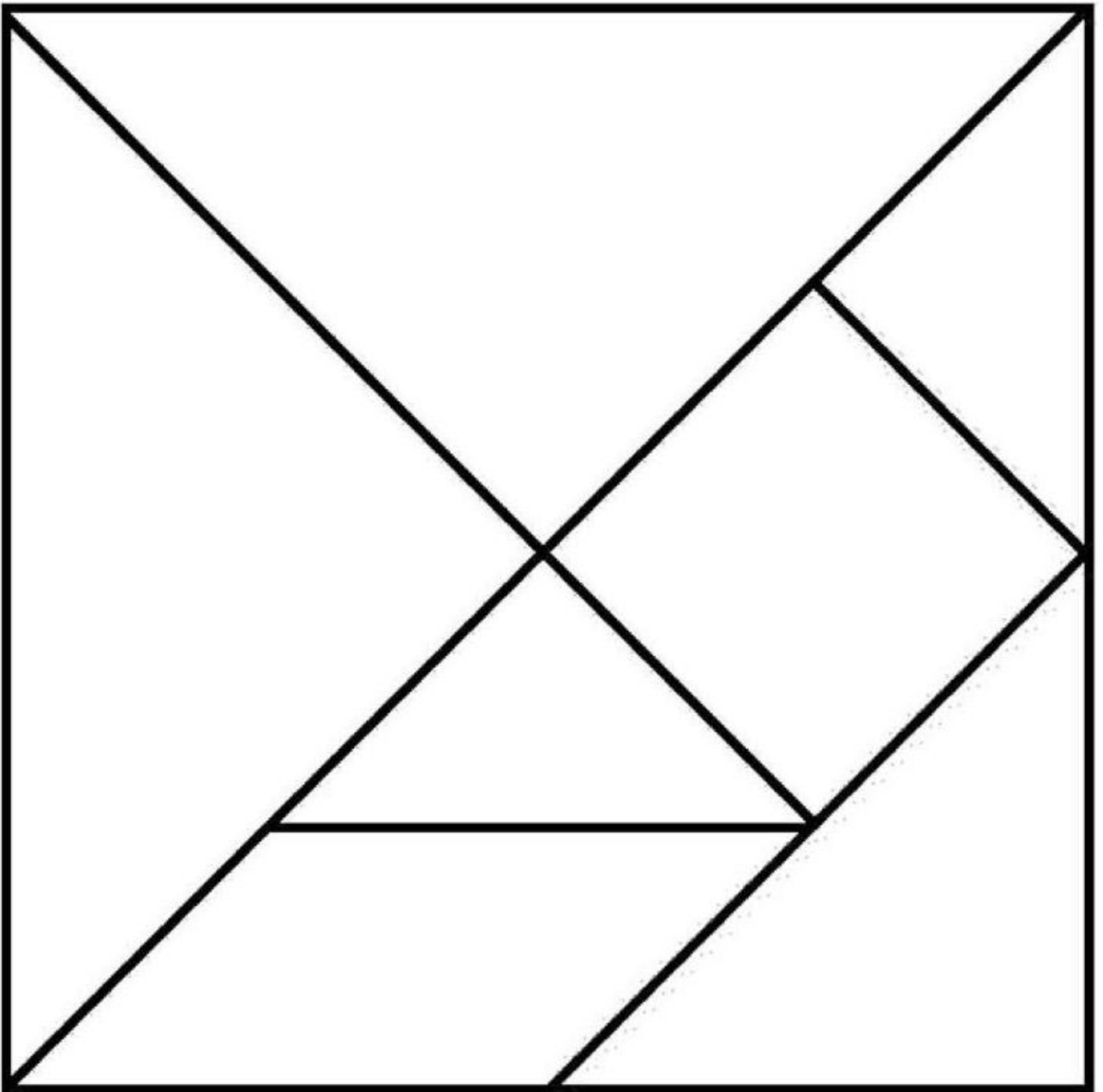
- Two big triangles ($\triangle ADG$ and $\triangle AGB$).
- Two small triangles ($\triangle GHJ$ and $\triangle BEK$)
- One small square (EHGK)
- One medium triangle ($\triangle CEF$)
- And one parallelogram (DFHJ).
- Your square should look like this



Yours must look like this one

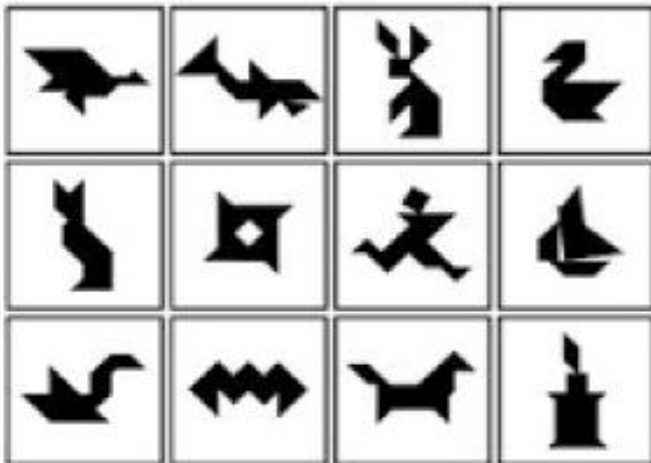
- i) Cut your shapes out along the lines you have drawn to create the shapes listed in question h) above.
- j) If your block doesn't look like this one, and you are struggling, trace or print the block on the next page.

Fun for the weekend continued!!



Fun for the weekend continued!!

Now see if you can use your tangram shapes to make up these given shapes:



See if you can create your own shapes or pictures with your tangrams.

Memorandum

Answers for Perimeter page 4:

1. Perimeter of square

$$P = 4 \times s$$

$$P = 4 \times 17,5 \text{ cm}$$

$$= 70 \text{ cm}$$

2. Equilateral triangle (all sides are equal)

$$\text{Triangle} = s+s+s$$

$$= 32 + 32 + 32 \text{ cm}$$

$$= 96 \text{ cm}$$

3. Perimeter of square = $4s$

$$4s = 7,2 \text{ m}$$

$$s = 7,2 \text{ m} \div 4$$

$$= 1,8 \text{ m}$$

4. Perimeter of Triangle = $s+s+s$

$$\text{Side} = 6,4 - (2,5 + 2,5)$$

$$= 6,4 - 5$$

$$= 1,4 \text{ cm}$$

5. Perimeter of rectangle = $2(l + b)$

$$= 2(40 + 25)$$

$$= 2(65)$$

$$= 130 \text{ cm}$$

6. $P = 2(l + b)$

$$= 2(4 + 2,4)$$

$$= 2(6,4)$$

$$= 12,8 \text{ m}$$

7. Perimeter = $l+l+b+b$

$$8,8 = 2l + (2 \times 1,2)$$

$$8,8 = 2l + 2,4$$

$$8,8 - 2,4 = 2l$$

$$6,4 = 2l$$

$$6,4 \div 2 = l$$

$$3,2 \text{ m} = \text{length}$$

- 8.

	Length	Breadth	Perimeter
(a)	74 mm	30 mm	<i>208 mm</i>
(b)	25 mm	<i>20 mm</i>	90 mm
(c)	<i>2 cm</i>	1,125 cm	6,25 cm
(d)	5,5 cm	<i>5,5 cm</i>	22 cm
(e)	7,5 m	3,8 m	<i>22,6 m</i>
(f)	<i>3,5 m</i>	2,5 m	12 m

Answers for Perimeter Worksheet page 5:

a. 48 cm

b. 56 cm

c. Remember the overhang of the roof is

$$16 - 9 = 7 \div 2 = 3,5 \text{ cm}$$

$$\text{Perimeter} = 52 \text{ cm}$$

d. 72 cm

e. 65 cm

f. 49 cm

g. 64 cm

The biggest perimeter is house d = 72 cm

Answers for Area 1 page 7:

a. 8 Squares

b. 4 Squares

c. 6 Squares

d. 14 Squares

Answers for Measurement Conversion page 6:

1a. 150 000 cm²

b. 500 mm²

c. 0,0020 m²

d. 0,20 cm²

2a. 250 000 cm²

b. 24 m²

c. 4 605 000 cm²

d. 4 000 cm²

e. 1,21 m²

f. 295,5 mm²

Memorandum continued

Answers for Area 1 page 9:

1a. Area = $l \times b$
= 12×9
= 108 m^2

b. The area of the square = side^2
= 110^2
= $12\,100 \text{ mm}^2$
= 121 cm^2

c. Area = $l \times b$
= 25×105
= $2\,625 \text{ mm}^2$

2a. Area = $l \times b$
= 100×69
= $6\,900 \text{ m}^2$

b. Cost of the grass
= $6900 \times \text{R}45$
= $\text{R}310\,500$

c. 1 hectare = 100×100
= $10\,000 \text{ m}^2$

The rugby field is smaller than 1 ha.

Smaller by = $10\,000 - 6900 \text{ m}^2$
= $3\,100 \text{ m}^2$

Answers for Area 2 Triangles page 12:

(\perp = perpendicular)

1. Area of Triangle = $\frac{1}{2} \text{ base} \times \perp \text{ height}$
= $\frac{1}{2} (18 \times 6)$
= 54 cm^2

2. Area of Triangle = $\frac{1}{2} \text{ base} \times \perp \text{ height}$
= $\frac{1}{2} (4 \times 16)$
= 32 cm^2

3. Area of Triangle = $\frac{1}{2} \text{ base} \times \perp \text{ height}$
= $\frac{1}{2} (400 \times 210)$
= $42\,000 \text{ mm}^2$

4. Area of Triangle = $\frac{1}{2} \text{ base} \times \perp \text{ height}$
= $\frac{1}{2} (10 \times 8,66)$
= $43,3 \text{ cm}^2$