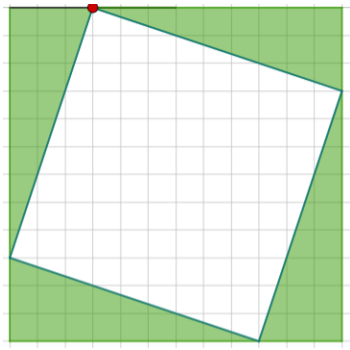
Grade 9 Math Key Concepts

Geometry: Quadrilaterals, Triangles and the Pythagorean Theorem

Name:

Date:



Lesson #	Lesson title	Pages	
1	Squares and Square numbers		
2			
3			
4			
5			
6			
7			
8			
9			
10			

Lesson 1: Squares, Square Numbers

A square belongs to a family of shapes known as …….. which means ‘many angles’.

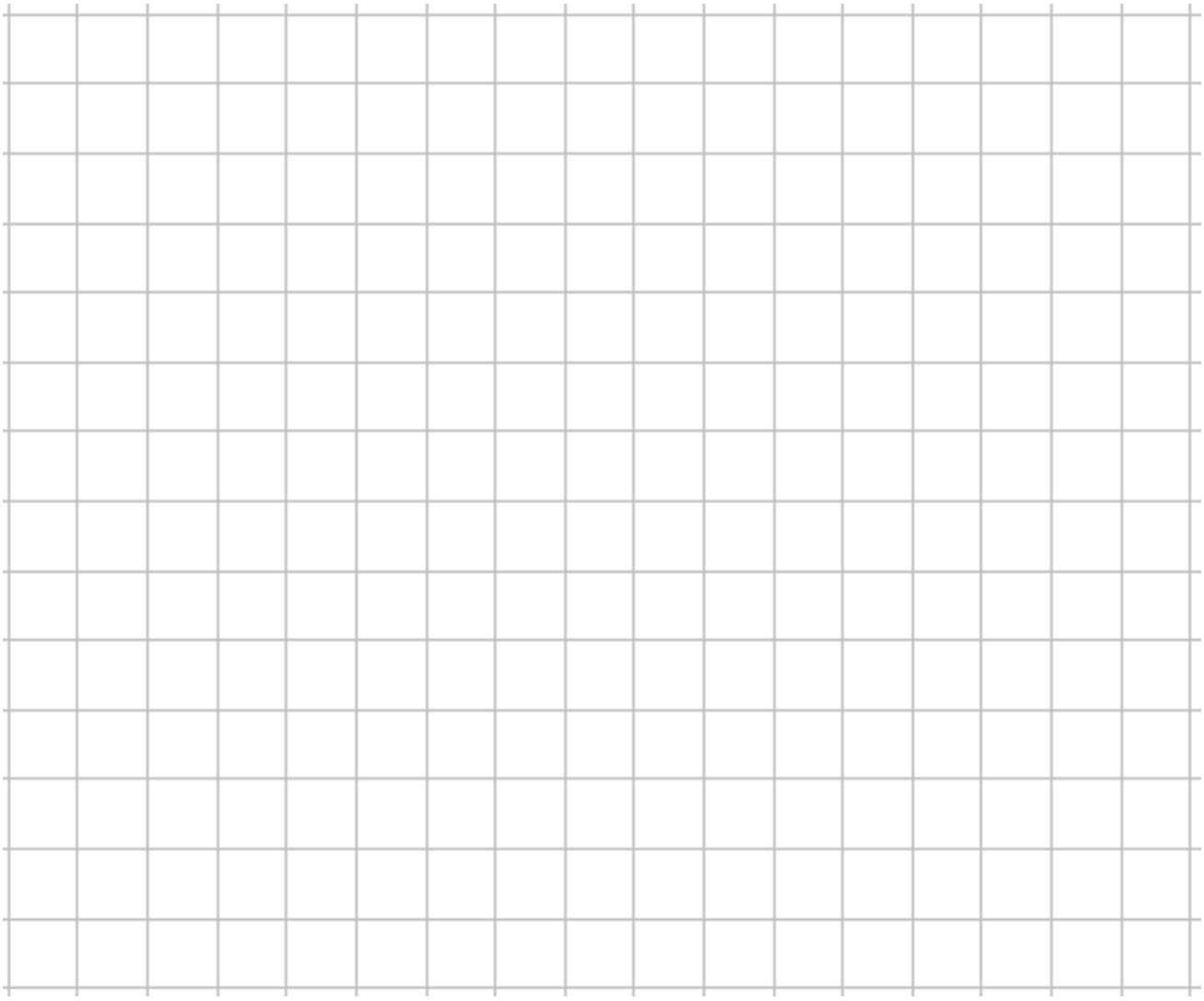
A square also belongs to a smaller family of shapes known as ……..……., which means ‘four sides’.

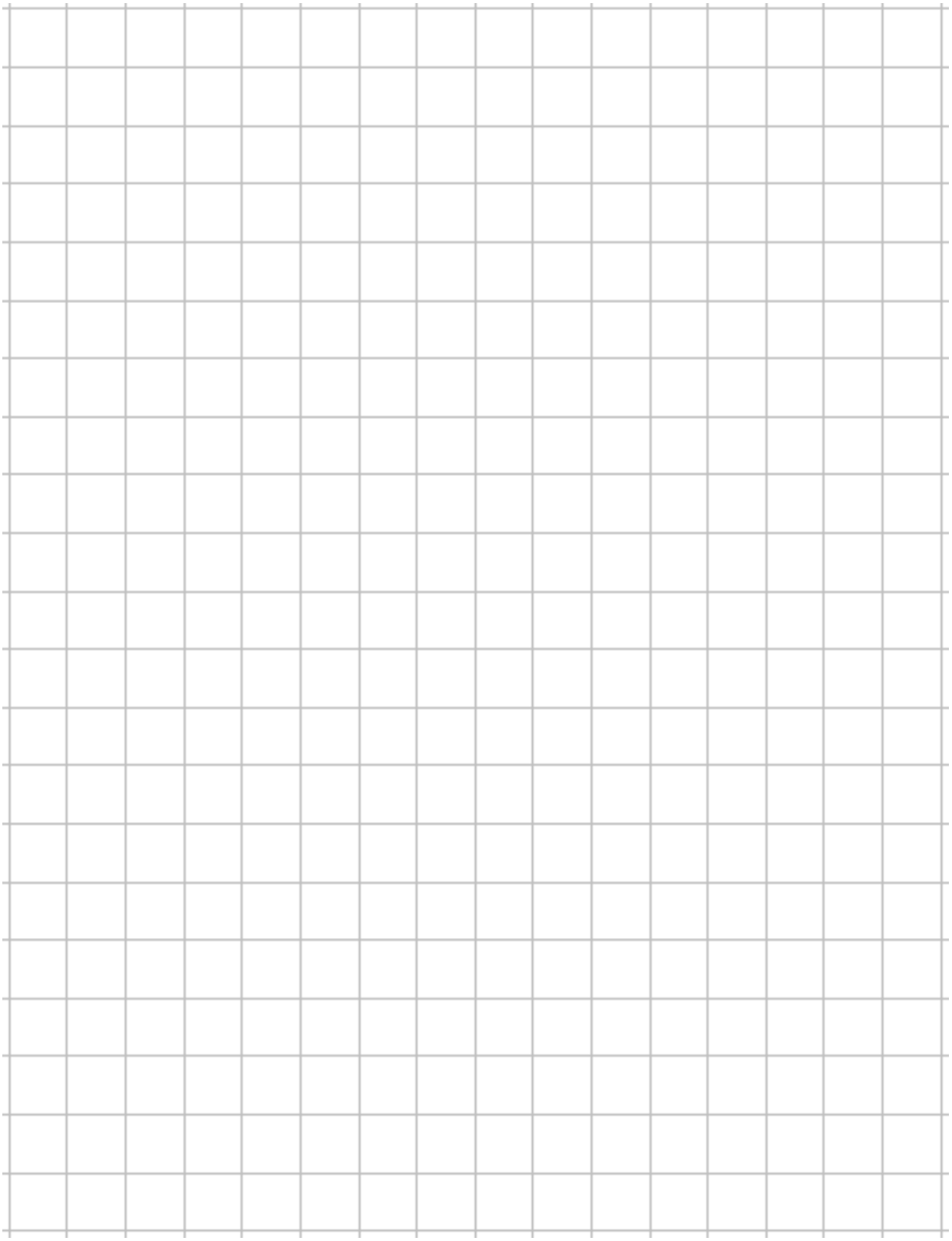
A quadrilateral is a square when

- All four sides are ……
- All four angles are …….

(a) On the grid below and on the next page, draw 10 squares. The first one should have side length 1, the second side length 2 and so on. Do not overlap squares.

(b) On each square, write the total number of squares it covers.





Square Numbers

A square number is the result when you multiply a whole number by itself. It is the same result as the area of a square that has that whole number side length. This is why they are called square numbers. Sometimes they are called 'perfect squares'.

$$6 \times 6 = 36$$

The number 36 is a perfect square.

We can also write $6^2 = 36$.

We read this by saying '6 squared equals 36'. You can also say '6 to the power of 2 is equal to 36.'

Here is a table of multiplication facts. The empty places are for the square numbers – 'a number times itself'. Complete the table.

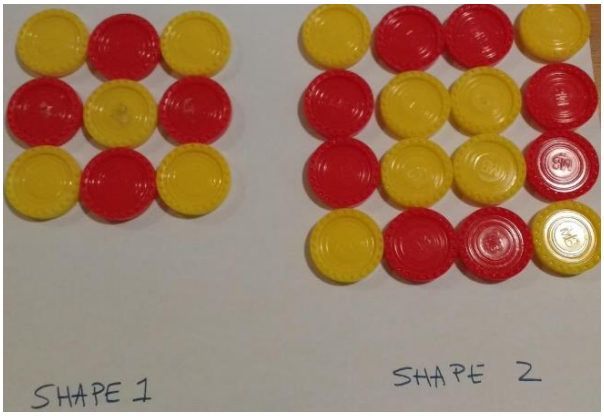
	1	***2***	***3***	***4***	***5***	***6***	***7***	***8***	***9***	***10***	***11***	***12***
1		2	3	4	5	6	7	8	9	10	11	12
2	2		6	8	10	12	14	16	18	20	22	24
3	3	6		12	15	18	21	24	27	30	33	36
4	4	8	12		20	24	28	32	36	40	44	48
5	5	10	15	20		30	35	40	45	50	55	60
6	6	12	18	24	30	36	42	48	54	60	66	72
7	7	14	21	28	35	42		56	63	70	77	84
8	8	16	24	32	40	48	56		72	80	88	96
9	9	18	27	36	45	54	63	72		90	99	108
10	10	20	30	40	50	60	70	80	90		110	120
11	11	22	33	44	55	66	77	88	99	110		132
12	12	24	36	48	60	72	84	96	108	120	132	

Use the table above if you need it or cover it if you don't to practice 'recall' on square numbers:

$2 \times 2 =$	$4 \times 4 =$	$3^2 =$	$5^2 =$	$6^2 =$
$3 \times 3 =$	$7 \times 7 =$	$0^2 =$	$9^2 =$	$7^2 =$
$12 \times 12 =$	$11 \times 11 =$	$4^2 =$	$1^2 =$	$8^2 =$

Two colour pattern

Use words to describe what you notice in this two colour shape pattern below:



Use two colours to copy the disc pattern on the grid. Draw shape #1, shape #2 and shape #3.

Put the number of discs in the table below:

Shape #	Yellow Discs	Red Discs	Total Discs
1			
2			
3			

Multiplication can be calculated on a grid. Here's an example:

Calculate 45^2

First, set up the grid:

	40	5
40		
5		

Second, complete the grid:

x	40	5
40	1600	200
5	200	25

Third, add together: $45^2 = 1600 + 200 + 200 + 25 = 2025$

Calculate 24^2. Check your answer on your calculator.

x	20	4
20		
4		

Set up a grid to calculate 35^2. Check your answer on your calculator.

Grade 9 KC Geometry I NAME:

Lesson 2: Using the exponent '2'

An exponent is a way to write down repeated multiplication.

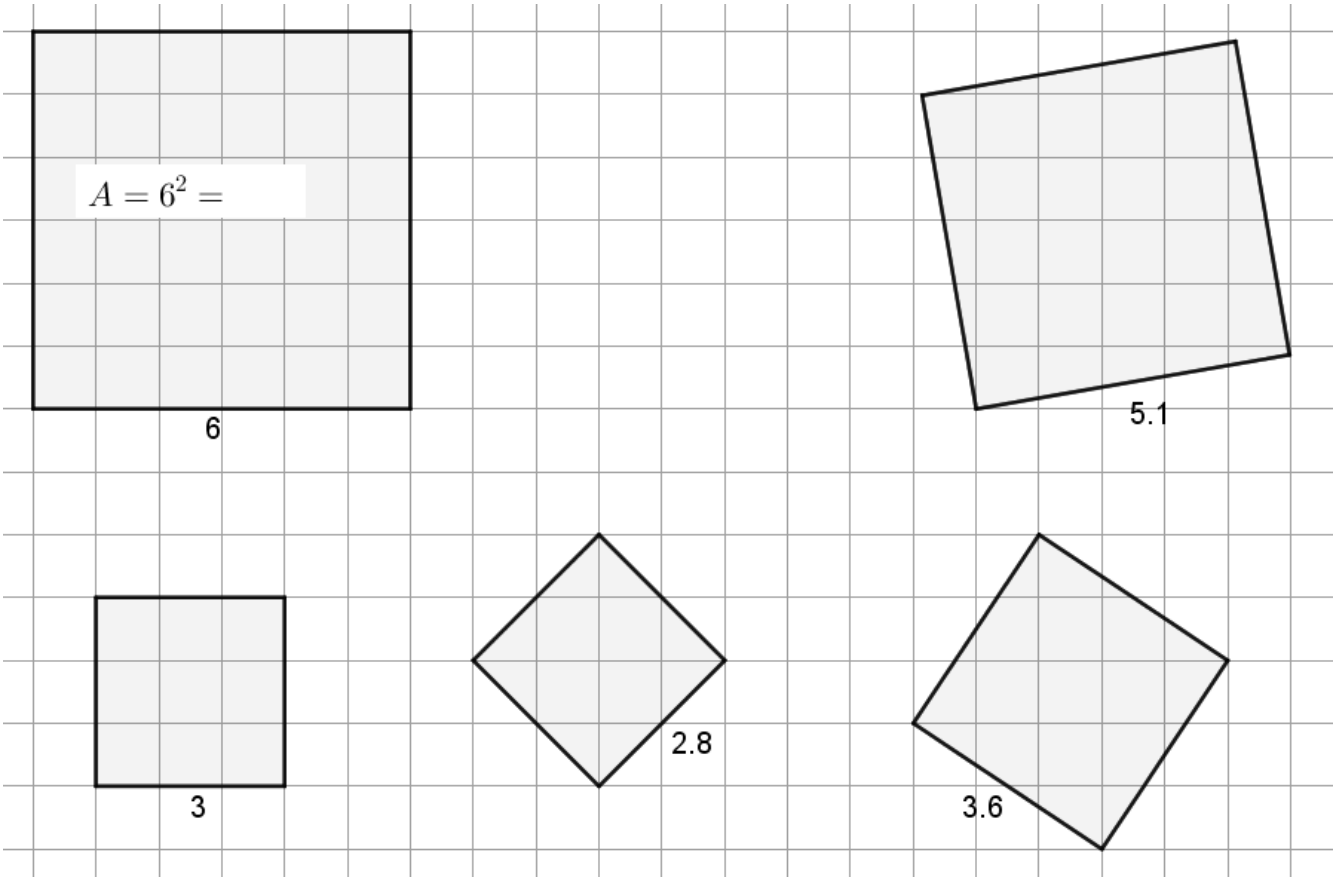
Eg, 3^7 means $3 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3$

We say '3 to the power of 7'.

The exponent '2' is used a lot. It is called 'squaring' because when you multiply a number by itself you get the area of a square.

Eg, 3^2 we can say '3 to the power of 2' or '3 *squared*'.

Use the exponent '2' to write the area for each square below. Use the x^2 button on your calculator to calculate. Count the squares to see if the answer is correct. Its awkward to count whole squares when the square is tilted.



Calculate/Recall/Memorize the first 12 perfect squares:

$1^2 =$	$5^2 =$	$11^2 =$	$12^2 =$	$3^2 =$	$1^2 =$
$10^2 =$	$6^2 =$	$2^2 =$	$8^2 =$	$7^2 =$	$4^2 =$

Workout:

Question 1: Write each of the following as multiplications
e.g. $5^2 = 5 \times 5$

(a) 3^2 (c) 6^2 (e) 10^2 (g) 12^2

Question 2: Write each of the following using the "squared" symbol
e.g. $8 \times 8 = 8^2$

(a) 2×2 (c) 11×11 (e) 20×20 (g) 7×7

Question 3: Work out each of the following

(a) 5^2 (c) 8^2 (e) 2^2 (g) 7^2

(h) 1^2 (j) 6^2 (l) 20^2 (n) 50^2

Question 4: Write down the first 10 square numbers

Question 5: Work out each of the following.
You may not use a calculator

(a) 14^2 (c) 21^2 (e) 35^2

Question 6: Work out each of the following.
You may use a calculator

(a) 73^2 (c) 208^2 (e) 6.5^2 (g) 7.8^2

(h) 0.7^2 (j) 0.45^2 (l) 800^2 (n) 1111^2

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Create a pattern of squares with the two colour discs on your desk.

Describe in words how to create ‘the next shape #’.

Use two colours to draw the disc pattern on the grid. Draw shape #1, shape #2 and shape #3.



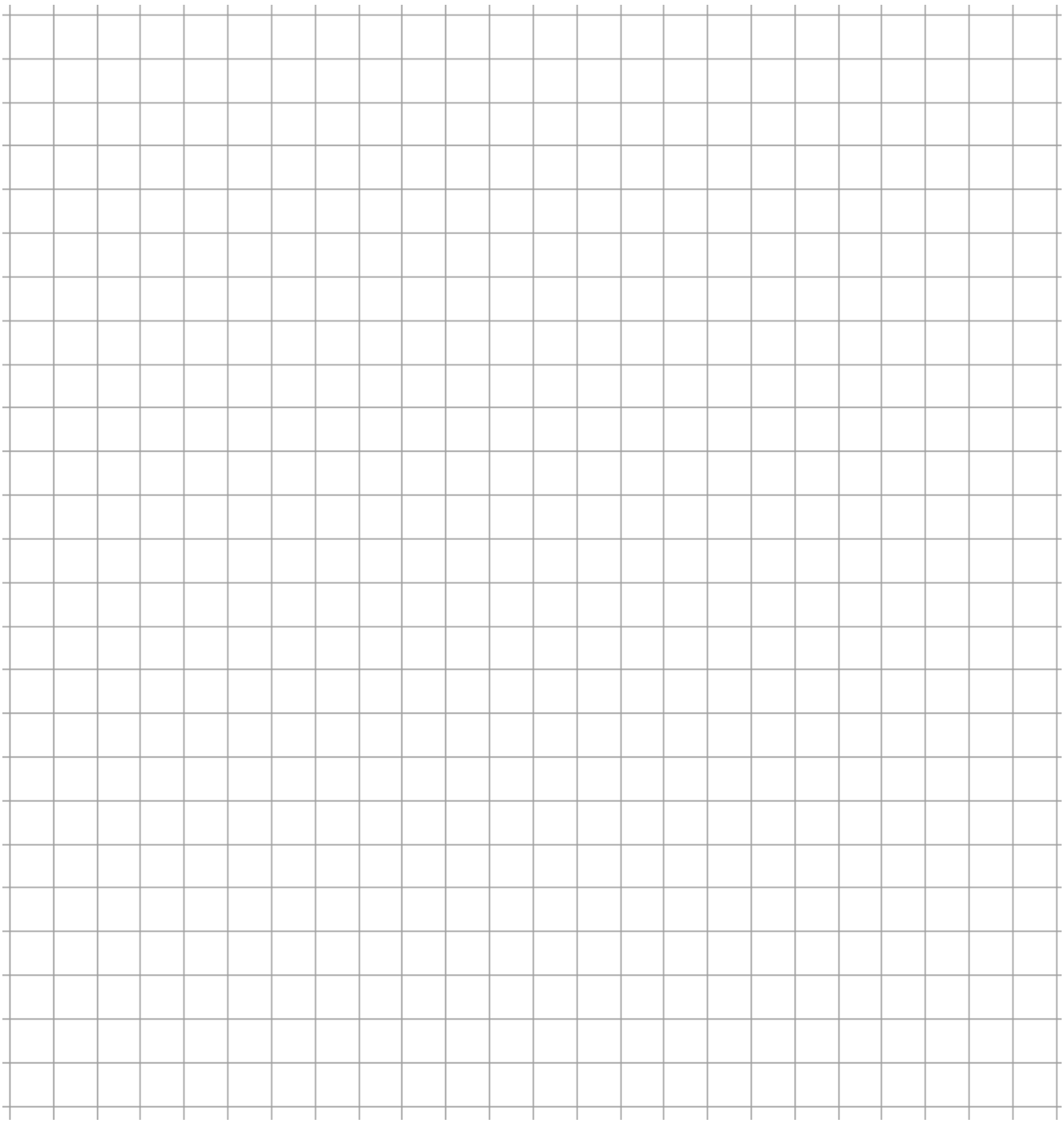
Create shape #4 with the red/yellow counters.

Put the number of discs in the table below:

Shape #	Yellow Discs	Red Discs	Total Discs
1			
2			
3			
4			

Describe all the number patterns you observe in the table:

On this grid, create & color a drawing of a cat or a dog or some other identifiable animal, using only squares or half squares. The squares can be tilted.



Grade 9 KC Geometry I NAME:

Lesson 3: Square Roots

Every square number has a square root. Perfect squares have whole number (integer) square roots.

$$6 \times 6 = 36$$

The square root of 36 is 6.

The square root symbol:

$$\sqrt{}$$

The square root symbol was invented by a German mathematician called Christopher Rudolff in 1525. Pretty much exactly 500 years ago. If you want to invent something that will last a long time - invent some math notation.

$$\sqrt{36} = 6$$

Christopher Rudolff's idea stuck because it's easy to write. You can write it with one stroke of the pen. It is good math notation because it is easy to write and to read and it soon becomes easy to remember what it means.

Write the value of the square root:	
$\sqrt{49} =$	$\sqrt{16} =$
$\sqrt{100} =$	$\sqrt{36} =$
$\sqrt{1} =$	$\sqrt{64} =$
$\sqrt{4} =$	$\sqrt{81} =$
$\sqrt{0} =$	$\sqrt{144} =$
$\sqrt{9} =$	$\sqrt{16} =$
$\sqrt{25} =$	$\sqrt{49} =$
$\sqrt{121} =$	$\sqrt{100} =$

Write the 'radicand' under the 'radical'	
$\sqrt{} = 0$	$\sqrt{} = 7$
$\sqrt{} = 1$	$\sqrt{} = 9$
$\sqrt{} = 2$	$\sqrt{} = 6$
$\sqrt{} = 5$	$\sqrt{} = 4$
$\sqrt{} = 8$	$\sqrt{} = 12$
$\sqrt{} = 10$	$\sqrt{} = 20$
$\sqrt{} = 11$	$\sqrt{} = 15$
$\sqrt{} = 3$	$\sqrt{} = 13$

These two mistakes are very common. Explain what is wrong:

$\sqrt{100} = 50$ What's wrong here?	$5^2 = 10$ What's wrong here?

Return to pages 2 and 3. Write a $\sqrt{}$ fact on each square. E.g. on the 9×9 square, write $\sqrt{81} = 9$.

Perfect squares and non-perfect squares

When you take the square root of a perfect square you get a whole number.

When you take the square root of a number that isn't a perfect square, you get a decimal that goes on forever. This kind of number is called **irrational** because it can't be written as a fraction.

Identify the perfect squares in this number cloud. Write them in the 'perfect square box'. Put the others in the 'not-so-perfect' box. Use the $\sqrt{}$ on your calculator to check you have put them in the correct place.

Perfect Squares		Not-so-perfect
	24 100 64 16 60 144 1000 49 40 25 42 50	

In between

Two facts: $7^2 = 49$ and $8^2 = 64$

How much is $\sqrt{58}$?

We know that $\sqrt{58}$ is between 7 and 8 because 58 is between 49 and 64.

Use a calculator to write $\sqrt{58}$ correct to one decimal place. $\sqrt{58} =$

Circle all the numbers below that are between 7 and 8.

$\sqrt{7.5}$ $\sqrt{80}$ $\sqrt{48}$ $\sqrt{50}$ $\sqrt{69}$ $\sqrt{65}$ $\sqrt{53}$ $\sqrt{63.5}$ $\sqrt{800}$

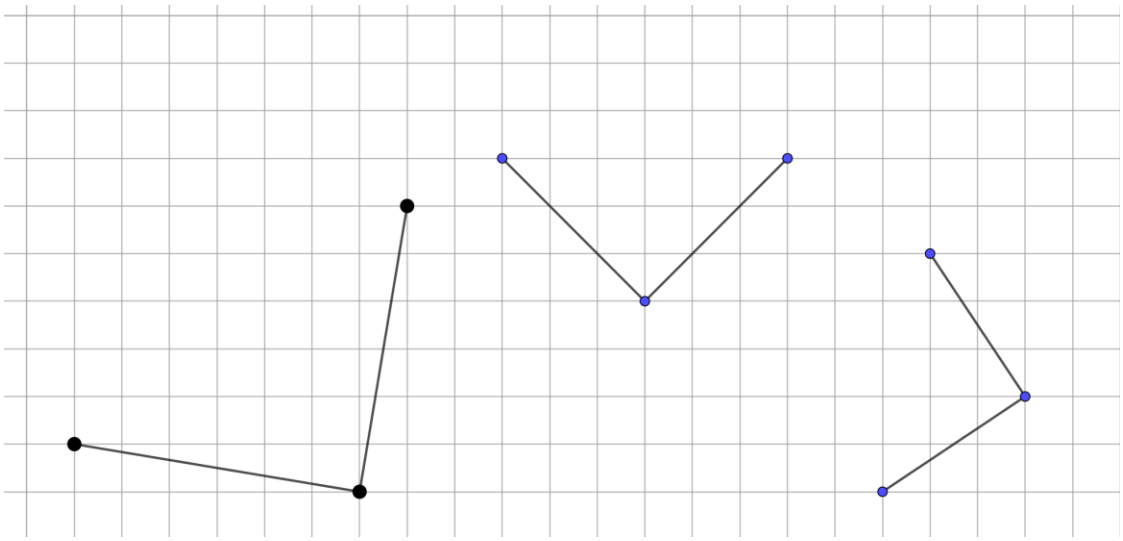
Check you have circled the correct numbers using your calculator.

Tilted Squares: Drawing

Please use a ruler on this page. On the grid below a square is drawn on a tilt. Copy the square exactly.



On the grid below, the start of three tilted squares has been drawn. Complete each square.

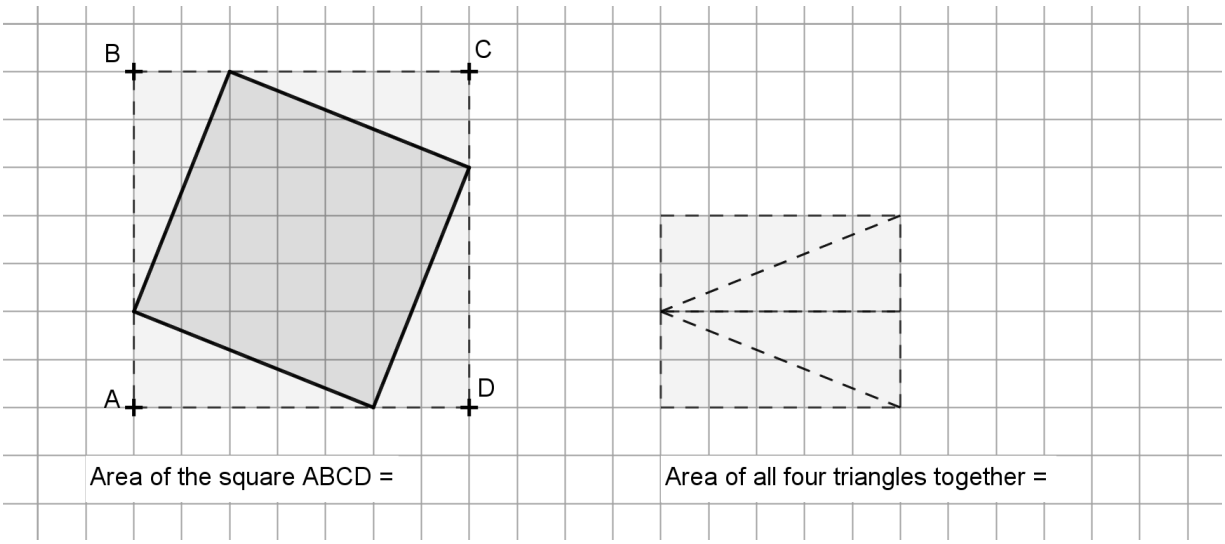


On the grid below, draw two of your own tilted squares.



Tilted Squares: Calculating the area

(a) On the grid below, the tilted square has been surrounded by four right-angled triangles. A copy of the four right triangles is drawn to the side.

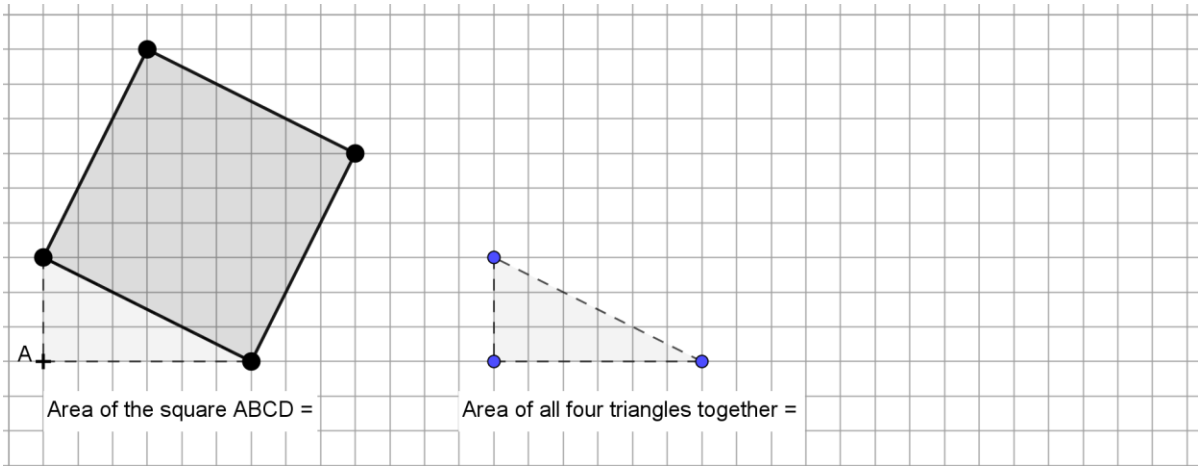


Use the information above to explain why the area of the tilted square is equal to 29 grid squares:

Calculate the length of one side of the square using the square root on your calculator. Write your answer rounded correctly to one decimal place.

One side of the tilted square has length = $\sqrt{29} =$

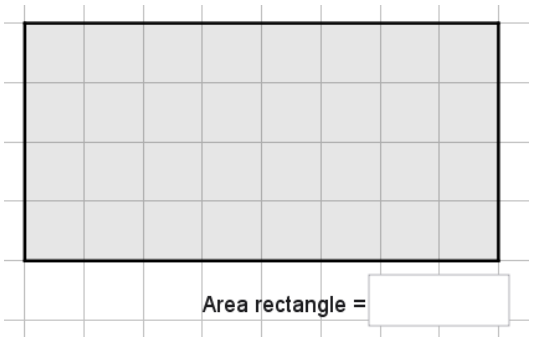
(b) Surround this tilted square with four triangles. Label the new vertices A, B, C, D.

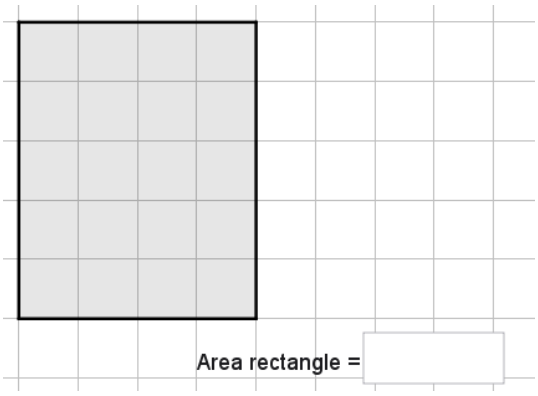


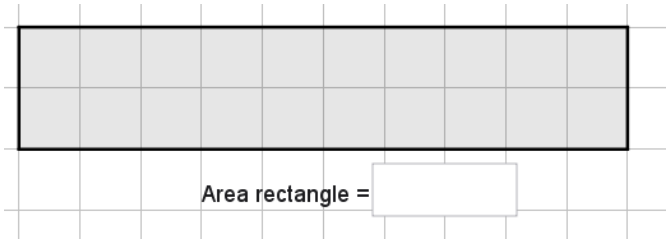
Area of the tilted square = Length of one side of the tilted square =

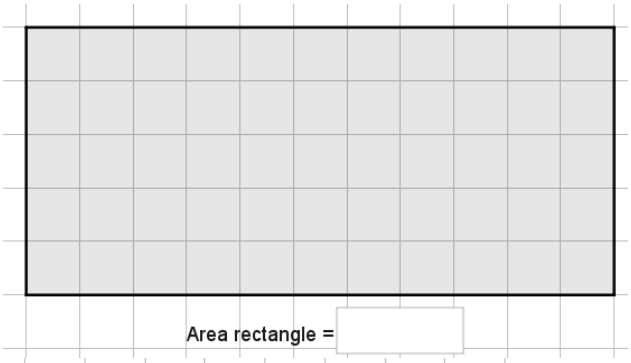
Lesson 4: Areas Rectangles and Right Angled Triangles

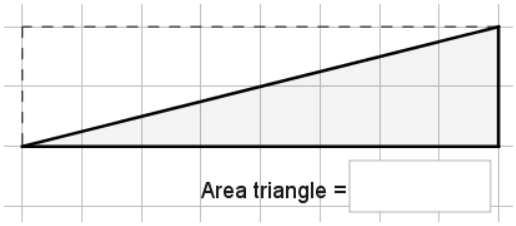
Write the number of squares each shape covers. Notice that a right triangle fills half a rectangle.

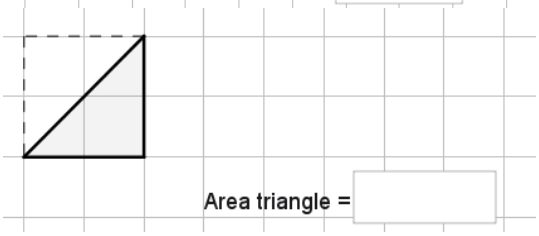


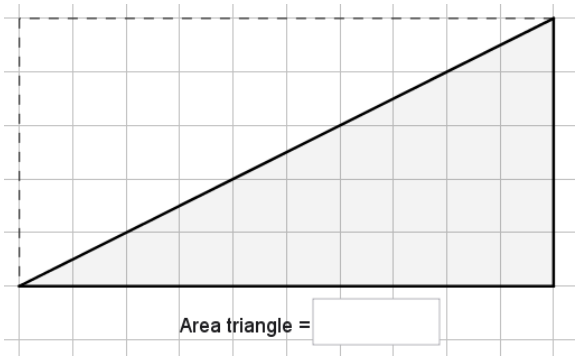


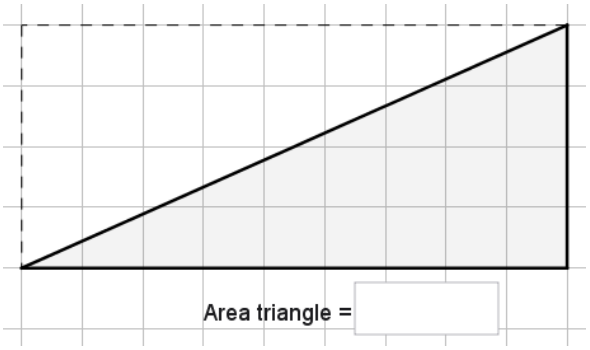










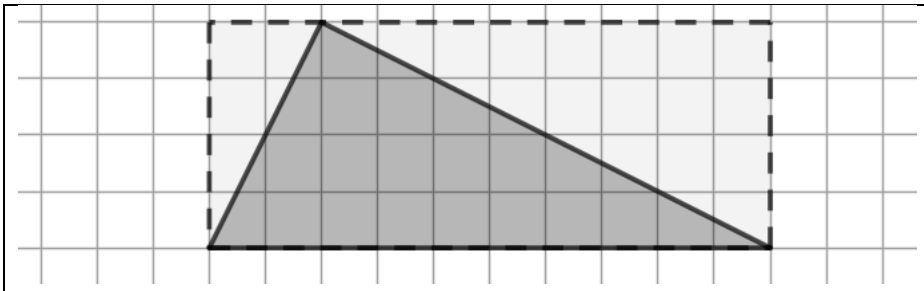


Every triangle can be doubled to fill a rectangle that has the same base and height.

1. Take a piece of construction paper.
2. Use a ruler to draw a triangle on the construction paper. The longest side should measure 15 cm. The other two sides can be any length but shorter than 15 cm.
3. Carefully cut the triangle out.
4. Place your triangle with the longest side as the base on this page.
5. Trace around it. Colour the traced triangle in.
6. On the construction paper triangle, draw a line from the upper vertex to the base. It should meet the base at 90° (perpendicular).
7. Cut your triangle in two along this line.
8. Stick the two parts onto the traced triangle to form a rectangle.
9. Measure your rectangle with a ruler.
10. Use $Area = length \times width$ to find the area of the rectangle.
11. Now divide by two to find the area of the original triangle.
12. Do the same with a second triangle. Make up the size and shape of your second triangle.

When a triangle is drawn with the longest side as the base, the triangle fills half the rectangle with the same base and height.

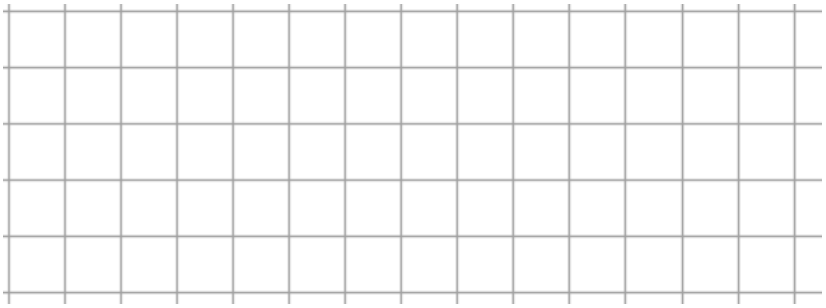
On this diagram, the triangle has a base length 10 and height 4. A rectangle has been drawn with the same base and height.



Area rectangle =

Area triangle =

On this grid, draw a triangle that has base length 8 and height 3. Draw a rectangle around the triangle that has the same base and height. Complete the area calculations.



Area rectangle =

Area triangle =

On this grid, draw a triangle that has base length 10 and height 6. Draw a rectangle around the triangle that has the same base and height. Complete the area calculations.



Area rectangle =

Area triangle =

Lesson 5: Area Parallelogram

A Parallelogram transforms into a rectangle.

A *rectangle* has area = length x width, or area = base x height.

A *parallelogram* can be transformed into a rectangle.

When a parallelogram has been transformed to a rectangle, it is easy to calculate the area.

1. From Parallelogram to Rectangle

Cut out the parallelograms labelled A, B and C on the parallelogram hand out.

Stick one copy of each parallelogram onto this page as it is. Convert the second copy into a rectangle and stick it on. Write the area onto each copy. Parallelogram 'C' will require more than one cut.

2. From rectangle to parallelogram

Cut out the rectangles labelled A, B and C on the rectangle hand out.

Stick one copy of each rectangle onto this page as it is. Convert the second copy into a parallelogram as follows:

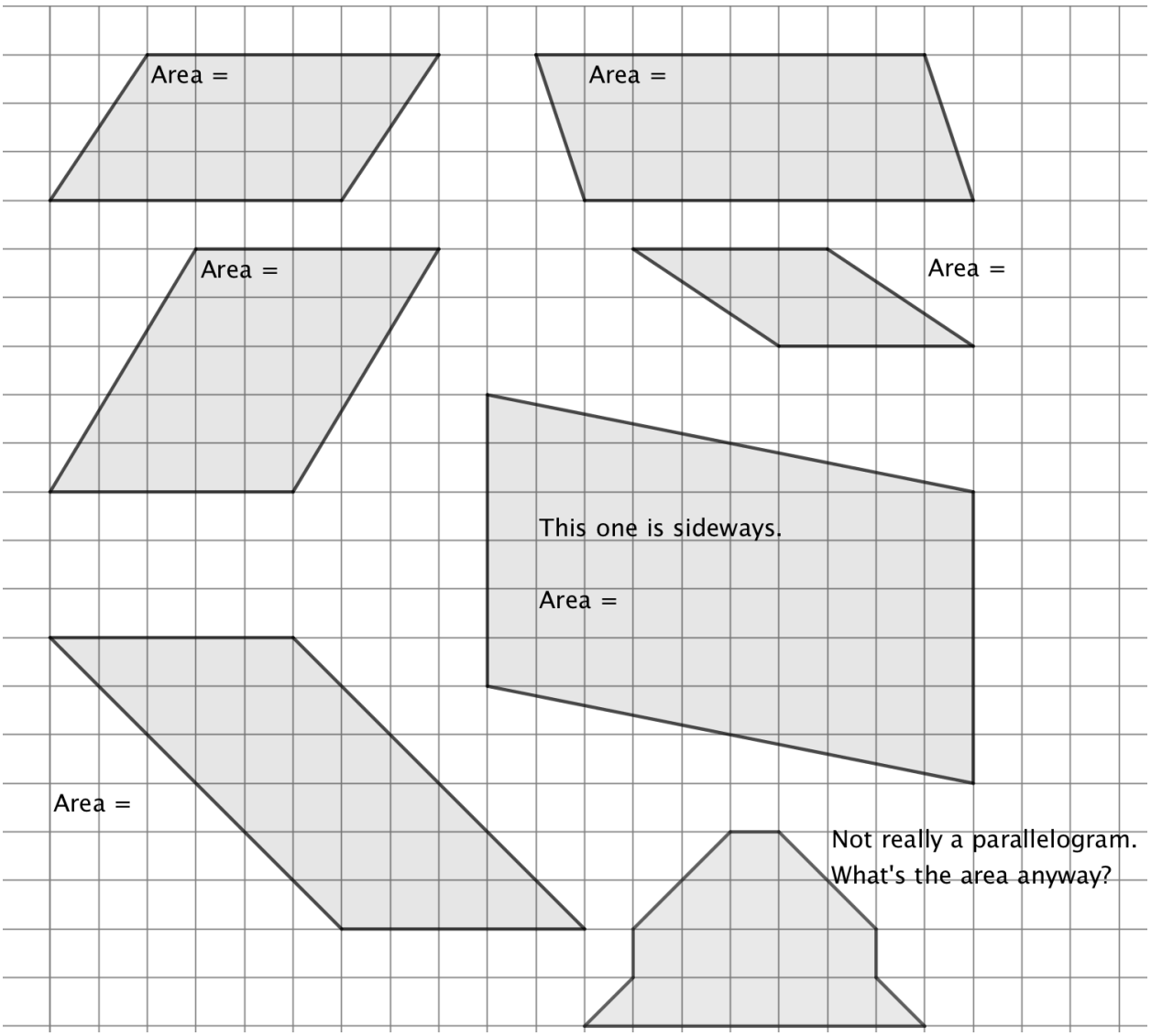
- cut on the dotted line,
- rearrange the pieces to form a parallelogram,
- stick the parallelogram onto this page.

Write the area onto each copy.

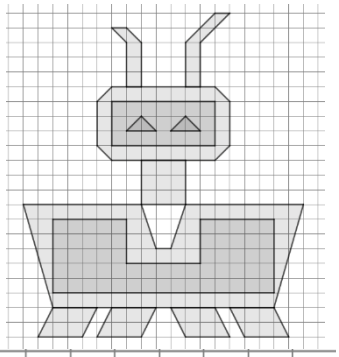
3. Draw a line from top to bottom on each of these parallelograms. This ‘top to bottom’ line is at right angles (perpendicular) to the base. The ‘top to bottom’ line is called the height.

On each parallelogram, write on the length of each base and the length of each height. Calculate the area, either by counting boxes or by using the formula:

Area Parallelogram = base × height



4. Use the grid to draw a design of a robot.



Calculate the area of your design.

RECTANGLES

Question 1: Calculate the area of each of these rectangles

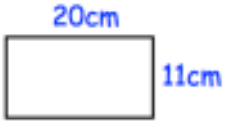
(a)



(c)



(e)



(g)



(i)



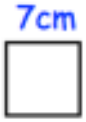
(j)

(k)



Question 2: Work out the area of each of these squares

(a)



(c)



Question 3: Work out the area of each of these rectangles

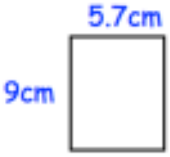
(a)



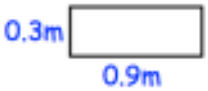
(c)



(e)



(g)

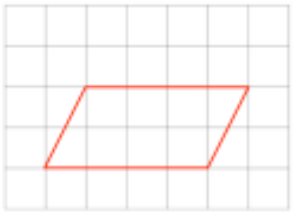


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PARALLELOGRAMS

Question 1: The following parallelograms are drawn on centimetre-squared paper.
Find the area of each.

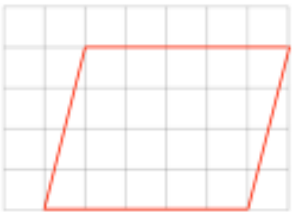
(a)



(b)

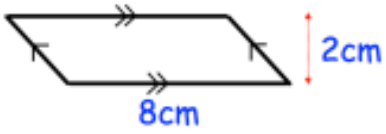


(c)

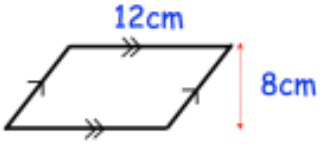


Question 2: Work out the area of each of the parallelograms below.
Include suitable units.

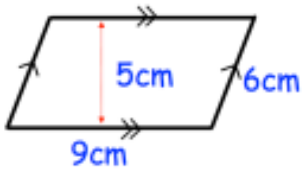
(a)



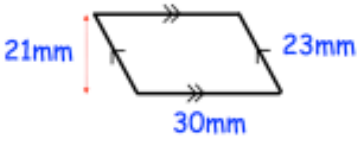
(c)



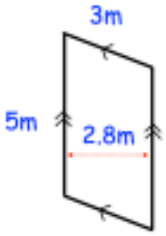
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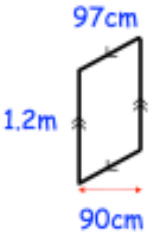
(f)



(g)



(i)

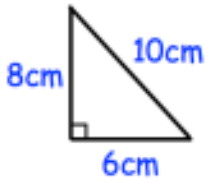


Question 3: A parallelogram has a base of 8cm and a perpendicular height of 6cm.
Calculate the area of the parallelogram.

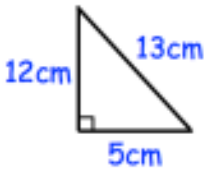
TRIANGLES

Question 1: Find the area of each triangle.

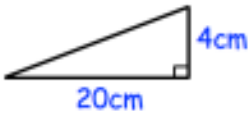
(a)



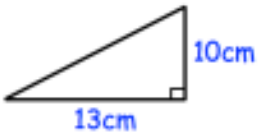
(c)



(d)



(e)

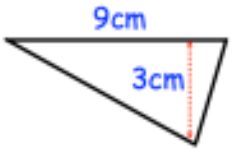


Question 2: Find the area of each triangle.

(a)



(c)



(d)

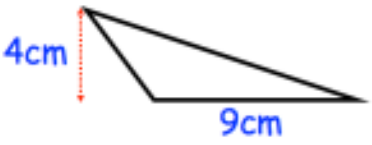


(f)



Question 3: Find the area of each triangle.

(a)



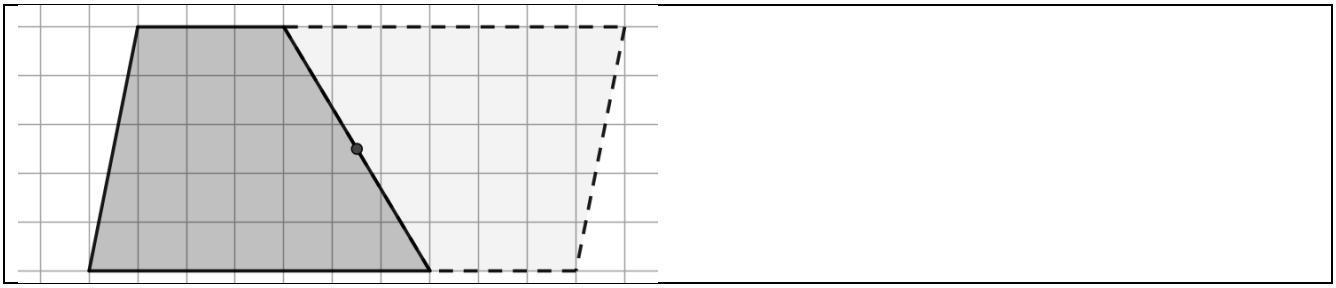
(b)

(c)



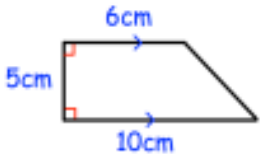
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TRAPEZOIDS

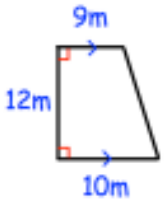


Question 1: Find the area of each trapezium.

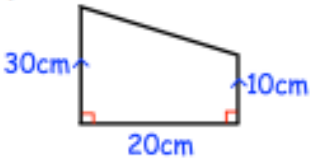
(a)



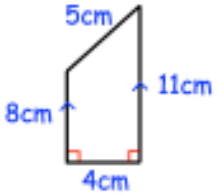
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(d)

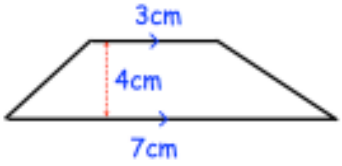


(f)

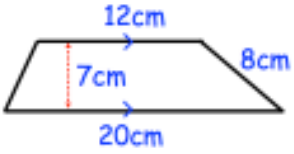


Question 2: Find the area of each trapezium.

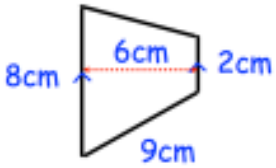
(a)



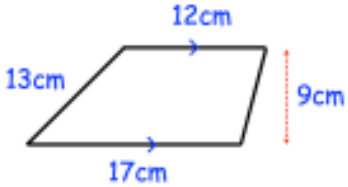
(c)



(d)

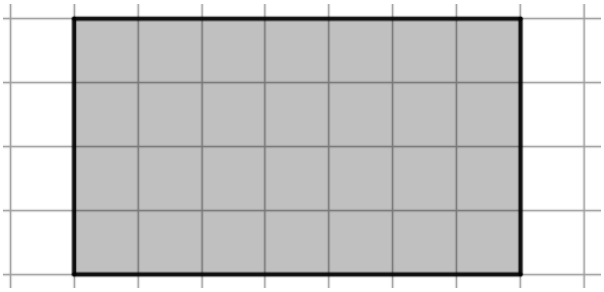
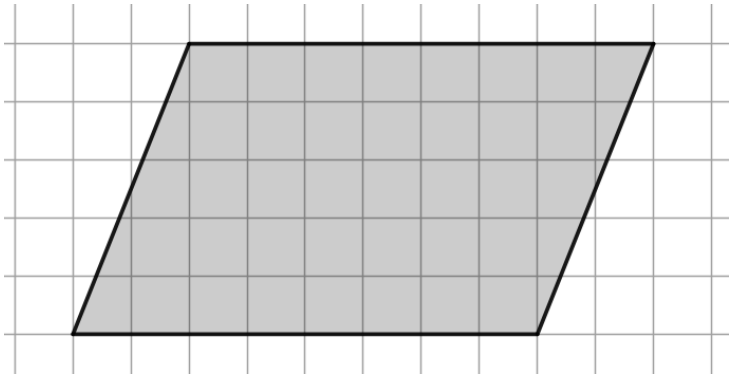
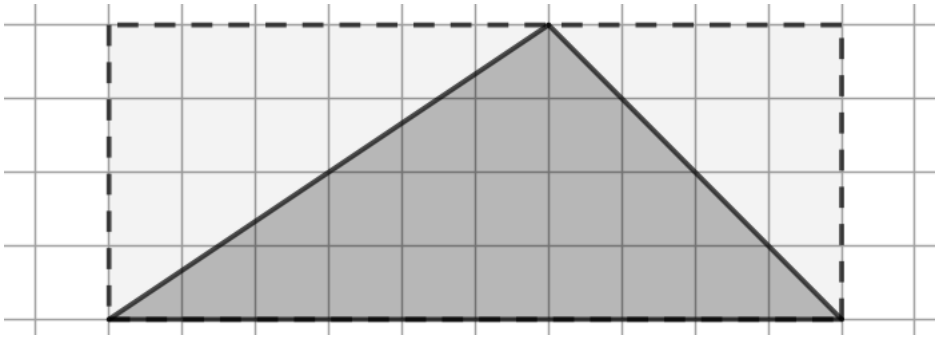


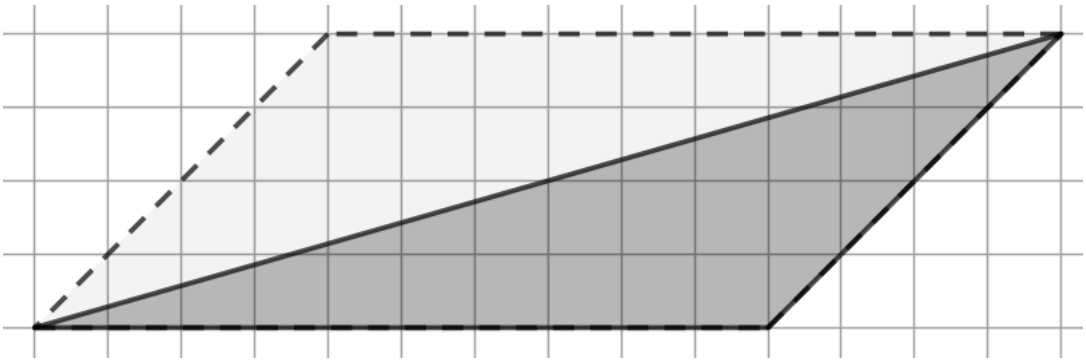
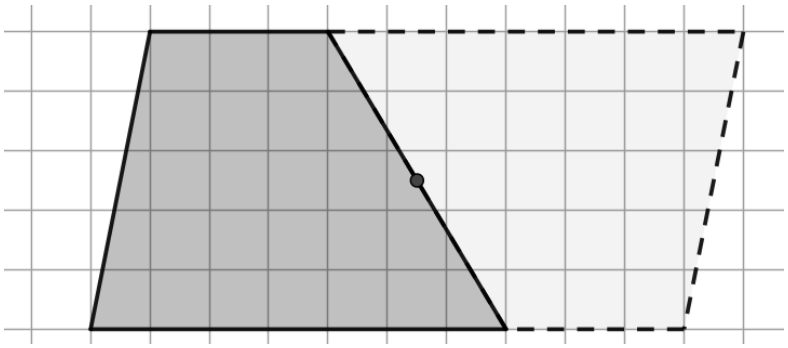
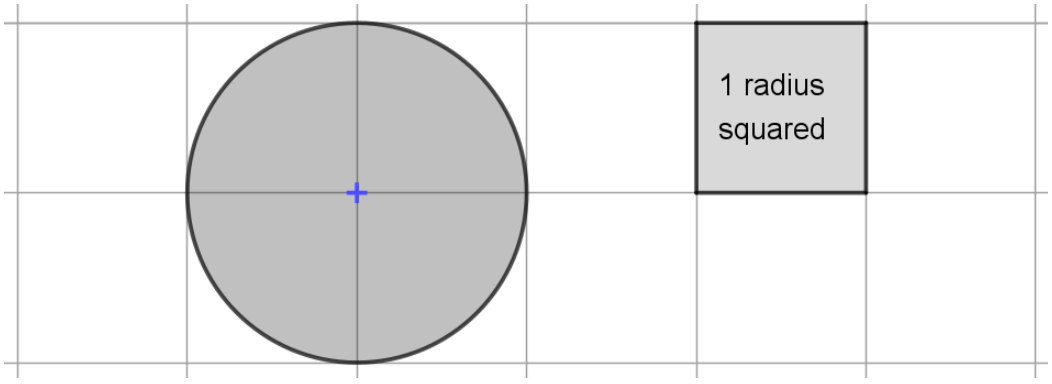
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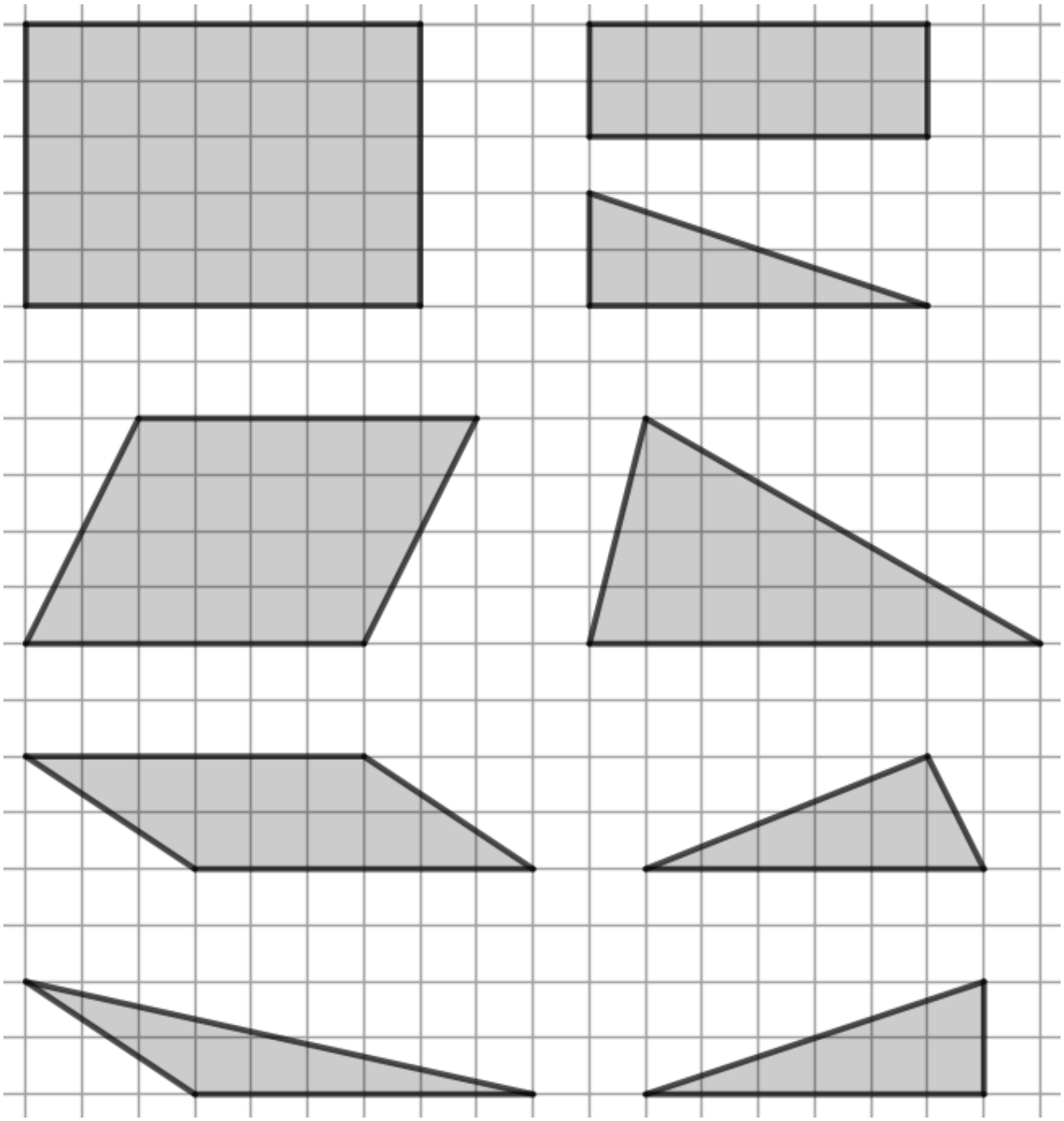
Grade 8 Geometry II NAME

Lesson 7: Making Formulas for Area

Rectangle	 Notes:
Parallelogram	 Notes: 'Visualize' the triangle moved to form a rectangle.
Triangle – longest side as the base	 Notes: 'Visualize' the triangle split in two. The triangle is half of the rectangle.

Triangle 2 – any side as the base	 Notes: ‘Visualize’ rotating the triangle to form a parallelogram. The triangle fills half the parallelogram.
Trapezoid	 Notes: ‘Visualize’ rotating the triangle to form a parallelogram. The trapezoid fills half the parallelogram.
Circle	 Notes: The area of the circle is definitely less than …….. squares made with the radius. The letter π was introduced in 1706 by a math teacher, William Jones. It is the ‘radius squared’ that fit in the circle.

Calculate the areas of each shape:

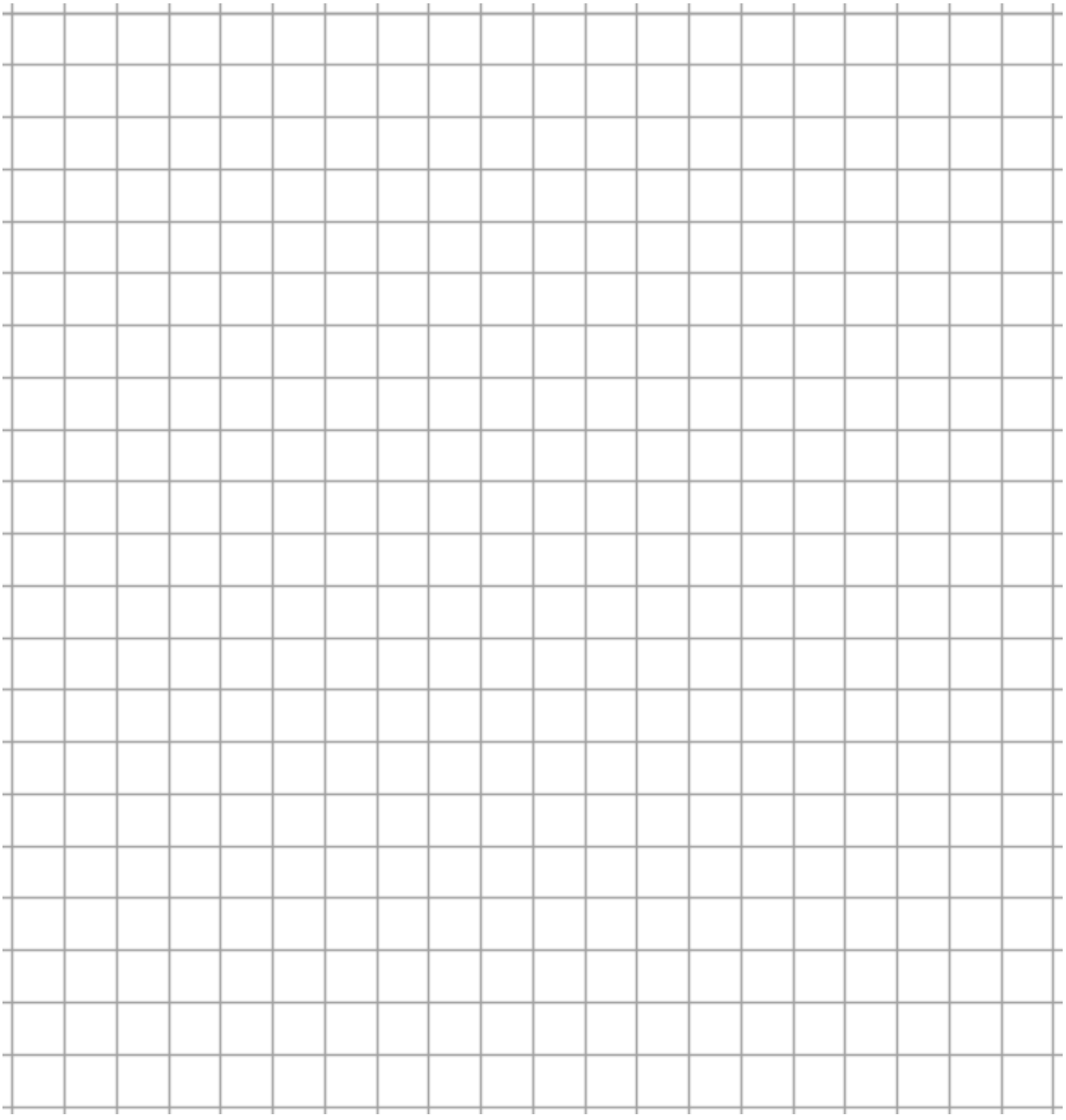


Formula recap:

Rectangle	Parallelogram	Triangle
base x height	base x height	Base x height ÷2

Use the app to help design the following shapes. Copy them onto the grid below:

(a) Two different rectangles with area 24 squares.
(b) Two different parallelograms with area 36 squares.
(c) Two different triangles with area 10 squares.



Grade 9 KC Geometry I NAME:

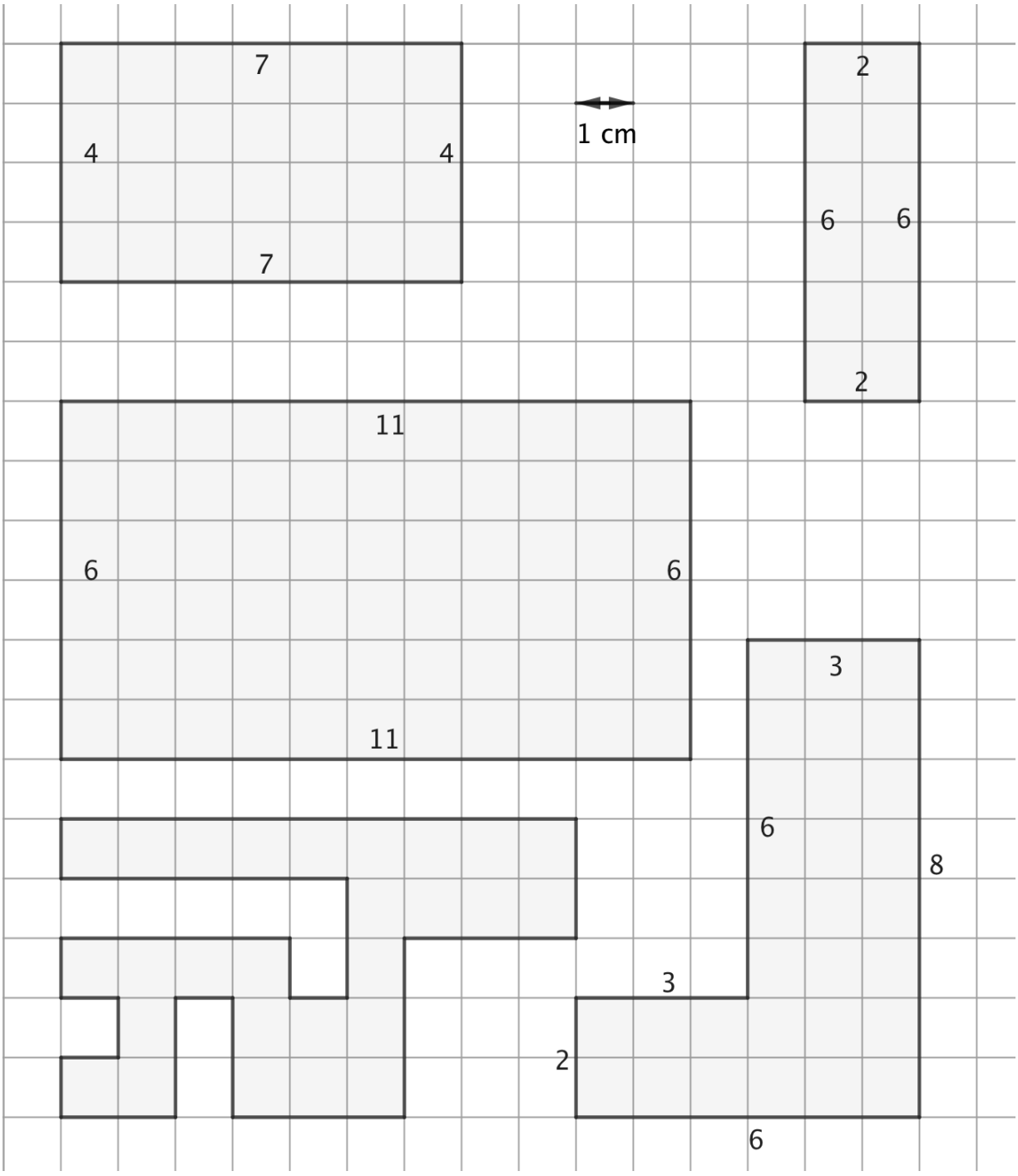
Lesson 8: Perimeter

The perimeter of a 2 dimensional shape is the length of all the edges added together.

In other words, if a spider were to crawl around all the edges once, the perimeter is how far would it crawl.



Calculate the perimeter around these 2 dimensional shapes.

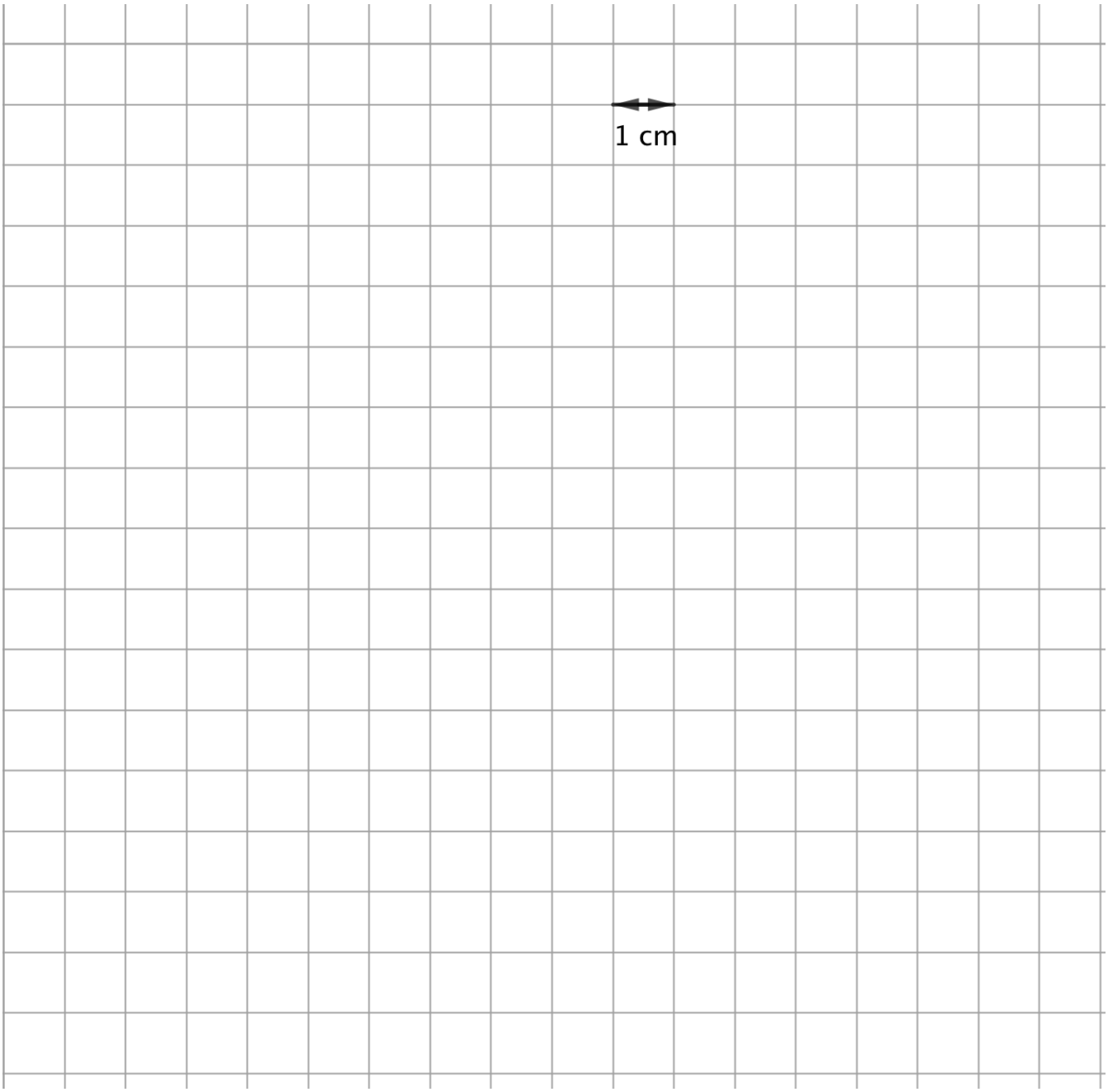


A rectangle is a type of quadrilateral that has:

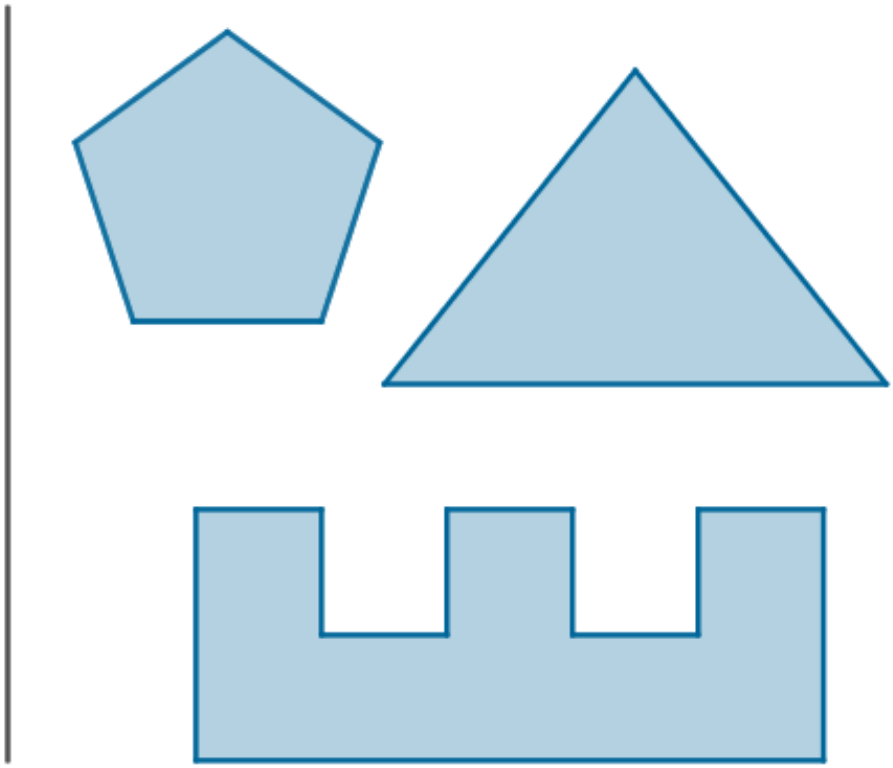
- Two sets of ……
- Four angles that…….

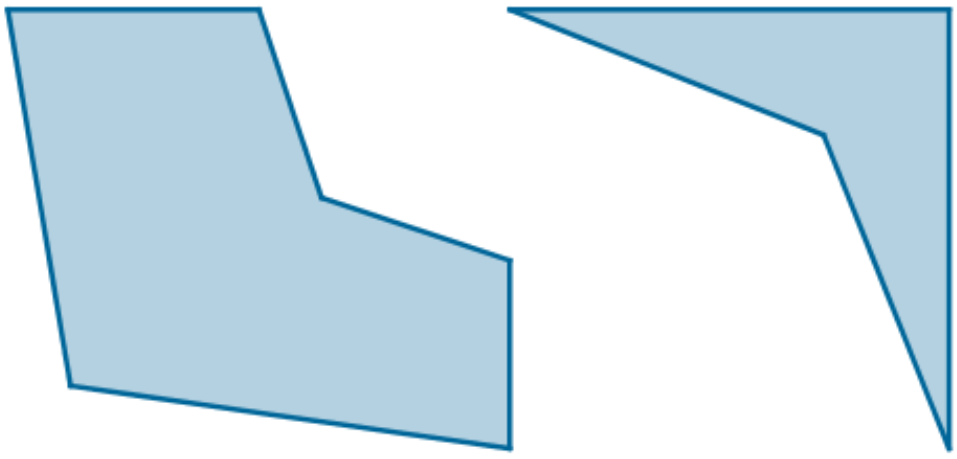
On the following grid

1. Draw any rectangle and measure its perimeter
2. Draw a rectangle with perimeter 20 cm
3. Draw a rectangle with perimeter 36 cm
4. Draw a rectangle with perimeter 10 cm

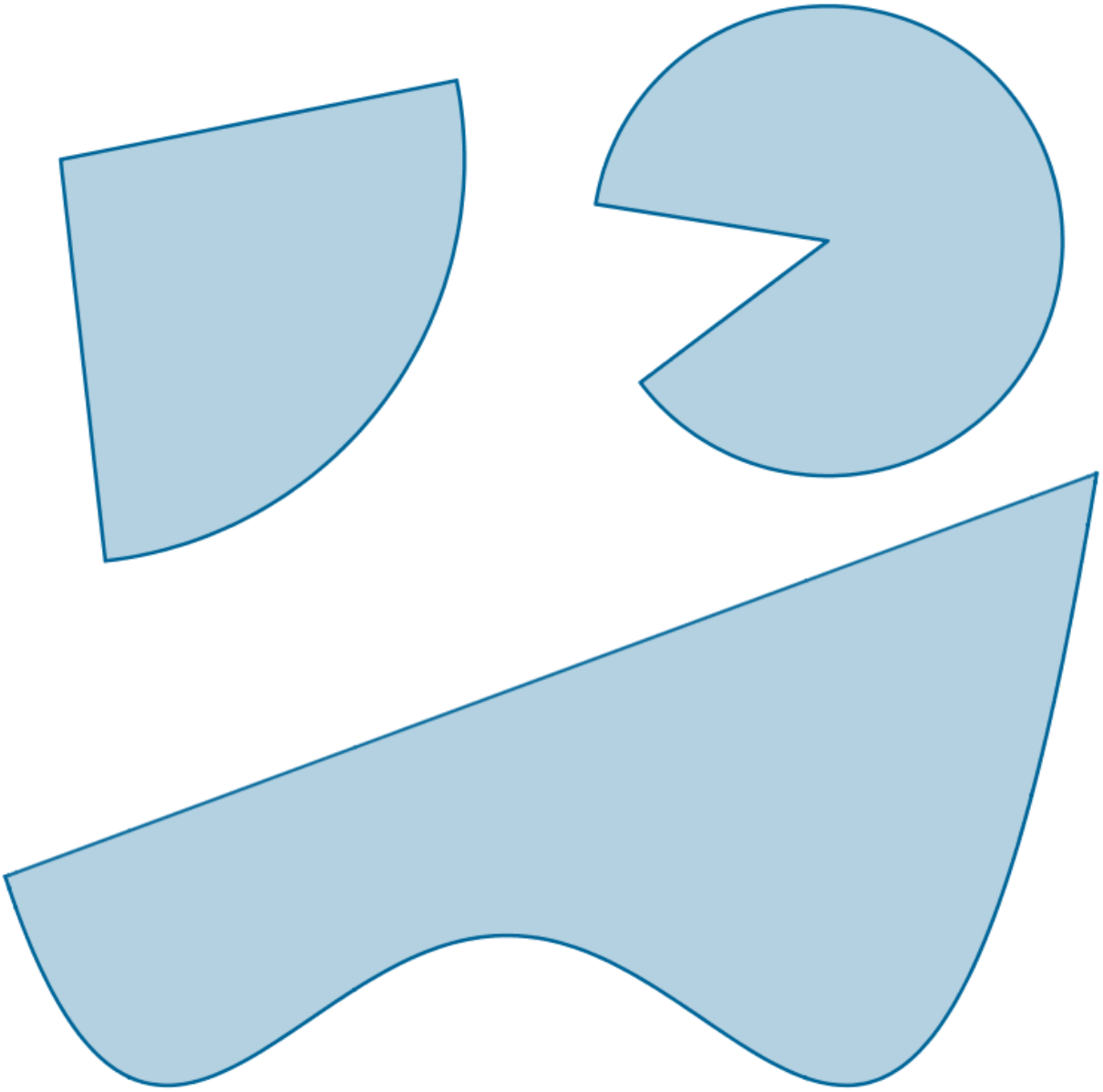


Use a ruler to measure the perimeter of each of these shapes. Measure each edge correct to the nearest mm.



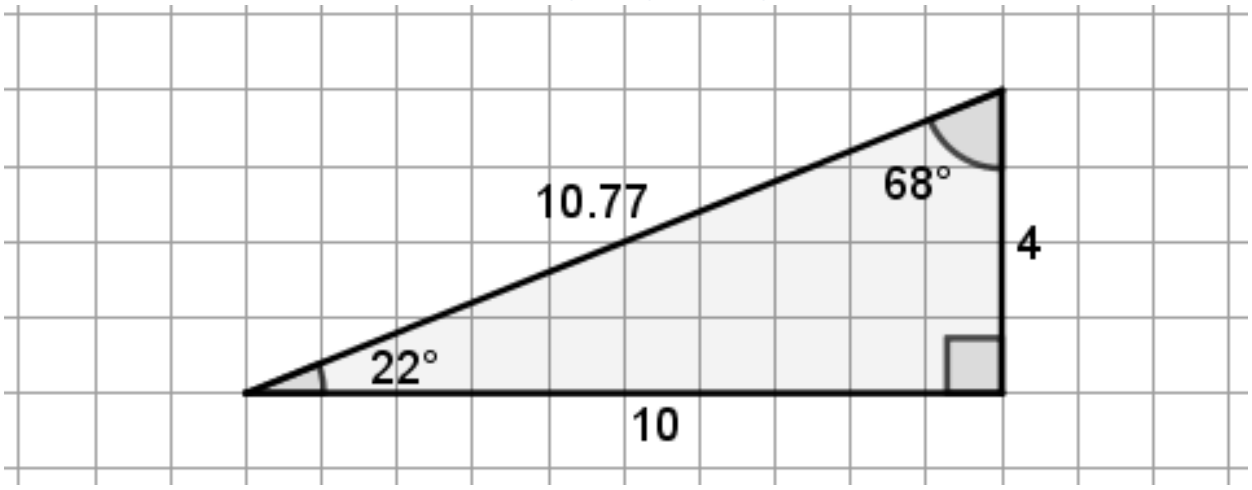


Use string to measure the perimeter of each of these shapes.



Grade 9 KC Geometry I ÷ NAME:

Lesson 9: Right-Angled Triangles



8 Facts about Right-Angled Triangles

1. Every right-angled triangle has one angle that is equal to ……..
2. Every right-angled triangle has two …….. angles that add together to ……
3. The side that lies opposite the right-angle is the longest side.
4. The longest side is known as the ……
5. Doubling a right angle triangle (by rotating 180° around the midpoint on the hypotenuse) forms a ……..
6. When two sides of a triangle are drawn, the third side has a fixed length. It can be calculated.
   Grade 8/9 KC: use the Pythagorean Theorem
   Grade 10: learn how to calculate any side or any angle of a right-angled triangle
   Grade 11: learn how to calculate any side or any angle of any triangle.
7. The '……. Theorem' is a formula for the sides on a right-angled triangle. Pythagoras' was a special, interesting, Greek mathematician but he didn't invent the Pythagorean theorem.
8. The Pythagorean Theorem states:

> Given a right-angled triangle with hypotenuse length c and shorter sides with lengths a and b respectively, then
>
> $$a^2 + b^2 = c^2$$

Triangle 1: Try the formula out with this triangle. Label the hypotenuse 'c'. The other two sides can be a or b.



$a =$ $b =$ $c =$

$a^2 =$ $b^2 =$ $c^2 =$

$a^2 + b^2 =$

Triangle 2:



$a =$ $b =$ $c =$

$a^2 =$ $b^2 =$ $c^2 =$

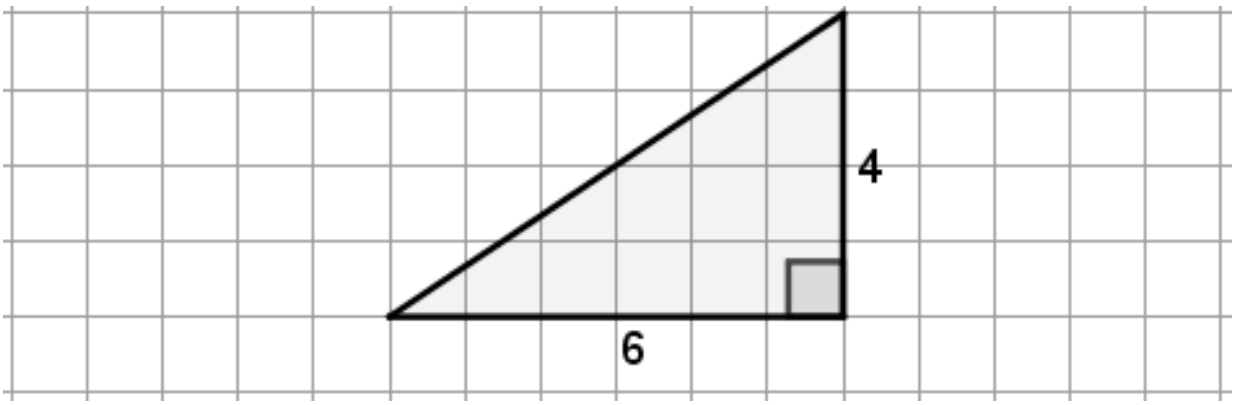
$a^2 + b^2 =$

Triangle 3: The grid squares measure 1 cm by 1 cm.

Label the hypotenuse with the letter c.

This is a right-angled triangle. Use $a^2 + b^2$ to calculate c^2. Then take $\sqrt{\square}$ to calculate c.

Measure the hypotenuse with a ruler to see if your answer is correct.



$a =$ $b =$

$a^2 =$ $b^2 =$

$a^2 + b^2 =$ $c^2 =$ $c = \sqrt{\quad} =$

Triangle 4: The grid squares measure 1 cm by 1 cm. Label the hypotenuse with the letter c.

This is a right-angled triangle. Use $a^2 + b^2$ to calculate c^2. Then take $\sqrt{\square}$ to calculate c.

Measure the hypotenuse with a ruler to see if your answer is correct.



$a =$ $b =$

$a^2 =$ $b^2 =$

$a^2 + b^2 =$ $c^2 =$ $c = \sqrt{\quad} =$

Triangle 5: The grid squares measure 1 cm by 1 cm. Label the hypotenuse with the letter c.

This is a right-angled triangle. Use $a^2 + b^2$ to calculate c^2. Then take $\sqrt{\square}$ to calculate c.

Measure the hypotenuse with a ruler to see if your answer is correct.



$a =$ $b =$

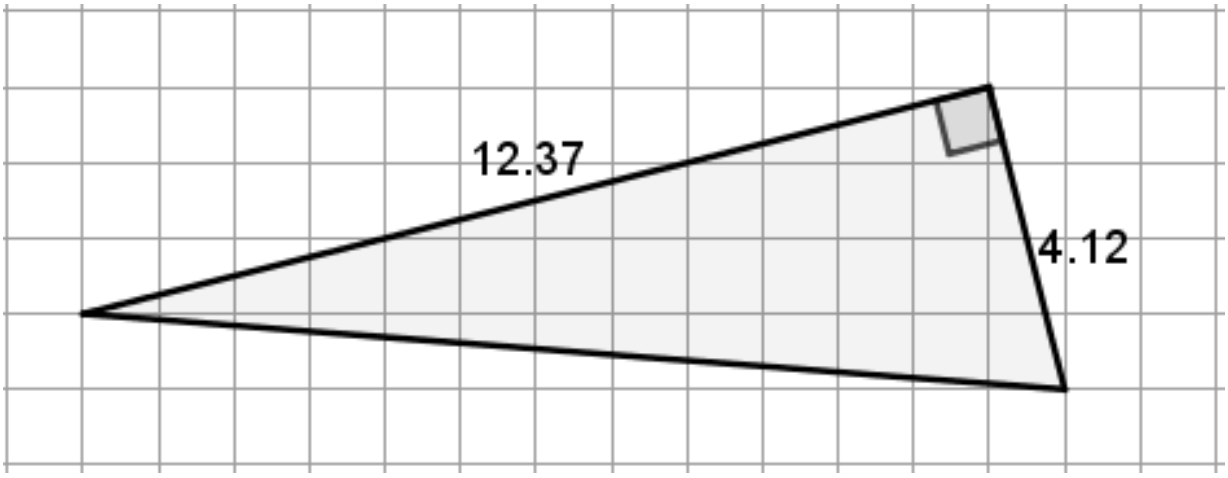
$a^2 =$ $b^2 =$

$a^2 + b^2 =$ $c^2 =$ $c = \sqrt{\quad} =$

Triangle 6: The grid squares measure 1 cm by 1 cm. Label the hypotenuse with the letter c.

This is a right-angled triangle. Use $a^2 + b^2 = c^2$ to calculate c^2. Then take $\sqrt{\square}$ to calculate c.

Measure the hypotenuse with a ruler to see if your answer is correct.



$a =$ $b =$

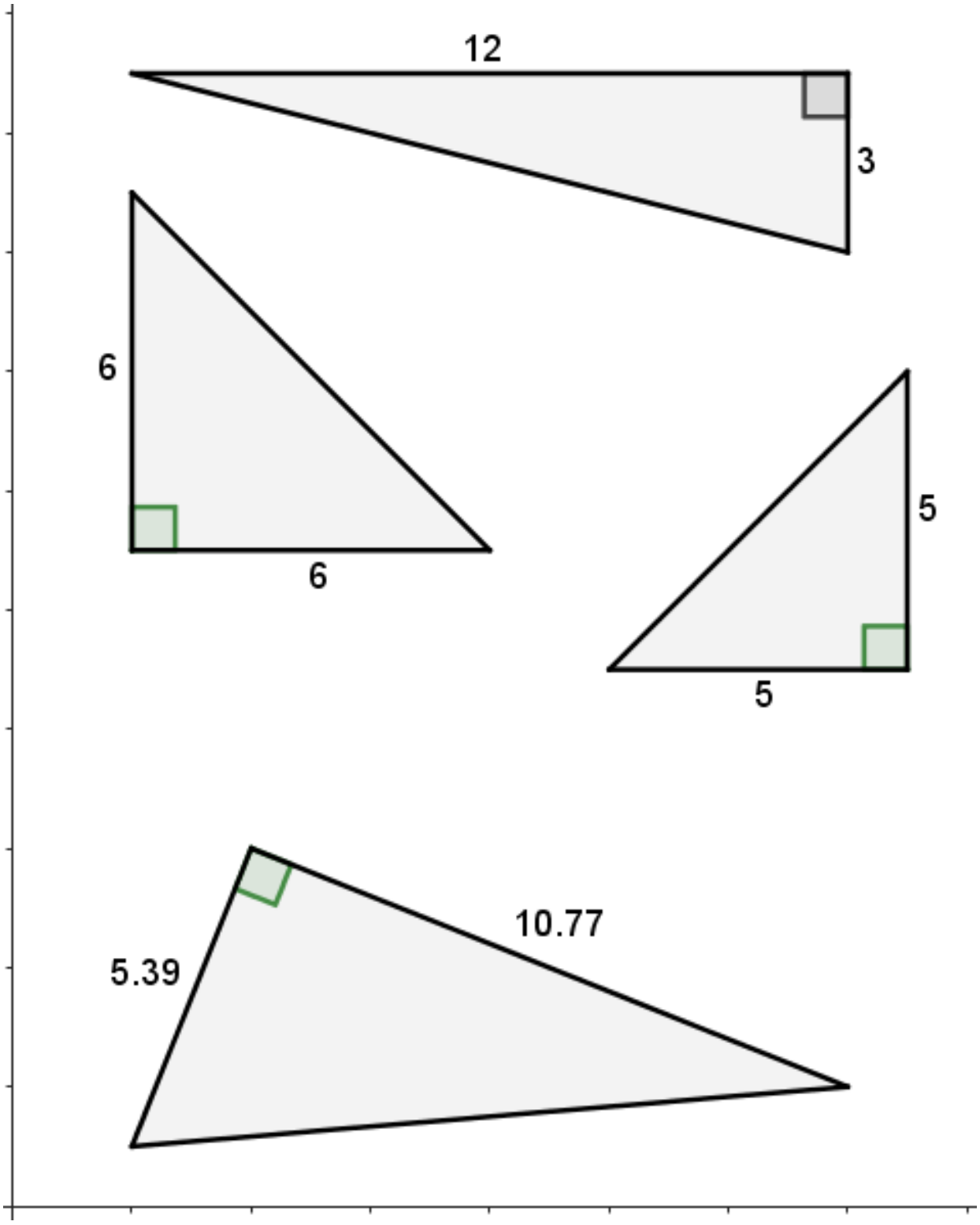
$a^2 =$ $b^2 =$

$a^2 + b^2 =$ $c^2 =$ $c = \sqrt{\quad} =$

Use the Pythagorean Theorem to calculate the length of the hypotenuse on each of these triangles.

Show your written calculations.

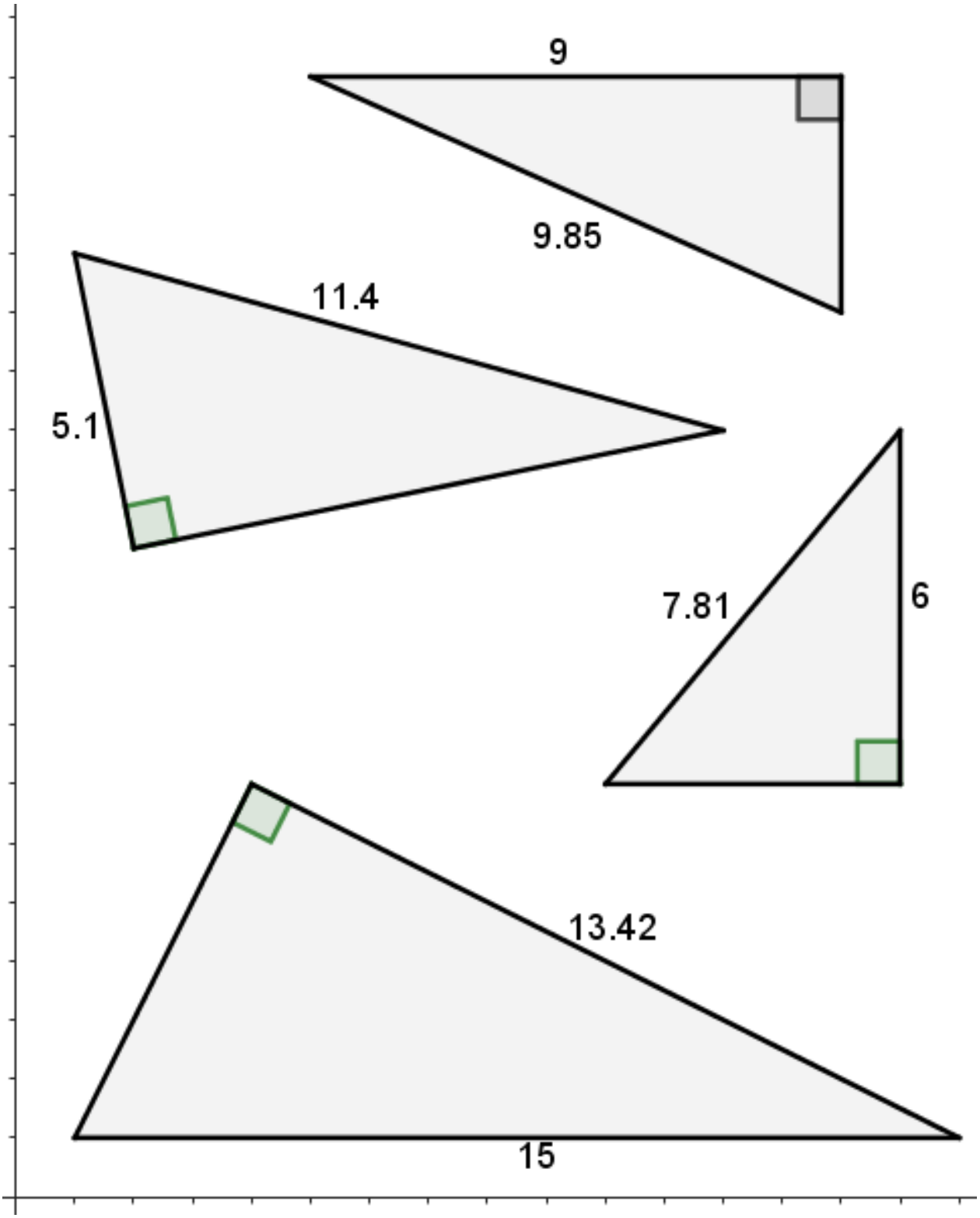
Verify your calculation by measuring the hypotenuse with a ruler.



These triangles have a shorter side missing.

Calculate the length of the shorter side. Show your written calculations.

Verify your calculation by measuring with a ruler.



Grade 9 KC Geometry I NAME:

Lesson 10: Cutting the squares to show that $a^2 + b^2 = c^2$

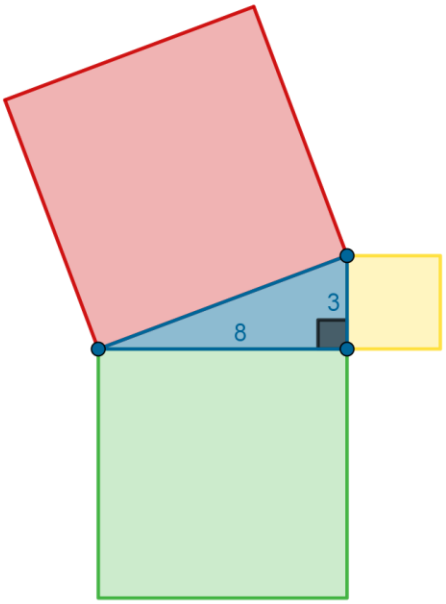
Go to https://www.geogebra.org/m/zpgxb5rg .

Move the points to form a triangle of your choosing. You can rotate it etc. Print two identical copies. Cut one complete copy out and stick it on this page. On the second copy, cut out the two smaller squares. Fit the pieces into the largest square on the hypotenuse.

Squares Diagram #1:

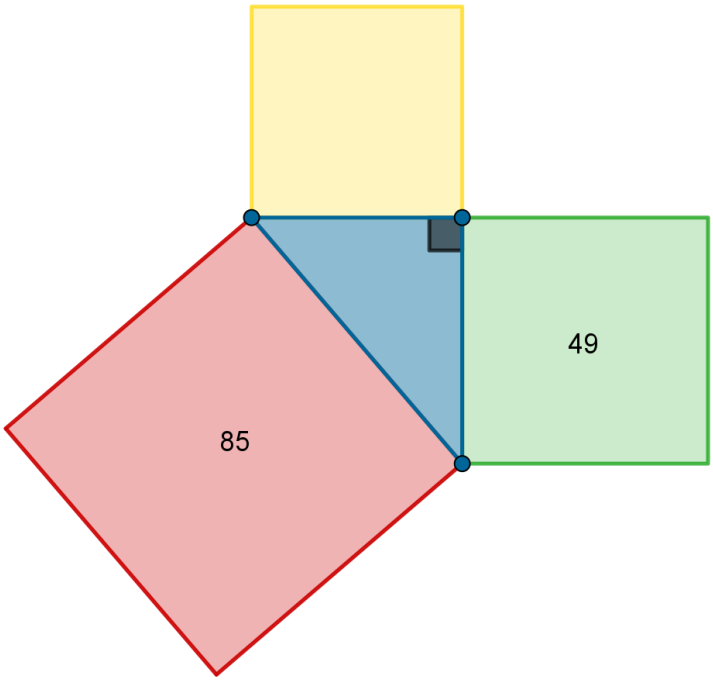
Write on the area of each square.

Calculate the length of the hypotenuse of the triangle.



Squares Diagram #2:

Write on the area of the third square. Calculate the three lengths of the triangle.



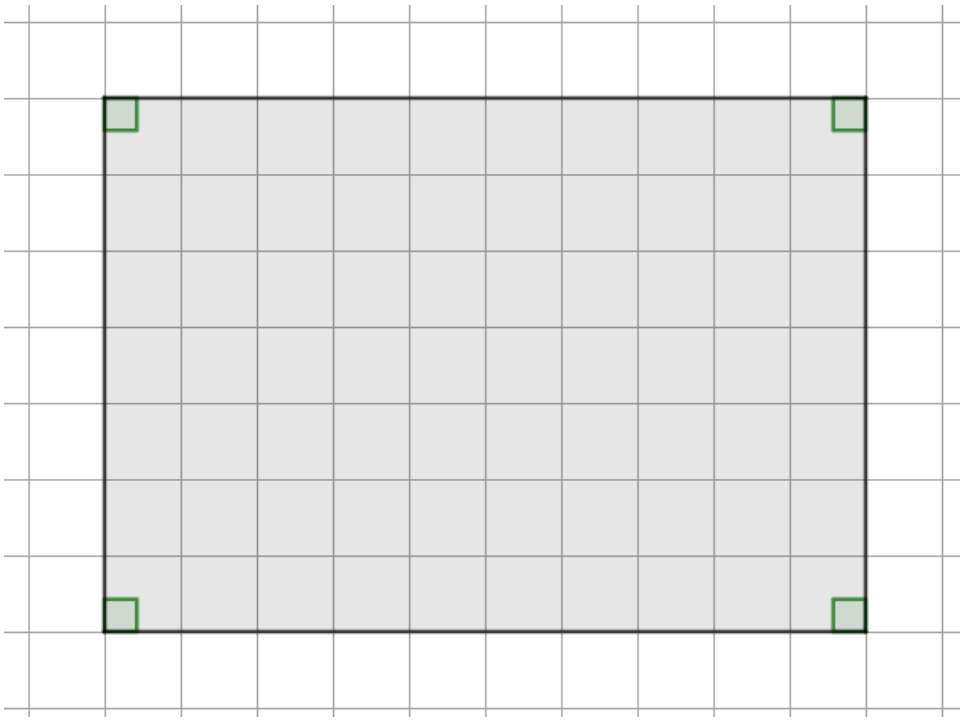
Lesson 11: Diagonal of a Rectangle

The Pythagorean theorem says that:



We can use it to find the diagonal of a rectangle.

Length = Width = Diagonal calculation =



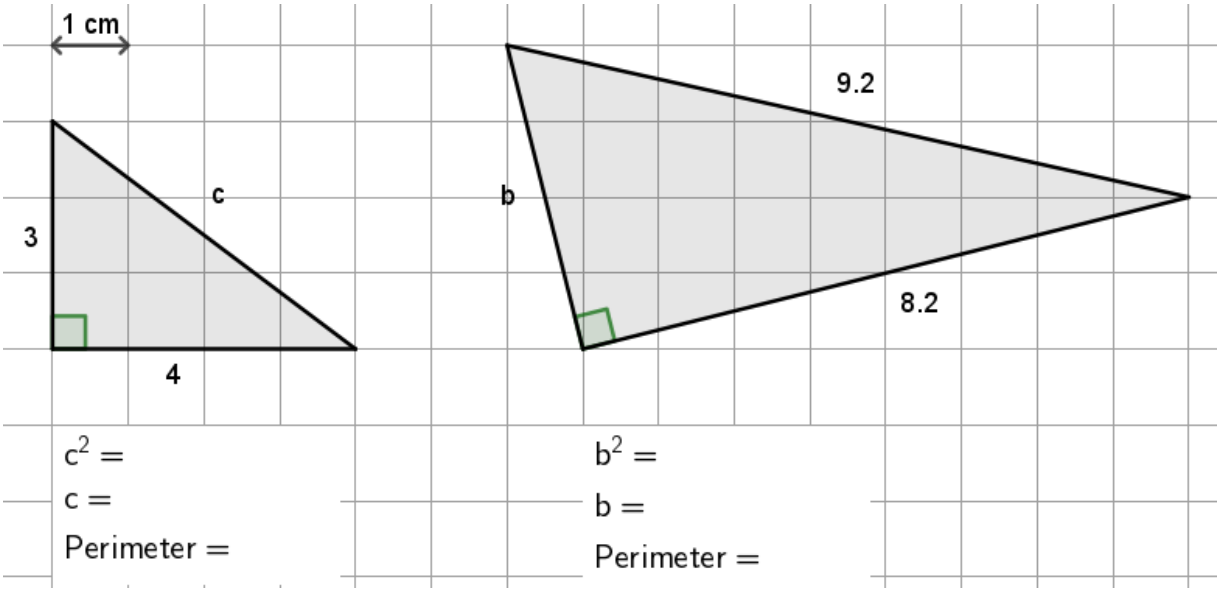
Find three rectangles in the classroom, eg window, book, door, piece of paper etc.

- Draw the item.
- Measure the length and width.
- Calculate the diagonal using the pythagorean theorem.
- Measure the diagonal to check that you calculation has worked.

Diagram	Calculation
	Length = Width = Diagonal Calculation = Diagonal Measurement =
	Length = Width = Diagonal Calculation = Diagonal Measurement =
	Length = Width = Diagonal Calculation = Diagonal Measurement =

Lesson 12: Calculate the Perimeter of Shapes Using Pythagorean Theorem for at least one side

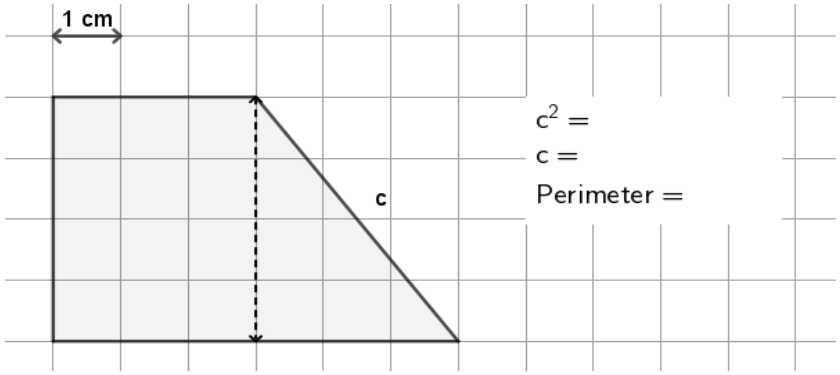
To find a missing side on a right-angled triangle, we need to use the Pythagorean theorem.



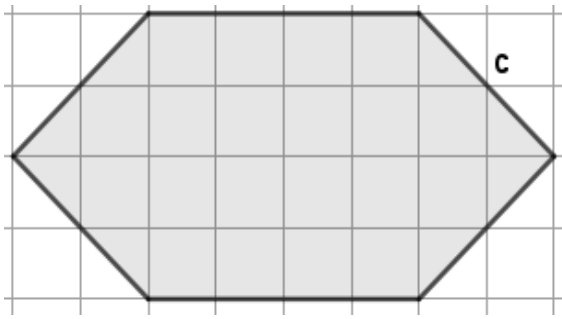
$c^2 =$
$c =$
Perimeter =

$b^2 =$
$b =$
Perimeter =

These two shapes have diagonal lines on them. Use the Pythagorean Theorem to find the length of the diagonal lines correct to one decimal place. Then calculate the perimeter.



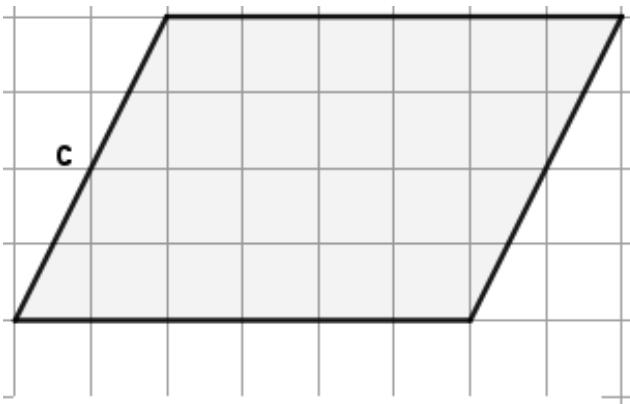
$c^2 =$
$c =$
Perimeter =



$c^2 =$
$c =$
Perimeter =

A Parallelogram is a quadrilateral that has to sets of parallel sides.

To find the perimeter of these parallelograms use the Pythagorean Theorem to calculate the length of the diagonal side.



$c^2 =$

$c =$

Perimeter =



$c^2 =$

$c =$

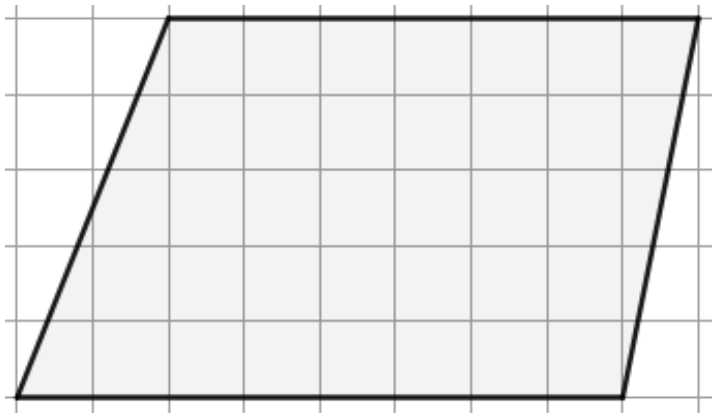
Perimeter =

An irregular Parallelogram

This quadrilateral is not a parallelogram. The left side is not parallel to the right side.

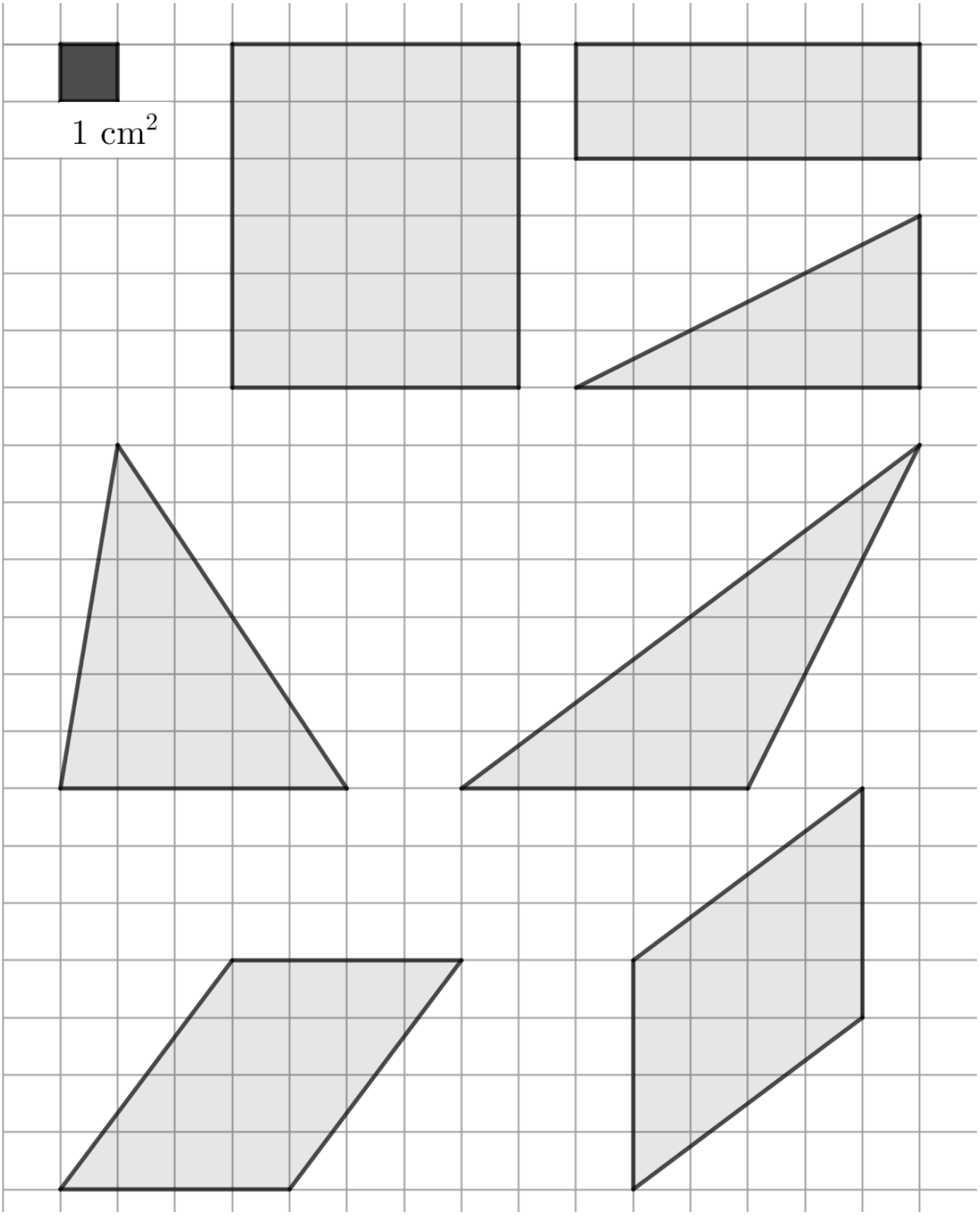
How is is possible to tell that the left and right are not parallel?

Calculate the perimeter of this irregular quadrilateral.



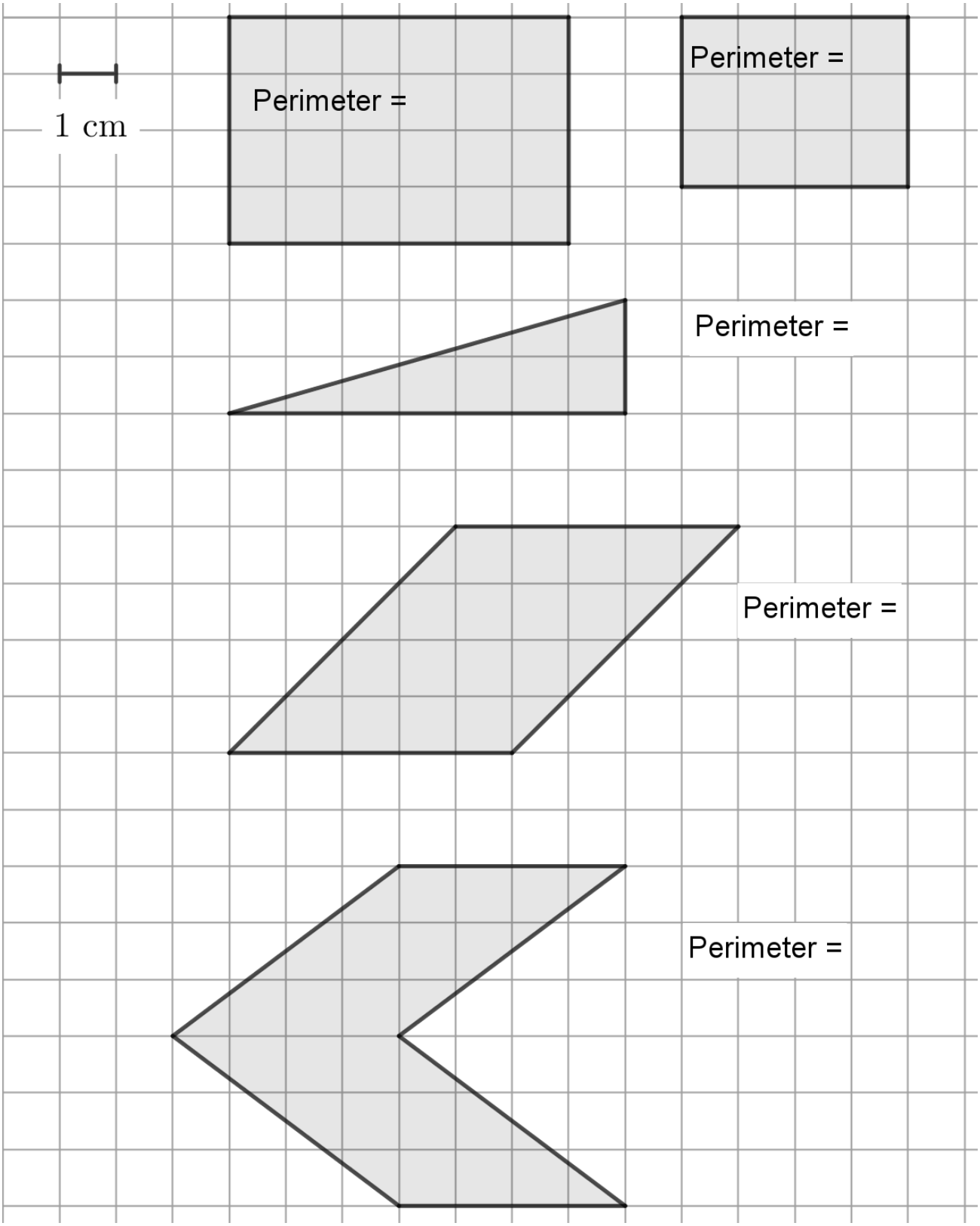
Review on Areas and Perimeters

1. Write the number of cm^2 on each shape drawn on the grid below.

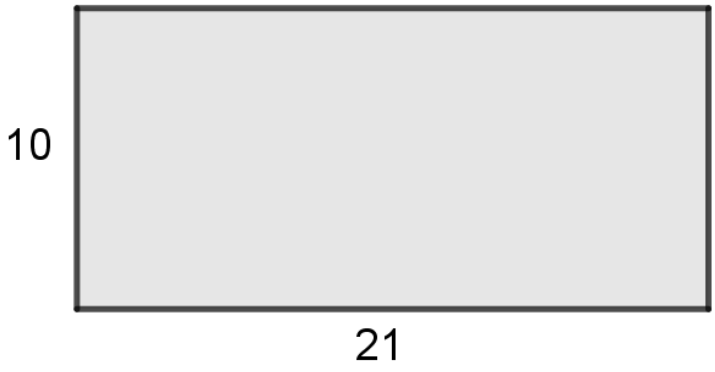


2. Calculate the **perimeter** of each shape. Remember to use the Pythagorean theorem to calculate lengths of diagonal lines.

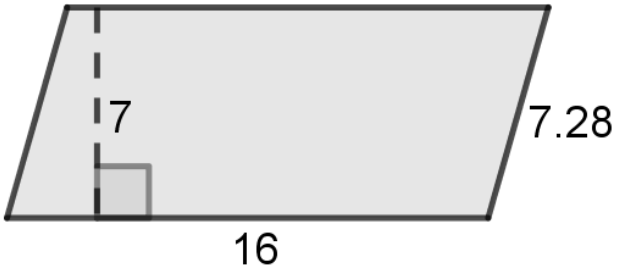
Round any decimal answers correct to **two decimal** places.



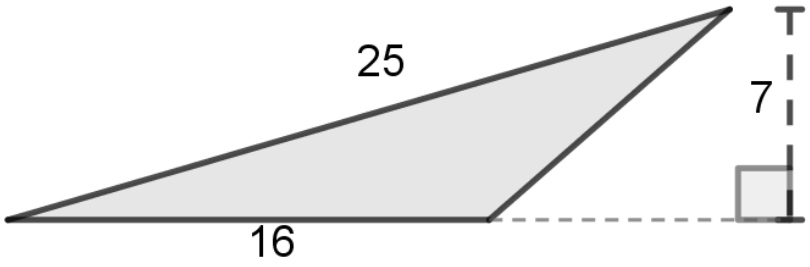
3. Calculate the area of each shape. Remember to ignore any dimensions that are given but not required.



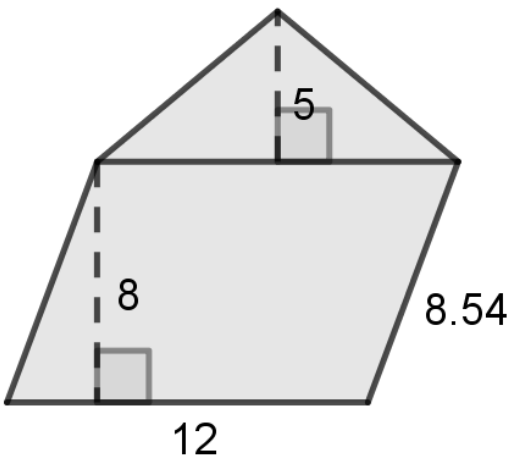
Area =



Area =



Area =



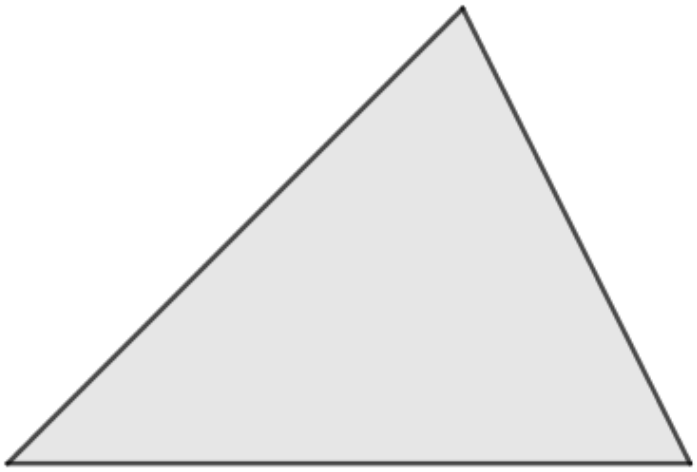
Area =

4. Use a ruler to measure these two shapes. Determine each area and perimeter.



Perimeter =

Area =



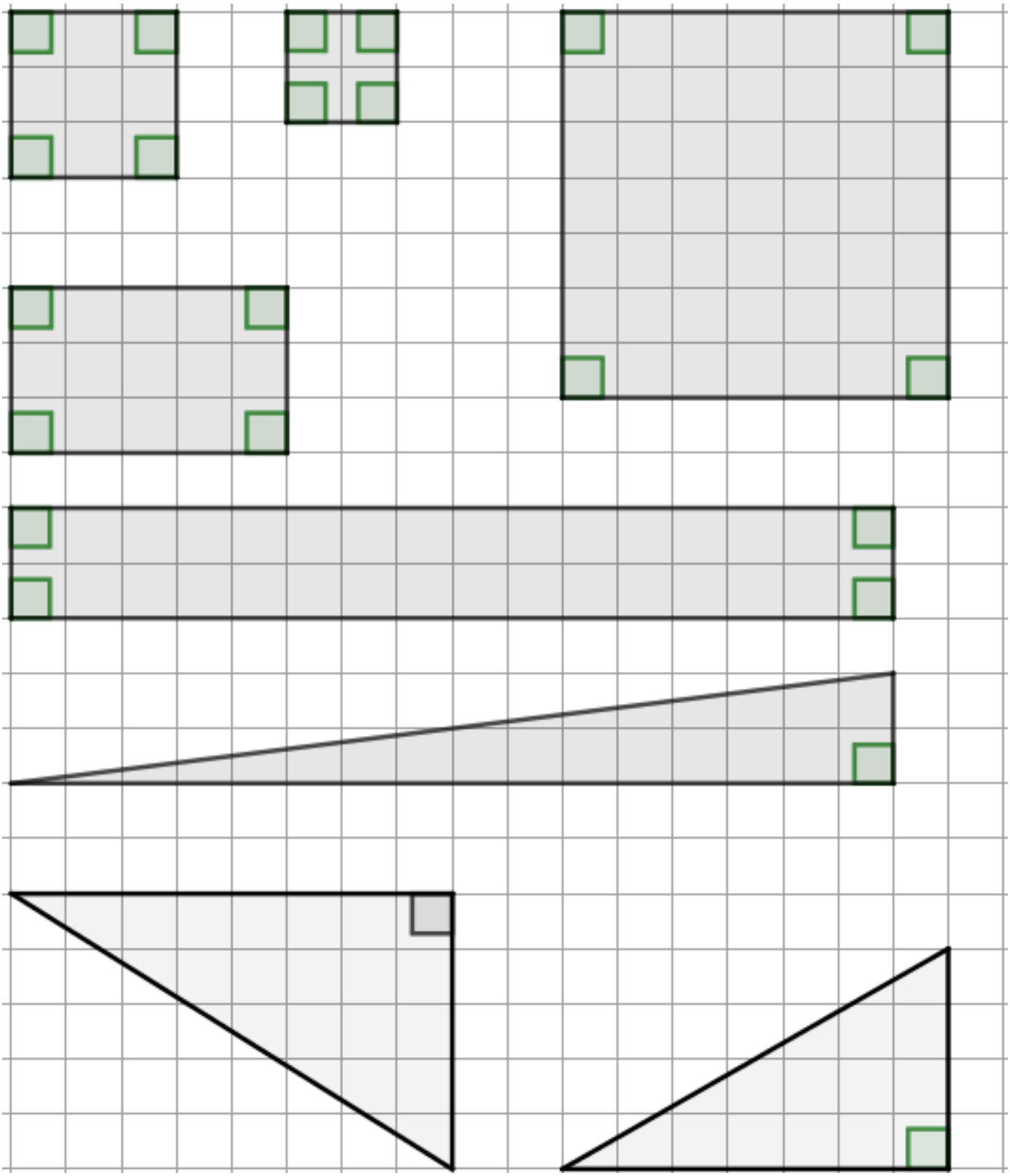
Perimeter =

Area =

5. On the grid below:

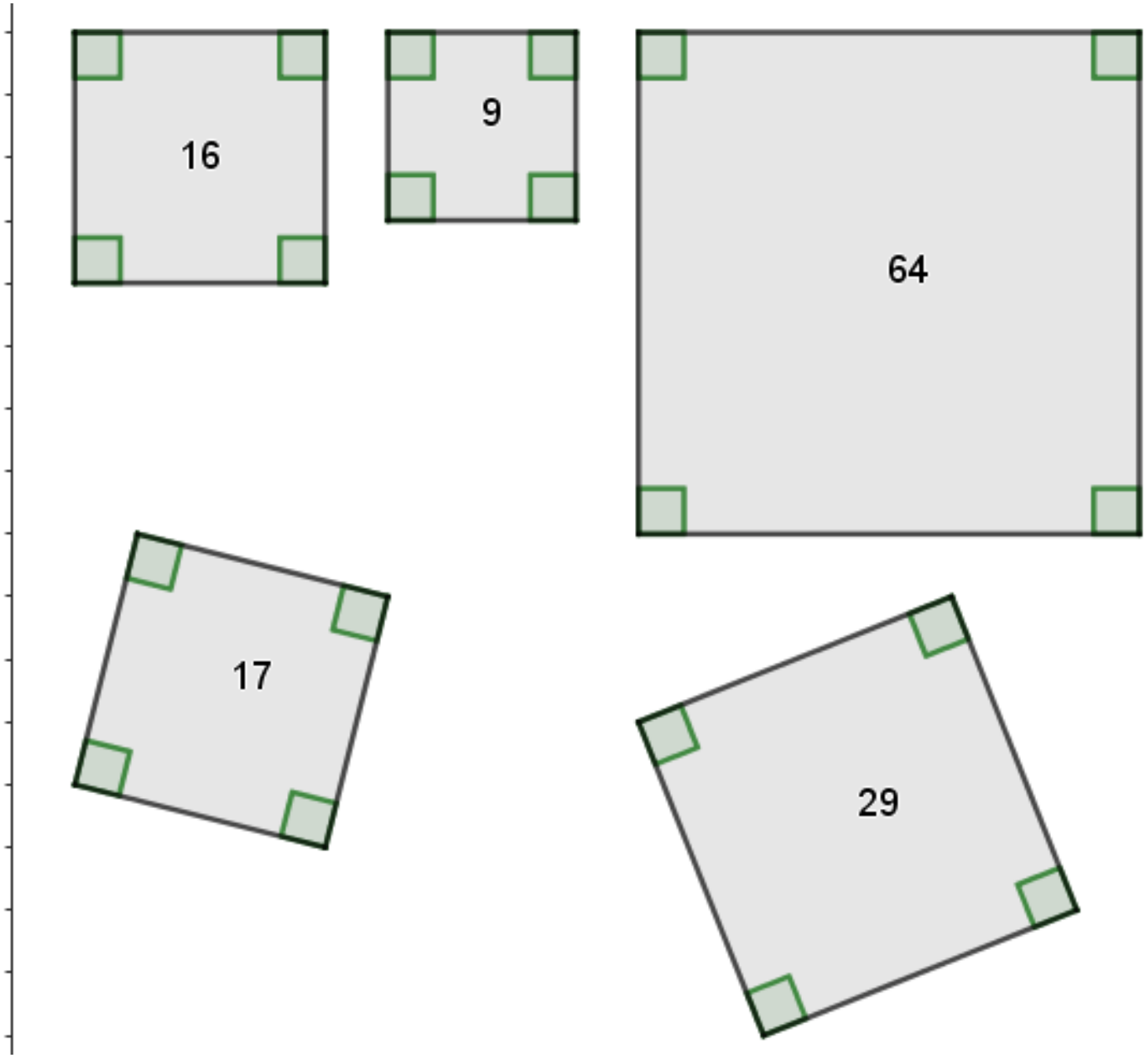
- draw a rectangle that has area = 24 cm^2 and perimeter = 22 cm.
- draw a parallelogram that has area = 30 cm^2
- draw a triangle or a trapezoid that has area = 20 cm^2

6. Write the area of each shape. 1 grid square is a ‘square cm’ (cm^2).



7. The shapes below are all squares. The area of each square is written on the square.

- Use $\sqrt{}$ to calculate the length of the side. Write it on the sides.
- If your answer is not an integer (whole number) round it to one decimal place.
- Use a ruler to check your calculation.



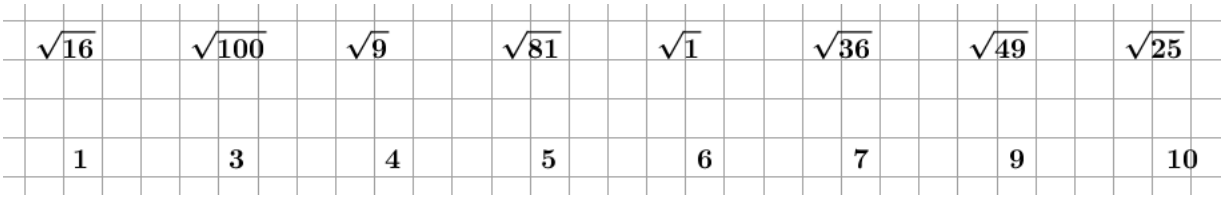
8. Here are the first 10 square numbers. Complete the blanks:

1	2	3	4	5	6	7	8	9	10
	4			25					100

9. CALCULATOR. Use x^2 and $\sqrt{\ }$ on your calculator to evaluate these numbers. If the answer is not a whole number, write it rounded correct to *two* decimal places:

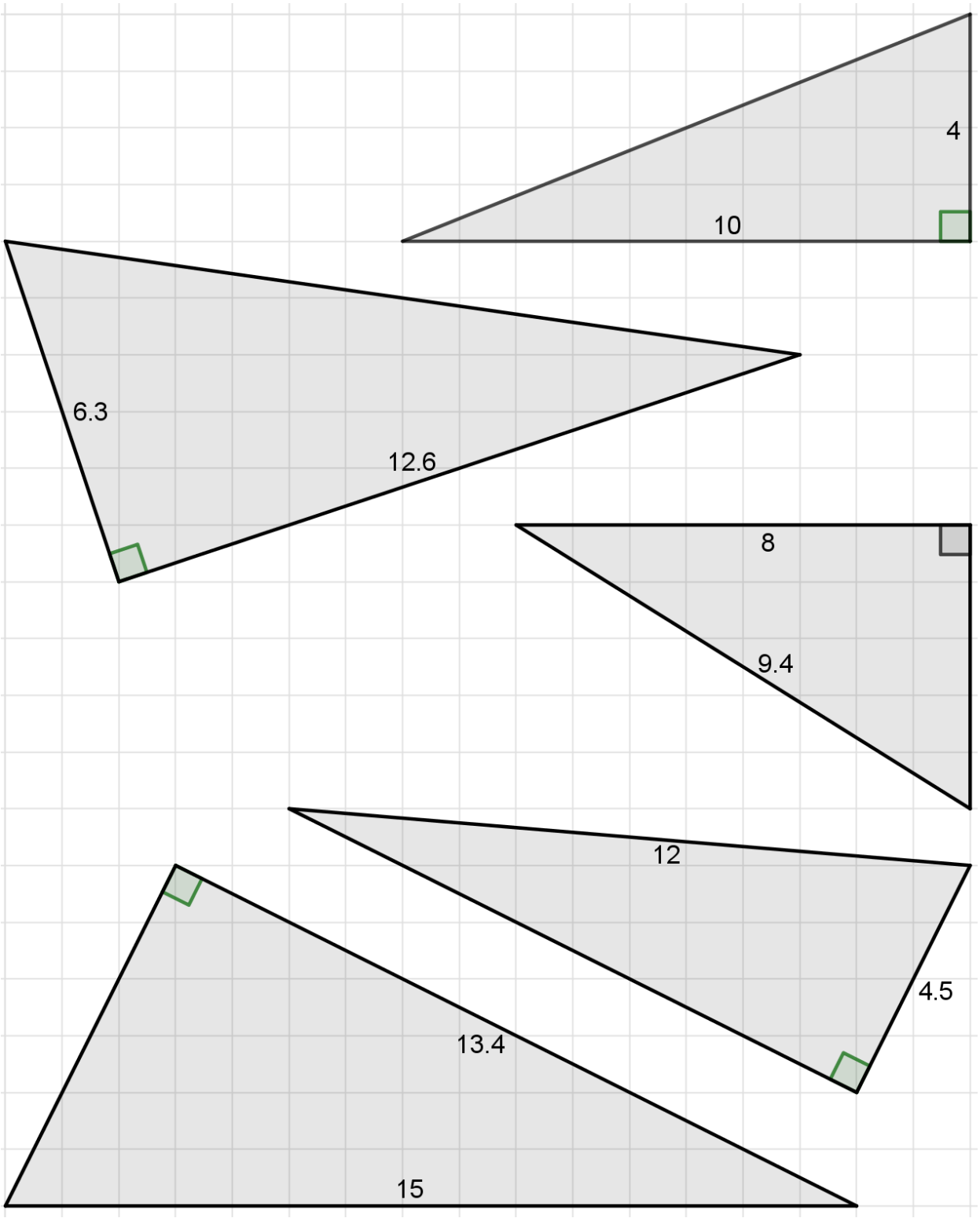
$30^2 =$	$13^2 =$	$0.9^2 =$	$7.6^2 =$
$\sqrt{1024} =$	$\sqrt{2025}$	$\sqrt{60} =$	$\sqrt{2023} =$

10. Match the square root with its value. Use lines to join them or colours/symbols to match them.



11. The Pythagorean Theorem says that $a^2 + b^2 = c^2$, when a, b are the shorter sides of a right angled triangle and c is the longest side (the hypotenuse).

Use the Pythagorean Theorem to calculate the length of the missing side length of these triangles. Show your working. Use a ruler to check your answer.



Geometry 1 Creative Task

Objective: Explain the calculations required for area and perimeter for two shapes.

Shape 1 Should be a triangle

Shape 2: Choose from a Parallelogram; Trapezoid or your own irregular quadrilateral.

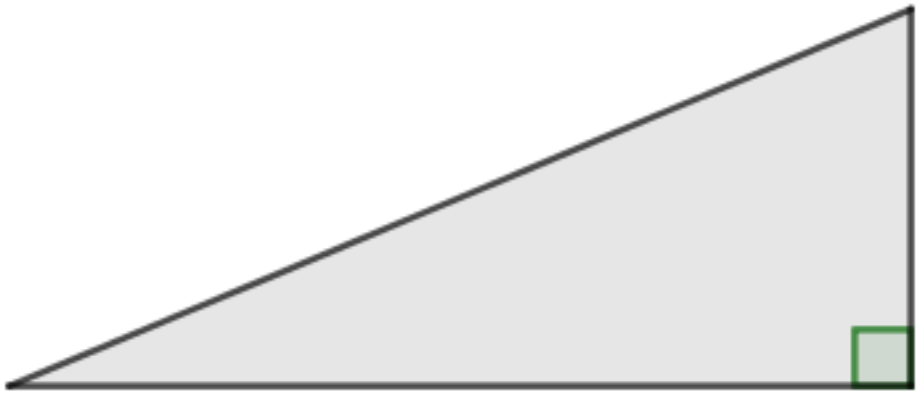
Instructions:

1. Take one piece of construction paper and two pieces of blank paper and one piece of scrap paper.
2. Stick the two pieces of blank paper onto the construction paper. Put a title and name on each side.
3. Take a chrome book. Open a google doc and put your name on it. Open the GeoGebra activity.
4. Create your triangle and your quadrilateral.
5. Export the images to your google doc. Make a few copies of each shape. One for area, one for perimeter, and perhaps one or two spare.
6. Print your doc and collect from the printer.
7. On your scrap paper, calculate the area and perimeter of each of your shapes. Check your calculations using the app and/or with Ms Jenn/Lee.
8. Use the space on your construction paper to explain all the steps of each calculation.

Grade 9 KC Module 2 NAME:

TEST: Squares, Square numbers, Rectangles and Right Triangles

1. Use a ruler to measure all three sides of this triangle. Write the length of each side on the triangle.



2. Match the square root with its value. Use lines to join them or colours/symbols to match them.

$\sqrt{16}$	$\sqrt{49}$	$\sqrt{4}$	$\sqrt{121}$	$\sqrt{1}$
1	2	4	7	11

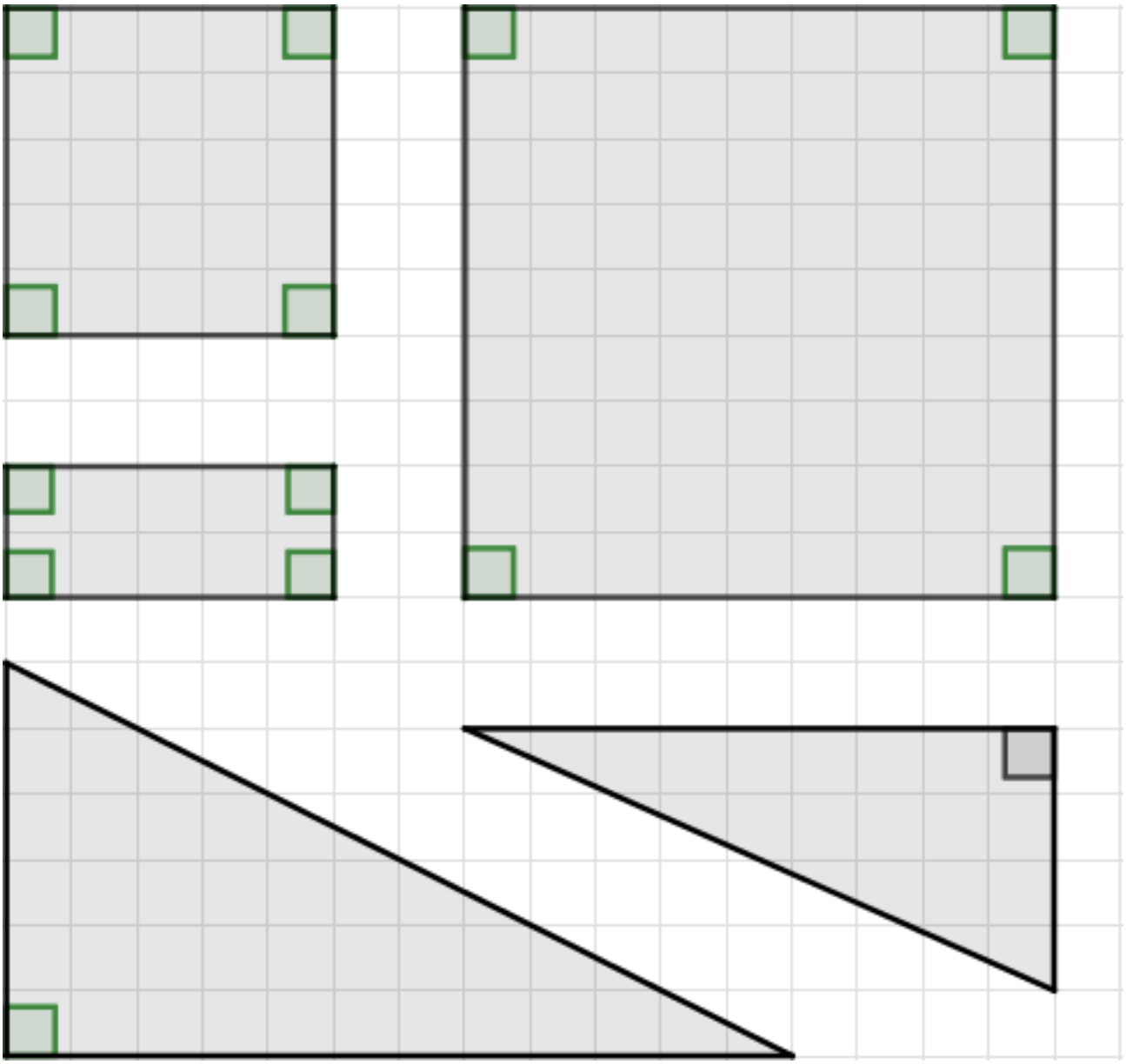
3. This list of 10 numbers includes three numbers that are *not* perfect squares. Cross them out.

$$1, \quad 81, \quad 60, \quad 49, \quad 36, \quad 40, \quad 100, \quad 9, \quad 48, \quad 144$$

4. CALCULATOR. Use x^2 and $\sqrt{\ }$ on your calculator to evaluate these numbers. If the answer is not a whole number, write it rounded correct to *two* decimal places:

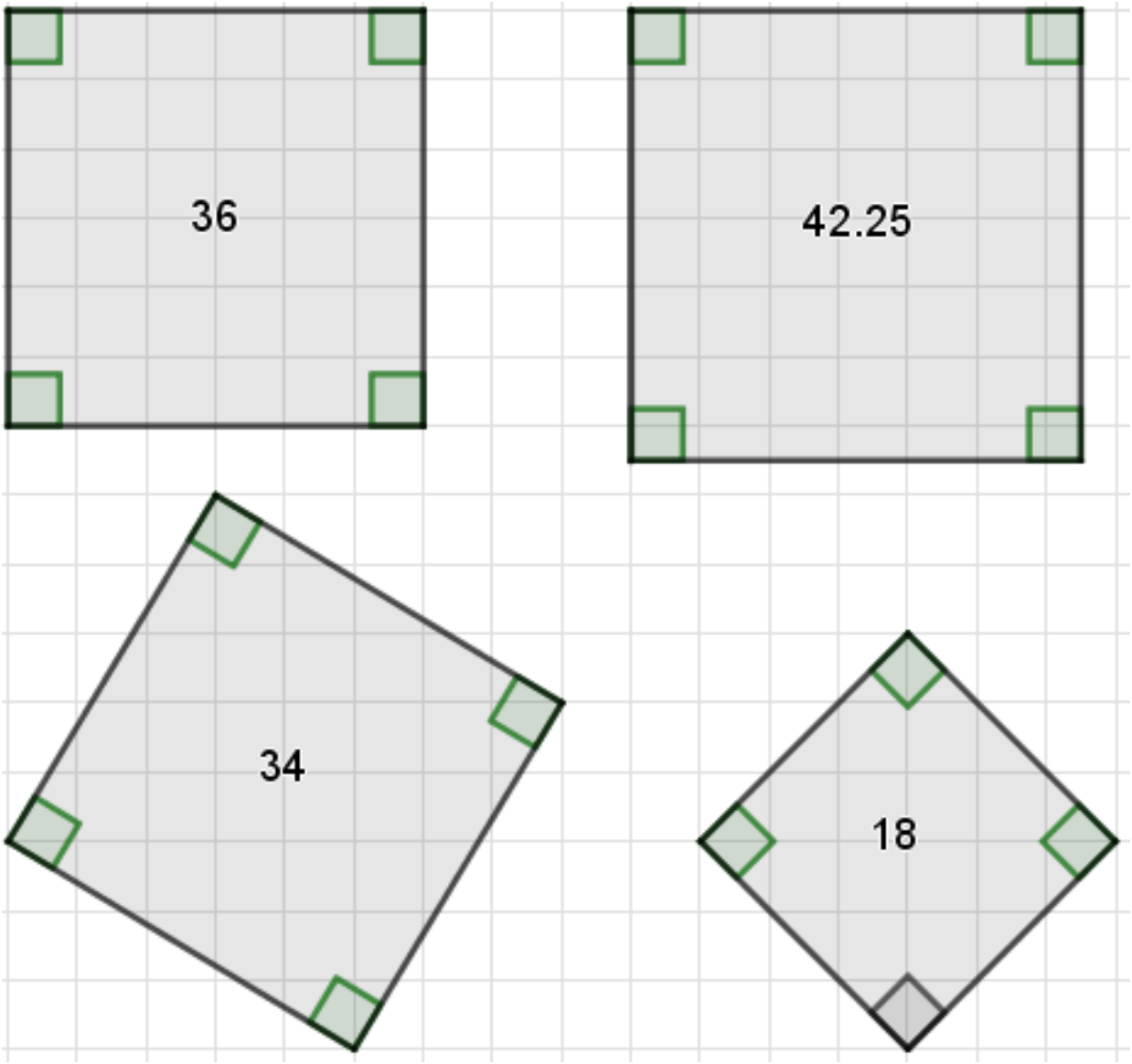
$23^2 =$	$0.3^2 =$
$\sqrt{900} =$	$\sqrt{500} =$

5. Write the area of each shape. 1 grid square is a ‘square cm’ (cm^2).



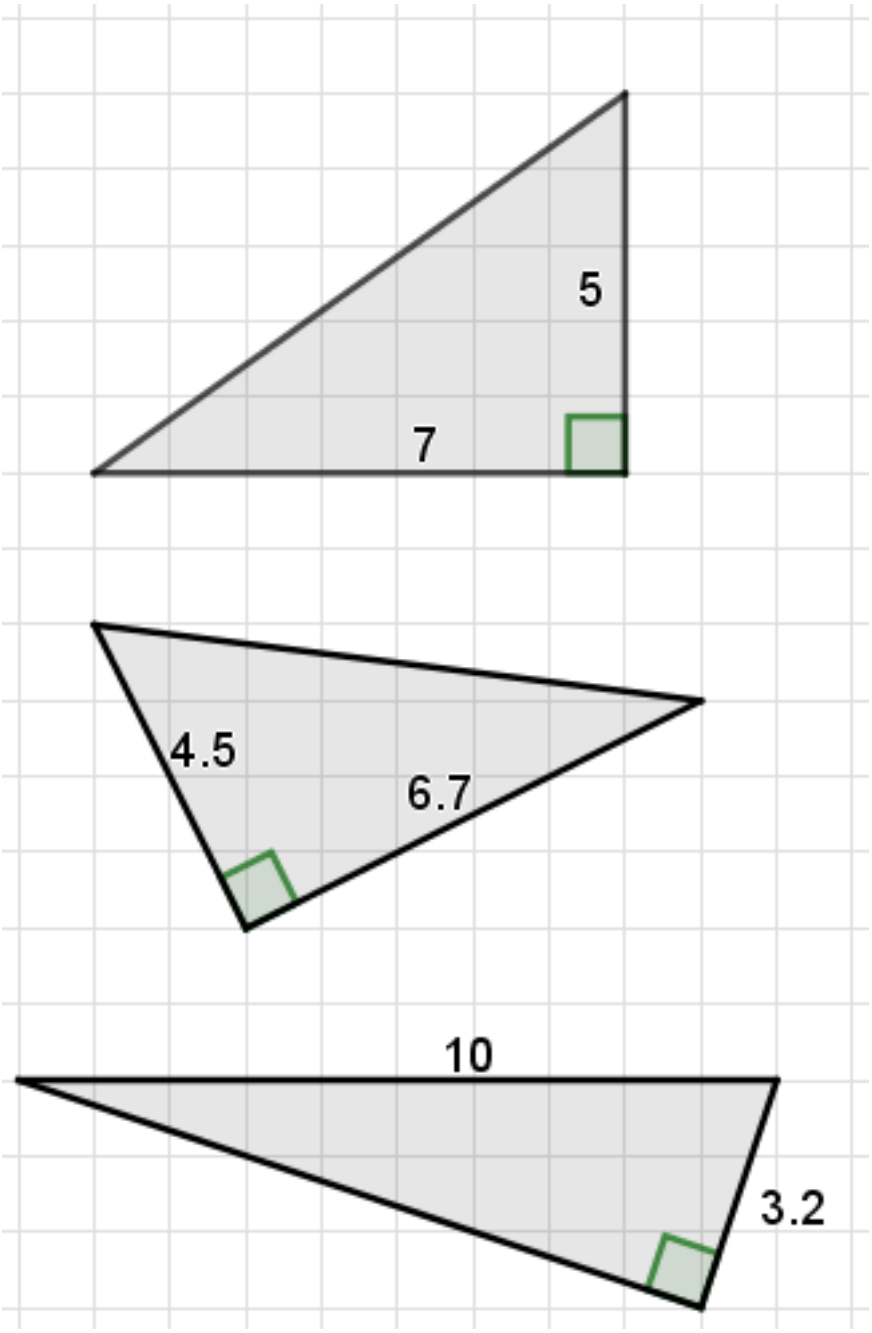
6. The shapes below are all squares. The area of each square is written on the square.

- Use $\sqrt{}$ to calculate the length of the side. Write it on one side.
- If your answer has many decimals, round it to two decimal places.
- Use a ruler to check your calculation.



7. The Pythagorean Theorem says that $a^2 + b^2 = c^2$, when a, b are the shorter sides of a right angled triangle and c is the longest side (the hypotenuse).

Use the Pythagorean Theorem to calculate the length of the missing side length of these triangles. Show your working. Use a ruler to check your answer.



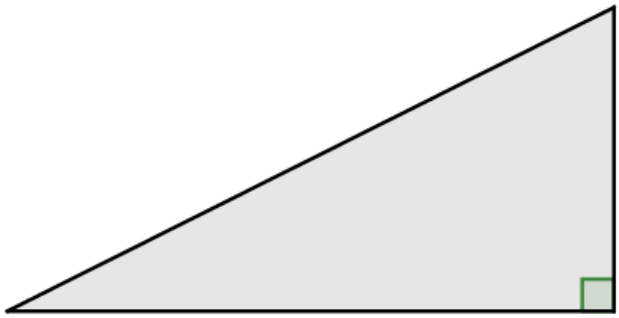
END OF QUIZ

Grade 9 KC Geom1 RETAKE NAME:

RETAKE: Squares, Square numbers, Rectangles and Right Triangles

1. Use a ruler to measure all three sides of this triangle using cm and mm.

   Write the length of each side on the triangle.



2. Match the square root with its value. Use lines to join them or colours/symbols to match them.

$\sqrt{9}$	$\sqrt{25}$	$\sqrt{144}$	$\sqrt{1}$	$\sqrt{36}$
1	3	5	6	12

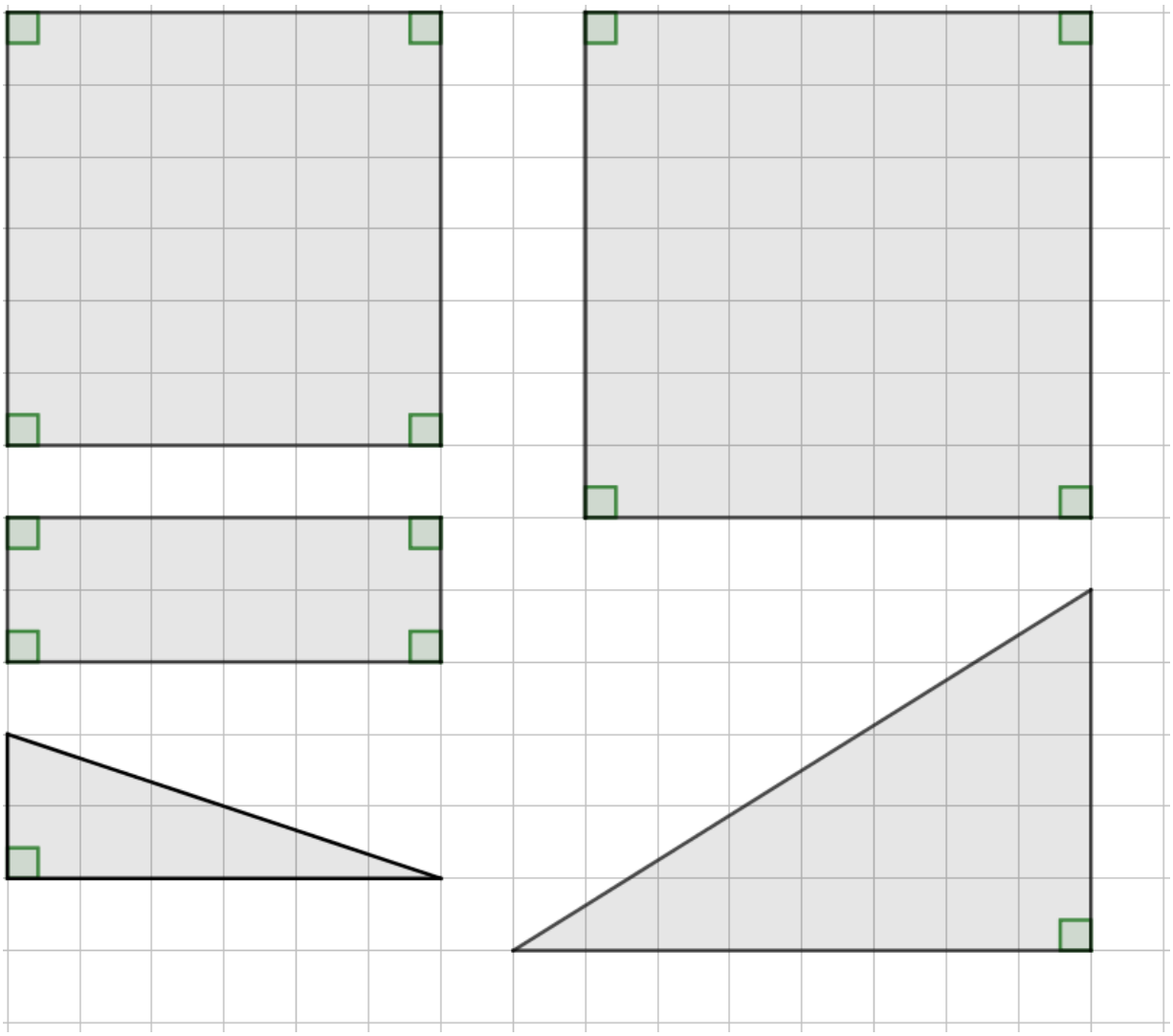
3. This list of 10 numbers includes three numbers that are *not* perfect squares. Cross them out.

1, 81, 60, 49, 36, 40, 100, 9, 48, 144

4. CALCULATOR. Use x^2 and $\sqrt{\ }$ on your calculator to evaluate these numbers. If the answer is not a whole number, write it rounded correct to *two* decimal places: camouflage

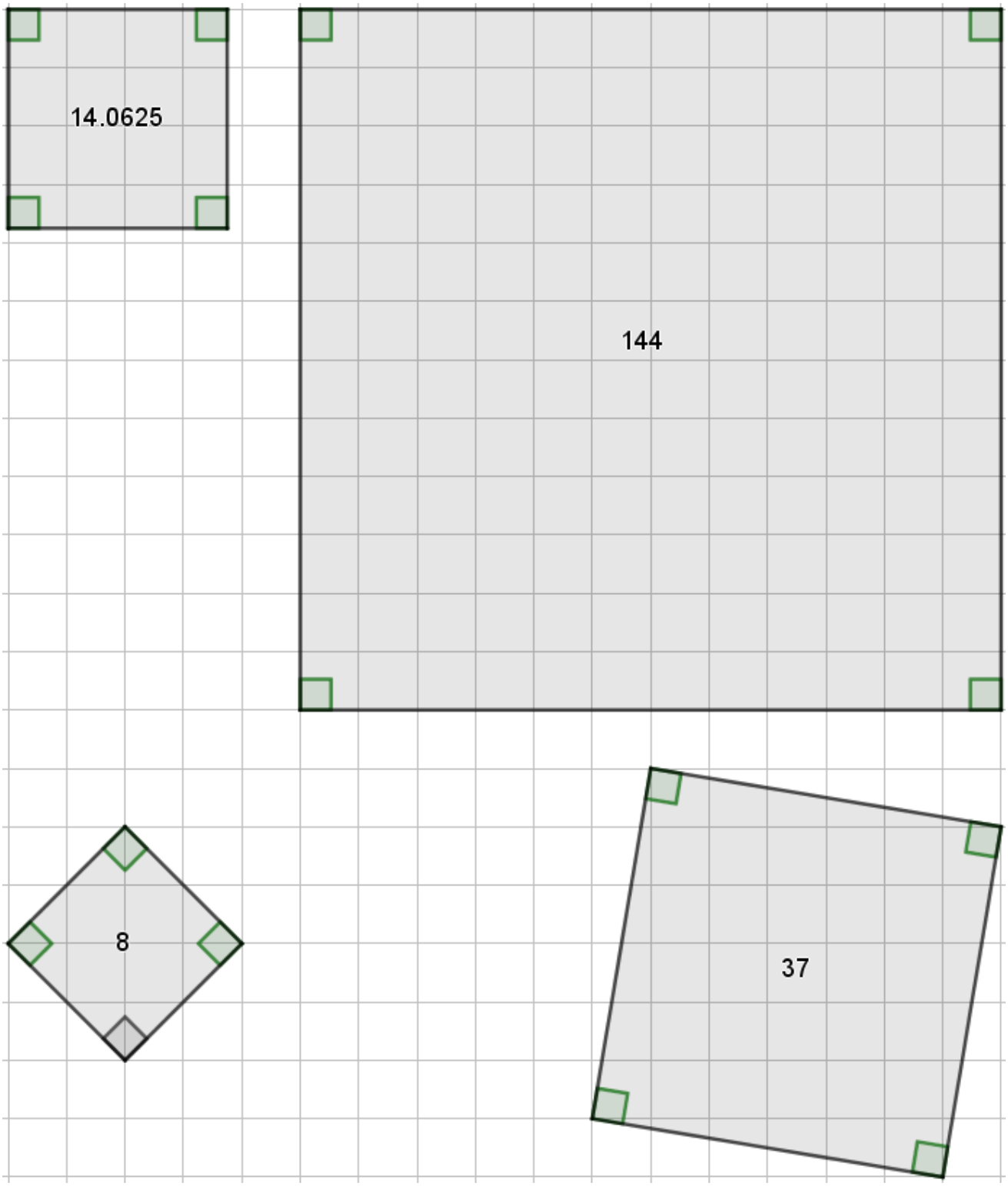
$17^2 =$	$0.8^2 =$
$\sqrt{1225} =$	$\sqrt{450} =$

5. Write the area of each shape. 1 grid square is a ‘square cm’ (cm^2).



6. The shapes below are all squares. The area of each square is written on the square.

- Use $\sqrt{}$ to calculate the length of the side. Write it on one side.
- If your answer has many decimals, round it to **two decimal places**.
- You may use a ruler to check your calculation.

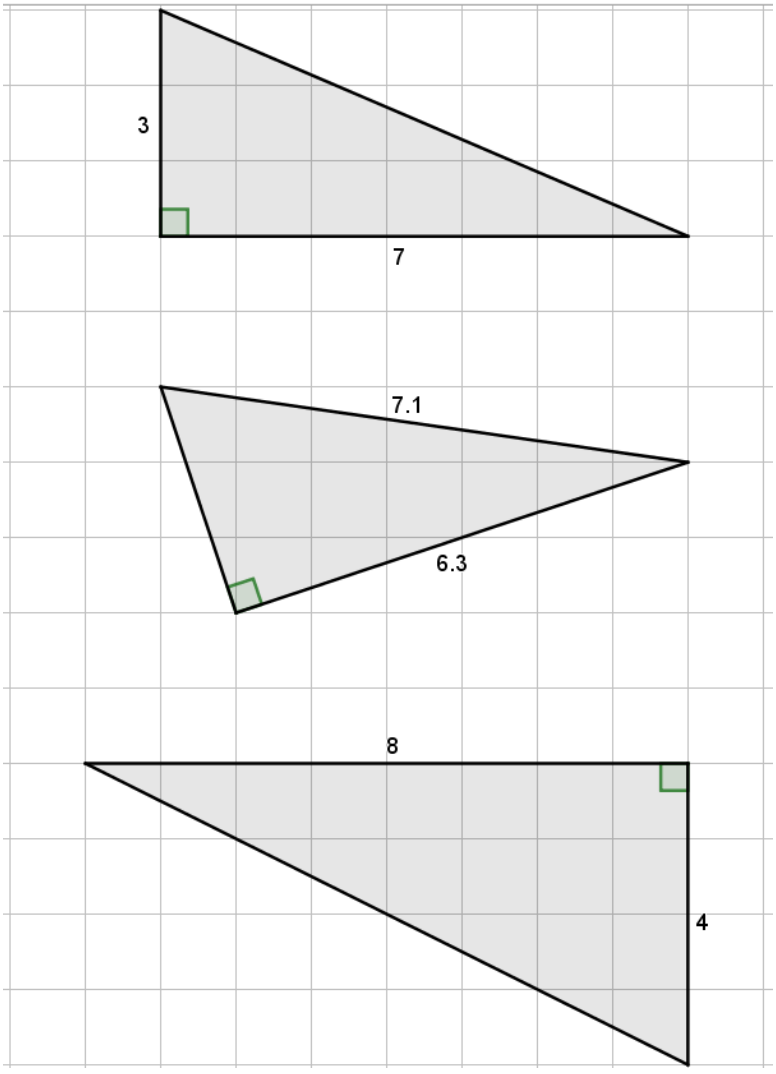


7. The Pythagorean Theorem says:

If a, b are the shorter sides of a right-angled triangle and c is the longest side (the hypotenuse) then $a^2 + b^2 = c^2$

Use the Pythagorean Theorem to calculate the length of the missing side length of these triangles.

Show your working. You may use a ruler to check your answer.

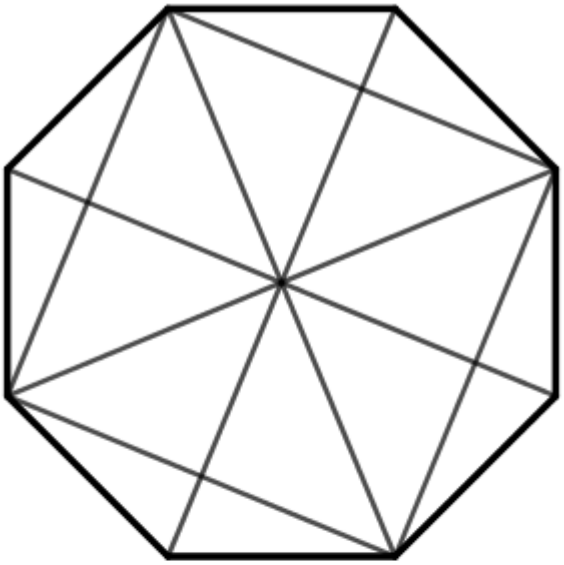


END OF RETAKE

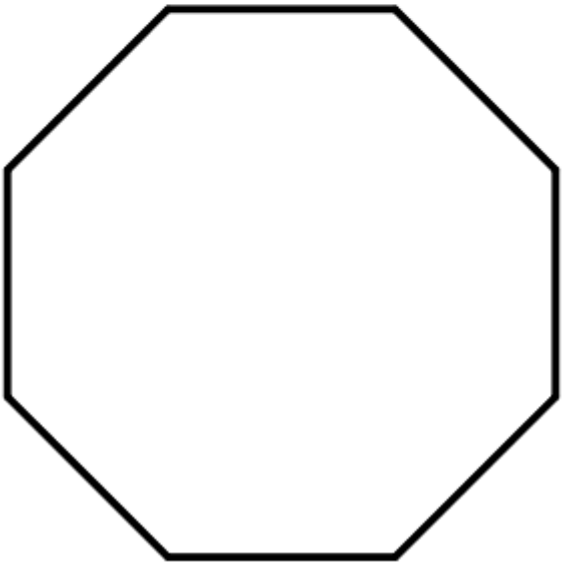
REGULAR OCTAGON (Draw & colour)

This regular octagon has been divided using 8 lines.

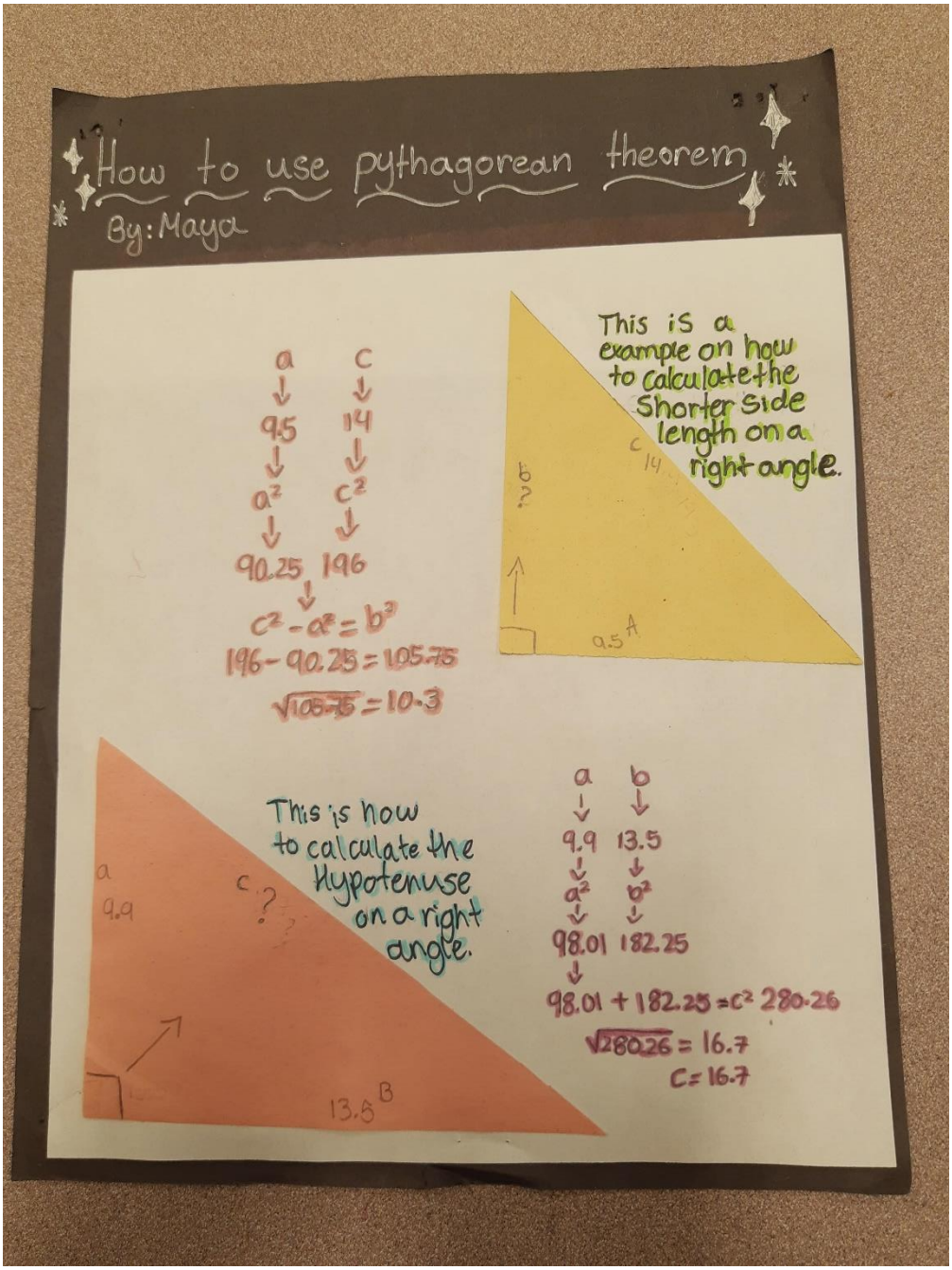
How many right-angled triangles are there in the octagon?

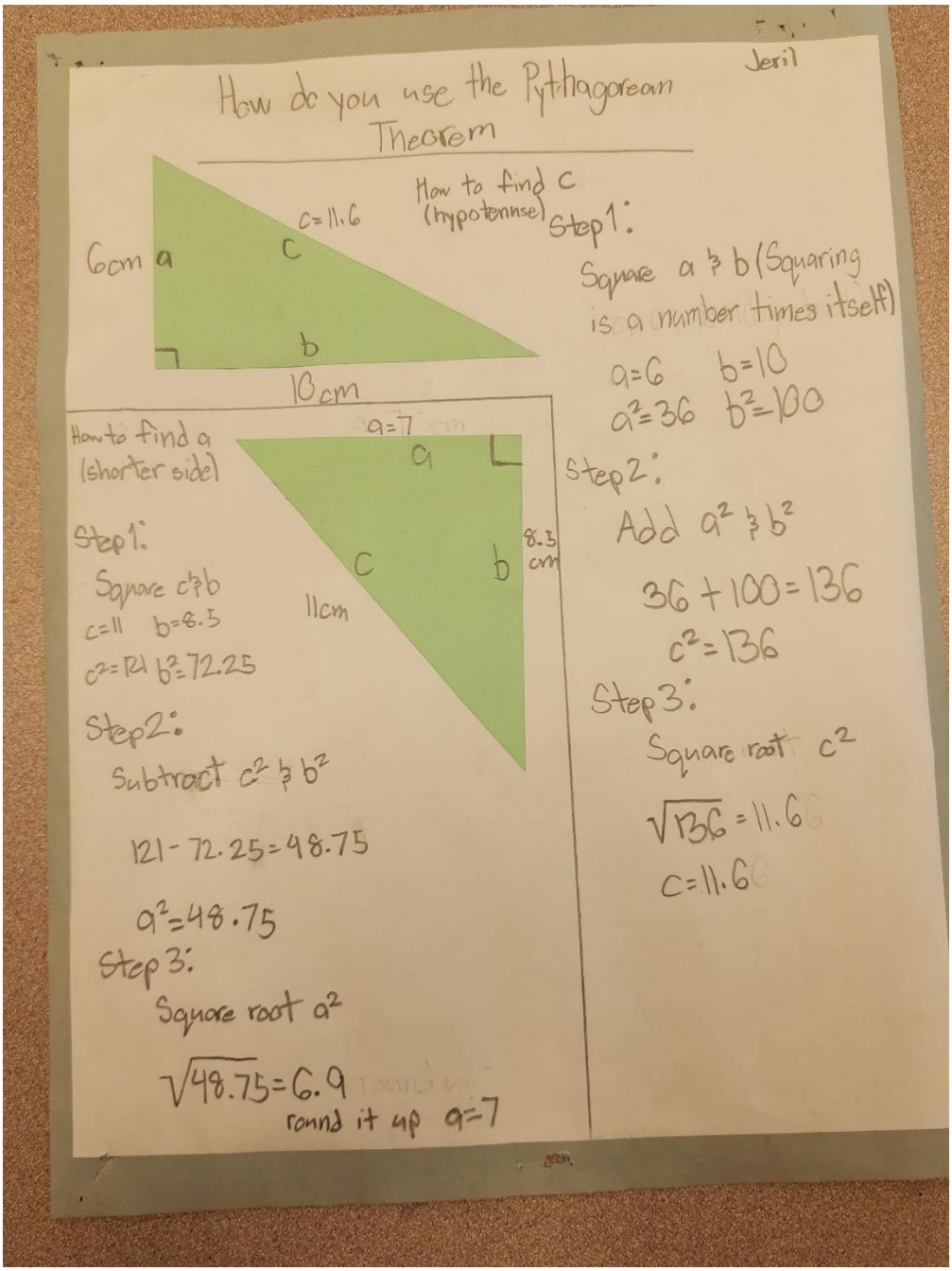


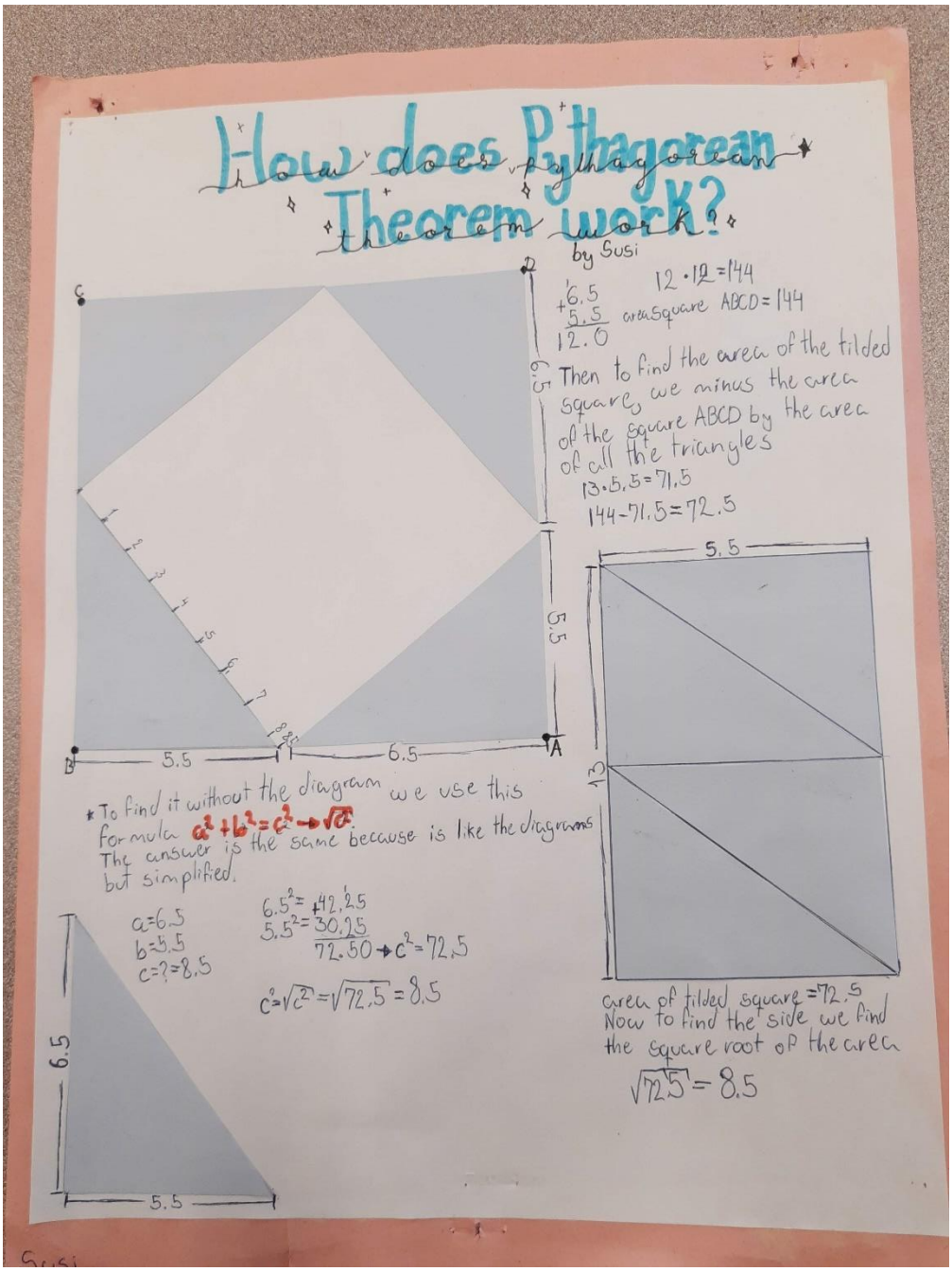
Make your own pattern in this octagon.
Colour your design.



Student work Creative task examples:




Jeril
How do you use the Pythagorean Theorem
How to find c (hypotennse)
c=11.6
6cm
a
c
b
10cm
Step 1:
Square a & b (Squaring is a number times itself)
a=6 b=10
a²=36 b²=100
Step 2:
Add a² & b²
36+100=136
c²=136
Step 3:
Square root c²
√136=11.6
c=11.6
How to find a (shorter side)
a=7
a
c
b
8.3 cm
11cm
Step 1:
Square c & b
c=11 b=8.5
c²=121 b²=72.25
Step 2:
Subtract c² & b²
121-72.25=48.75
a²=48.75
Step 3:
Square root a²
√48.75=6.9
round it up a=7



$12 \cdot 12 = 144$

$+\frac{6.5}{5.5}$ area square ABCD = 144

12.0

Then to find the area of the tilded square, we minus the area of the square ABCD by the area of all the triangles

$13 \cdot 5.5 = 71.5$

$144 - 71.5 = 72.5$

area of tilded square = 72.5

Now to find the side we find the square root of the area

$\sqrt{72.5} = 8.5$

* To find it without the diagram we use this formula $a^2 + b^2 = c^2 \rightarrow \sqrt{c^2}$. The answer is the same because is like the diagrams but simplified.

$a = 6.5$

$b = 5.5$

$c = ? = 8.5$

$6.5^2 = 42.25$

$5.5^2 = 30.25$

$72.50 \rightarrow c^2 = 72.5$

$c = \sqrt{c^2} = \sqrt{72.5} = 8.5$

Susi