ame Area, Different Perimeter

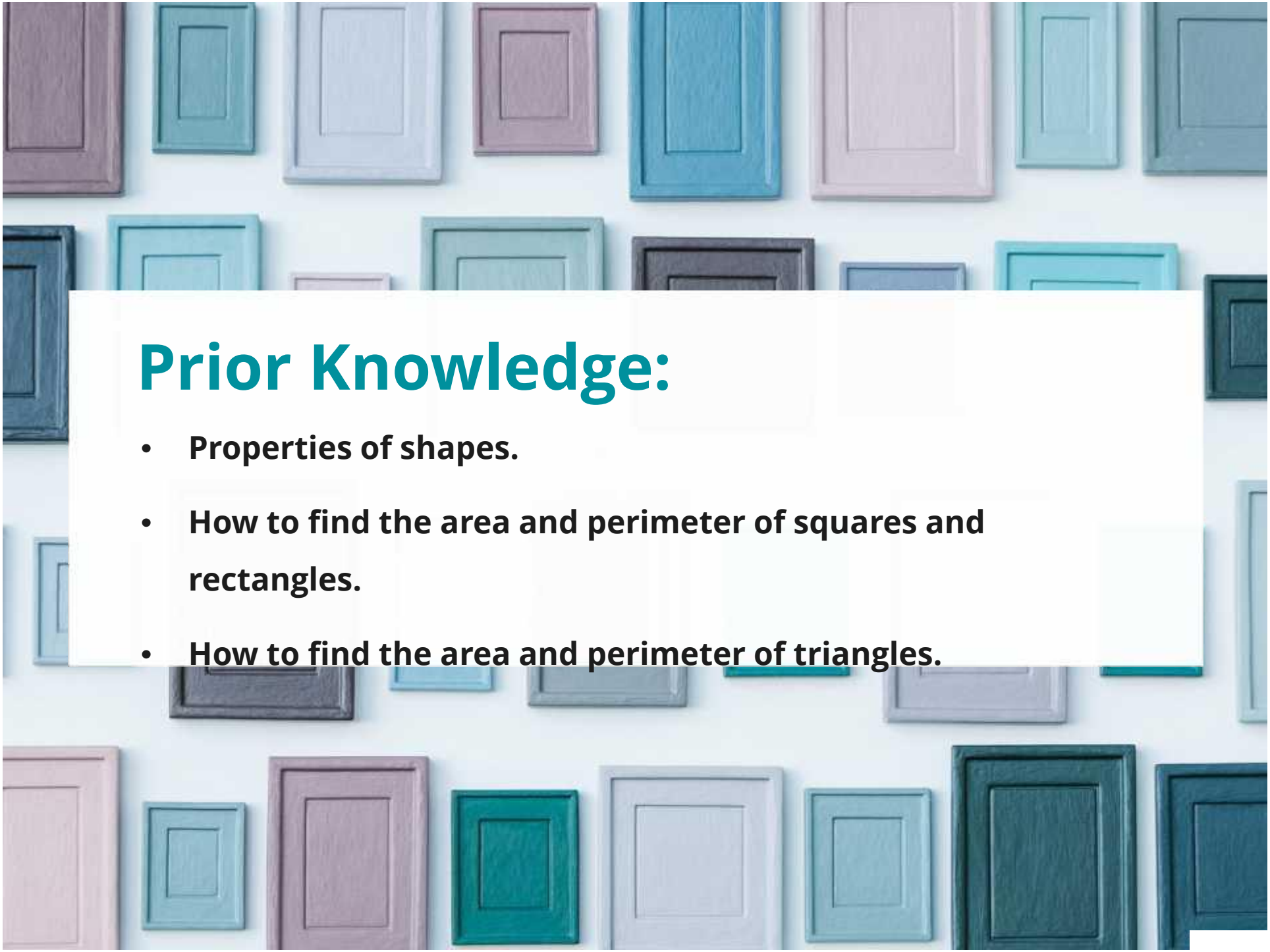
This content pack is aimed at students entering Year 7 who have missed out on Year 6 Key Stage 2 maths content, described in the KS2 specification as being able to *'recognise that shapes with the same areas can have different perimeters and vice versa'.*

These resources require prior knowledge of properties of shapes and how to find the area and perimeter of squares, rectangles and triangles.

This resource pack contains the following:

- Worked examples going through the background to the topic.
- A worksheet (with or without answer spaces) with a variety of problem-solving questions of increasing difficulty.
- Answers to the worksheet questions
- A slideshow containing all of the above. Note that this is not designed as an entire lesson – more or less content may be required depending on the length of your lessons and the needs of your students.

Same Area, Different Perimeter



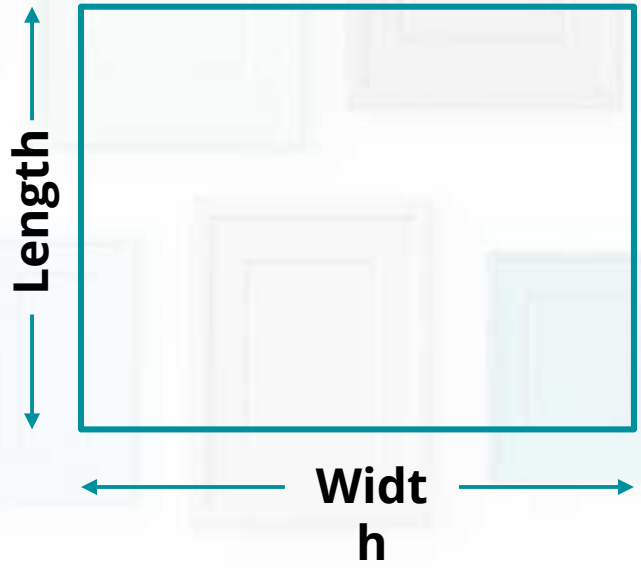
Prior Knowledge:

- **Properties of shapes.**
- **How to find the area and perimeter of squares and rectangles.**
- **How to find the area and perimeter of triangles.**

Example 1:

You have a square with an area of 25cm^2. What is its perimeter?

The area of a shape is the amount of 2D space it occupies. To find the area of a square or rectangle, you multiply the length by the width:



Area = Length × Width

Example 1:

You have a square with an area of 25cm^2. What is its perimeter?

A square is a regular shape. This means the lengths of all of its sides are equal, so the length is the same as the width.

If we know the area is 25cm^2, we need to think of a number which gives 25 when multiplied by itself:

$5 \times 5 = 25$

This means the length and width of the square are both 5cm.

The perimeter is the distance around the outside of a shape. To find the perimeter of any shape, we add up the lengths of all the sides.

Our square has 4 sides and each side is 5cm. Therefore, our perimeter is:

$5 + 5 + 5 + 5 = 20$cm

Example 2:

A rectangle has an area of 30cm^2. What could its perimeter be?

Again, to find the area of a rectangle we multiply the length (L) by the width (W):

$A = L \times W$

However, a rectangle is not a regular shape. This means its width is not the same as its length, so we don't have enough information to work out the length of its sides – there are a lot of pairs of numbers that multiply to give 30:

$1 \times 30 = 30$

$2 \times 15 = 30$

$3 \times 10 = 30$

$5 \times 6 = 30$

$0.5 \times 60 = 30$

Example 2:

A rectangle has an area of 30cm^2. What could its perimeter be?

In this case, the question is asking us the perimeter of the rectangle, so maybe all these different dimensions will give us the same perimeter? To find the perimeter, we need to add up all 4 sides – 2 widths and 2 lengths:

1 + 1 + 30 + 30 = 62cm

2 + 2 + 15 + 15 = 34cm

3 + 3 + 10 + 10 = 26cm

5 + 5 + 6 + 6 = 22cm

0.5 + 0.5 + 60 + 60 = 121cm

As you can see, each of these rectangles has the same area but each has a different perimeter. This means the question does not have a unique solution – there are many possible answers.

If shapes are irregular (the lengths of all the sides are not equal) then they can have the same area but different perimeters.

Example 3:

A rectangle has perimeter of 10cm. What could its area be?

As you may suspect, this question also does not have a unique answer.
A rectangle has two pairs of equal sides, so let's think of a couple of examples of rectangles which each have a perimeter of 10cm:
1 + 1 + 4 + 4 = 10
2 + 2 + 3 + 3 = 10

Now, let's calculate the area of each of these rectangles:
$1 \times 4 = 4cm^2$
$2 \times 3 = 6cm^2$

As you can see, if shapes are irregular then they can have the same perimeter but different areas.

Your Turn

Your Turn

1. The area of a square is $16cm^2$.
   What is its perimeter?

2. The perimeter of a square is 24cm.
   What is its area?

3. The area of a rectangle is $28cm^2$.
   If the length of one side is 7cm,
   what is its perimeter?

4. The perimeter of a rectangle is $50m^2$.
   The length of one side is 5m.
   What is its area?

5. The area of a rectangle is $40cm^2$.
   List four different perimeters the rectangle could have.

6. On a centimetre grid, draw three rectangles. Each rectangle should have a perimeter of 20 squares. Calculate the area of each rectangle.

7. A rectangle has a perimeter of 24cm. List four different areas it could have.

8. A rectangle has a perimeter of 38cm. If the length and width are both integer values, what is the largest area it can have?

Your Turn

9. On a centimetre grid, draw three right-angled triangles, each with an area of $12cm^2$.

    a. Use a ruler to measure the perimeter of each.

    b. Use what you learnt in part a to draw a right-angled triangle with an area of 10 squares and the largest possible perimeter. The length of each side should be a whole number of squares.

10. A right-angled triangle has a perimeter of 12cm. The length of the diagonal side (the hypotenuse) is 5cm.

    a. You know the perimeter and the length of the diagonal side. Is this enough information to be sure of the area of the triangle?

    b. If the width of the triangle is 3cm, what is its area?

Your Turn

11. Two rectangles have the same perimeter and the lengths of their sides are whole numbers of centimetres.

One has an area of 16cm^2, the other has an area of 12cm^2.

Sarah has made two tables to try to work out the perimeter of each rectangle.

Copy and complete the tables, then use them to find the perimeter of each rectangle.

Height	Width	Area	Perimeter
16cm	1cm	16cm^2	34cm
8cm	2cm		
	4cm		
	8cm		
1cm			

Height	Width	Area	Perimeter
1cm		12cm^2	26cm
	6cm	12cm^2	
3cm			
6cm			

Your Turn

12. A rectangle has an area of $100cm^2$.
    If the length of each side is a whole number of centimetres, what is the largest perimeter the rectangle could have?

    Challenge: How would your answer change if the length of each side could be a decimal number of centimetres?

13. Two rectangles have the same area.
    The perimeter of one rectangle is 22cm.
    The perimeter of the other rectangle is 18cm.
    If the length of every side is a whole number of centimetres, what is the area of each rectangle?

14. A regular hexagon has an area of $30cm^2$.
    John says that there isn't enough information to work out its perimeter.
    Is John correct? Explain your answer.
    (Hint – you don't have to calculate the perimeter of the hexagon).

Extension:
An equilateral triangle has a perimeter of 18cm. What is its area?

Answers

Answers

1. The area of a square is 16cm^2.
   What is its perimeter?
   4 × 4 = 16
   Therefore, the perimeter is:
   4 + 4 + 4 + 4 = 16cm

2. The perimeter of a square is 24cm.
   What is its area?
   24 ÷ 4 = 6cm
   6 × 6 = 36cm^2

3. The area of a rectangle is 28cm^2.
   If the length of one side is 7cm, what is its perimeter?
   28 ÷ 7 = 4cm
   4 + 4 + 7 + 7 = 22cm

4. The perimeter of a rectangle is 50m^2.
   The length of one side is 5m.
   What is its area?
   50 – 5 – 5 = 40m
   40 ÷ 2 = 20m
   20 × 5 = 100m^2

5. The area of a rectangle is 40cm^2. List four different perimeters the rectangle could have.
   Four correct perimeters, for example:
   1 × 40 = 40; 1 + 1 + 40 + 40 = 82cm
   2 × 20 = 40; 2 + 2 + 20 + 20 = 44cm
   4 × 10 = 40; 4 + 4 + 10 + 10 = 28cm
   5 × 8 = 40; 5 + 5 + 8 + 8 = 26cm

Answers

6. On a centimetre grid, draw three rectangles. Each rectangle should have a perimeter of 20 squares. Calculate the area of each rectangle.

Any three correct rectangles, for example:

$1 + 1 + 9 + 9 = 20$; $1 \times 9 = 9\text{cm}^2$

$2 + 2 + 8 + 8 = 20$; $2 \times 8 = 16\text{cm}^2$

$3 + 3 + 7 + 7 = 20$; $3 \times 7 = 21\text{cm}^2$

$4 + 4 + 6 + 6 = 20$; $4 \times 6 = 24\text{cm}^2$

$5 + 5 + 5 + 5 = 20$; $5 \times 5 = 25\text{cm}^2$

7. A rectangle has a perimeter of 24cm. List four different areas it could have.

Four correct areas, for example:

$11 \times 1 = 11\text{cm}^2$

$10 \times 2 = 20\text{cm}^2$

$9 \times 3 = 27\text{cm}^2$

$8 \times 4 = 32\text{cm}^2$

$7 \times 5 = 35\text{cm}^2$

$6 \times 6 = 36\text{cm}^2$

Answers

8. A rectangle has a perimeter of 38cm. If the length and width are both integer values, what is the largest area it can have?

   $10 \times 9 = 90cm^2$

9. On a centimetre grid, draw three right-angled triangles, each with an area of $12cm^2$.

   a. Use a ruler to measure the perimeter of each.

      Three triangles with correctly measured perimeter, for example:

      4 × 6: perimeter around 17.2cm

      3 × 8: perimeter around 19.5cm

      2 × 12: perimeter around 26.2cm

   b. Use what you learnt in part a to draw a right-angled triangle with an area of 10 squares and the largest possible perimeter. The length of each side should be a whole number of squares.

      Triangle with one dimension 1cm and the other dimension 10cm.

Answers

10. A right-angled triangle has a perimeter of 12cm. The length of the diagonal side (the hypotenuse) is 5cm.

a. You know the perimeter and the length of the diagonal side. Is this enough information to be sure of the area of the triangle?

No, because you don't use the diagonal to find the area. You need to know the width or the length.

b. If the width of the triangle is 3cm, what is its area?

12 – 5 – 3 = 4cm

4 × 3 ÷ 2 = 6cm^2

Answers

11. Two rectangles have the same perimeter and the lengths of their sides are whole numbers of centimetres.

One has an area of $16cm^2$, the other has an area of $12cm^2$.

Sarah has made two tables to try to work out the perimeter of each rectangle.

Copy and complete the tables, then use them to find the perimeter of each rectangle.

Height	Width	Area	Perimeter
16cm	1cm	$16cm^2$	34cm
8cm	2cm	$16cm^2$	20cm
4cm	4cm	$16cm^2$	16cm
2cm	8cm	$16cm^2$	20cm
1cm	16cm	$16cm^2$	34cm

Height	Width	Area	Perimeter
1cm	12cm	$12cm^2$	26cm
2cm	6cm	$12cm^2$	16cm
3cm	4cm	$12cm^2$	14cm
6cm	2cm	$12cm^2$	16cm
12cm	1cm	$12cm^2$	26cm

The only perimeter in common is 16cm.

Answers

12. A rectangle has an area of 100cm^2.
If the length of each side is a whole number of centimetres, what is the largest perimeter the rectangle could have?
100 + 1 + 100 + 1 = 202cm

Challenge

How would your answer change if the length of each side could be a decimal number of centimetres?

As the length of one pair of sides gets bigger, the length of the other pair of sides gets smaller:
1000 × 0.1 = 100
1000 + 1000 + 0.1 + 0.1 = 2000.2cm

10 000 × 0.01 = 100
10 000 + 10 000 + 0.01 + 0.01 = 20 000.02cm

Eventually, one pair of sides would be infinitely big – as would the perimeter.

Answers

13. Two rectangles have the same area.
The perimeter of one rectangle is 22cm.
The perimeter of the other rectangle is 18cm.
If the length of every side is a whole number of centimetres, what is the area of each rectangle?

Rectangles of perimeter 22cm	
Perimeter	Area
10 + 10 + 1 + 1	$10cm^2$
9 + 9 + 2 + 2	$18cm^2$
8 + 8 + 3 + 3	$24cm^2$
7 + 7 + 4 + 4	$28cm^2$

Rectangles of perimeter 18cm	
Perimeter	Area
8 + 8 + 1 + 1	$8cm^2$
7 + 7 + 2 + 2	$14cm^2$
6 + 6 + 3 + 3	$18cm^2$
5 + 5 + 4 + 4	$20cm^2$

The only area in common is $18cm^2$.

14. A regular hexagon has an area of $30cm^2$.
John says that there isn't enough information to work out its perimeter.
Is John correct? Explain your answer.
(Hint – you don't have to calculate the perimeter of the hexagon).
You do have enough information, because the hexagon is regular. This means all the sides are the same length, so you only need to find one piece of information.

Answers

Extension:

An equilateral triangle has a perimeter of 18cm. What is its area?

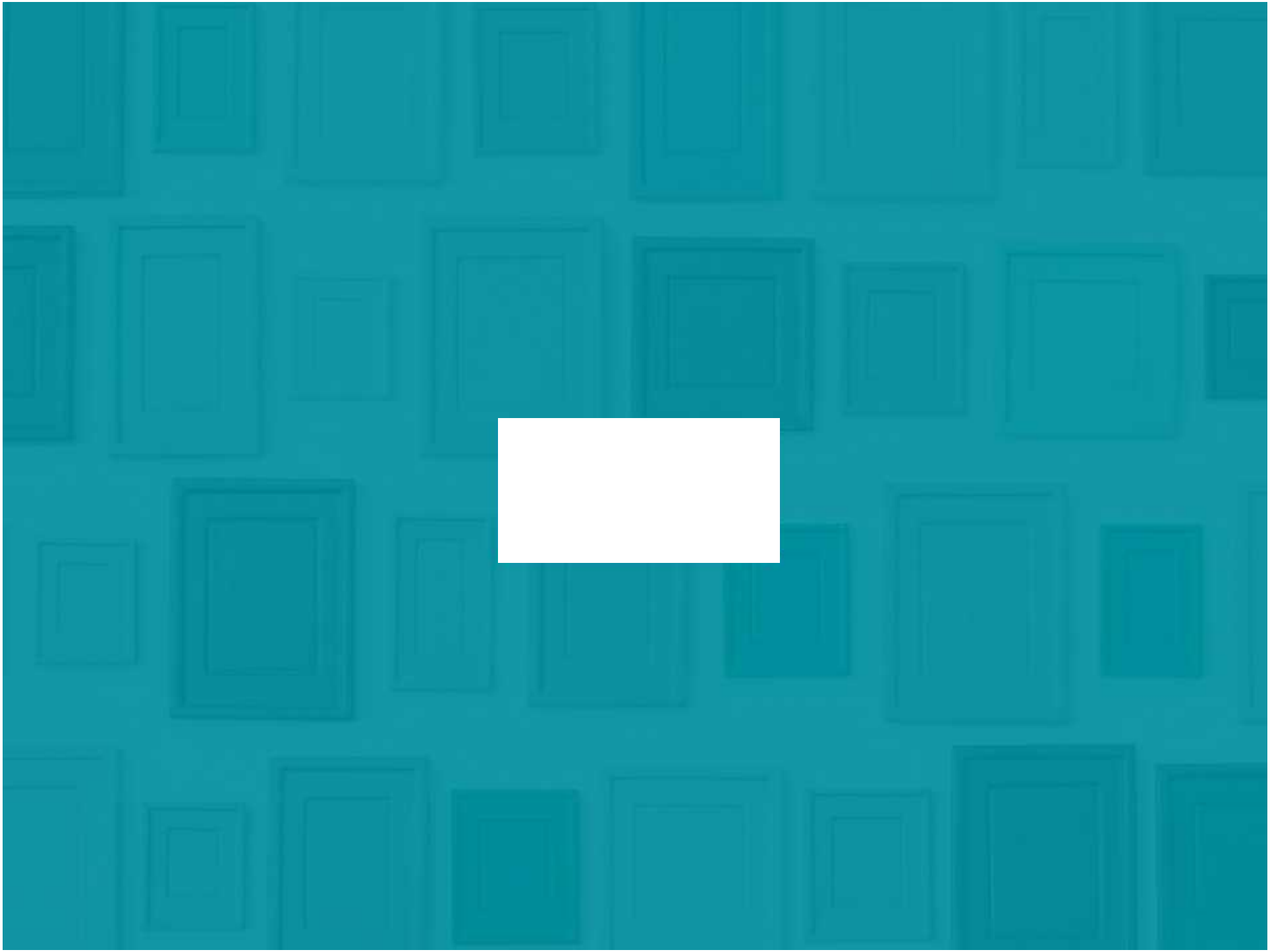
An equilateral triangle has three sides of equal length. Therefore, each side is 6cm long.

To find the area of a triangle, you need the height. There are two ways you can calculate it:

1) **Use Pythagoras' theorem, which gives you a height of 5.2cm (1d.p.)**

2) **Use a pencil and either a protractor or a pair of compasses to very carefully draw the triangle, then measure the height. This will give approximately the same height.**

$5.2 \times 6 \div 2 = 15.6cm^2$



Same Area, Different Perimeter

Prior Knowledge:

- Properties of shapes.
- How to find the area and perimeter of squares and rectangles.
- How to find the area and perimeter of triangles.

Example 1:

You have a square with an area of 25cm^2. What is its perimeter?

The area of a shape is the amount of 2D space it occupies. To find the area of a square or rectangle, you multiply the length by the width:

Area = Length × Width

A square is a regular shape. This means the lengths of all of its sides are equal, so the length is the same as the width.

If we know the area is 25cm^2, we need to think of a number which gives 25 when multiplied by itself:

5 × 5 = 25

This means the length and width of the square are both 5cm.

The perimeter is the distance around the outside of a shape. To find the perimeter of any shape, we add up the lengths of all the sides.

Our square has 4 sides and each side is 5cm. Therefore, our perimeter is:

5 + 5 + 5 + 5 = **20cm**

Example 2:

A rectangle has an area of 30cm^2. What could its perimeter be?

Again, to find the area of a rectangle we multiply the length (L) by the width (W):

$A = L \times W$

However, a rectangle is not a regular shape. This means its width is not the same as its length, so we don't have enough information to work out the length of its sides – there are a lot of pairs of numbers that multiply to give 30:

$1 \times 30 = 30$

$2 \times 15 = 30$

$3 \times 10 = 30$

$5 \times 6 = 30$

$0.5 \times 60 = 30$

In this case, the question is asking us the perimeter of the rectangle, so maybe all these different dimensions will give us the same perimeter? To find the perimeter, we need to add up all 4 sides – 2 widths and 2 lengths:

$1 + 1 + 30 + 30 = 62$cm

$2 + 2 + 15 + 15 = 34$cm

$3 + 3 + 10 + 10 = 26$cm

$5 + 5 + 6 + 6 = 22$cm

$0.5 + 0.5 + 60 + 60 = 121$cm

As you can see, each of these rectangles has the same area but each has a different perimeter. This means the question does not have a unique solution – there are many possible answers.

If shapes are **irregular** (the lengths of all the sides are not equal) then they can have the same area but different perimeters.

Example 3:

A rectangle has perimeter of 10cm. What could its area be?

As you may suspect, this question also does not have a unique answer. A rectangle has two pairs of equal sides, so let's think of a couple of examples of rectangles which each have a perimeter of :

$1 + 1 + 4 + 4 = 10$

$2 + 2 + 3 + 3 = 10$

Now, let's calculate the area of each of these rectangles:

$1 \times 4 = 4$cm^2

$2 \times 3 = 6$cm^2

As you can see, if shapes are **irregular** then they can have the same perimeter but different areas.

Same Area, Different Perimeter **Worksheet**

1. The area of a square is 16cm^2.

   What is its perimeter?

2. The perimeter of a square is 24cm.

   What is its area?

3. The area of a rectangle is 28cm^2.

   If the length of one side is 7cm, what is its perimeter?

4. The perimeter of a rectangle is 50m^2.

   The length of one side is 5m.

   What is its area?

5. The area of a rectangle is 40cm^2. List four different perimeters the rectangle could have.

6. On a centimetre grid, draw three rectangles. Each rectangle should have a perimeter of 20 squares.

   Calculate the area of each rectangle.

7. A rectangle has a perimeter of 24cm. List four different areas it could have.

   What is its area?

8. A rectangle has a perimeter of 38cm. If the length and width are both integer values, what is the largest area it can have?

9. On a centimetre grid, draw three right-angled triangles, each with an area of 12cm^2.

   a. Use a ruler to measure the perimeter of each.

   b. Use what you learnt in part **a** to draw a right-angled triangle with an area of 10 squares and the largest possible perimeter.

10. A right-angled triangle has a perimeter of 12cm.

    The length of the diagonal side (the hypotenuse) is 5cm.

    a. You know the perimeter and the length of the diagonal side. Is this enough information to be sure of the area of the triangle?

    b. If the width of the triangle is 3cm, what is its area?

11. Two rectangles have the same perimeter and the lengths of their sides are whole numbers of centimetres.

    One has an area of 16cm^2, the other has an area of 12cm^2.

    Sarah has made two tables to try to work out the perimeter of each rectangle.

    Copy and complete the tables, then use them to find the perimeter of each rectangle.

Height	Width	Area	Perimeter
16cm	1cm	16cm^2	34cm
8cm	2cm		
	4cm		
	8cm		
1cm			

Height	Width	Area	Perimeter
1cm		12cm^2	26cm
	6cm	12cm^2	
3cm	4cm		
6cm	2cm		

12. A rectangle has an area of 100cm^2.

    If the length of each side is a whole number of centimetres, what is the largest perimeter the rectangle could have?

    Challenge: How would your answer change if the length of each side could be a decimal number of centimetres?

13. Two rectangles have the same area.

    The perimeter of one rectangle is 22cm.

    The perimeter of the other rectangle is 18cm.

    If the length of every side is a whole number of centimetres, what is the area of each rectangle?

14. A regular hexagon has an area of 30cm^2.

    John says that there isn't enough information to work out its perimeter.

    Is John correct? Explain your answer.

    (Hint – you don't have to calculate the perimeter of the hexagon).

Extension:

An equilateral triangle has a perimeter of 18cm. What is its area?

Same Area, Different Perimeter **Worksheet**

1. The area of a square is $16cm^2$.

   What is its perimeter?

2. The perimeter of a square is 24cm.

   What is its area?

3. The area of a rectangle is $28cm^2$.

   If the length of one side is 7cm, what is its perimeter?

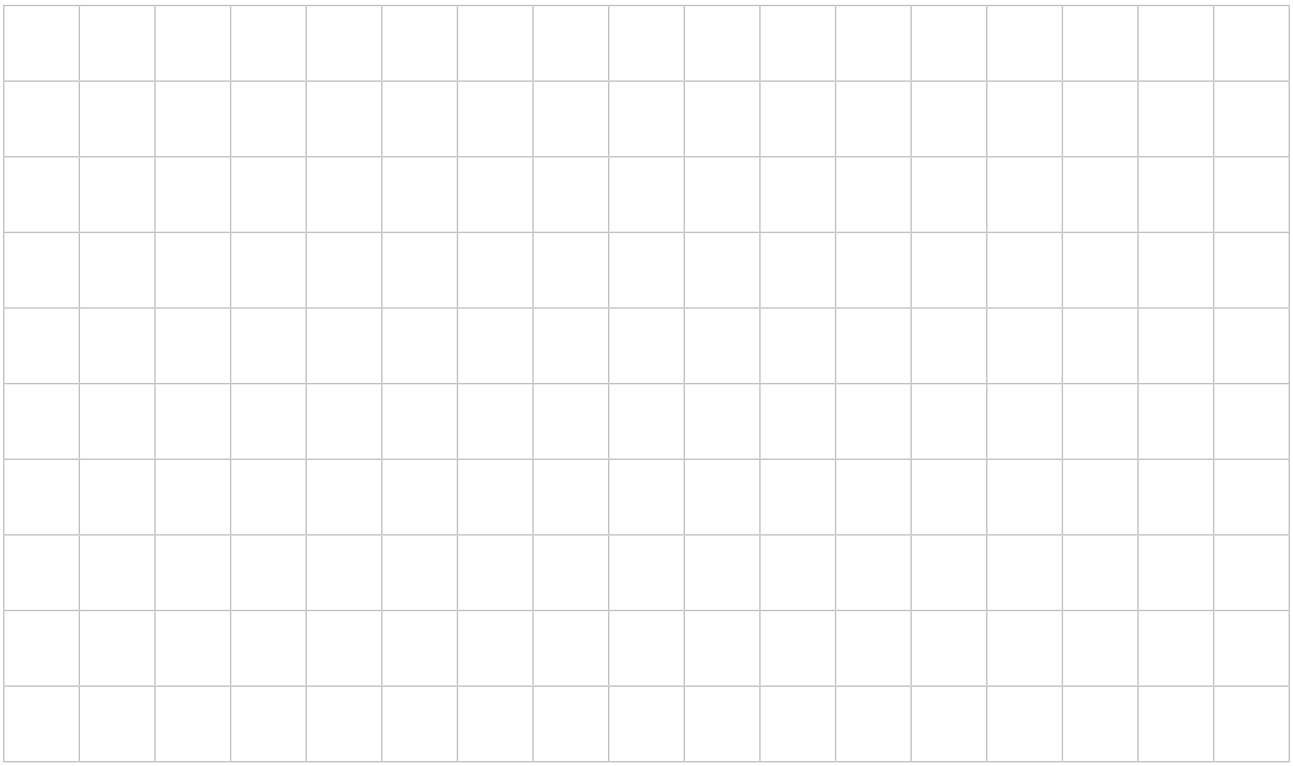
4. The perimeter of a rectangle is $50m^2$.

   The length of one side is 5m.

   What is its area?

5. The area of a rectangle is $40cm^2$. List four different perimeters the rectangle could have.

6. On the grid below, draw three rectangles. Each rectangle should have a perimeter of 20 squares. Calculate the area of each rectangle.

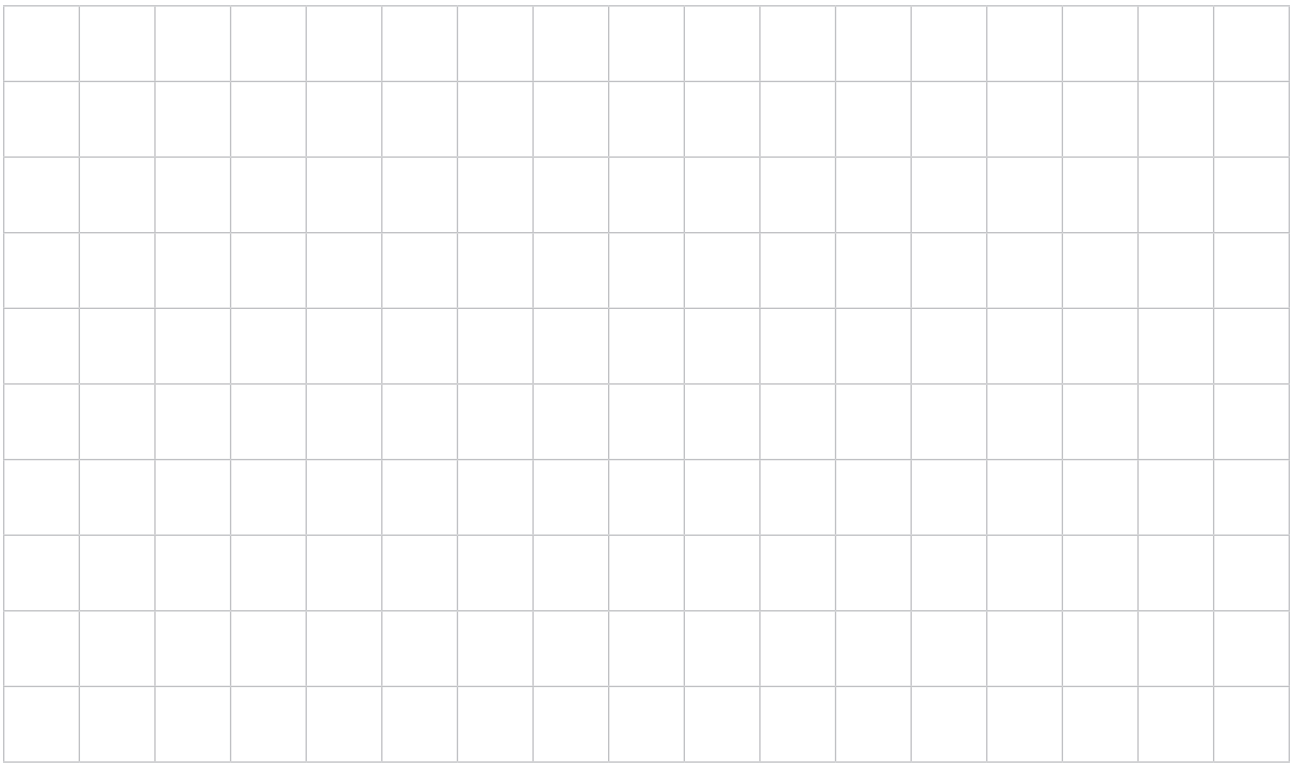


7. A rectangle has a perimeter of 24cm. List four different areas it could have.

   What is its area?

8. A rectangle has a perimeter of 38cm. If the length and width are both integer values, what is the largest area it can have?

9. On the grid below, draw three right-angled triangles with an area of $12cm^2$.



a. Use a ruler to measure the perimeter of each.

b. Use what you learnt in part **a** to draw a right-angled triangle with an area of 10 squares and the largest possible perimeter.

10. A right-angled triangle has a perimeter of 12cm.

The length of the diagonal side (the hypotenuse) is 5cm.

a. You know the perimeter and the length of the diagonal side. Is this enough information to be sure of the area of the triangle?

b. If the width of the triangle is 3cm, what is its area?

11. Two rectangles have the same perimeter and the lengths of their sides are whole numbers of centimetres.

    One has an area of $16cm^2$, the other has an area of $12cm^2$.

    Sarah has made two tables to try to work out the perimeter of each rectangle.

    Complete the tables, then use them to find the perimeter of each rectangle.

Height	Width	Area	Perimeter
16cm	1cm	$16cm^2$	34cm
8cm	2cm		
	4cm		
	8cm		
1cm			

Height	Width	Area	Perimeter
1cm		$12cm^2$	26cm
	6cm	$12cm^2$	
3cm	4cm		
6cm	2cm		

12. A rectangle has an area of $100cm^2$.

    If the length of each side is a whole number of centimetres, what is the largest perimeter the rectangle could have?

    Challenge: How would your answer change if the length of each side could be a decimal number of centimetres?

13. Two rectangles have the same area.

    The perimeter of one rectangle is 22cm.

    The perimeter of the other rectangle is 18cm.

    If the length of every side is a whole number of centimetres, what is the area of each rectangle?

14. A regular hexagon has an area of $30cm^2$.

    John says that there isn't enough information to work out its perimeter.

    Is John correct? Explain your answer.

    (Hint – you don't have to calculate the perimeter of the hexagon).

Extension:

An equilateral triangle has a perimeter of 18cm. What is its area?

Same Area, Different Perimeter **Answers**

1. The area of a square is 16cm^2.

   What is its perimeter?

   4 × 4 = 16

   Therefore, the perimeter is:

   4 + 4 + 4 + 4 = 16cm

2. The perimeter of a square is 24cm.

   What is its area?

   24 ÷ 4 = 6cm

   6 × 6 = 36cm^2

3. The area of a rectangle is 28cm^2.

   If the length of one side is 7cm, what is its perimeter?

   28 ÷ 7 = 4cm

   4 + 4 + 7 + 7 = 22cm

4. The perimeter of a rectangle is 50m^2.

   The length of one side is 5m.

   What is its area?

   50 – 5 – 5 = 40m

   40 ÷ 2 = 20m

   20 × 5 = 100m^2

5. The area of a rectangle is 40cm^2. List four different perimeters the rectangle could have.

   Four correct perimeters, for example:

   1 × 40 = 40; 1 + 1 + 40 + 40 = 82cm

   2 × 20 = 40; 2 + 2 + 20 + 20 = 44cm

   4 × 10 = 40; 4 + 4 + 10 + 10 = 28cm

   5 × 8 = 40; 5 + 5 + 8 + 8 = 26cm

6. On a centimetre grid, draw three rectangles. Each rectangle should have a perimeter of 20 squares.

   Calculate the area of each rectangle.

   Any three correct rectangles, for example:

   $1 + 1 + 9 + 9 = 20$; $1 \times 9 = 9cm^2$

   $2 + 2 + 8 + 8 = 20$; $2 \times 8 = 16cm^2$

   $3 + 3 + 7 + 7 = 20$; $3 \times 7 = 21cm^2$

   $4 + 4 + 6 + 6 = 20$; $4 \times 6 = 24cm^2$

   $5 + 5 + 5 + 5 = 20$; $5 \times 5 = 25cm^2$

7. A rectangle has a perimeter of 24cm. List four different areas it could have.

   Four correct areas, for example:

   $11 \times 1 = 11cm^2$

   $10 \times 2 = 20cm^2$

   $9 \times 3 = 27cm^2$

   $8 \times 4 = 32cm^2$

   $7 \times 5 = 35cm^2$

   $6 \times 6 = 36cm^2$

8. A rectangle has a perimeter of 38cm. If the length and width are both integer values, what is the largest area it can have?

   $10 \times 9 = 90cm^2$

9. On a centimetre grid, draw three right-angled triangles, each with an area of $12cm^2$.

   a. Use a ruler to measure the perimeter of each.

      Three triangles with correctly measured perimeter, for example:

      4 × 6: perimeter around 17.2cm

      3 × 8: perimeter around 19.5cm

      2 × 12: perimeter around 26.2cm

   b. Use what you learnt in part **a** to draw a right-angled triangle with an area of 10 squares and the largest possible perimeter.

      The length of each side should be a whole number of squares.

      Triangle with one dimension 1cm and the other dimension 10cm.

10. A right-angled triangle has a perimeter of 12cm.

    The length of the diagonal side (the hypotenuse) is 5cm.

    a. You know the perimeter and the length of the diagonal side. Is this enough information to be sure of the area of the triangle?

       No, because you don't use the diagonal to find the area. You need to know the width or the length.

    b. If the width of the triangle is 3cm, what is its area?

       12 – 5 – 3 = 4cm

       4 × 3 ÷ 2 = 6cm^2

11. Two rectangles have the same perimeter and the lengths of their sides are whole numbers of centimetres.

    One has an area of 16cm^2, the other has an area of 12cm^2.

    Sarah has made two tables to try to work out the perimeter of each rectangle.

    Complete the tables, then use them to find the perimeter of each rectangle.

Height	Width	Area	Perimeter
16cm	1cm	16cm^2	34cm
8cm	2cm	**16cm^2**	**20cm**
4cm	4cm	**16cm^2**	**16cm**
2cm	8cm	**16cm^2**	**20cm**
1cm	**16cm**	**16cm^2**	**34cm**

Height	Width	Area	Perimeter
1cm	**12cm**	12cm^2	26cm
2cm	6cm	12cm^2	**16cm**
3cm	4cm	**12cm^2**	**14cm**
6cm	2cm	**12cm^2**	**16cm**
12cm	**1cm**	**12cm^2**	**26cm**

    The only perimeter in common is 16cm.

12. A rectangle has an area of 100cm^2.

    If the length of each side is a whole number of centimetres, what is the largest perimeter the rectangle could have?

    100 + 1 + 100 + 1 = 202cm

    Challenge: How would your answer change if the length of each side could be a decimal number of centimetres?

    As the length of one pair of sides gets bigger, the length of the other pair of sides gets smaller:

    1000 × 0.1 = 100

    1000 + 1000 + 0.1 + 0.1 = 2000.2cm

    10 000 × 0.01 = 100

    10 000 + 10 000 + 0.01 + 0.01 = 20 000.02cm

    Eventually, one pair of sides would be infinitely big – as would the perimeter.

13. Two rectangles have the same area.

    The perimeter of one rectangle is 22cm.

    The perimeter of the other rectangle is 18cm.

    If the length of every side is a whole number of centimetres, what is the area of each rectangle?

Rectangles of perimeter 22cm	
Perimeter	**Area**
10 + 10 + 1 + 1	**10cm^2**
9 + 9 + 2 + 2	**18cm^2**
8 + 8 + 3 + 3	**24cm^2**
7 + 7 + 4 + 4	**28cm^2**

Rectangles of perimeter 18cm	
Perimeter	**Area**
8 + 8 + 1 + 1	**8cm^2**
7 + 7 + 2 + 2	**14cm^2**
6 + 6 + 3 + 3	**18cm^2**
5 + 5 + 4 + 4	**20cm^2**

The only area in common is 18cm^2.

14. A regular hexagon has an area of 30cm^2.

    John says that there isn't enough information to work out its perimeter.

    Is John correct? Explain your answer.

    (Hint – you don't have to calculate the perimeter of the hexagon).

    You do have enough information, because the hexagon is regular. This means all the sides are the same length, so you only need to find one piece of information.

Extension:

An equilateral triangle has a perimeter of 18cm. What is its area?

An equilateral triangle has three sides of equal length. Therefore, each side is 6cm long.

To find the area of a triangle, you need the height. There are two ways you can calculate it:

1) **Use Pythagoras' theorem, which gives you a height of 5.2cm (1d.p.)**
2) **Use a pencil and either a protractor or a pair of compasses to very carefully draw the triangle, then measure the height. This will give approximately the same height.**

5.2 × 6 ÷ 2 = 15.6cm^2