Mathematics GCSE. Edexcel Linear paper. Foundation tier.
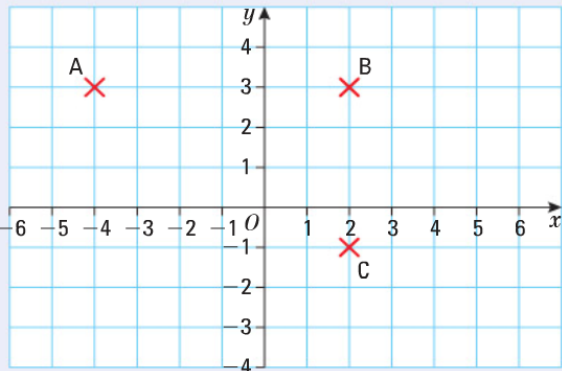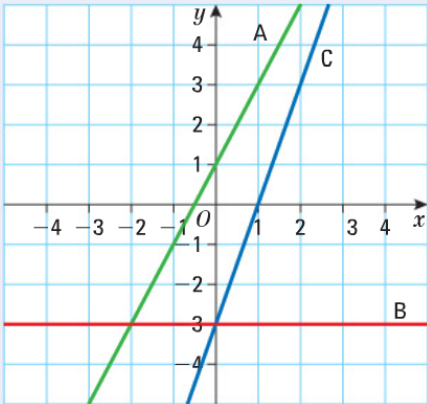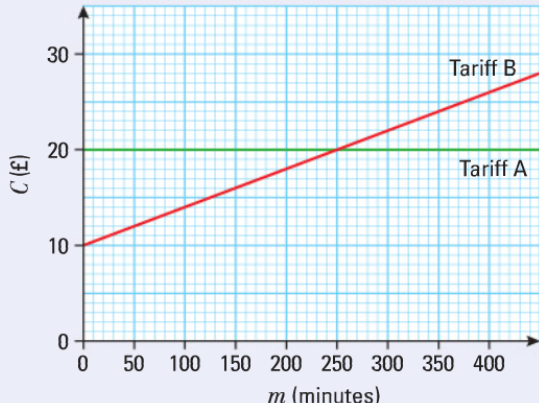
Calc/ Non-calc	Topic	Grade	Example questions	Self-assessment
	Digits and Place Value	G	Write down the value of the 5 in the following numbers. a 651 b 5302 c 253 101 d 10 050 e 175	YES / OK / NO
	Negative numbers	F	Work out a $3 - 7$ b $-3 + 5$ c $-11 - 4$ d $4 - (-6)$ e $(-5) + (+3)$ Work out a $+3 \times -7$ b -4×-5 c $16 \div -2$ d $-15 \div -3$ e $-28 \div +4$	YES / OK / NO
	Functional Number Calculations	E	The table shows the cost of two different models of the Eiffel Tower. | Small	£2.40
Large	£4.50	 Pierre buys 10 small models and 5 large models. He pays with a £50 note. Work out how much change he should get.	YES / OK / NO

❌	Factors, Multiples, Primes	**G**	Using only the numbers in the cloud, write down: **a** all the multiples of 6 **b** all the square numbers **c** all the factors of 12 **d** all the cube numbers. Cloud numbers: 8, 12, 5, 6, 3, 27, 16, 4	YES / OK / NO
❌	HCF & LCM	**D**	A buzzer buzzes every 4 seconds and a bell rings every 6 seconds. The buzzer and the bell start at the same time. How many times in the first minute will they make a sound at the same instant?	YES / OK / NO
❌	Prime factorisation HCF & LCM	**C**	**a** Express the following numbers as products of their prime factors. **i** 60 **ii** 96 **b** Find the highest common factor of 60 and 96. **c** Work out the lowest common multiple of 60 and 96. A car's service book states that the air filter must be replaced every 10 000 miles and the diesel fuel filter every 24 000 miles. After how many miles will both need replacing at the same time?	YES / OK / NO
❌	Decimals	**F**	C M B N 2.7 m D 3.6 m A N is the midpoint of CD. M is the midpoint of CB. Work out the difference in length between N to C to M and M to B to A.	YES / OK / NO
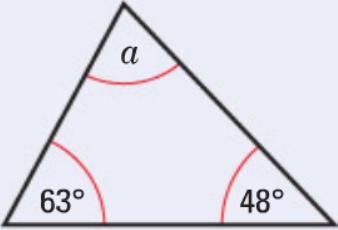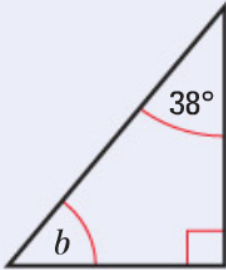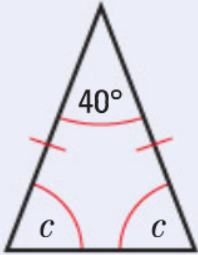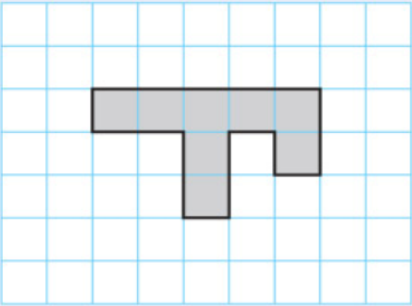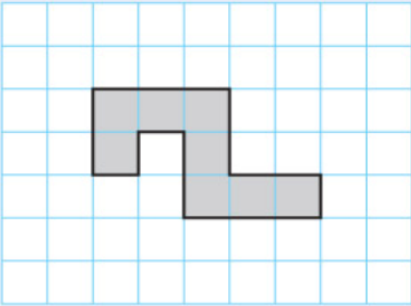
	Decimals	F	Angela has £15.76. She buys as many bottles of drink costing £1.20 each as she can. How many does she buy and how much money does she have left?	YES / OK / NO
	Rounding to DP and SF	E	Round these numbers to 1 decimal place. a 23.48 b 1.7502 c 0.3479 d 150.03 Round these numbers to the number of decimal places given in brackets. a 7.263 (2) b 73.0448 (2) c 0.041 68 (3) d 0.7208 (3) Round these numbers to the number of significant figures given in brackets. a 8317 (2) b 20 056 (3) c 0.546 72 (1) d 20.873 (3)	YES / OK / NO
	Estimation	C	Work out an estimate for the total cost of 36 books costing £7.97 each. Sasha works for a company. She gets paid expenses of 40p for each mile she drives during work. Last year she worked for 48 weeks. Her total expenses for driving for the year were £2116.80. Work out an estimate for the average number of miles Sasha drove during work each week last year.	YES / OK / NO
	Fractions	D	Work out a $\frac{3}{5} \times \frac{2}{9}$ b $\frac{7}{15} \times \frac{5}{21}$ c $\frac{9}{16} \div \frac{3}{4}$ Work out a $\frac{5}{12} + \frac{1}{4}$ b $\frac{7}{15} + \frac{4}{45}$ c $\frac{3}{5} + \frac{3}{8}$ d $\frac{7}{12} + \frac{4}{9}$ e $\frac{7}{9} - \frac{1}{3}$	YES / OK / NO
	Mixed numbers	C	a $2\frac{1}{2} \times 3\frac{2}{5}$ b $3\frac{3}{8} \div 2\frac{4}{7}$ c $1\frac{2}{5} \div 1\frac{11}{14}$	YES / OK / NO
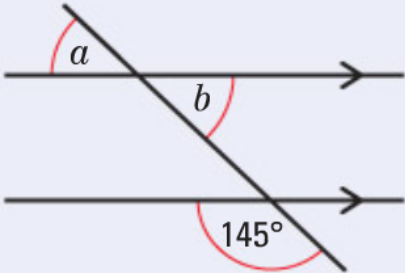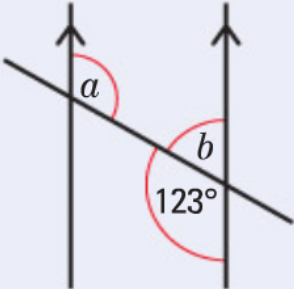
			The diagram represents a part of a machine. In order to fit the machine, the part must be between $6\frac{1}{16}$ cm and $6\frac{3}{16}$ cm long. Will the part fit the machine? You must explain your answer. $2\frac{1}{2}$ cm $3\frac{5}{8}$ cm	
	Percentages	D	Last year, a football team won 40% of all its games. The team won 14 of the first 30 games. The team played 10 more games. How many of these 10 games did the team win? A store reduced all normal prices by 10% in a two-day-sale. Work out the sale price of: a a drill with a normal price of £70 b a lawnmower with a normal price of £180 c a tin of paint with a normal price of £14	
	Ratio	D	There are 600 counters in a bag. 90 of the 600 are yellow. 180 of the 600 are red. The rest of the counters in the bag are blue or green. There are twice as many blue counters as green counters. Work out the number of green counters in the bag.	

			Mr Brown makes some compost. He mixes soil, manure and leaf mould in the ratio $3:1:1$. Mr Brown makes 75 litres of compost. How many litres of soil does he use?	

❌	Writing & simplifying expressions	D	Callum has £3 more than Luke. Becky has twice as much as Callum. Write down an expression for the total amount in pounds Callum, Luke and Becky have altogether. Simplify a $5bc + 2bc - 4bc$ b $4x + 3y - 2x + 2y$ c $m \times m \times m$ d $3n \times 2p$	YES / OK / NO
❌	Expanding & Factorising	C	Expand and simplify a $3a(b - 2a) + 2b(3a - 2b)$ b $4p(2q + 3p) + 3p(2p + q)$ c $5c(3c + 2d) - 2c(c - d)$ d $a(a + b) + b(a + b)$ e $3a(b + c) + 2b(a + c) - c(2a + 3b)$ f $2a(b - 2c) - 3b(2a + 3c)$ Factorise a $x^2 - 7x$ b $t^2 + at$ c $bx^2 - x$ d $3p^2 + py$ e $aq^2 - at$	YES / OK / NO
❌	Indices	C	Simplify a $x^6 \times x^3$ b $x^8 \div x^5$ c $(x^3)^5$ d $x^5 \div x^4$ e $x \times x^4$ f $(x^6)^2$ g $x^8 \div x^8$ h $x^7 \div x$ i $x^2 \times x^6 \times x^3$ j $x^8 \times x$ k $x^6 \times \dfrac{x^4}{x^7}$ l $x^3 \times \dfrac{x^7}{x^4} \times x^5$	YES / OK / NO
❌	Sequences	C	Here are the first five terms of a number sequence. 3 7 11 15 19 a Work out the 8th term of the number sequence. b Write down an expression, in terms of n, for the nth term of the number sequence.	YES / OK / NO
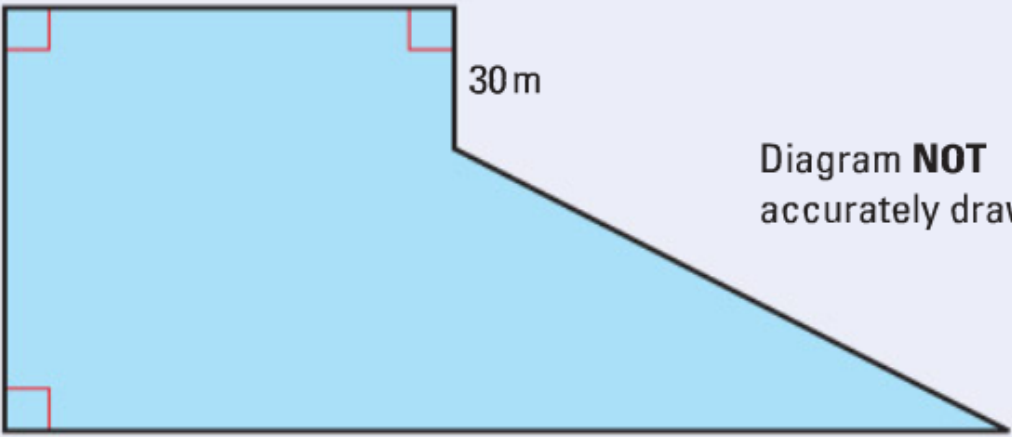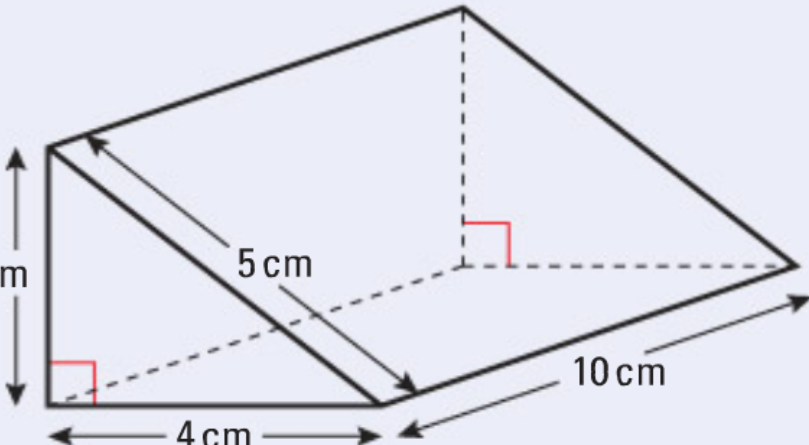
	Co-ordinates	C	Here is a grid of centimetre squares. **a** Write down the coordinates of the points **i** B **ii** C. ABCD is a quadrilateral. The area of ABCD is $24\ cm^2$. **b** Write down the coordinates of D. E is another point on the grid. The coordinates of the midpoint of AE are $(-1, 2)$. **c** Find the coordinates of E.		
	Straight Line Graphs	C	Write down the equation of each of the lines shown in the grid.		
	Real World Graphs	C	Josh is presented with a graph showing him a choice of two different mobile phone tariffs. The graph shows the cost, C, against the number of minutes, m, spent on his mobile in a particular month. **a** Find the formulae of C against m for both tariffs. **b** Explain in words how the tariffs are calculated. **c** Advise Josh which scheme he should choose.		
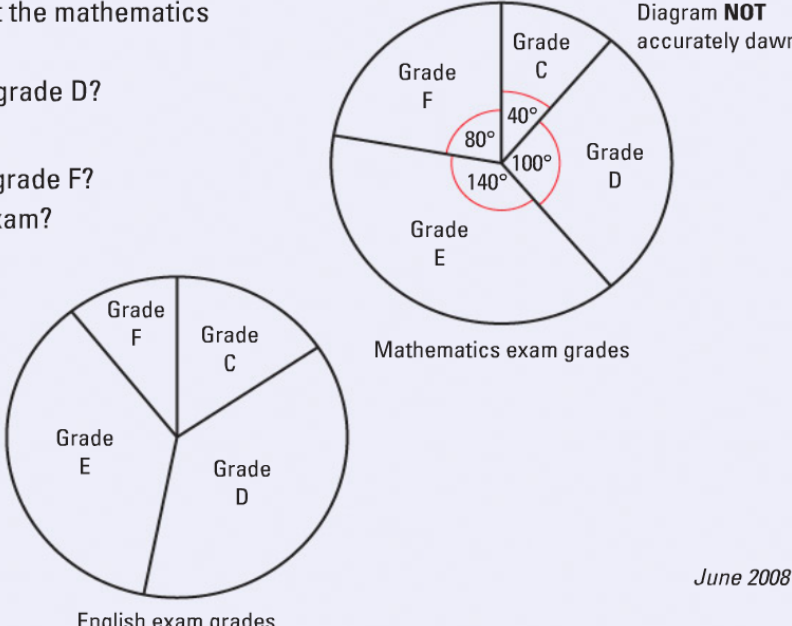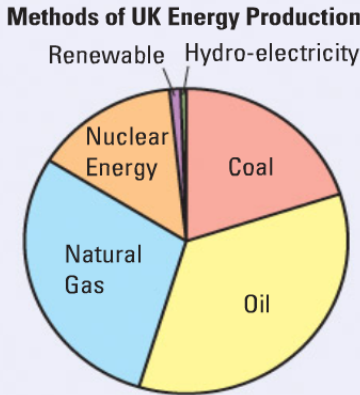
	Formulae	**C**	The cost of hiring a car can be worked out using this rule. Cost = £90 + 50p per mile Bill hires a car and drives 80 miles. **a** Work out the cost. The cost of hiring a car is C pounds. **b** Write the formula for C.	YES OK NO
	Angles 1	**F**	Work out the missing angles in these triangles. **a** 63° 48° a **b** 38° b **c** 40° c c	YES OK NO
	2D Shapes	**D**	**a** On a copy of this diagram, shade **one** more square so that the shape has exactly **one** line of symmetry. **b** On a copy of this diagram, shade **one** more square so that the shape has rotational symmetry of order **2**.	YES OK NO

❌	Angles 2	**D**	Find the size of the marked angles. Give reasons for your answers. **a** 145° **b** 123°	YES OK NO
❌	Measure	**C**	**Stuart drives 180 km in 2 hours 15 minutes.** **Work out Stuart's average speed.** A gold necklace has a mass of 127 grams, correct to the nearest gram. **a** Write down the least possible mass of the necklace. **b** Write down the greatest possible mass of the necklace.	YES OK NO

	Area & Perimeter	**C**	The diagram shows the plan of a field. The farmer sells the field for £3 per square metre. Work out the total amount of money the farmer should get.	
	3D Shapes	**C**	Work out the total surface area of the triangular prism. Diagram **NOT** accurately drawn	

Diagram **NOT** accurately drawn

75 m
30 m
100 m
160 m

3 cm
5 cm
4 cm
10 cm

| | Questionnaires | E | Poppy wants to find out for how much time people use their computer.
She uses this question on a questionnaire and gives it to all the students in her class.

For how much time do you use your computer?

0–1 hours ☐   3–4 hours ☐

1–2 hours ☐   4–5 hours ☐

2–3 hours ☐   5–6 hours ☐

Write down what is wrong with this question.
Is her sample biased? Explain why.

Angela asked 20 people in which country they spent their last holiday.
Here are their answers.

France   Spain   Italy   England
Spain   England   France   Spain
Italy   France   England   Spain
Spain   Italy   Spain   France
England   Spain   France   Italy

Design and complete a suitable data collection sheet that Angela could have used to show this information. | |
| | Collection and Bias | D | The Wildlife Trust are doing a survey into the number of field mice on a farm of size 240 acres.
They look at one field of size 6 acres.
In this field they count 35 field mice.

a Estimate how many field mice there are on the whole farm.

b Why might this be an unreliable estimate? | |

	Pie charts	E	The table below gives some information about the nutritional content of 120 g of baked beans. | Protein	Carbohydrate	Fibre	Other
---	---	---	---
6 g	16 g	5 g		 Copy and complete the table. Draw a pie chart for these data.	

	Comparing data sets	D	The pie chart gives information about the mathematics exam grades of some students.
			a What fraction of the students got grade D?
			
			8 of the students got grade C.
			b i How many of the students got grade F?
			  ii How many students took the exam?
			This accurate pie chart gives information about the English exam grades for a different set of students.
			Sean says "More students got a grade D in English than in mathematics."
			c Sean could be **wrong**.
			  Explain why.
			
			Diagram **NOT** accurately dawn
			Grade C Grade F 40° 80° 100° 140° Grade D Grade E
			Mathematics exam grades
			
			Grade F Grade C Grade E Grade D
			English exam grades
			
			June 2008	

	Pie charts to Bar charts	D	The pie chart shows the sources of the UK's energy production in the early part of the 21st century. Estimate the percentages of each type of energy and use your answers to draw a composite bar chart. Draw a new composite bar chart showing how you think it will have changed by 2050, stating reasons for your answers. **Methods of UK Energy Production** Renewable Hydro-electricity Nuclear Energy Coal Natural Gas Oil	

	<u>Averages & Range</u>	**D**	A group of girls went to a college dance. They each bought a new dress. The costs of the dresses were £22 £22 £22 £28 £32 £36 £40 £40 £45 £180 **a** Write down the mode of these data. **b** Find the median price **c** Work out the mean price. **d** Which of the three averages worked out in parts **a**, **b** and **c** best describes the price the girls paid? Give a reason for your answer.

Zoe recorded the weights, in kilograms, of 15 people.
Here are her results.

87   51   46   77   74   58   68   78
48   63   52   64   79   60   66

a Complete the ordered stem and leaf diagram to show these results.
b Write down the number of people with a weight of more than 70 kg.
c Work out the range of the weights.

4	
5	
6	
7	
8	

March 2009

The stem and leaf diagram shows the ages, in years, of all the workers in a small factory.

```
2 | 0  2  2  5  7
3 | 3  4  4  4  4  5
4 | 5  6  6  6  6  8  9  9  9        Key:
5 | 2  4  4  6  7  9                 4|5 stands for 45 years
6 | 0  2  5
```

a Work out the number of workers.
b Write down the mode of these data.
c Find the median of these data.
d Work out the range of these data.

(Row label: <u>Stem and Leaf</u>, grade **D**)

80 people work in Joe's factory.

The table shows some information about the annual pay of these 80 workers.

Annual pay (£x)	Number of workers
$10\,000 < x \leqslant 14\,000$	32
$14\,000 < x \leqslant 16\,000$	24
$16\,000 < x \leqslant 18\,000$	16
$18\,000 < x \leqslant 20\,000$	6
$20\,000 < x \leqslant 40\,000$	2

a   Write down the modal class interval.

b   Find the class interval that contains the median.

The stem and leaf diagram shows the ages, in years, of all the workers in a small factory.

```
2 | 0   2   2   5   7
3 | 3   4   4   4   4   5                    Key:
4 | 5   6   6   6   6   8   9   9   9        4|5 stands for 45 years
5 | 2   4   4   6   7   9
6 | 0   2   5
```

a   Work out the number of workers.

b   Write down the mode of these data.

c   Find the median of these data.

d   Work out the range of these data.

Class interval data

C

		Scatter Graphs	C

The scatter graph shows some information about the age, in years, of apprentices and the time, in minutes, it takes them to learn a certain skill.

A line of best fit is drawn on the graph.

a Work out an estimate for the gradient of the line of best fit.

b Use the line of best fit to estimate how long it would take a 16.5 year old to learn the skill.

c Describe the correlation.

d What conclusions can you draw about the time it takes apprentices to learn skills?
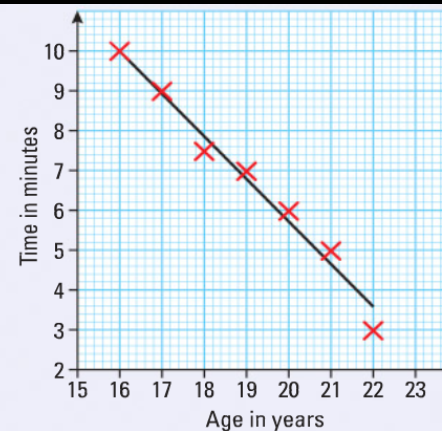
The table gives information about the marks gained by 10 students in a French exam and in a German exam. The exam was marked out of 50.

Student	A	B	C	D	E	F	G	H	I	J
French	10	10	18	25	28	33	39	42	43	46
German	11	14	21	26	35	32	42	42	45	50

a Draw a scatter diagram for these data.

b Draw in a line of best fit.

c Work out the gradient of the line of best fit.

d Work out the proportion of students that got less than 26 in at least one of the exams.

	<u>Probability 1</u>	**F**	Iqbal eats in a cafe. He can choose **one** main course and **one** piece of fruit. | Main Course	Fruit
---	---
Fish	Apple
Lamb	Banana
Salad	Pear	 One possible combination is (Fish, Pear). Write down all the possible combinations that Iqbal can choose.	YES OK NO
	<u>Probability 2</u>	**E**	There are three beads in a bag. One bead is blue, one bead is yellow and one bead is green. Zoe takes a bead at random from the bag. **a** On a copy of the probability scale, mark with the letter B the probability that she takes a blue bead. 0 $\frac{1}{2}$ 1 Zoe now throws a coin. One possible outcome for the bead and the coin is (green, heads). **b** List all the possible outcomes for the bead and the coin. One has already been done for you. *May 2008*	YES OK NO

	Probability 3	D	

Marco has a 4-sided spinner.

The sides of the spinner are numbered 1, 2, 3 and 4.

The spinner is biased.

The table shows the probability that the spinner will land on each of the numbers 1, 2 and 3.

Number	1	2	3	4
Probability	0.20	0.35	0.20	

a Work out the probability that the spinner will land on the number 4.

Marco spins the spinner 100 times.
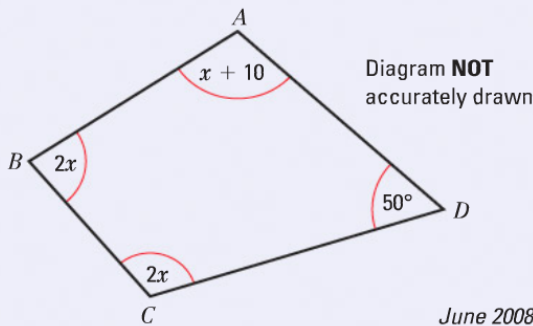
b Work out an estimate for the number of times the spinner will land on the number 2.

YES

OK

NO

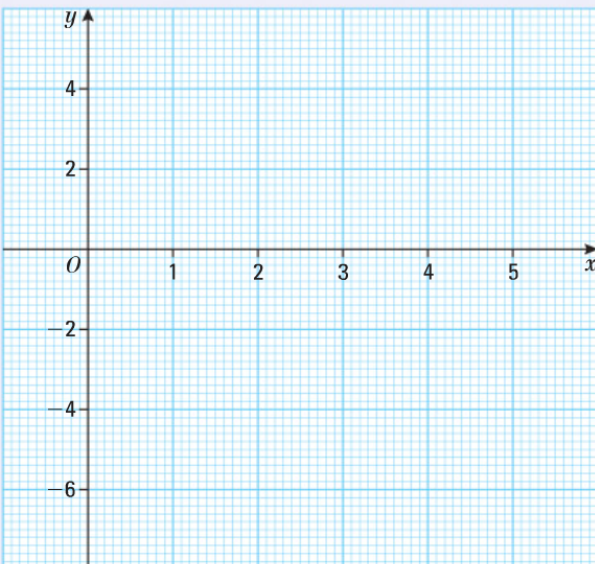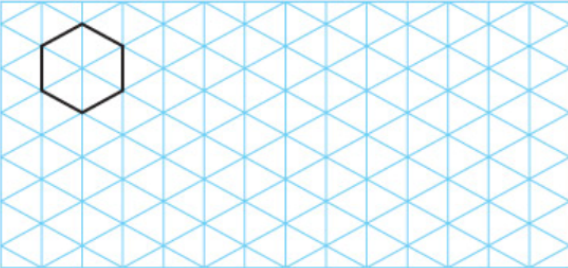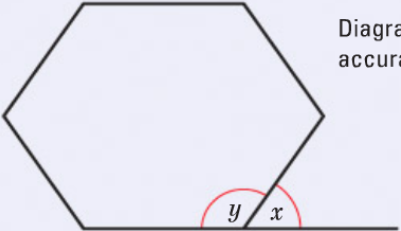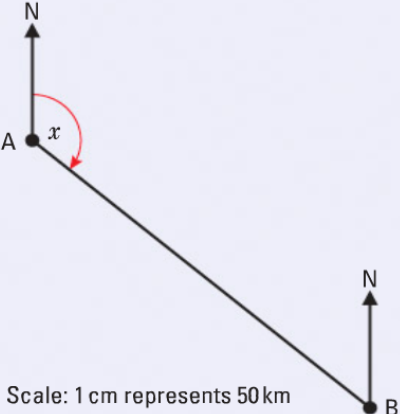|				
	Probability 4	C	Two spinners are each numbered 1 to 4. When they are both spun, the score is found by adding the two numbers. E.g. a 1 and a 4 scores 5. Three friends are playing with these spinners and devise a set of rules. If Alice gets a score of 6, 7 or 8 she wins. If Robbie scores 4 or 5 he wins. If Megan scores 1, 2 or 3 she wins. Who should win the most games?	
	Calculator skills	E	Plain tiles cost 28p each. Patterned tiles cost £9.51 each. Julie buys 450 plain tiles and 15 patterned tiles. Work out the total cost of the tiles.	

Work out the value of each of these.

Write down all the figures on your calculator display.

a $\dfrac{\sqrt{3.96} + 1.8}{7.625 - 3.48}$

b $\sqrt{\dfrac{4.92 + 3.48}{9.2 - 3.75}}$

Best buy

D

£3.80

200 g
Large

£3.50

175 g
Regular

A large tub of popcorn costs £3.80 and holds 200 g.

A regular tub of popcorn costs £3.50 and holds 175 g.

Rob says that the 200 g large tub is the better value for money.

Linda says that the 175 g regular tub is the better value for money.

Who is correct?

Explain the reasons for your answer.

You must show all your working.

YES

OK

NO

	Percentages	D	A hotel has 56 guests. 35 of the guests are male. **a** Work out 35 out of 56 as a percentage. 40% of the 35 male guests wear glasses. **b** Write the number of male guests who wear glasses as a fraction of the 56 guests. Give your answer in its simplest form. The normal price of a cat basket is £20. In a sale, the manager reduces the price of the cat basket by 15%. Work out the price of the cat basket in the sale.	YES OK NO
	Percentages	C	Rachael is a sales manager. Last year, Rachael had a 10% pay rise. This year, she had a 5% pay rise. Ziggy says, 'Rachael has had a 15% pay rise over the two years.' Is Ziggy correct? Explain your answer.	YES OK NO
	Equations	D	Solve these equations. **a** $2r + 7 = r + 10$ **b** $3x - 2 = x + 8$ **c** $5c + 4 = 2c + 19$ **d** $3b + 4 = b + 5$ **e** $5d - 2 = 2d + 3$ **f** $7y - 9 = 2y - 5$ **g** $3t + 8 = 6t + 1$ **h** $2w = 8w - 15$ **i** $7u - 6 = 4u - 15$ **j** $5w + 8 = 3w - 5$ **k** $3y - 5 = 7y + 5$	YES OK NO

	Equations	C	In this quadrilateral, the sizes of the angles, in degrees, are $x + 10$ $2x$ $2x$ 50 a Use this information to write down an equation in terms of x. b Work out the value of x. Diagram **NOT** accurately drawn *June 2008* The equation $x^3 + 10x = 21$ has a solution between 1 and 2. Use a trial and improvement method to find this solution. Give your answer correct to 1 d.p. You must show ALL your working.	
	Inequalities	C	Solve each inequality and show the solution on a number line. a $2x < 5$ b $4x \geqslant -2$ c $3x - 4 > 1$ d $6x + 7 \leqslant 1$ e $9x - 5 < 4x + 5$ f $6x + 7 < 8x + 7$	
	Quadratic Graphs	C	a Copy and complete the table of values for $y = x^2 - 4x - 2$. | x	-1	0	1	2	3	4	5
---	---	---	---	---	---	---	---
y		-2	-5			-2	3	 b Copy the grid and draw the graph of $y = x^2 - 4x - 2$. c Use your graph to find estimates of the solutions of $x^2 - 4x - 2 = 0$. *Nov 2008* 	

|					
	Formulae	E	You can use this rule to work out the cost, in pounds, of hiring a carpet cleaner. Jill hires the carpet cleaner for 3 days. **a** Work out the cost. Carlos hires the carpet cleaner. The cost is £52. **b** Work out for how many days Carlos hires the carpet cleaner. **Multiply the number of days' hire by 6 Add 4 to your answer**		YES OK NO
	Tessellation	E	On the grid, show how this shape will tessellate. You should draw at least 8 shapes.		YES OK NO
	Angles	D	The diagram shows a regular hexagon. **a** Work out the size of angle x. **b** Work out the size of angle y. Diagram **NOT** accurately drawn		YES OK NO
	Bearings	D	The diagram shows the position of two airports, A and B. A plane flies from airport A to airport B. **a** Measure the size of the angle marked x. **b** Work out the real distance between airport A and airport B. Use the scale 1 cm represents 50 km. Airport C is 350 km on a bearing of 060° from airport B. **c** On the diagram, mark airport C with a cross (×). Label it C. Scale: 1 cm represents 50 km		YES OK NO

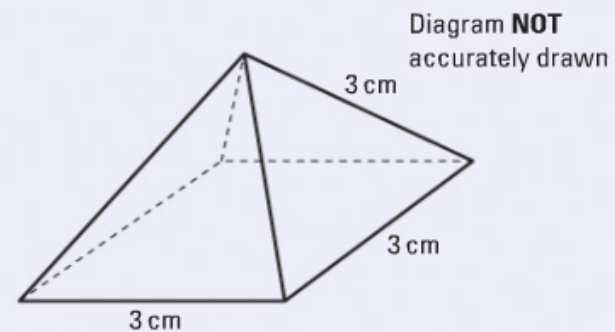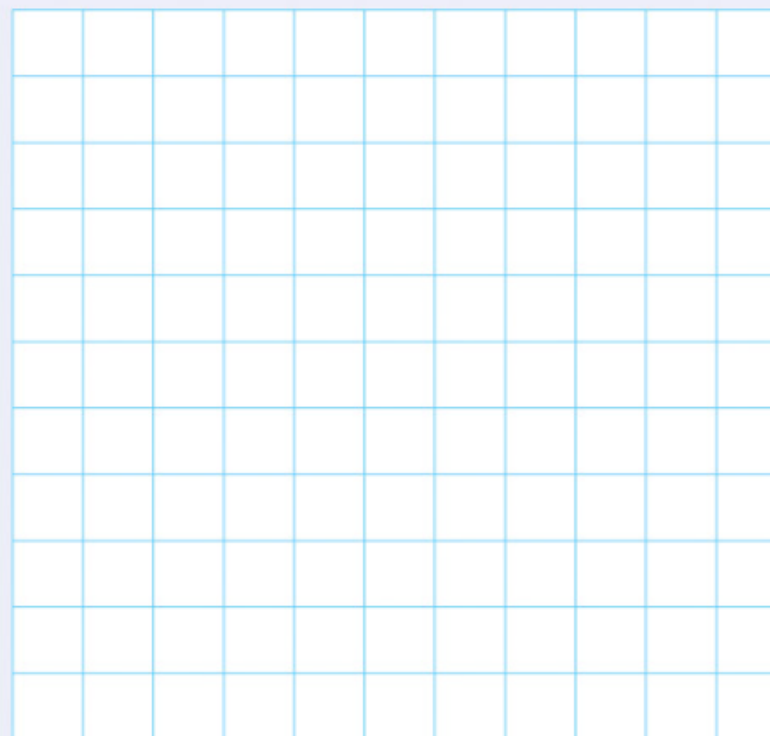| | Circles | C | The diagram shows two small circles inside a large circle. The large circle has a radius of 8 cm. Each of the two small circles has a diameter of 4 cm. a Write down the radius of each of the small circles. b Work out the area of the region shown shaded in the diagram. Give your answer correct to one decimal place. | | |
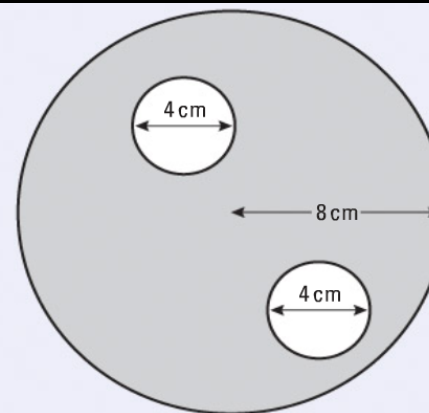
	Nets	E	The diagram shows a pyramid with a square base. Diagram **NOT** accurately drawn 3 cm 3 cm 3 cm The length of each side of the base is 3 cm. The length of each sloping edge is 3 cm. On a copy of the grid of centimetre squares, draw an accurate net of the pyramid.	YES OK NO
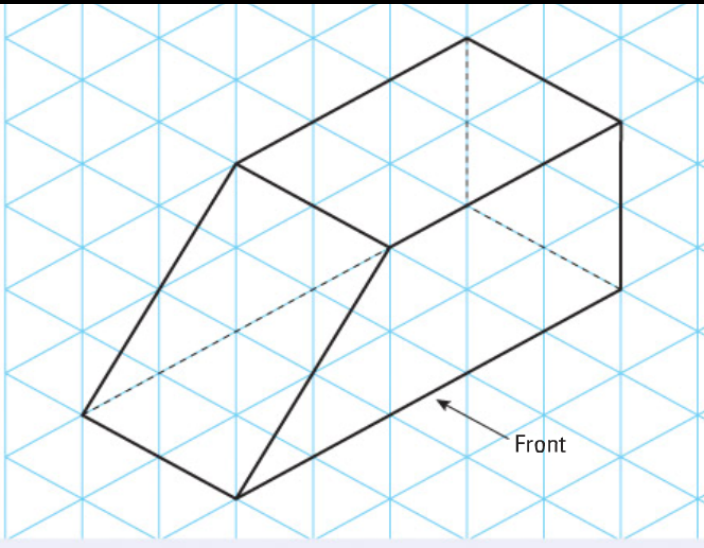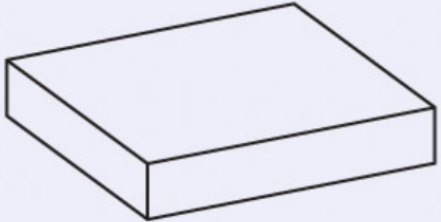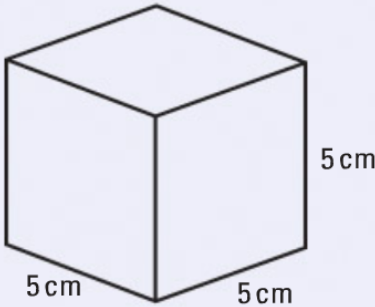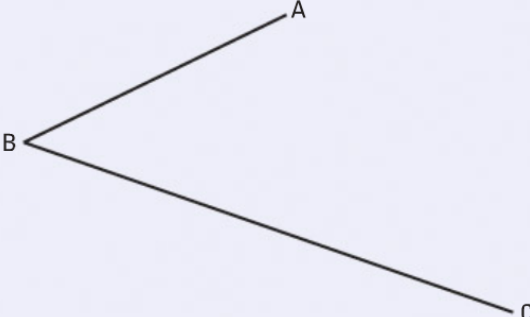
	3D elevations	**E**	The diagram shows a prism drawn on a centimetre isometric grid.	

The diagram shows a prism drawn on a centimetre isometric grid.

a On a centimetre grid, draw the front elevation of the prism from the direction marked by the arrow.

b On a centimetre grid, draw a plan of the prism.

Front

	3D dimensions	**D**		

Louise makes chocolates.
Each box she puts them in has
Volume $= 1000\,\text{cm}^3$
Length $= 20\,\text{cm}$
Width $= 10\text{cm}$.

a Work out the height of a box.

Louise makes 350 chocolates.
Each box will hold 18 chocolates.

b Work out
   i how many boxes Louise can fill completely,
   ii how many chocolates will be left over.

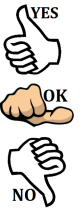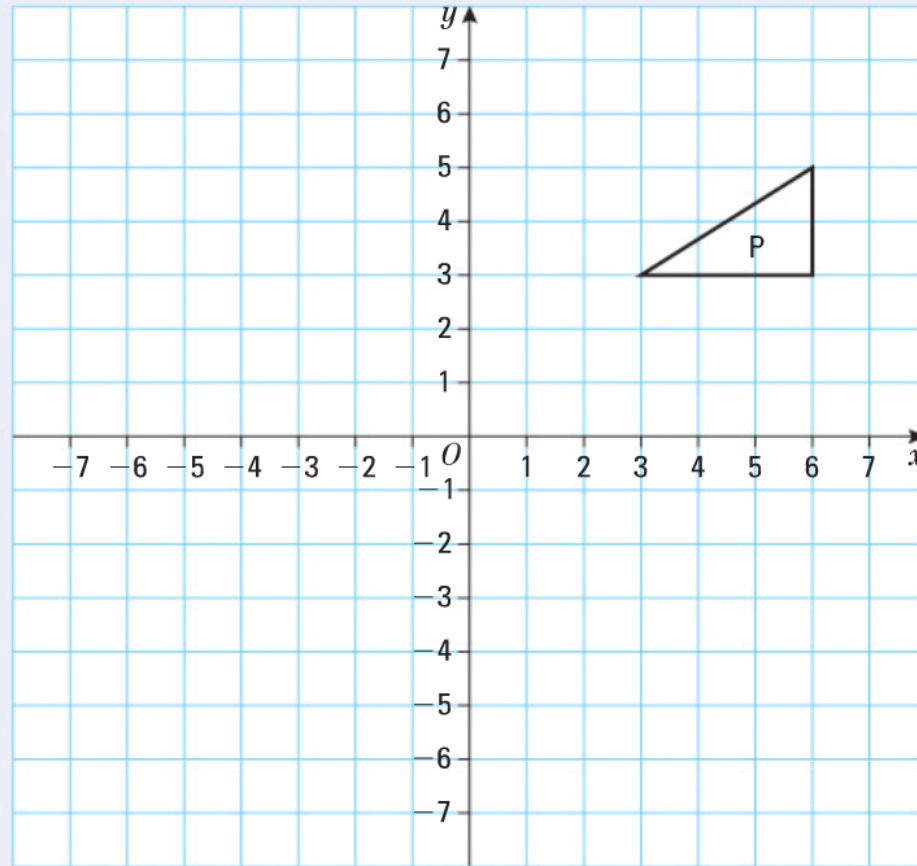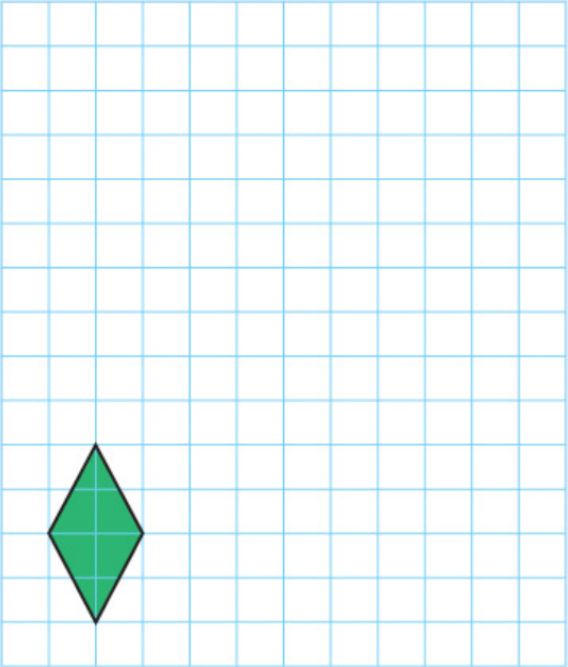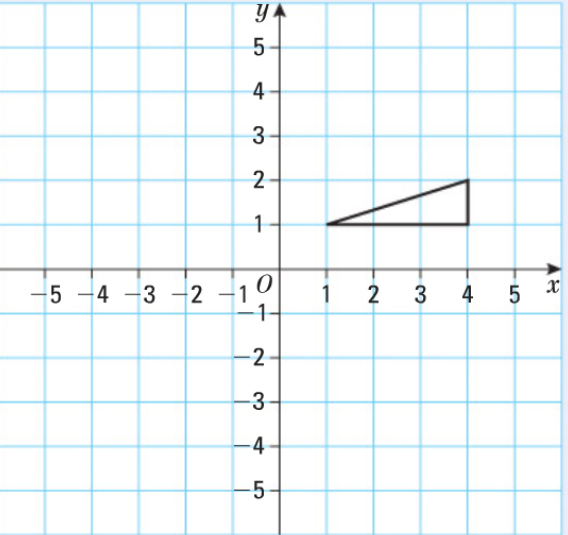|			
Unit conversions	**C**	The volume of the cube is 125 cm^3. Change 125 cm^3 into mm^3. Diagram **NOT** accurately drawn 5 cm 5 cm 5 cm	YES OK NO
Construction	**C**	Use ruler and compasses to construct the bisector of angle ABC. You must show all your construction lines. A B C	YES OK NO
Loci	**C**	Draw the locus of all points which are equidistant from the points A and B. A✕ ✕B	YES OK NO

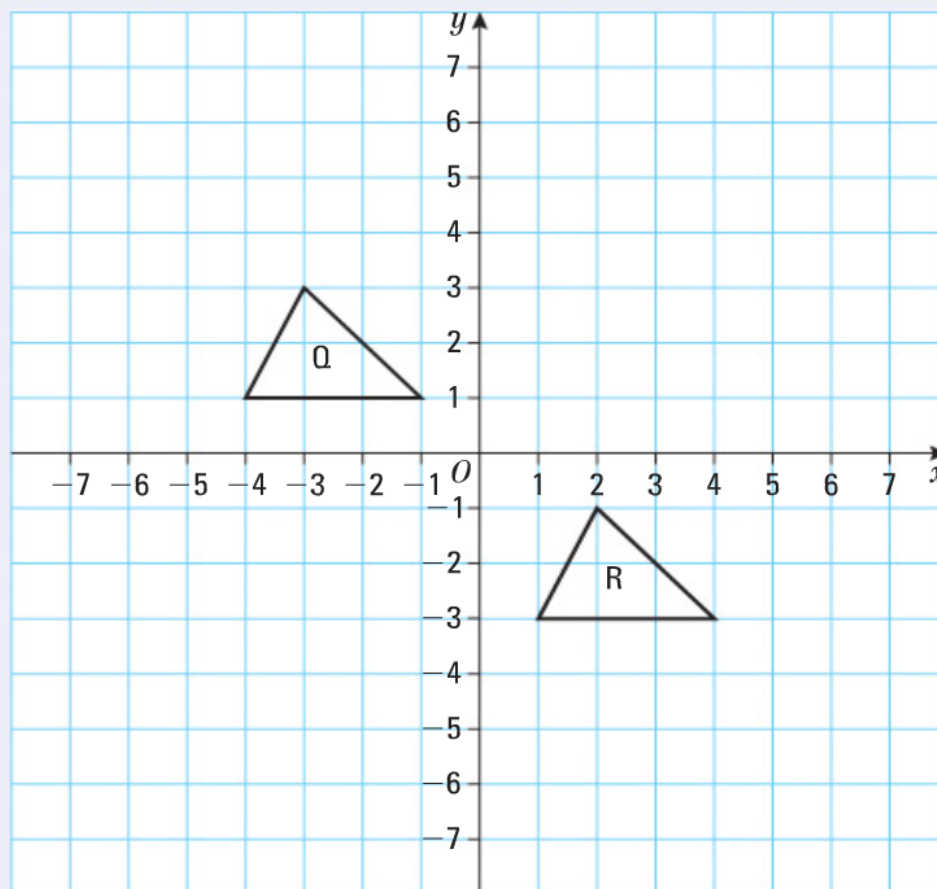| | Transformations 1 | C | On a copy of the grid, reflect triangle **P** in the line $x = 2$. | |

			On a copy of the grid, draw an enlargement of the shaded shape with a scale factor of 3.		
	Transformations 2	C			YES OK NO
	Transformations 3	C	On a copy of the grid, rotate the triangle a half turn about the point O.		YES OK NO
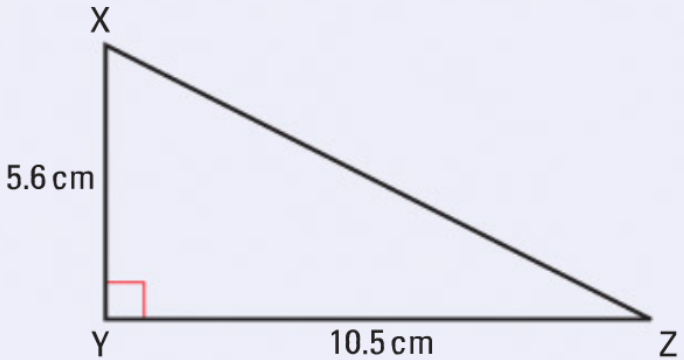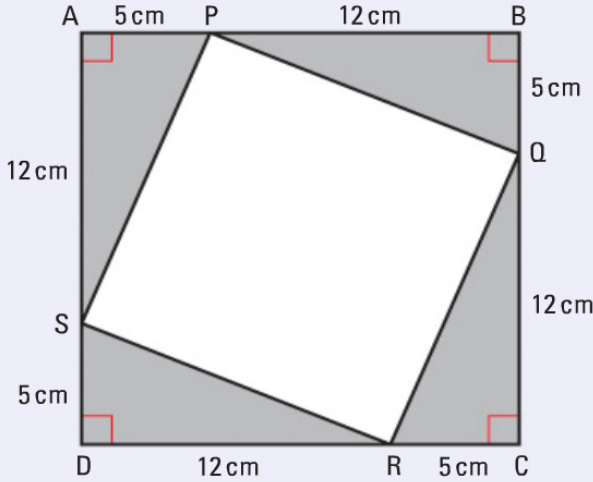
Describe fully the **single** transformation that takes triangle **Q** to triangle **R**.

C

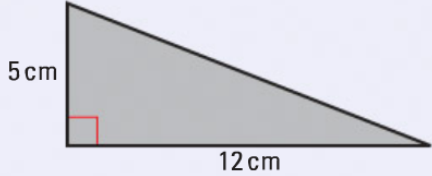|	Pythagoras 1	C	In the triangle XYZ XY = 5.6 cm YZ = 10.5 cm angle XYZ = 90° Work out the length of XZ. X 5.6 cm Y　　10.5 cm　　Z	YES OK NO
	Pythagoras 2	C	a Work out the area of the triangle. 5 cm 12 cm A　5 cm　P　　12 cm　　B 12 cm　　　5 cm 　　　　　　Q S 　　　　　　12 cm 5 cm D　　12 cm　　R　5 cm　C 4 copies of the triangle and the quadrilateral PQRS are used to make the square ABCD. b Work out the area of the quadrilateral PQRS.	YES OK NO

| | Pythagoras 3 | C | A is the point with coordinates (2, 5).
B is the point with coordinates (8, 13).
Calculate the length AB.

y
$\times$ B (8, 13)
$\times$ A (2, 5)
O x | YES
OK
NO |