Mathematics pitch and expectations

Year 6 to 7 progression

The Coalition Government took office on 11 May 2010. This publication was published prior to that date and may not reflect current government policy. You may choose to use these materials, however you should also consult the Department for Education website www.education.gov.uk for updated policy and resources.

Department for Education

Year 6 progression to Year 7

Using and applying mathematics

- **Solve problems by breaking down complex calculations into simpler steps, choose and use operations and calculation strategies appropriate to the numbers and context; try alternative approaches to overcome difficulties; present, interpret and compare solutions**

Ben thinks of a number.

He adds half of the number to a quarter of the number. The result is 60.

What was the number Ben first thought of?
Show your working.

KS2 2008 Paper A level 5

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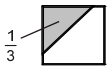
50 000 people visited a theme park in one year.

15% of the people visited in April and 40% of the people visited in August.

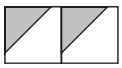
How many people visited the park in the rest of the year?

KS2 2003 Paper B level 5

$\frac{1}{3}$ of this square is shaded.



The same square is used in the diagrams below.
What fraction of this diagram is shaded?



What fraction of this diagram is shaded?

KS2 2008 Paper A level 5

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30 children are going on a trip.
It costs £5 including lunch.

Some children take their own packed lunch.
They pay only £3.

The 30 children pay a total of £110. How many children are taking their own packed lunch?

KS2 2003 Paper A level 5

Every 100g of brown bread contains 6g of fibre.

A loaf of bread weighs 800g and has 20 equal slices. How much fibre is there in one slice?

KS2 2004 Paper B level 5

Emily makes 250 grams of a snack mixture.
15% of the weight is raisins, 25% is banana chips and the rest is peanuts.

How many grams of peanuts does she use?

KS2 2008 Paper A level 5

Shortcrust pastry is made using flour, margarine and lard.

The flour, margarine and lard are mixed in the ratio

8 : 3 : 2

by weight.

How many grams of margarine and lard are needed to mix with 200 grams of flour?

KS2 2000 Paper C level 6

Two families go to the cinema.

The Smith family buy tickets for one adult and four children and pay £19.

The Jones family buy tickets for two adults and two children and pay £17.

What is the cost of one child's ticket?

KS2 2000 Paper C level 6

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- **Represent information or unknown numbers in a problem, e.g. in a table, formula or equation; explain solutions in the context of the problem**

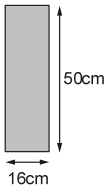
Two whole numbers are each between 50 and 70.
They multiply to make 4095.
Write in the missing numbers.

$$\square \times \square = 4095$$

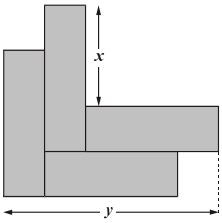
KS2 2007 Paper B level 5

Kate has some rectangles.

They each measure 16 centimetres by 50 centimetres.



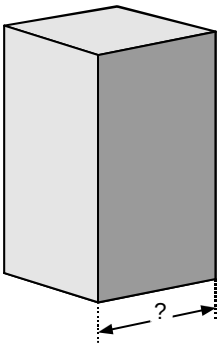
She makes this design with four of the rectangles.



Work out the lengths x and y.

KS2 2007 Paper B level 5

A cuboid has a square base.
It is twice as tall as it is wide.
Its volume is 250 cubic centimetres.



Calculate the width of the cuboid.

KS2 2001 Paper C level 6

Write the largest whole number to make this statement true.

$$50 + \square < 73$$

KS2 2004 Paper B level 5

k, m and n each stand for a whole number. They add together to make 1500.

$k + m + n = 1500$
m is three times as big as n.
k is twice as big as n.

Calculate the numbers k, m and n.

KS2 2003 Paper B level 5

n stands for a number.
Complete this table of values.

n	$5n - 2$
20	$\square$
$\square$	38

KS2 2000 Paper B level 5

p and q each stand for whole numbers.

$p + q = 1000$

p is 150 greater than q.

Calculate the numbers p and q.

KS2 2001 Paper B level 5

Find the value of t in this equation.

$$33 - 8t = 15$$

KS2 2002 Paper C level 6

Find the value of u in this equation.

$$7 + 4u = 70 - 3u$$

KS2 2001 Paper C level 6

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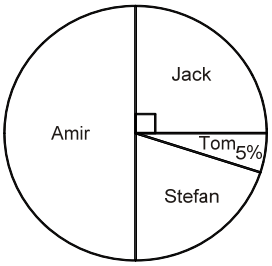
- **Develop and evaluate lines of enquiry; identify, collect, organise and analyse relevant information; decide how best to represent conclusions and what further questions to ask**

40 children predicted who would win the boys' race at sports day. This pie chart shows their predictions.



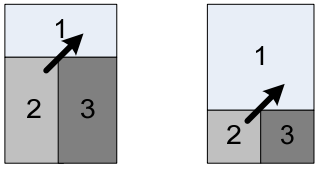
What percentage of the children predicted that Stefan would win?

10 children predicted the winner of the race correctly.
Who won the race?
Explain how you know.

KS2 2009 Paper A level 5

Represent the information in the pie chart in two other ways.

Katie made two spinners, A and B.



She says, 'Scoring a 1 on spinner A is just as likely as scoring a 1 on spinner B'.

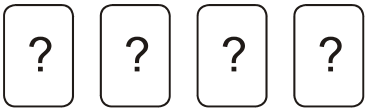
Explain why Katie is correct.

KS2 2000 Paper B level 5

Think of another question you could ask about the two spinners.

Debbie has a pack of cards numbered from 1 to 20

She picks four different number cards.

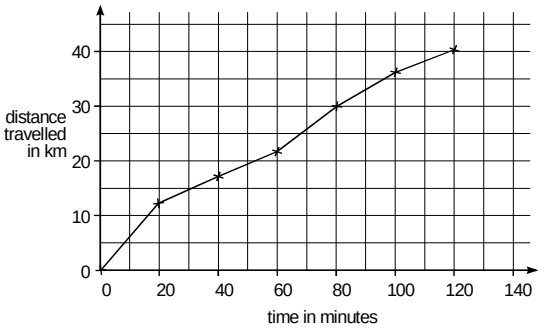


Exactly three of the four numbers are multiples of 5.
Exactly three of the four numbers are even numbers.
All four of the numbers add up to less than 40.
Write what the numbers could be.

KS2 2003 Paper A level 5

Write two further questions that you could ask about the cards.

Carol went on a 40-kilometre cycle ride. This is a graph of how far she had gone at different times.



How many minutes did Carol take to travel the last 10 kilometres of the ride?

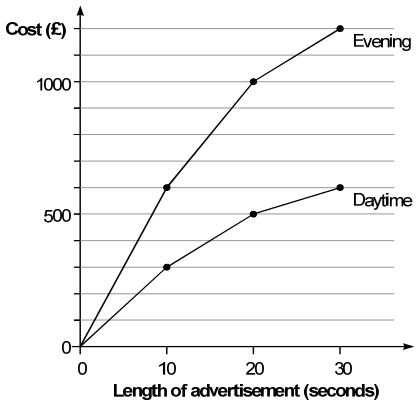
Use the graph to estimate the distance travelled in the first 20 minutes of the ride.

Carol says, 'I travelled further in the first hour then in the second hour'. Explain how the graph shows this.

KS2 2000 Paper B level 5

Write two further questions that you could ask about the information in the graph.

This chart gives the cost of showing advertisements on television at different times.



An advertisement lasts 25 seconds.
Use the graph to estimate how much cheaper it is to show it in the daytime compared with the evening.

An advertisement was shown in the daytime and again in the evening. The total cost was £1200.
How long was the advertisement in seconds?

KS2 2000 Paper C level 6

Write two further questions that you could ask about the information in the graph.

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- **Generate sequences and describe the general term; use letters and symbols to represent unknown numbers or variables; represent simple relationships as graphs**

m stands for a whole number greater than 10 and less than 20.

n stands for a whole number greater than 2 and less than 10.

What is the smallest number that $m \times n$ could be?

What is the largest number that $m - n$ could be?

KS2 2008 Paper B level 5

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k stands for a whole number.

$k + 7$ is greater than 100.
$k - 7$ is less than 90.

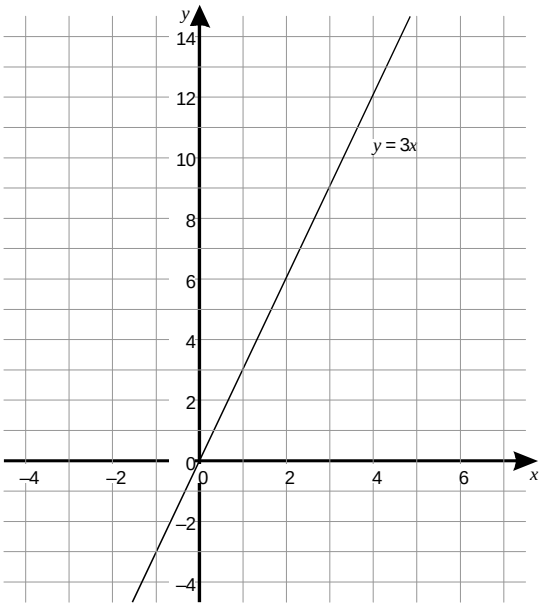
Find all the numbers that k could be.

KS2 2006 Paper A level 5

When m equals twenty, what is the value of ten plus three m?

KS2 2007 Mental test level 5

The graph shows a straight line.
The equation of the line is $y = 3x$.



Does the point (25, 75) lie on the straight line y = 3x?

Tick (✓) Yes or No.
Explain how you know.

KS3 2002 Paper 1 level 6

Here are five number cards.

A	A	A	B	B

A and B stand for two different whole numbers. The sum of all the numbers on all five cards is 30. What could be the values of A and B?

KS2 2004 Paper B level 5

A sequence starts at 500 and 80 is subtracted each time.

500 420 340 ...

The sequence continues in the same way. Write the first two numbers in the sequence which are less than zero.

KS2 2002 Paper A level 5

This sequence of numbers goes up by 40 each time.

40 80 120 160 200 …

This sequence continues.

Will the number 2140 be in the sequence?
Circle Yes or No. Explain how you know.

KS2 2000 Paper A level 5

The rule for this sequence of numbers is 'add 3 each time'.

1 4 7 10 13 16 …

The sequence continues in the same way.

Mary says, 'No matter how far you go there will never be a multiple of 3 in the sequence' .

Is she correct? Circle Yes or No.
Explain how you know.

KS2 2001 Paper B level 5

Paulo makes a sequence of numbers.

He chooses a starting number and then subtracts equal amounts each time.

The third number in his sequence is 45.

The tenth number is –32.

		45							–32

What is the first number in the sequence?

KS2 2002 Paper C level 6

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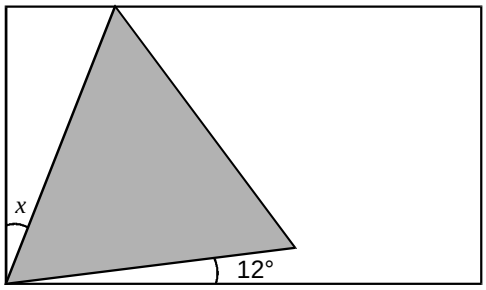
- **Explain and justify reasoning and conclusions, using notation, symbols and diagrams; find a counter-example to disprove a conjecture; use step-by-step deductions to solve problems involving shapes**

Here is an equilateral triangle inside a rectangle.



Calculate the value of angle x.
Do not use a protractor (angle measurer).

KS2 2001 Paper B level 5

The numbers in this sequence increase by 7 each time.

1 8 15 22 29 ....

The sequence continues in the same way.

Will the number 777 be in the sequence?
Circle Yes or No.
Explain how you know.

KS2 2008 Paper A level 5

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6 green apples cost 75p.
10 red apples cost 90p.

Jason bought some bags of green apples and some bags of red apples. He spent £4.20. How many bags of each type of apples did he buy?

Nika says, 'I bought more apples than Hassan, but I spent less money.'

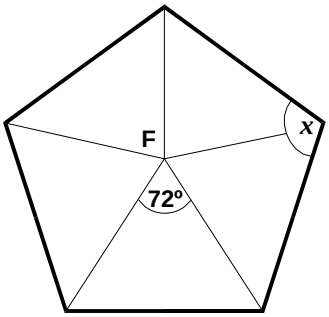
Explain how this is possible.

KS2 2002 Paper A level 5

Ling says: 'Number words never contain a letter a.'

Find a counter-example to show that Ling is wrong.

F is the centre of a regular pentagon.



Work out the value of angle x.
Give your reasons.

Susan says: 'When you cut a piece off a shape, you reduce its area and perimeter.'

Is Susan's conjecture sometimes true, always true or never true? Explain how you know.

Which is larger, $\frac{1}{3}$ or $\frac{2}{5}$?

Explain how you know.

KS2 2002 Paper A level 5

An isosceles triangle has a perimeter of 12 cm.
One of its sides is 5 cm.
What could the length of each of the other two sides be?
Two different answers are possible.
Give both answers.

KS2 2003 Paper A level 5

Two numbers are in the ratio 3 : 2.

One of the numbers is 0.6.

There are two possible answers for the other number. What are the two possible answers?

KS2 2002 Paper C level 6

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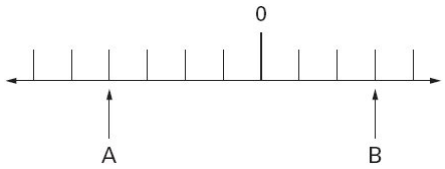
Counting and understanding number

- **Compare and order integers and decimals in different contexts**

What number is eight less than minus four?

KS3 2005 Mental test level 5

A and B are two numbers on the number line below.



The difference between A and B is 140.
Write the values of A and B.

KS2 2005 Paper A level 5

Write half a million in figures.

KS2 2006 Mental test level 5

What number is one hundred less than ten thousand?

KS2 2006 Mental test level 5

7.4 8.1 9.4 10

Which two of these numbers, when multiplied together, have the answer closest to 70?

KS2 2005 Paper B level 5

Here are five calculations.

A 720 ÷ 64
B 820 ÷ 75
C 920 ÷ 80
D 1020 ÷ 90
E 1120 ÷ 100

Write the letter of the calculation that has the greatest answer.

Write the letter of the calculation that has an answer closest to 11.

KS2 2009 Paper B level 5

What number is halfway between zero point three and zero point four?

KS2 2009 Mental test level 5

Write the answer to each of these calculations rounded to the nearest whole number.
One has been done for you.

	To the nearest whole number
75.7 × 59	4466
7734 ÷ 60	
772.4 × 9.7	
20.34 × (7.9 – 5.4)	

KS2 2006 Paper B level 5

Write a decimal which is greater than 0.7 and less than 0.71.

Circle the number closest in value to 0.1.

0.01 0.05 0.11 0.2 0.9

KS2 2002 Paper B level 5

Circle the two decimals which are closest in value to each other.

0.9 0.09 0.99 0.1 0.01

KS2 2002 Paper C level 6

Write these numbers in order of size, starting with the smallest.

1.01 1.001 1.101 0.11

smallest

KS2 1997 Paper C level 6

Here is a number line.
Draw an arrow to show the position of 0.111

KS2 1998 Paper C level 6

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• Order a set of fractions by converting them to decimals

Which is larger, $\frac{1}{3}$ or $\frac{2}{5}$?

Explain how you know.

KS2 2002 Paper A level 5

Write these fractions in order of size starting with the smallest.

$\frac{3}{4}$ $\frac{3}{5}$ $\frac{9}{10}$ $\frac{17}{20}$

☐ ☐ ☐ ☐

smallest

KS2 2005 Paper A level 5

Place these fractions in order of size starting with the smallest.

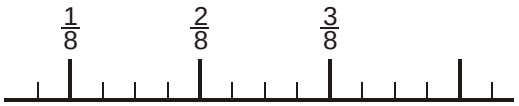
$\frac{1}{2}$ $\frac{1}{3}$ $\frac{5}{12}$ $\frac{5}{6}$

☐ ☐ ☐ ☐

smallest

KS2 1995 Paper C level 6

Here is a number line. Draw an arrow to show the position of $\frac{7}{16}$.



KS2 1998 Paper C level 6

$\frac{5}{11} = 0.454545\ldots$

Find a fraction that is equal in value to

0.0454545 ...

KS2 1999 Paper C level 6

Look at the fractions. Which of them are less than a half?
Ring your answers.

$\frac{1}{50}$ $\frac{2}{3}$ $\frac{3}{4}$ $\frac{1}{10}$ $\frac{3}{7}$

KS3 2004 Mental test level 6

Look at the fractions.
Put rings round all those that are greater than three-quarters.

$\frac{3}{5}$ $\frac{4}{5}$ $\frac{5}{6}$ $\frac{6}{9}$ $\frac{7}{10}$

KS3 2008 Mental test level 6

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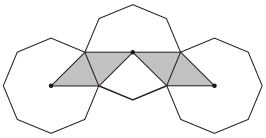
- **Recognise approximate proportions of a whole and use fractions and percentages to describe and compare them, e.g. when interpreting pie charts**

The diagram shows three regular octagons joined together. There is a dot at the centre of each one.



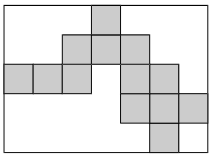
What fraction of the diagram is shaded?

KS2 2007 Paper B level 5

What fraction of two pounds is twenty pence?

KS2 2006 Mental test level 5

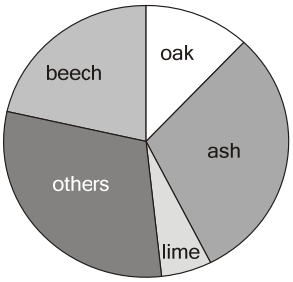
Here is a rectangle with 13 identical shaded squares inside it.



What fraction of the rectangle is shaded?

KS2 2003 Paper A level 5

Class 6 did a survey of the number of trees in a country park. This pie chart shows their results.

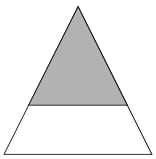


Estimate the fraction of trees in the survey that are oak trees.

The children counted 60 ash trees.
Use the pie chart to estimate the number of beech trees they counted.

KS2 2006 Paper A level 5

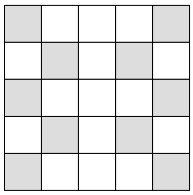
The diagram shows a shaded triangle inside a larger triangle.



The area of the shaded triangle is 52 cm^2.
The area of the shaded triangle is $\frac{4}{9}$ of the area of the larger triangle.
Calculate the area of the larger triangle.

KS2 1999 Paper C level 6

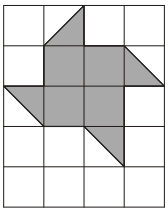
Here is a pattern on a grid.



What percentage of the grid is shaded?

KS2 2006 Paper B level 5

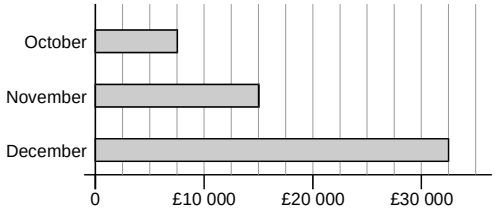
Here is a grid of 20 squares.



What percentage of the grid is shaded?

KS2 2009 Paper B level 5

This chart shows the amount of money spent in a toy shop in three months.



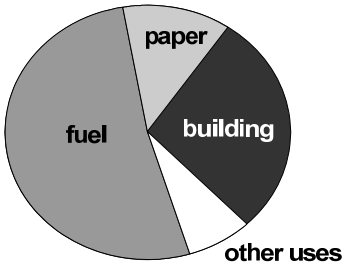
How much more money was spent in the shop in December than in November?

Stepan says, 'In November there was a 100% increase on the money spent in October'.

Is he correct? Circle Yes or No.
Explain how you can tell from the chart.

KS2 2001 Paper A level 5

This pie chart shows the different ways that wood is used in the world.



Use the pie chart to estimate the percentage of wood that is used for paper.

KS2 1997 Paper C level 6

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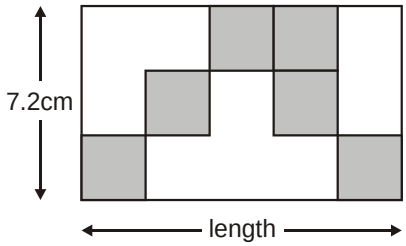
- **Use ratio notation, reduce a ratio to its simplest form and divide a quantity into two parts in a given ratio; solve simple problems involving ratio and direct proportion, e.g. identify the quantities needed to make a fruit drink by mixing water and juice in a given ratio**

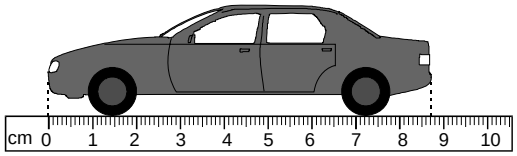
Here is a rectangle with six identical shaded squares inside it.



The width of the rectangle is 7.2 centimetres.
Calculate the length of the rectangle.

KS2 2004 Paper B level 5

Here is a drawing of a model car.



What is the length of the model? Give your answer in centimetres, correct to one decimal place.

The height of the model is 2.8 centimetres.
The height of the real car is 50 times the height of the model.
What is the height of the real car?
Give your answer in metres.

KS2 1999 Paper B level 5

Here is a recipe for fruit smoothies.

Recipe

$\frac{1}{2}$ litre of orange juice
10 strawberries
250ml yogurt
1 banana

Makes two smoothies

Stefan uses the recipe to make smoothies.
He uses 1 litre of yogurt.
How many strawberries does he use?

Amir uses the same recipe.
He wants to make 5 smoothies.
He has 1 litre of orange juice.

How many more millilitres of orange juice does he need?

KS2 2009 Paper B level 5

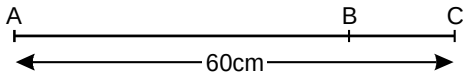
Three pens cost one pound fifty pence altogether.
How much would seven pens cost?

KS2 2008 Mental test level 5

Two metres of wire cost ninety pence.
How much will three metres of wire cost?

KS2 2007 Mental test level 5

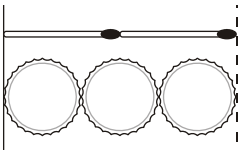
The distance from A to B is three times as far as from B to C.



The distance from A to C is 60 centimetres.
Calculate the distance from A to B.

KS2 2002 Paper B level 5

Two matchsticks have the same length as three bottle tops.



How many bottle tops will have the same length as 50 matchsticks?

KS2 2007 Paper A level 5

Sapna makes a fruit salad using bananas, oranges and apples. For every one banana, she uses 2 oranges and 3 apples.

Sapna uses 24 fruits.
How many oranges does she use?

KS2 2005 Paper B level 5

David and his friends prepare a picnic.
Each person at the picnic will get:

3 sandwiches
2 bananas
1 packet of crisps

The children pack 45 sandwiches.
How many bananas do they pack?

KS2 2006 Paper B level 5

In a survey, the ratio of the number of people who preferred milk chocolate to those who preferred plain chocolate was 5 : 3.

46 more people preferred milk chocolate, to plain chocolate.

How many people were in the survey?

KS2 2001 Paper C level 6

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Knowing and using number facts

- **Consolidate rapid recall of number facts, including multiplication facts to 10 × 10 and the associated division facts**

Six times a number is three thousand.
What is the number?
KS2 2005 Mental test level 5

What is thirty times forty times ten?
KS2 2005 Mental test level 5

What is three thousand divided by twenty?
KS2 2002 Mental test level 5

When a number is divided by seven, the answer is three remainder four. What is the number?
KS2 2007 Mental test level 5

What is nought point eight multiplied by five?
KS3 2008 Mental test level 5

What is eighteen multiplied by nine?
KS3 2005 Mental test level 5

I am thinking of a two-digit number that is a multiple of eight.
The digits add up to six.
What number am I thinking of?
KS3 Mental test 2003 level 5

Write in the two missing digits.
□0 × □0 = 3000
KS2 2002 Paper A level 5

Circle two different numbers which multiply together to make 1 million.
10 100 1000 10 000 100 000
KS2 2000 Paper A level 5

- **Recognise the square roots of perfect squares to 12 × 12**

What is the next number in the sequence of square numbers?
One, four, nine, sixteen ...
KS3 2004 Mental test level 5

What is the next square number after thirty-six?
KS3 2008 Mental test level 6

Find two square numbers that total 45.
□ + □ = 45
KS2 2005 Paper A level 5

Lara chooses a square number.
She rounds it to the nearest hundred.
Her answer is 200.
Write all the possible square numbers Lara could have chosen.
KS2 2009 Paper A level 5

What is the square root of sixty-four?
KS2 2002 Mental test level 4

What is the square root of eighty-one?
KS3 2008 Mental test level 5

This four digit number is a square number.
Write in the missing digits.
9□□9
KS2 2001 Paper C level 6

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• Recognise and use multiples, factors, divisors, common factors, highest common factors and lowest common multiples in simple cases

What is the smallest whole number that is divisible by five and by three?

KS3 2004 Mental test level 4

Write two factors of twenty-four which add to make eleven.

KS2 2005 Mental test level 5

Write down a number that is both a multiple of four and a multiple of six.

KS3 2002 Mental test level 4

Write down a multiple of four that is greater than one thousand.

KS3 2009 Mental test level 5

Write all the factors of 30 which are also factors of 20.

KS2 2005 Paper B level 4

Find the multiple of 45 that is closest to 8000

KS2 2008 Paper B level 5

Write all the numbers between 50 and 100 that are factors of 180.

KS2 2009 Paper A level 5

Two whole numbers are each between 50 and 70.
They multiply to make 4095.
Write in the missing numbers.

□ × □ = 4095

KS2 2007 Paper B level 5

The same number is missing from each box. Write the same missing number in each box.

□ × □ × □ = 1331

KS2 1999 Paper B level 5

Write in the two missing digits.

□0 × □0 = 3000

KS2 2002 Paper A level 5

• Make and justify estimates and approximations to calculations

Which two of these numbers, when multiplied together, have the answer closest to 70?

7.4 8.1 9.4 10

KS2 2005 Paper B level 5

Look at the calculation on your answer sheet.
Write an approximate answer.

$$\frac{52}{1.4 + 3.6}$$

KS3 2005 Mental test level 5

A bus company has 62 minibuses.
On average, each minibus travels 19 miles on a gallon of fuel and goes 284 miles each day.
The Company says it needs about 1000 gallons of fuel every day.

Approximate these numbers and make an estimate to show whether what the company says is about right.

KS2 1995 Paper C level 6

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Calculating

- **Understand how the commutative, associative and distributive laws, and the relationships between operations, including inverse operations, can be used to calculate more efficiently; use the order of operations, including brackets**

Six times a number is three thousand.
What is the number?

KS2 2005 Mental test level 5

Three times a number is one hundred and two.
What is the number?

KS2 2001 Mental test level 5

Ten times a number is eight-six.
What is the number?

KS2 2002 Mental test level 5

Liam thinks of a number. He multiplies the number by 5 and then subtracts 60 from the result.

His answer equals the number he started with.
What was the number Liam started with?

KS2 2004 Paper A level 5

Write the correct sign >, < or = in each of the following.

(10 + 5) – 9	☐	(10 + 9) – 5
3 × (4 + 5)	☐	(3 × 4) + 5
(10 × 4) ÷ 2	☐	10 × (4 ÷ 2)

KS2 2005 Paper A level 4

Calculate 900 ÷ (45 × 4).

KS2 2004 Paper A level 5

Write in the missing number.

50 ÷ ☐ = 2.5

KS2 2003 Paper A level 5

Write in the missing numbers.

☐ ÷ 21.7 =37.5

100 – (22.75 + 19.08) = ☐

KS2 2004 Paper B level 5

Calculate:

1.2 × (1.3 + 1.4) × 1.5

KS2 2007 Paper B level 5

What is fifteen multiplied by eleven?

KS2 2003 Mental test level 4

Multiply thirty-nine by seven.

KS2 2005 Mental test level 5

What is twenty-five multiplied by two hundred?

KS2 2002 Mental test level 5

Four point three multiplied by six equals twenty-five point eight.
What does four point three multiplied by twelve equal?

KS3 2009 Mental test level 5

Twenty multiplied by thirty-eight is seven hundred and sixty.
What is twenty-one multiplied by thirty-eight?

KS3 2008 Mental test level 5

Twenty-nine multiplied by thirty-four is nine hundred and eighty-six.
What is nought point two nine multiplied by thirty-four?

KS3 2008 Mental test level 5

Eighteen multiplied by twenty-two is three hundred and ninety-six.
What is three thousand nine hundred and sixty divided by eighteen?

KS3 2007 Mental test level 5

Leila knows that

65 × 3 = 195

Explain how she can use this information to find the answer to this multiplication:

165 × 3

KS2 2000 Paper A level 5

Kim knows that

137 × 28 = 3836

Explain how she can use this information to work out this multiplication.

138 × 28

KS2 1997 Paper A level 5

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- **Consolidate and extend mental methods of calculation to include decimals, fractions and percentages**

What is six point two multiplied by one thousand?
KS3 2005 Mental test level 5

What is nought point two six divided by ten?
KS2 2001 Mental test level 5

Divide thirty-one point five by ten.
Y5 Optional test 2003 Mental test level 5

Divide nought point nine by one hundred.
KS2 2006 Mental test level 5

What is seven point five divided by one hundred?
KS2 2004 Mental test level 5

What is thirty-one point nine subtract twenty-one point four?
KS2 2008 Mental test level 5

Subtract nought point nought five from nought point five.
KS2 2008 Mental test level 5

Calculate ten minus four point three five.
KS2 2001 Mental test level 5

Calculate ten minus four point three five.
KS2 2001 Mental test level 5

What is one point three multiplied by four?
KS2 2004 Mental test level 5

What is half of six point three?
KS3 2001 Mental test level 5

What is three point nine divided by two?
KS3 2003 Mental test level 6

Nine is half of a number.
What is one-third of the number?
KS2 2009 Mental test level 5

Three-quarters of a number is 48.
What is the number?
KS2 2003 Mental test level 5

What is three-quarters of five hundred?
KS2 2003 Mental test level 5

What is one-fifth of one thousand?
KS2 2007 Mental test level 5

What is two thirds of sixty-six?
KS2 2004 Mental test level 5

What is three-fifths of forty pounds?
KS3 2003 Mental test level 5

Tariq won one hundred pounds in a maths competition.
He gave two-fifths of his prize money to charity.
How much of his prize money, in pounds, did he have left?
KS3 2004 Mental test level 5

What is five percent of one thousand?
KS2 2008 Mental test level 5

What is two percent of three hundred?
KS2 2000 Mental test level 5

What is ninety-nine per cent of two hundred?
KS2 2002 Mental test level 5

What is twenty per cent of sixty pounds?
KS3 2005 Mental test level 5

What is fifty per cent of twenty pounds?
KS3 2003 Mental test level 4

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- **Use standard column procedures to add and subtract integers and decimals, and to multiply two- and three-digit integers by a one- or two-digit integer; extend division to dividing three-digit integers by a two-digit integer**

Calculate 15.05 – 14.84.

KS2 2002 Paper A level 5

Calculate 52.85 + 143.6.

KS2 2006 Paper A level 5

Calculate 8.6 – 3.75.

KS2 2000 paper A level 5

Calculate 602 × 57.

KS2 2009 Paper A level 5

Calculate 143 × 37.

KS2 2005 Paper A level 5

Calculate 509 × 24.

KS2 2001 Paper A level 5

You can buy a new calculator for £1.25.

In 1979 the same type of calculator cost 22 times as much as it costs now.

How much did the same type of calculator cost in 1979?

Show your working.

KS3 2004 Paper 1 level 5

Calculate 504 ÷ 21.

KS2 2007 Paper A level 5

Calculate 848 ÷ 16.

KS2 2006 Paper A level 5

Calculate 924 ÷ 22.

KS2 2002 Paper A level 5

Calculate 31.6 × 7.

KS2 2004 Paper A level 5

Write in the missing number.

$50 \div \square = 2.5$

KS2 2003 Paper A level 5

I pay £16.20 to travel to work each week.
I work for 45 weeks each year.
How much do I pay to travel to work each year?
Show your working.

I could buy one season ticket that would let me travel for all 45 weeks.
It would cost £630.
How much is that per week?

KS3 2003 Paper 1 level 5

A football club is planning a trip.
The club hires 234 coaches. Each coach holds 52 passengers.
How many passengers is that altogether?
Show your working.

The club wants to put one first aid kit into each of the 234 coaches.
These first aid kits are sold in boxes of 18.
How many boxes does the club need?

KS3 2001 Paper 1 level 5

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- **Calculate percentage increases or decreases and fractions of quantities and measurements (integer answers)**

Calculate $\frac{3}{4}$ of 840.

KS2 2000 Paper A level 4

Calculate $\frac{5}{12}$ of 378.

KS2 2001 Paper B level 5

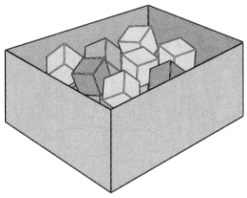
Calculate $\frac{3}{8}$ of 980.

KS2 2003 Paper B level 5

Three-quarters of a number is 48.
What is the number?

KS2 2003 Paper A level 5

There are 24 coloured cubes in a box.
Three-quarters of the cubes are red, four of the cubes are blue and the rest are green.



How many green cubes are in the box?

One more blue cube is put into the box. What fraction of the cubes in the box are blue now?

KS2 2002 Paper B level 5

Fill in the missing numbers.

$\frac{1}{2}$ of 20 = $\frac{1}{4}$ of …

$\frac{3}{4}$ of 100 = $\frac{1}{2}$ of …

$\frac{1}{3}$ of 60 = $\frac{2}{3}$ of …

KS3 2003 Paper 1 level 5

Increase one pound fifty by fifty per cent.

KS3 2004 Mental test level 5

Calculate 5% of £3600.

KS2 2004 Paper A level 5

Calculate 15% of 460.

KS2 2001 Paper A level 5

Calculate 24% of 525.

KS2 1998 Paper B level 5

Write in the missing numbers.

30% of 60 is ☐

30% of ☐ is 60

KS2 2005 Paper B level 5

Emily makes 250 grams of a snack mixture.
15% of the weight is raisins, 25% is banana chips and the rest is peanuts.
How many grams of peanuts does she use?

KS2 2008 Paper A level 5

250 000 people visited a theme park in one year.
15% of the people visited in April and 40% of the people visited in August. How many people visited the park in the rest of the year?

KS2 2003 Paper B level 5

In Class 6, 80% of the children like crisps.
75% of the children who like crisps also like chocolate.
In Class 6, what percentage of the children like both crisps and chocolate?

KS2 2002 Paper C level 6

The population of the world is approximately 6200 million people.

It is increasing by approximately 93 million people each year.

Use this information to calculate the percentage increase in the population over a year.

KS2 2001 Paper C level 6

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- **Use bracket keys and the memory of a calculator to carry out calculations with more than one step; use the square root key**

How much less than 1000 is 9.7 × 9.8 × 9.9?

KS2 2008 Paper B level 5

Calculate:

$$1.2 \times (1.3 + 1.4) \times 1.5$$

KS2 2007 Paper B level 5

Use a calculator to work out

$$49.3 \times (2.06 + 8.5)$$

KS2 2002 Paper B level 5

Write the answer..

$$100 - (22.75 + 19.08) =$$

KS2 2004 Paper B level 5

Write in the missing numbers.

$$\square \div 21.7 = 37.5$$

$$100 - (22.75 + 19.08) = \square$$

KS2 2004 Paper B level 5

Write in the missing number.

$$32.45 \times \square = 253.11$$

KS2 2002 Paper B level 5

Write in the missing number.

$$404.09 \div \square = 8.5$$

KS2 2001 Paper B level 5

Write in the missing number.

$$\square \div 21.7 = 37.5$$

KS2 2004 Paper B level 5

Write in what the missing numbers could be.

$$170 + \square = 220 - \square$$

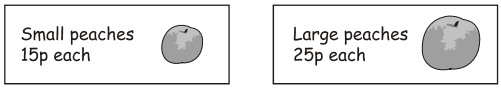
KS2 2002 Paper B level 5

Use your calculator to work out the answers.

$$(48 + 57) \times (61 - 19)$$

$$\frac{48 + 57}{61 - 19}$$

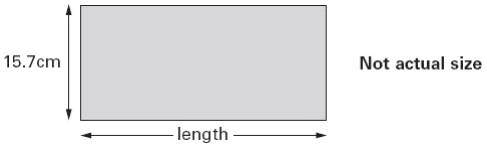
KS3 2003 Paper 2 level 5



Emily has £5 to spend on peaches.
She decides to buy only small peaches or only large peaches.
How many more small peaches than large peaches can she buy for £5?

KS2 2008 Paper B level 5

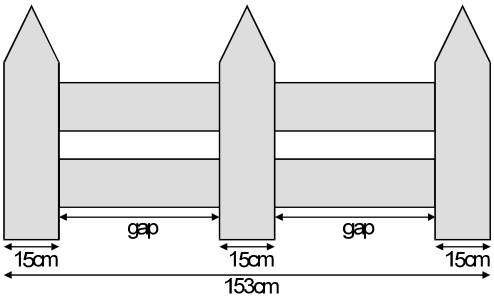
Here is a rectangle with a width of 15.7 centimetres.



The perimeter of this rectangle is 85 centimetres.
Calculate the length of the rectangle.

KS2 2005 Paper B level 5

This fence has three posts, equally spaced.



Each post is 15 centimetres wide.
The length of the fence is 153 centimetres.
Calculate the length of one gap between two posts.

KS2 2003 Paper B level 5

The cost for using a minibus is £1.36 for each kilometre.

8 friends go on a 114 kilometre journey.
They share the cost equally.

How much does each person pay?

KS2 2007 Paper B level 5

A box contains 220 matches and weighs 45 grams.
The empty box weighs 12 grams.
Calculate the weight of one match.

KS2 2005 Paper B level 5

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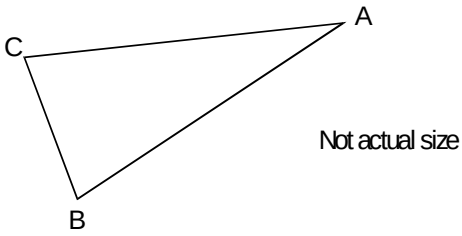
Understanding shape

- **Use correctly the vocabulary, notation and labelling conventions for lines, angles and shapes**

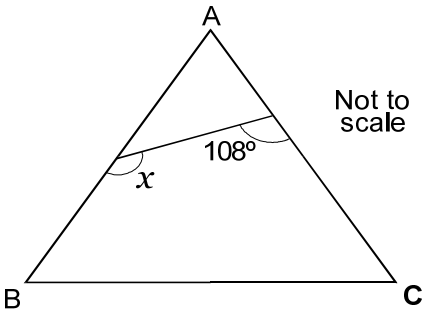
Triangle ABC is isosceles and has a perimeter of 20 centimetres.
Sides AB and AC are each twice as long as BC.



Calculate the length of the side BC.
Do not use a ruler.

KS2 2001 Paper A level 5

Triangle ABC is equilateral.

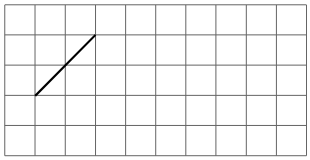


Calculate the size of angle *x*.
Do not use an angle measurer (protractor).

KS2 1999 Paper C level 6

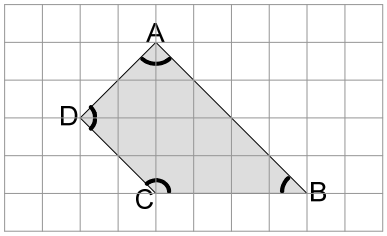
- **Extend knowledge of properties of triangles and quadrilaterals and use these to visualise and solve problems, explaining reasoning with diagrams**

This is a centimetre grid.
Draw 3 more lines to make a parallelogram with an area of 10 cm^2.
Use a ruler.



KS2 2001 Paper A level 5

Here is a shape on a square grid.



For each sentence, put a tick (✓) if it is true. Put a cross (×) if it is not true.

Angle C is an obtuse angle.
Angle D is an acute angle.
Line AD is parallel to line BC.
Line AB is perpendicular to line AD.

KS2 2000 Paper B level 5

Jamie draws a triangle. He says,

'Two of the three angles in my triangle are obtuse'.

Explain why Jamie cannot be correct.

KS2 2007 Paper A level 5

Here are four statements.

For each statement put a tick (✓) if it is possible.
Put a cross (×) if it is impossible.

☐ A triangle can have 2 acute angles.

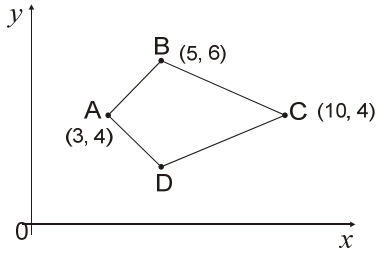
☐ A triangle can have 2 obtuse angles.

☐ A triangle can have 2 parallel sides.

☐ A triangle can have 2 perpendicular sides.

KS2 2005 Paper A level 5

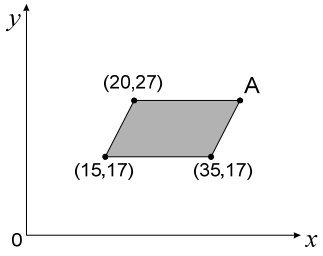
Here is a kite.



Write the coordinates of point D.

KS2 2004 Paper A level 5

The shaded shape is a parallelogram.



Write in the coordinates of point A.

KS2 2002 Paper A level 5

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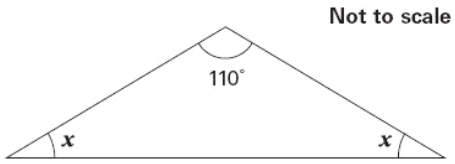
- **Know the sum of angles on a straight line, in a triangle and at a point, and recognise vertically opposite angles**

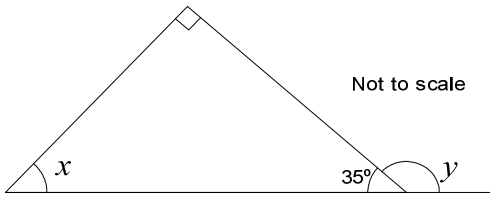
Here is an isosceles triangle.



Calculate the size of angle x.
Do not use a protractor (angle measurer).

KS2 2005 Paper B level 5

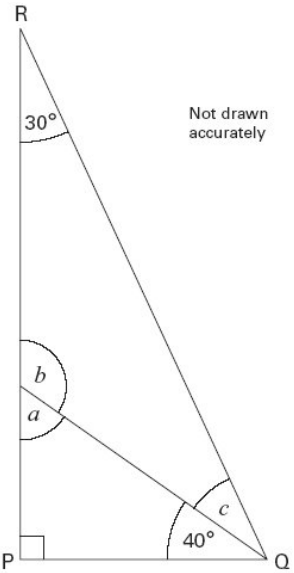
Look at this diagram.



Calculate the size of angle x and angle y.
Do not use a protractor (angle measurer).

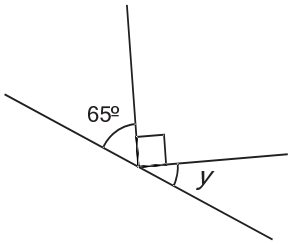
KS2 2002 Paper A level 5

The diagram shows triangle PQR.



Work out the sizes of angles a, b and c.

KS3 2005 Paper 1 level 5

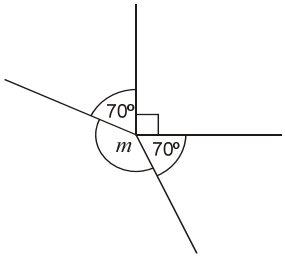


Not to scale

Calculate the size of angle y in this diagram.
Do not use a protractor (angle measurer).

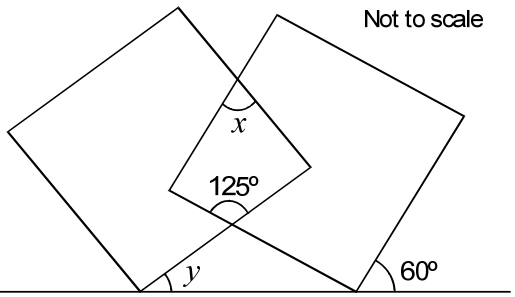
KS2 2009 Paper B level 5

This diagram is not drawn accurately.
Calculate the size of angle m.



KS3 2004 Paper 1 level 5

The diagram shows two overlapping squares and a straight line.



Calculate the value of angle x and the value of angle y.
Do not use a protractor (angle measurer).

KS2 2000 Paper C level 6

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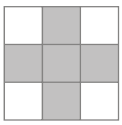
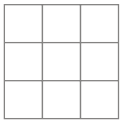
• Identify all the symmetries of 2-D shapes; transform images using ICT

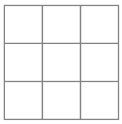
On the square grid below, some squares are shaded to make a pattern with exactly 4 lines of symmetry.



On the square grid below, shade some squares to make a pattern with exactly 2 lines of symmetry.

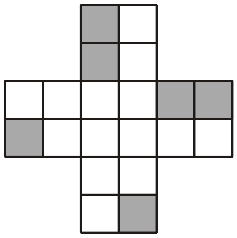


On the square grid below, shade some squares to make a pattern with exactly 1 line of symmetry.

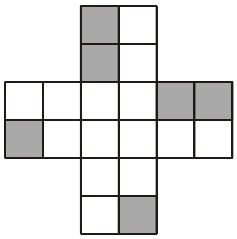


KS3 2008 Paper 1 level 4

Shade two more squares on the shape below so that it has rotation symmetry of order 4.



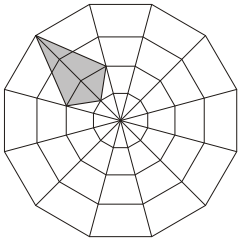
Now shade four more squares on the shape below so that it has rotation symmetry of order 2.



KS3 2008 Paper 1 level 5

Here is a shaded shape on a grid. Jamie rotates the shape 90° clockwise about the centre of the grid.

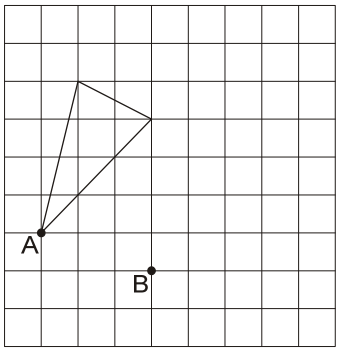
Draw the shaded shape in its new position.



KS2 2007 Paper B level 5

Here is a triangle on a square grid. The triangle is translated so that point A moves to point B.

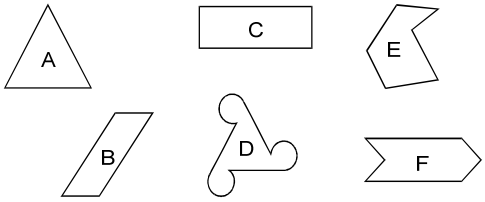
Draw the triangle in its new position. Use a ruler.



KS2 2006 Paper B level 5

An equilateral triangle has 3 lines of symmetry. It has rotational symmetry of order 3.

Write the letter of each shape in the correct space in the table below. The letters for the first two shapes have been written for you.



Number of lines of Symmetry

Order of Rotational Symmetry	0	1	2	3
1				
2	**B**			
3				**A**

KS3 1999 Paper1 level 5

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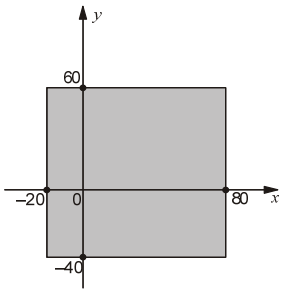
• Use all four quadrants to find coordinates of points determined by geometric information

Here is a shaded square on x and y axes.

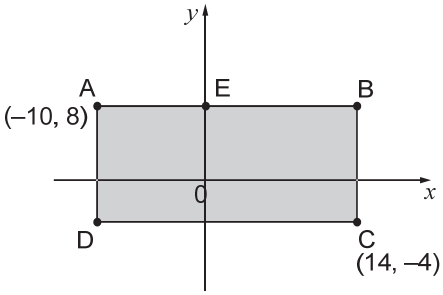


For each of these points, put a tick (✓) to show if it is inside the square or outside the square.

	inside the square	outside the square
(50, 70)	☐	☐
(60, –30	☐	☐
(–10, 50)	☐	☐
(–30, –30)	☐	☐

KS2 2007 Paper A level 5

ABCD is a rectangle drawn on coordinate axes.
The sides of the rectangle are parallel to the axes.

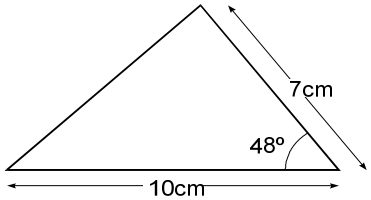


What are the coordinates of D and E?

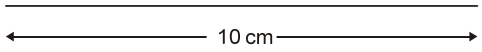
KS2 2009 Paper A level 5

• Construct a triangle given two sides and the included angle

Here is a sketch of a triangle.
It is not drawn to scale.

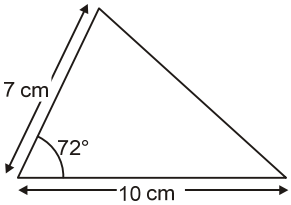


Draw the full size triangle accurately, below.
Use an angle measurer (protractor) and a ruler.
One line has been drawn for you.

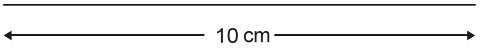


KS2 1999 Paper A level 5

Here is a sketch of a triangle.
It is not drawn to scale



Draw the full-size triangle accurately below.
Use a protractor (angle measurer) and a ruler.
One line has been drawn for you.



KS2 2006 Paper A level 5

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Measuring

- **Convert between related metric units using decimals to three places, e.g. convert 1375 mm to 1.375 m, or vice versa**

How many grams are there in two point seven kilograms?

KS2 2007 Mental test level 5

How many grams are there in twelve kilograms?

KS2 2003 Mental test level 5

How many metres are there in three point eight kilometres?

KS2 2009 Mental test level 5

How many metres are there in one point five kilometres?

KS2 2000 Mental test level 5

How many millilitres are there in two and a half litres?

KS2 1999 Mental test level 5

How many millilitres are there in one and a quarter litres?

KS2 2005 Mental test level 5

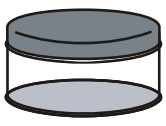
Write the missing numbers in the boxes.

120 mm is the same as	cm
120 cm is the same as	m
120 m is the same as	km

KS3 2006 Paper 1 level 5

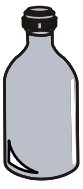
Here are two containers and the amounts they hold.

A



750 millilitres

B



0.5 litre

Which container holds the greater amount?
How much more does it hold?
Give your answer in millilitres.

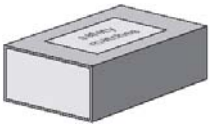
KS3 2007 Paper 1 level 5

A box contains bags of crisps.
Each bag of crisps weighs 25 grams.
Altogether, the bags of crisps inside the box weigh 1 kilogram.
How many bags of crisps are inside the box?

KS3 2004 Paper 1 level 5

A packet contains 1.5 kilograms of guinea pig food.
Remi feeds her guinea pig 30 grams of food each day.
How many days does the packet of food last?

KS2 2003 Paper A level 5



A box contains 220 matches and weighs 45 grams.
The empty box weighs 12 grams.
Calculate the weight of one match.

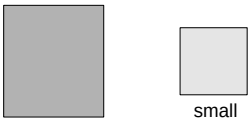
KS2 2005 Paper B level 5

Cheddar cheese costs £7.50 for 1 kg.
Marie buys 200 grams of cheddar cheese.
How much does she pay?

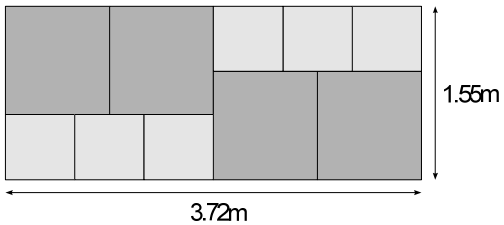
Cream cheese costs £3.60 for 1 kg.
Robbie buys a pot of cream cheese for 90p.
How many grams of cream cheese does he buy?

KS2 2003 Paper B level 5

Mr Jones has two sizes of square paving stones.



He uses them to make a path.



The path measures 1.55 metres by 3.72 metres.
Calculate the width of a small paving stone.

KS2 1999 Paper B level 5

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- **Solve problems by measuring, estimating and calculating; measure and calculate using imperial units still in everyday use; know their approximate metric values**

A glass holds 225 ml.

An adult needs about 1.8 litres of water each day to stay healthy. How many glasses is that?

An adult weighs 80 kg.
60% of his total mass is water.
What is the mass of this water?

KS3 2003 Paper 1 level 5

Put a ring round the number which is the approximate weight of a thirty-centimetre plastic ruler.

2 g 20 g 200 g 2 kg 20 kg

KS2 2001 Mental test level 5

How many pints are about the same as one litre?
Ring the best answer.

1 2 3 4 5

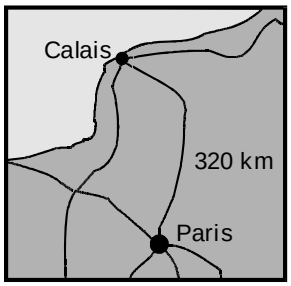
KS3 2003 Mental test level 5

A man measures his height as six feet.
About how many metres high is that?
Ring the best answer.

0.6 1 1.4 1.8 2.2

KS3 2003 Mental test level 5

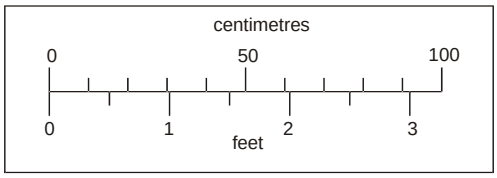
Here is a map of part of France.



The map shows that the distance from Calais to Paris is 320 kilometres.
5 miles is approximately 8 kilometres.
Use these facts to calculate the approximate distance in miles from Calais to Paris.

KS2 2000 Paper B level 5

This scale shows length measurements in centimetres and feet.



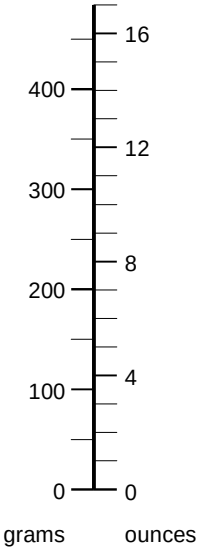
Not actual size

Look at the scale.
Estimate the number of centimetres that are equal to $2\frac{1}{2}$ feet.

Estimate the difference in centimetres between 50 cm and 1 feet.

KS2 2009 Paper B level 5

A scale measures in grams and in ounces.



About how many ounces is 400 grams?

About how many grams is 8 ounces?

About how many ounces is 1 kilogram?
Explain your answer.

KS3 2002 Paper 1 level 5

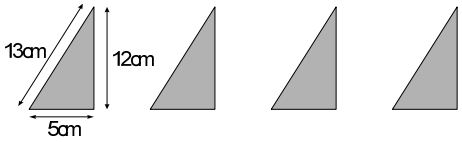
© Crown copyright 2009

- **Calculate the area of right-angled triangles given the lengths of the two perpendicular sides, and the volume and surface area of cubes and cuboids**

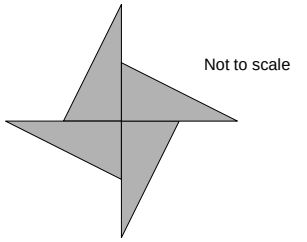
A rectangle has a width of ten centimetres and a length of eleven centimetres. What is its area?

KS2 2008 Mental test level 5

Lindy has 4 triangles, all the same size.



She uses them to make a star.

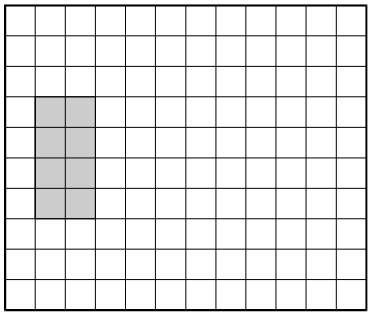


Calculate the perimeter of the star.

Calculate the area of the star.

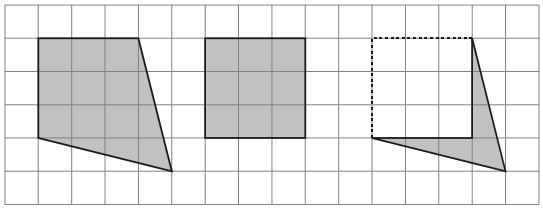
KS2 1999 Paper B level 5

On the grid draw a triangle with the same area as the shaded rectangle. Use a ruler.



KS2 1999 Paper A level 5

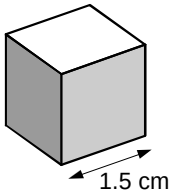
Look at the shapes drawn on the centimetre square grid.
For each one, work out the area that is shaded.
The first one is done for you.



Area = 12 cm^2 Area = ... cm^2 Area = ... cm^2

KS3 2008 Paper 1 level 5

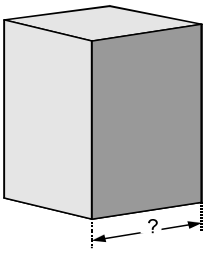
Amit has some small cubes.



The edge of each cube is 1.5 centimetres.
He makes a larger cube out of the small cubes.
The volume of this larger cube is 216 cm^3.
How many small cubes does he use?

KS2 2000 Paper C level 6

A cuboid has a square base.
It is twice as tall as it is wide.
Its volume is 250 cubic centimetres.

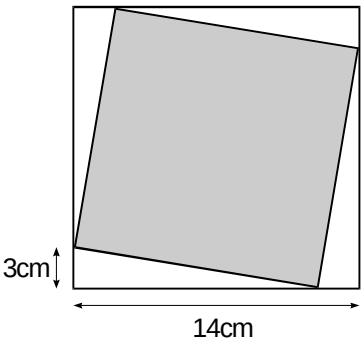


Not actual size

Calculate the width of the cuboid.

KS2 2001 Paper C level 6

The diagram shows a shaded square inside a larger square.



Calculate the area of the larger square.

Calculate the area of the shaded square.

KS2 1999 Paper C level 6

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Handling data

- **Understand and use the probability scale from 0 to 1; find and justify probabilities based on equally likely outcomes in simple contexts**

Dan has a bag of seven counters numbered 1 to 7.
Abeda has a bag of twenty counters numbered 1 to 20.
Each chooses a counter from their own bag without looking.

For each statement, put a tick (✓) if it is true.
Put a cross (×) if it is not true.

☐ Dan is more likely than Abeda to choose a '5'.

☐ They are both equally likely to choose a number less than 3.

☐ Dan is more likely than Abeda to choose an odd number.

☐ Abeda is less likely than Dan to choose a '10'.

KS2 2002 Paper A level 5

The labels have fallen off. Here are the labels.

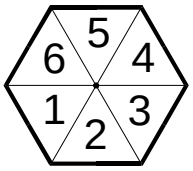
Harry chooses a tin.
What is the probability that it is a tin of Pea Soup?
Give your answer as a fraction.

What is the probability that the tin he chooses is NOT a tin of Tomato Soup?
Give your answer as a fraction.

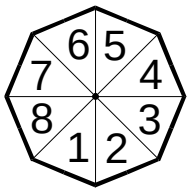
KS2 1999 Paper B level 5

Here are two spinners.

Jill's spinner



Peter's spinner

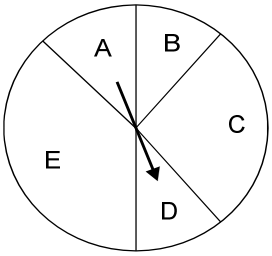


Jill says, 'I am more likely than Peter to spin a 3.'
Give a reason why she is correct.

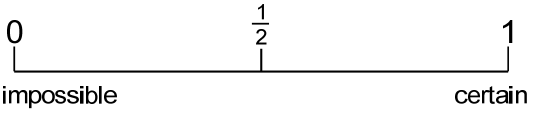
Peter says, 'We are both equally likely to spin an even number.' Give a reason why he is correct.

KS2 1996 Paper A level 5

Here is a spinner



Anne spins the arrow. What is the probability that the arrow stops in sector E?
Show this probability by putting a cross (X) on the probability line below.



KS2 1998 Paper B level 5

On my desk I have three blue pens, one red pen and four black pens.
I am going to pick up one of the pens at random.
What is the probability that I will pick up a black pen?

KS3 2009 Mental test level 5

Ben has one red marble, one green marble and three blue marbles in his pocket.
He is going to take one of the marbles out of his pocket without looking.
What is the probability it will be green?

KS3 2008 Mental test level 5

The probability I will be late for school is one-twentieth.
What is the probability that I will not be late for school?

KS3 2005 Mental test level 5

The probability that I will have toast for breakfast is nought point three.
What is the probability that I will not have toast for breakfast?

KS3 2004 Mental test level 6

There are six balls in a bag. The probability of taking a red ball out of the bag is 0.5.

A red ball is taken out of the bag, and put to one side.
What is the probability of taking another red ball out of the bag?

KS2 2000 Paper C level 6

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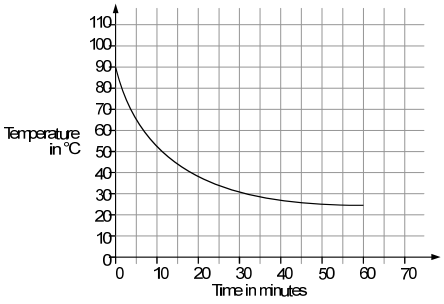
- **Explore hypotheses by planning surveys or experiments to collect small sets of discrete or continuous data; select, process, present and interpret the data, using ICT where appropriate; identify ways to extend the survey or experiment**

A hot liquid is left to cool in a science experiment.
This graph shows how the temperature of the liquid changes as it cools.



Read from the graph how many minutes it takes for the temperature to reach 40°C.

Read from the graph how many minutes the temperature is above 60°C.

KS2 2001 Paper B level 5

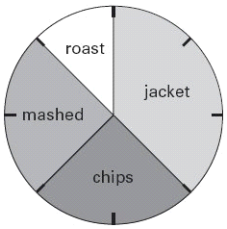
On Monday all the children at Grange School each play one sport.
They choose either hockey or rounders.

There are 103 children altogether in the school.
27 girls choose hockey.
Write all this information in the table.
Then complete the table.

	hockey	rounders	Total
boys	22		
girls			53
Total			

KS2 2005 Paper B level 5

This pie chart shows how the 32 children in Class 6 best like their potatoes cooked.



Look at the four statements below.
For each statement put a tick (✓) if it is correct.
Put a cross (✗) if it is not correct.

10 children like chips best. ☐

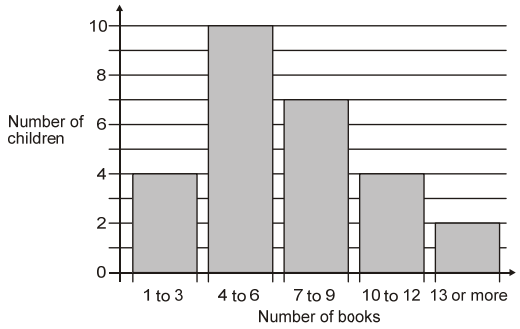
25% of the children like mashed potatoes best. ☐

$\frac{1}{5}$ of the children like roast potatoes best. ☐

12 children like jacket potatoes best. ☐

KS2 2005 Paper A level 5

This chart shows the number of books some children read last month

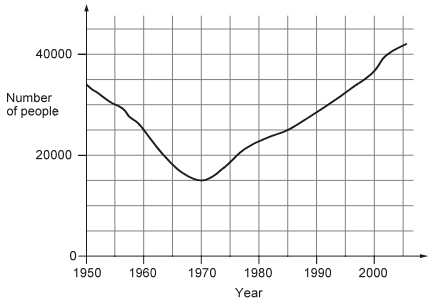


How many children altogether read more than 9 books?

7 children read 4 books. 1 child read 5 books. Lin says, 'That means 2 children read 6 books.'
Explain how she can work this out from the chart.

KS2 2006 Paper A level 5

This graph shows the number of people living in a town.



How many people lived in the town in 1985?
In which year was the number of people the same as in 1950?
Find the year when the number of people first went below 20 000.

KS2 2008 Paper A level 5

Carol counts the matches in 10 boxes. She works out that the mean number of matches in a box is 51.
Here are her results for 9 boxes.

Number of matches in a box						
48	49	50	51	52	53	54
	✓	✓	✓	✓		✓
	✓	✓				✓
	✓					

Calculate how many matches are in the 10th box.

KS2 2001 Paper C level 6

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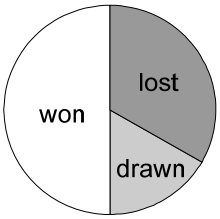
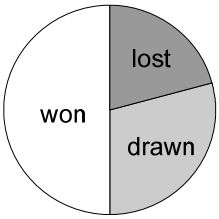
- **Construct, interpret and compare graphs and diagrams to represent data; compare proportions in two pie charts that represent different totals**

The pie charts show the results of a school's netball and football matches.



Netball



Football

The netball team played 30 games.
The football team played 24 games.
Estimate the percentage of games that the netball team lost.

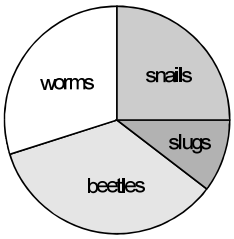
David says, 'The two teams won the same number of games'.
Is he correct? Circle Yes or No.
Explain how you know.

KS2 2003 Paper A level 5

Tony and Gemma looked for snails, worms, slugs and beetles in their gardens.

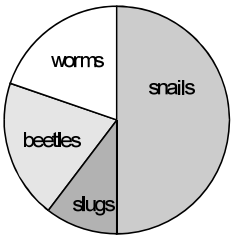
They each made a pie chart of what they found.

Tony's pie chart



Total 80

Gemma's pie chart



Total 36

Estimate the number of worms that Tony found.

Who found more snails, Tony or Gemma?
Explain how you know.

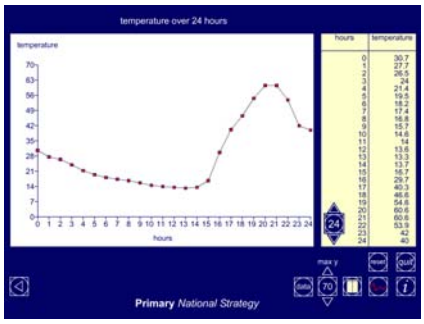
KS2 2000 Paper B level 5

- **Write a short report of a statistical enquiry and illustrate with appropriate diagrams, graphs and charts, using ICT as appropriate; justify the choice of what is presented**

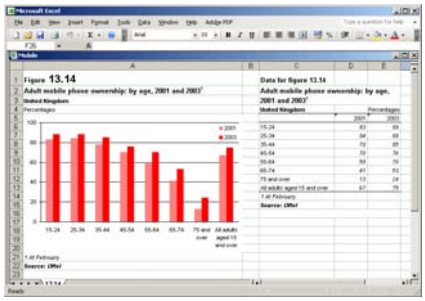
Examples of the use of ICT in data handling

Line graph accompanying a report on temperature in a room over 24 hours

ITP: line_graph/



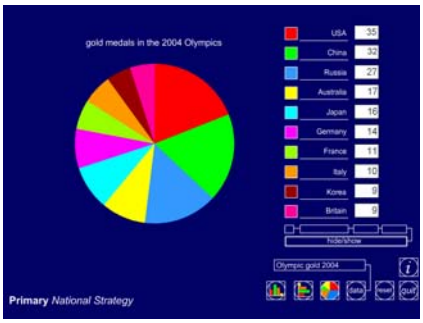
Graphs accompanying a report on mobile phone ownership for people over 16, produced in Excel

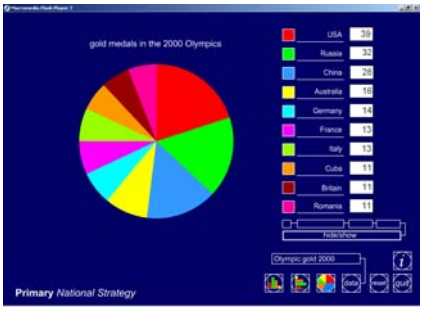


Source:statistics.gov.uk/STATBASE/Expodata/Spreadsheets/D7202.xls

Pie charts comparing the number of gold medals achieved by the top countries in the 2000 and 2004 Olympics

ITP: Data handling





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