The Catholic High School Chester

MathΣmatics

Transition Booklet

2023

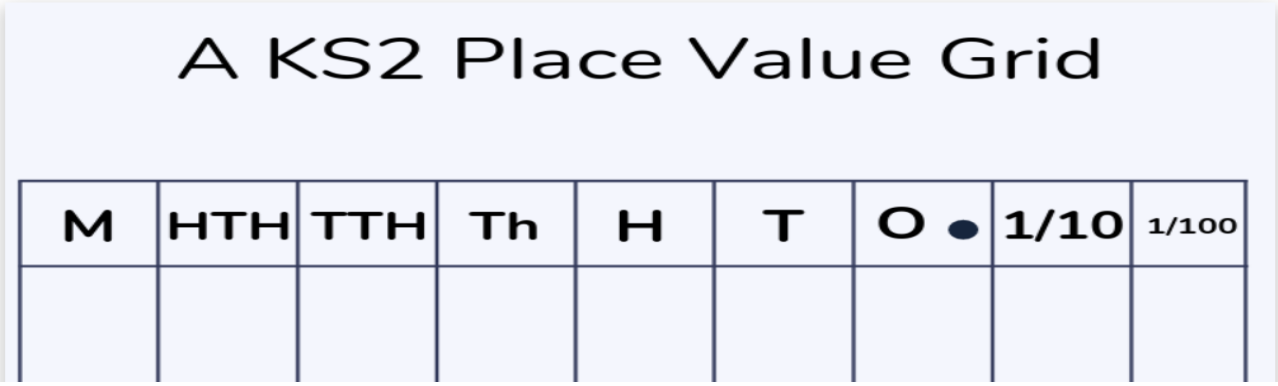
1 CONTENTS

CHAPTER 1 - NUMBER AND PLACE VALUE:

PLACE VALUE:

Place value is the value of each digit in a number. For example, in the number 1435, 1 represents one thousand, 4 represents 4 hundred, 3 represents thirty and five represents 5. So, 1435 is one thousand, four hundred and thirty-five. By the end of Year 6 you learned about numbers up to 10 million!

You will have used a place value grid to help you to decide which digit represents a place value like the one shown below:

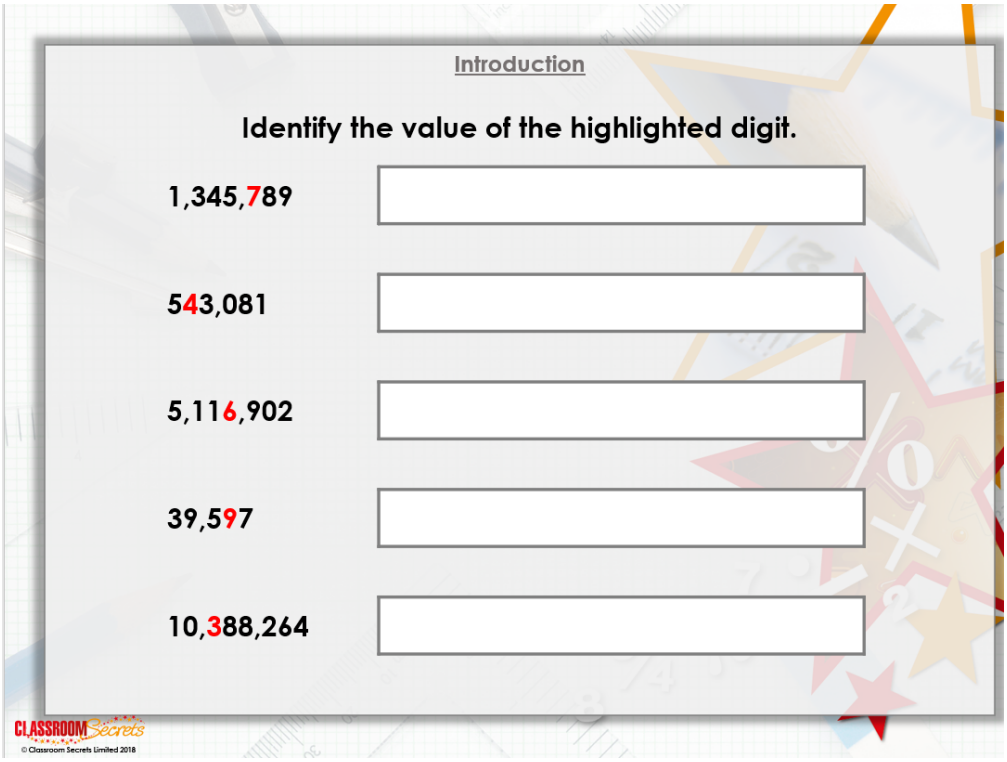


Source: thirdspacelearning.com

For some examples see the following video:
https://www.youtube.com/watch?v=a1ONSxrgal0

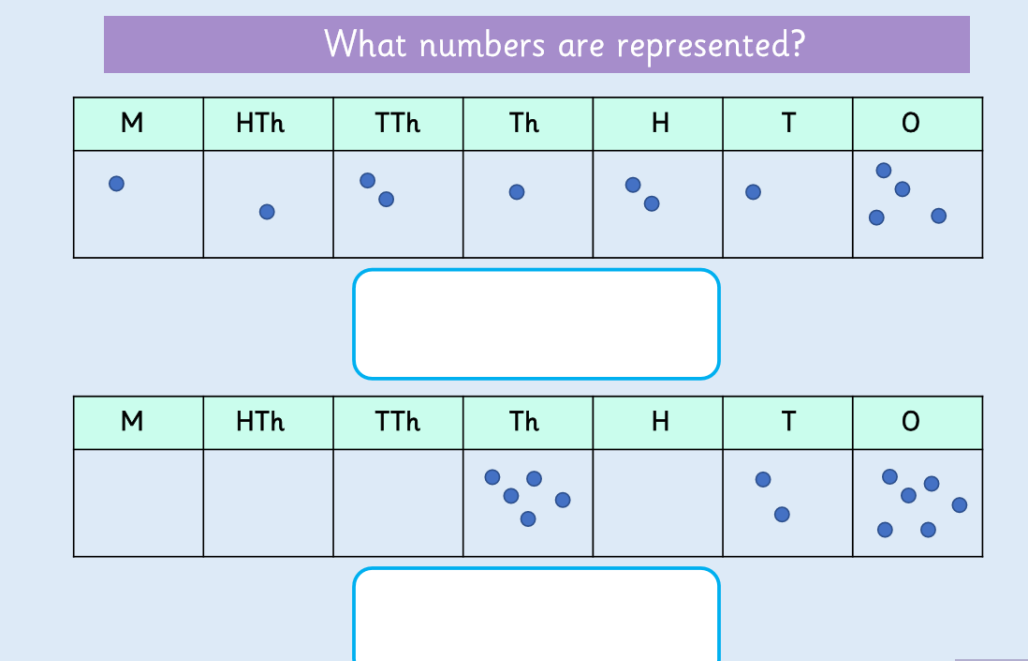
Now try the following:

Q.1


Introduction
Identify the value of the highlighted digit.
1,345,789
543,081
5,116,902
39,597
10,388,264
CLASSROOM Secrets
© Classroom Secrets Limited 2018

1.
2.
3.
4.
5.

Q2.

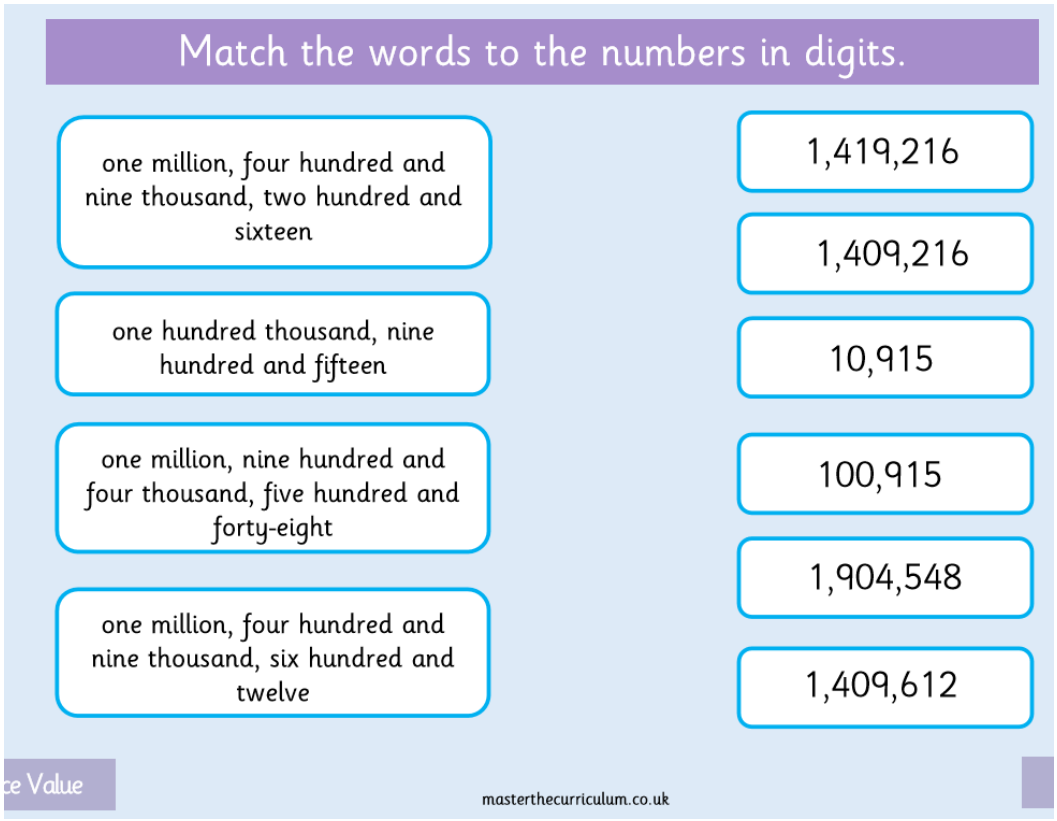


Source: masterthecurriculum.co.uk

1.

2.

Q.3


Match the words to the numbers in digits.
one million, four hundred and nine thousand, two hundred and sixteen
one hundred thousand, nine hundred and fifteen
one million, nine hundred and four thousand, five hundred and forty-eight
one million, four hundred and nine thousand, six hundred and twelve
1,419,216
1,409,216
10,915
100,915
1,904,548
1,409,612
masterthecurriculum.co.uk

Q.4 and Q.5

The Catholic High School Chester

christofid

4a. Match the pairs of numbers in the grid below to create the target number.	4b. Match the pairs of numbers in the grid below to create the target number.
3,465,326	**7,424,645**

High School

For extra online practice there are games and problem-solving at:
https://www.topmarks.co.uk/maths-games/7-11-years/place-value
https://nrich.maths.org/6343/index

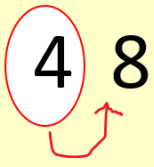
Test yourself:
To check how much you have learned complete the following test:

https://smspprimary.co.uk/wp-content/uploads/2017/03/year_6_place_value_test_SATs.pdf
(includes answers)

ROUNDING:
You need to be able to round numbers to the nearest whole number (decimals) or to the nearest power of 10.

The rules!

Round this number to the nearest 10



1. You find the number in the **tens column** and circle it.
2. You then look next door.
3. If the number is 4 or less, you keep the circled number the same.
4. If the number is 5 or more, you add 1 more to the circled number.
5. The numbers after the circled number become zeros.
6. 48 is rounded up to 50

The rules!

Round this number to the nearest 100

263

1. You find the number in the **tens column** and circle it.
2. If the number is 4 or less, you keep the circled number the same.
3. If the number is 5 or more, you add 1 more to the hundreds.
5. The numbers after the hundreds become zeros.
6. 263 is rounded up to 300.

For more information on rounding numbers up or down look at the following video on BBC Bitesize:

https://www.bbc.co.uk/bitesize/topics/zh8dmp3/articles/zpx2qty

Now that you have revised rounding numbers, try the following questions:

Rounding to the nearest 10:

1) 63

2) 549

3) 173

4) 428

Rounding to the nearest 100:

1) 85

2) 527

3) 819

4) 2486

Rounding to the nearest 1000.

1) 549

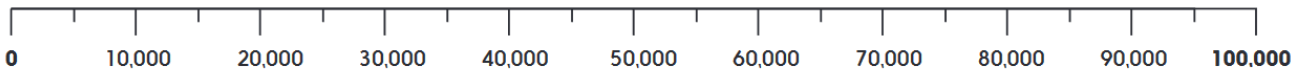
2) 284

3) 2719

4) 6475

Areas of islands round the world (square km)

Mark each area on the number line, then round it as instructed.



1. Sri Lanka 65,600. *Round to the nearest 1000.*
2. Vancouver Island 32,150. *Round to the nearest 100.*
3. Mauritius 1865. *Round to the nearest 100.*
4. Ireland 70,273. *Round to the nearest 1000.*

1.

2.

3.

4.

5. Madagascar 587,040 *(to the nearest 100,000)*
6. Borneo, Indonesia 744,360 *(to the nearest 10,000)*
7. New Guinea 821,030 *(to the nearest 100)*

5.

6.

7.

Challenges:

How many numbers round to 550,000 as the nearest 10,000 and to 555,000 as the nearest 1000?

My answer has six digits. Four of the digits are identical and the other two are both 9. It rounds to 560,000 as the nearest 10,000. Write two different possible answers.

Rounding to the nearest whole number:

The following video shows you how to round to the nearest whole number (decimals):

https://www.youtube.com/watch?v=r109VbISKe8

See also the BBC Bitesize guide at:

https://www.bbc.co.uk/bitesize/topics/zh8dmp3/articles/zsvt97h

How to round a number to the nearest integer (whole number)

Look at the ***tenths*** digit (the digit after the decimal point).

- ***if it is less than 5 then round the number down*** by removing the decimal part of the number;
- ***if it is 5 or more then round the number up*** by adding one on to the ones digit and removing the decimal part of the number.

Examples

- 3.8 rounds up to 4 because the tenths digit is an 8.
- 6.29 rounds down to 6 because the tenths digit is a 2.
- 12.527 rounds up to 13 because the tenths digit is a 5.

ROUNDING TO THE NEAREST WHOLE SHEET 1

Fill in the number marked by the arrow.

Draw an arrow to show where the nearest whole number is.

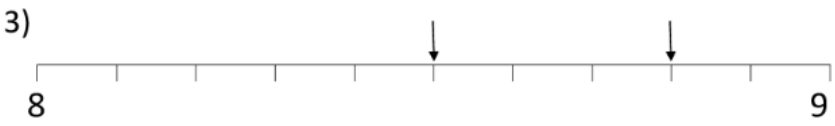
Remember: if the number is in the middle, it rounds up to the next one.

Example

1)

2)

3)



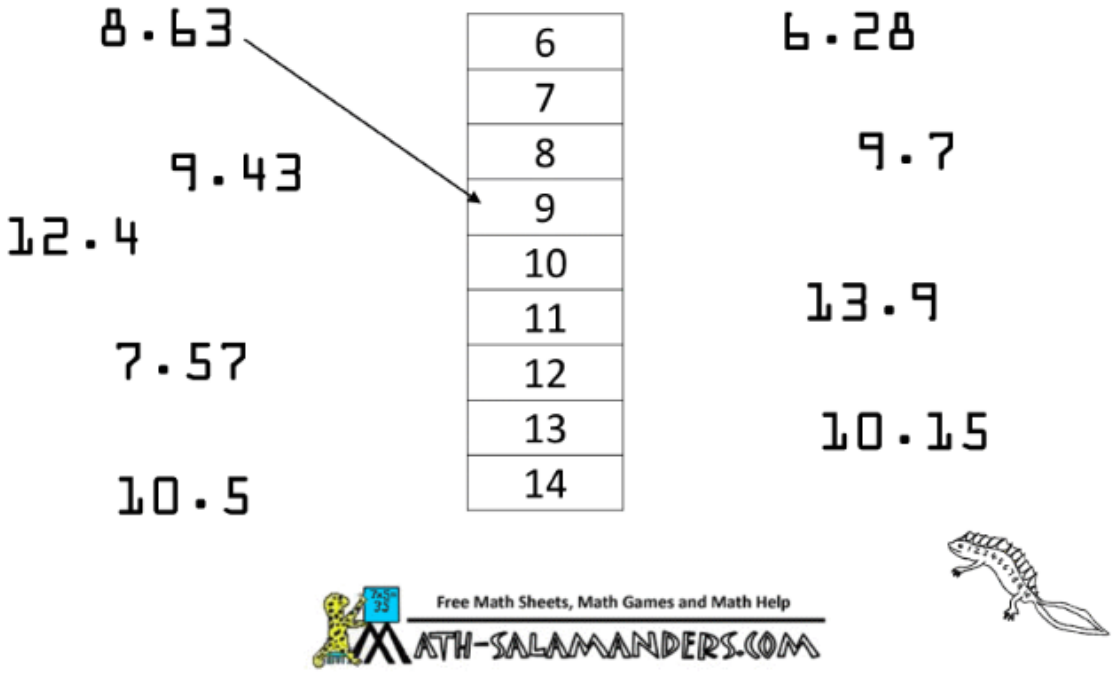
4)

5)

Round these numbers to the nearest one

1) 5.7 → _____	2) 2.8 → _____	3) 6.5 → _____
4) 8.4 → _____	5) 1.4 → _____	6) 9.0 → _____
7) 4.5 → _____	8) 2.4 → _____	9) 5.7 → _____
10) 9.6 → _____	11) 12.3 → _____	12) 14.1 → _____
13) 17.1 → _____	14) 26.6 → _____	15) 32.5 → _____
16) 22.4 → _____	17) 14.8 → _____	18) 40.6 → _____
19) 9.6 → _____	20) 63.4 → _____	21) 35.3 → _____
22) 4.37 → _____	23) 8.72 → _____	24) 2.48 → _____

Draw an arrow to match each number to its nearest whole.



Complete the challenges on the next page:

The Catholic High School Chester

Use the clues to find the correct answer from the eight possibilities.

christofid High School

CHALLENGE A

- I am between 10 and 20.
- I am 15 rounded to the nearest whole

For more practice play:

https://www.topmarks.co.uk/maths-games/rocket-rounding

https://www.helpingwithmath.com/resources/games/5nbt4-rounding-whole01/5nbt4-rounding-whole01.htm

https://www.transum.org/software/SW/Starter_of_the_day/Students/RoundingWN.asp

Test yourself:

https://www.educationquizzes.com/ks2/maths/rounding-numbers-year-5-6/

NEGATIVE NUMBERS:

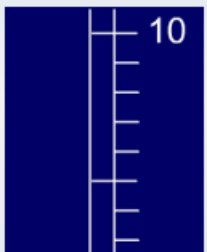
Negative numbers are numbers less than 0: -1, -2, -3 etc. We often use negative numbers to show temperatures, in the winter or at night, or to show the depth below sea level, for example.

This short video from BBC Bitesize will show you some examples of negative numbers:

https://www.bbc.co.uk/bitesize/topics/znwj6sg/articles/zxthnbk

Test out your knowledge of negative numbers with this interactive thermometer game:

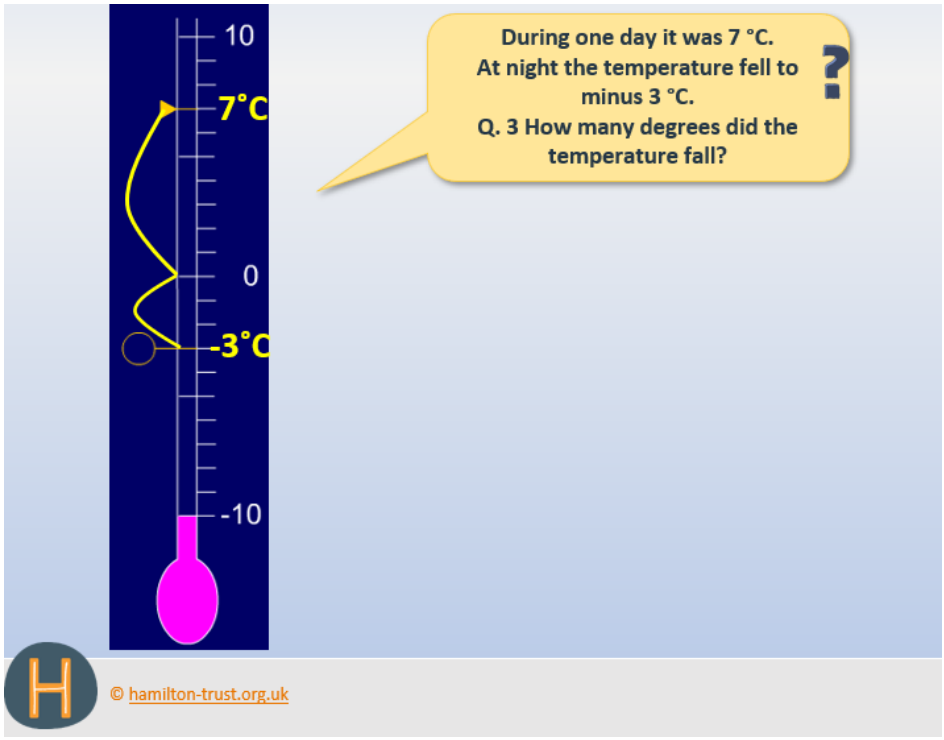
https://www.transum.org/Software/SW/Starter_of_the_day/students/Temperature.asp



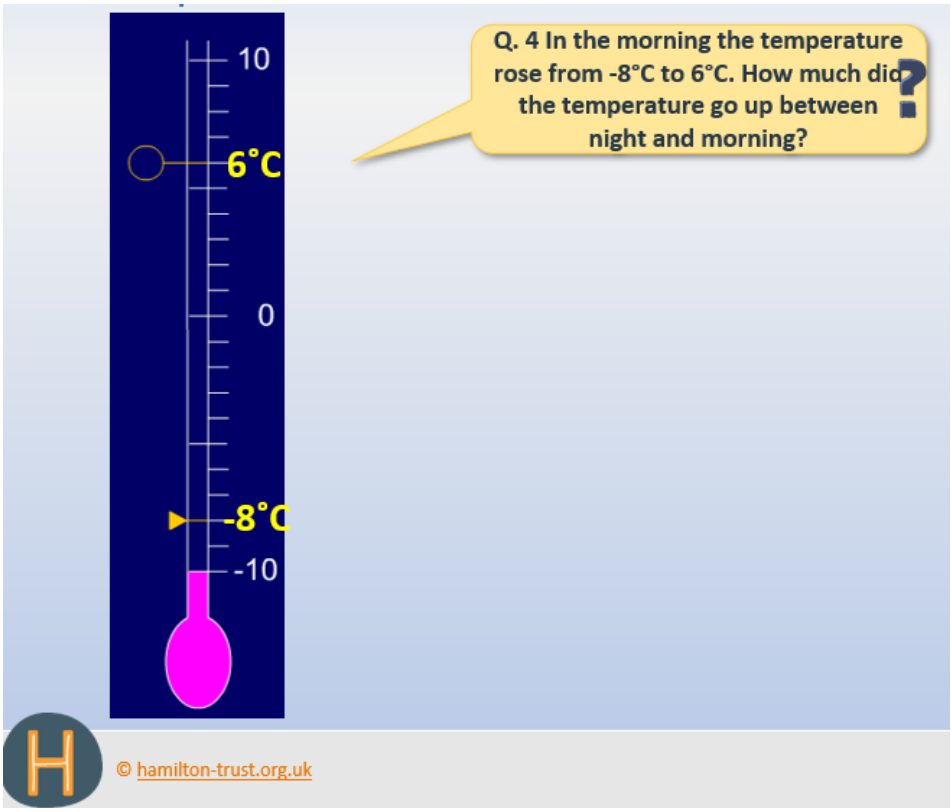
1. At what sort of temperature might we get ice outside? Why?

Q1.

Q2.


10
7°C
0
-3°C
-10
During one day it was 7 °C.
At night the temperature fell to minus 3 °C.
Q. 3 How many degrees did the temperature fall?
?
© hamilton-trust.org.uk

Q.3



Q4.

Day	Maximum day temperature	Minimum night temperature
Monday	5°C	-3°C
Tuesday	4°C	-2°C
Wednesday	2°C	-3°C
Thursday	-1°C	-6°C
Friday	-2°C	-4°C

What was the coldest night?

Which was the mildest night?

What was the fall in temperature on Monday?

What was the fall in temperature on Friday?

Which day had the biggest drop in temperature?

Lighthouse negative and positive numbers:

The Catholic High School Chester

There are black markings all the way up the lighthouse and on the support for the lighthouse going down to the seabed. These markings are 1 metre apart.

The sea level is of course "0" and then positive numbers going up and negative numbers going down to the seabed.

If we think about the mouths of the creatures then we can see how much deeper they are from each other, or what distance they are apart.

For example, the (mouth of) the fierce looking blue and white fish near the middle is 1 metre deeper than the (mouth of) the golden yellow fish.

1. What number should be where the light shines from the lighthouse?
2. What number should be where the (head of the) seagull is?
3. What number should be where the (mouth of the) red crab, near the bottom, is?
4. How far is it down from the (head of the) seagull to the (mouth of the) yellow fish?
5. How far is it from the turtle, near the surface of the water, to the crab?
6. There's a little brown seahorse to the right of the lighthouse support. How far from the surface is it?
7. How high above the sea level is the seagull flying?
8. How far is the seagull from the seahorse?
9. How high is the pointed end of the cloud?

(Source: nrich.maths.org)

Challenge:

The temperature at 6pm is given first and then the fall during the night until 5am. Write the night temperatures for each weekday.

Monday: 5°C Falls 9°

Tuesday: 3°C Falls 8°

Wednesday: 8°C Falls 10°

Thursday: 3°C Falls 7°

Friday: 2°C Falls 3°

On which night was the temperature lowest?

On Saturday, the temperature fell 15° overnight to -6°C. What was the temperature at 6pm?

On Sunday, the temperature was 13°C at 6pm and -5°C at 5am. How much did it fall overnight?

Extra practice:

https://primarygamesarena.com/Play/Minus-Numbers-In-Outer-Space-409

https://mathsframe.co.uk/en/resources/resource/37/placing_numbers_on_a_number_line

https://nrich.maths.org/5897

CHAPTER 2 – ADDITION, SUBTRACTION, MULTIPLICATION AND DIVISION:

MULTIPLICATION OF FOUR-DIGIT BY TWO-DIGIT NUMBERS (LONG MULTIPLICATION):

By the end of Year 6 you need to be able to multiply a four-digit number (e.g. 4358) by a two-digit number (e.g. 11). To make multiplication easier, it is really important that you know your times tables. You can practice these here:

https://www.timestables.co.uk/

https://www.topmarks.co.uk/maths-games/hit-the-button

https://www.topmarks.co.uk/maths-games/mental-maths-train

https://mathsframe.co.uk/en/resources/resource/477/Multiplication-Tables-Check

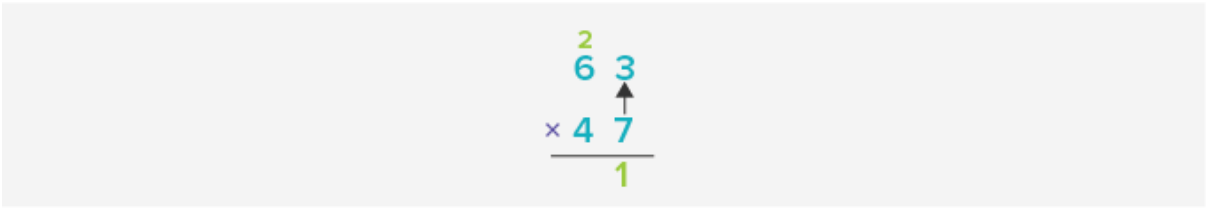
There are a number of steps involved in long multiplication:

1. Write the two numbers one below the other as per the places of their digits. Write the bigger number on top and a multiplication sign on the left. Draw a line below the numbers.

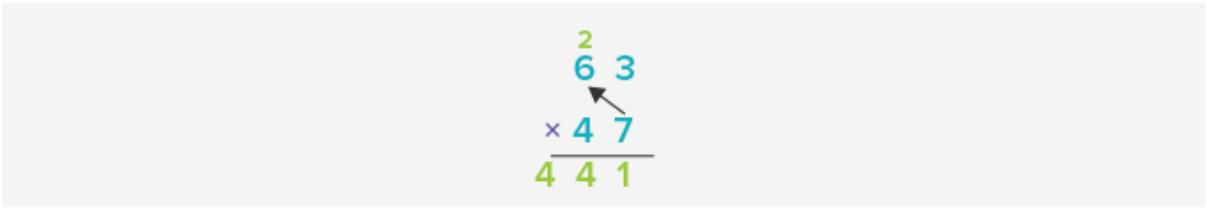
$$\begin{array}{r} 63 \\ \times\ 47 \\ \hline \end{array}$$

2. Multiply the ones digit of the top number by the ones digit of the bottom number.

Write the product as shown.

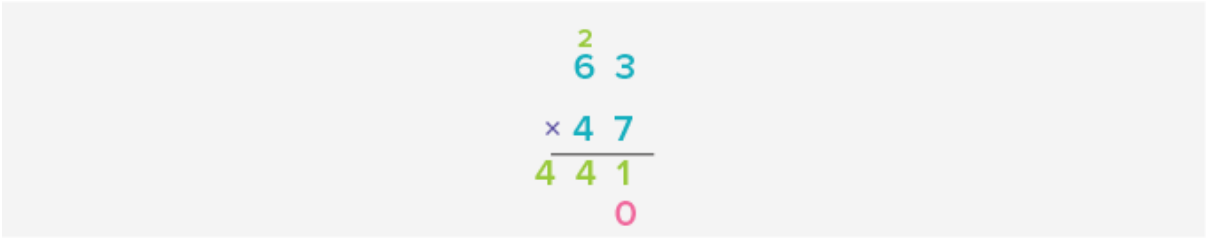


3. Multiply the tens digit of the top number by the ones digit of the bottom number.

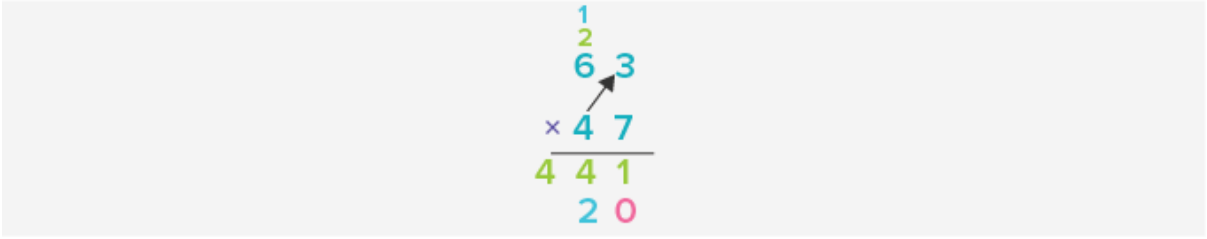


This is our first partial product which we got on multiplying the top number by the ones digit of the bottom number.

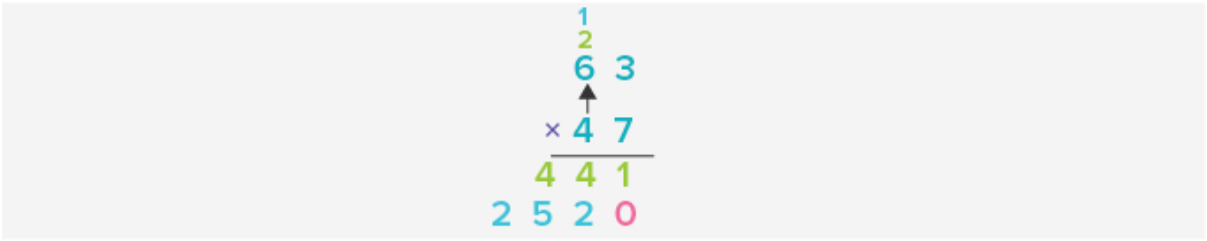
4. Write a 0 below the ones digit as shown. This is because we will now be multiplying the digits of the top number by the tens digit of the bottom number. Hence, we write a 0 in the ones place.



5. Multiply the ones digit of the top number by the tens digit of the bottom number.

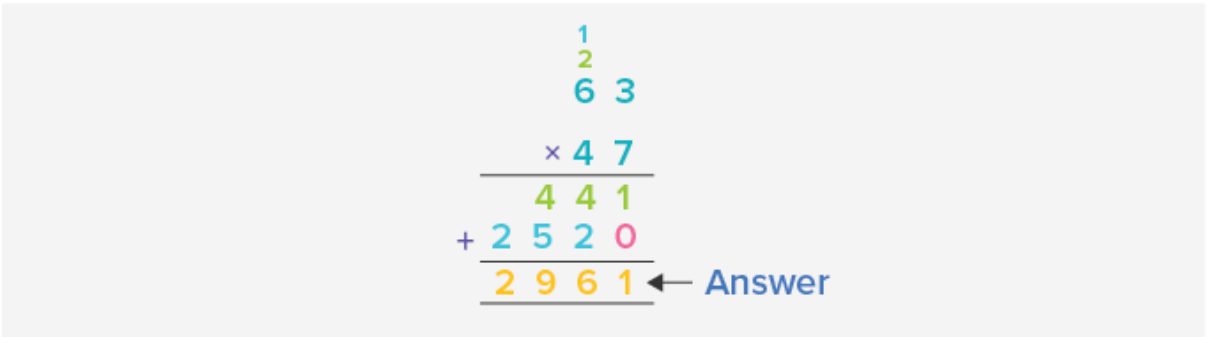


6. Multiply the tens digit of the top number by the tens digit of the bottom number.



This is the second partial product obtained on multiplying the top number by the tens digit of the bottom number.

7. Add the two partial products.



In long multiplication method, the number on the top is called the multiplicand. The number by which it is multiplied, that is, the bottom number is called the multiplier.

(Source: www.splashlearn.com)

Using the long multiplication method, calculate:

60 x 4000 =
30 x 8000 =
40 x 5000 =

1.

2.

3.

4. 36 × 467

5. 21×4235

6. 32×6314

7. 35×4328

8. 43×2139

4.

5.

6.

7.

8.

Dana makes jewellery to sell at a school fair.

Each bracelet has 47 beads.

She makes 65 bracelets.

Each necklace has 120 beads.

She makes 36 bracelets.

How many beads does Dana use **altogether**?

Challenges:

True or false?

- 12 x 4345 is the same as 3 x 4345 plus double 8690
- 1448 x 24 is the same as 36,200 – 1448
- 36 x 478 gives the same product as 9 x 478 doubled twice.

Estimate the answer to 195 x 18 by doing 200 x 18

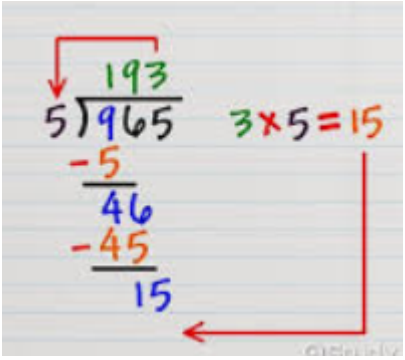
Use grid or long multiplication to find an exact answer.

Check by subtracting 18 lots of 5 from your original estimate.

DIVISION OF FOUR-DIGIT BY TWO DIGIT NUMBERS (LONG DIVISION):

Long division is used when you are dividing a large number (usually 3 digits or more) by a smaller number (2 digits or more). The following video shows you how to use long division with the 'bus stop' method:

https://youtu.be/ZFYLSoUMYs4



Long division is set out like this.

A step-by-step guide to long division can be found at:

https://www.mathsisfun.com/long_division.html

DIVISION – 4 DIGITS BY 2 DIGITS SHEET 1

Divide these 4 digit numbers by a 2 digit number with no remainders.

1) $15\overline{)4215}$ 2) $24\overline{)3168}$ 3) $43\overline{)1333}$

4) $26\overline{)6214}$ 5) $35\overline{)1715}$ 6) $14\overline{)8218}$

Challenge:

Which of the following divisions give an answer which ends $^1/_4$ or .25?

- 3750 ÷ 24
- 2223 ÷ 18
- 7300 ÷ 16
- 8669 ÷ 19

What do you notice about the two divisors in the two divisions which gave an answer ending $^1/_4$?

Extra practice:

https://www.free-training-tutorial.com/long-division/snorks/snorks.html

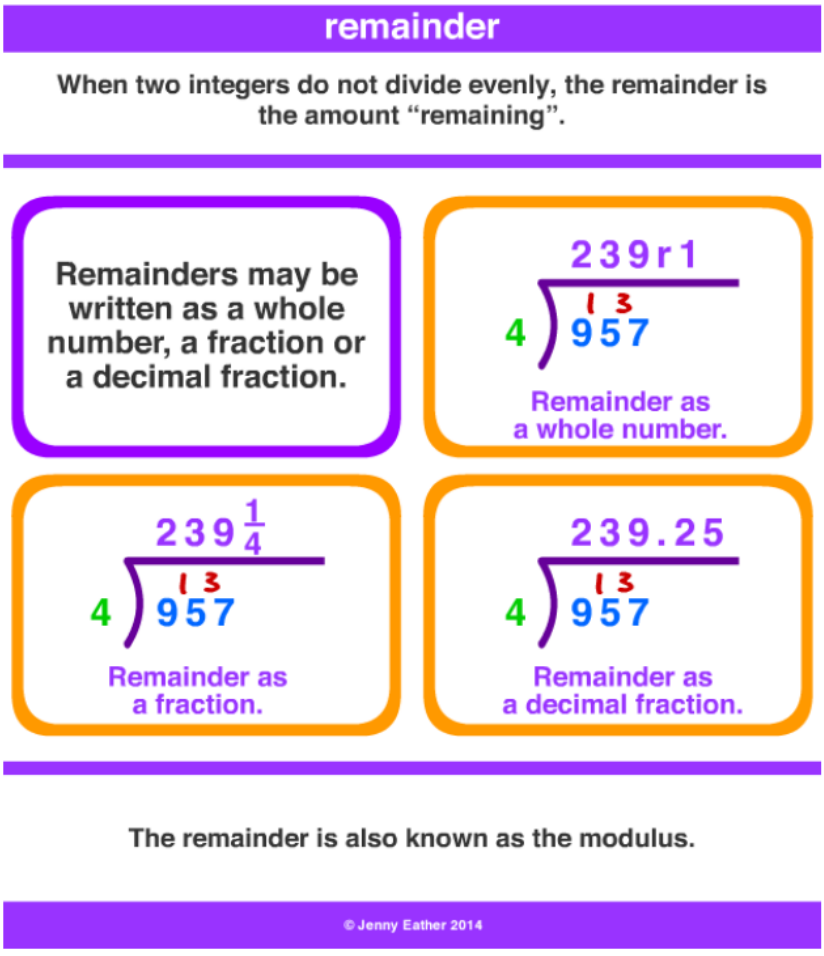
https://www.funbrain.com/games/math-mountain

https://mrnussbaum.com/divide-pal-online-workshop

INTERPRETING REMAINDERS (DIVISION):

Sometimes when you do long division the dividend cannot be evenly divided by the divisor and you will have a remainder (an amount left over).

See the example on the next page:



Divide these numbers by 17:

425 547 697

Divide these numbers by 18:

394 774 936

Divide these numbers by 21:

295 483 720

To help you – use multiples of the divisor e.g. multiples of 17, then subtract to find the remainder. (Answers in the last chapter)

Write multiples of 15 from 15 to 75.

Use them to help you work out these divisions.
Write remainders as fractions, simplifying where possible.

1. 200 ÷ 15
2. 250 ÷ 15
3. 365 ÷ 15
4. 620 ÷ 15
5. 545 ÷ 15
6. 440 ÷ 15

1.

2.

3.

4.

5.

6.

Word problems: Give your answer with the remainder in decimals.

1. A shop has a piece of ribbon that is 25m long. They need to divide the ribbon into 8 equal pieces. How long will each piece of ribbon be?

2. A group of 4 children are running a 26-mile marathon for charity between them. They want to make sure they each run the same distance. How far should each child run?

3. If a regular pentagon has a perimeter of 112cm, what would be the length of each side of the pentagon?

4. A school has raised £478 for charity. They want to share the money equally between 5 charities. How much money will each charity receive?

5. A coach is travelling from High Wycombe to Rome. The distance is 1931km. The driver wants to split the journey equally over 4 days. How far should he drive each day?

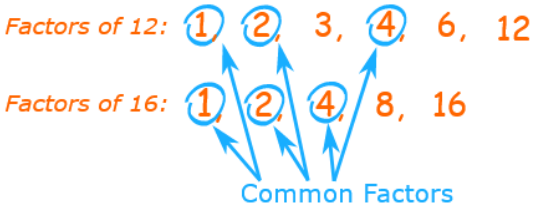
Challenge:

https://nrich.maths.org/1783

COMMON FACTORS, COMMON MULTIPLES AND PRIME NUMBERS:

"Factors" are numbers we can multiply together to get another number.

When we find the factors of two or more numbers, and then find some factors are the same ("common"), then they are the "common factors".



Example: 12 and 16

- The factors of 12 are: 1, 2, 3, 4, 6 and 12
- The factors of 16 are: 1, 2, 4, 8 and 16

So the common factors of 12 and 16 are: 1, 2 and 4

See: Factor

(Source: mathsisfun.com)

Common Multiples

A Common Multiple is a number that is a multiple of two or more numbers.

To find the Common Multiples of two or more numbers, follow these steps:

1. Make a list of multiples for each number
2. Continue your list until at least two multiples are common to all lists
3. Identify the common multiples

How to find the Common Multiples

Follow the three steps below to find common multiples of 6 and 8

List the multiples of 6	6, 12, 18 , 24 , 30, 36 , 42 , 48, 54, 60
List the multiples of 8	8 , 16 , 24 , 32 , 40 , 48 , 56 , 64
What are the common multiples? What numbers are multiples of 6 and 8?	24 and 48

Note: We would get more common multiples if we had continued our lists for multiples of 6 and for multiples of 8.

(Source: helpingwithmath.com)

The lowest common multiple in the example is 24.

Prime numbers are special numbers that can only be divided by **themselves** and **1.**

19 is a prime number. It can only be divided by 1 and 19.

The prime numbers below 20 are: 2, 3, 5, 7, 11, 13, 17, 19.

Don't forget: the number 1 is not thought of as a prime number, because it only has one factor.

For more information on Prime Numbers see:

https://www.bbc.co.uk/bitesize/topics/zfq7hyc/articles/z2q26fr

Which of these numbers are common multiples of 3 and 4?

9, 12, 15, 16, 18, 20, 24, 30, 34, 36

Which of these numbers are common multiples of 3 and 5?

9, 12, 15, 16, 18, 20, 24, 30, 34, 36

Which of these numbers are common multiples of 4 and 6?

9, 12, 15, 16, 18, 20, 24, 30, 34, 36

Which of these numbers are common factors of 12 and 16?

2, 3, 4, 5, 6, 7, 8, 9, 10

Which of these numbers are common factors of 24 and 30?

2, 3, 4, 5, 6, 7, 8, 9, 10

Which of these numbers are common factors of 18 and 27?

2, 3, 4, 5, 6, 7, 8, 9, 10

The Catholic High School Chester

There are only two numbers between 20 and 30 which are prime.
Which numbers are they?

These are the prime numbers less than 20:
2, 3, 5, 7, 11, 13, 17, 19. Remember 1 is not a prime number.

The Catholic High School Chester

Problem solving and reasoning questions

Which pair(s) of numbers under 20 have the largest number of common factors? What is the highest common factor?

Write common multiples of 4 and 6 up to 60. What is the lowest common multiple?

Use this information to find the lowest common multiple of 8 and 12.

True or false

- The lowest common multiple of two prime numbers, a and b is always a x b.
- The highest common factor of two multiples of 6 is always 6.

Extra practice:

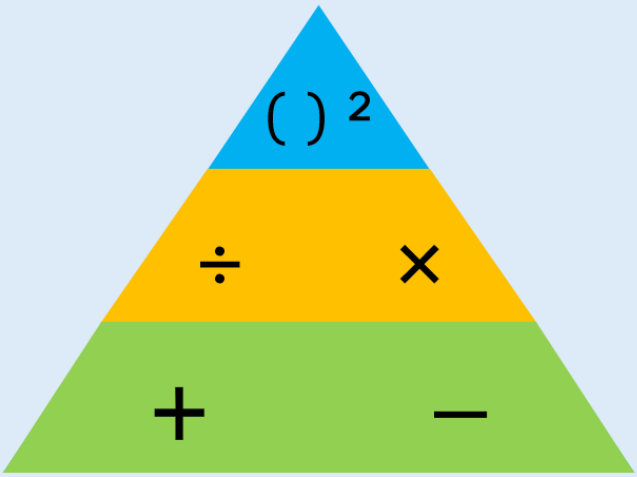
https://www.topmarks.co.uk/maths-games/multiples-and-factors

https://www.transum.org/Maths/Activity/Prime/

ORDER OF THE FOUR OPERATIONS:

When solving multi-operation calculations, we do not just solve the calculation from left to right.
We have to use a special order of operations called BIDMAS.

B – Brackets
I – Indices
D – Division
M – Multiplication
A – Addition
S – Subtraction



This diagram can help when referring to the order of operations.

Add brackets and missing numbers to make the calculations correct.

$3 + \_\_\_ \times 5 = 25$

$25 - 6 \times \_\_\_ = 38$

(Source – masterthecurriculum.co.uk)

Solve the following, making sure that you work out the answers to the calculations in brackets first, and then multiplication or division before addition or subtraction.

1. (4 + 6) ÷ 2
2. 10 x (5 - 3)
3. 20 ÷ (3 + 2)
4. (10 - 8) x 4
5. 4 x 3 - 2
6. 15 ÷ 3 + 4
7. 10 - 3 x 2
8. 10 - 6 ÷ 3
9. 4 + 2 x 5
10. 17 + 12 ÷ 4

Challenge

Use the digits 6, 8 and 9 once each, with any combination of operations to give answers -5 and 46. Now make 12 in three different ways...

1.

2.

3.

4.

5.

6.

7.

8.

9.

10.

Challenge:

More:

The Catholic High School Chester

Solve these.
Remember the order of operations!

1. $33 + 28 \div 4 - 22 =$

2. $72 - 5 \times 7 + 13 =$

3. $(12 + 16) \div 4 \times 5 + 1 =$

4. $(7 + 13) \times (17 - 9) =$

1.

2.

3.

4.

Word problems using BIDMAS:

1. Matt the baker has 8 packs of buns. He's baked 40 more and puts these into packs of 4. How many packs does he have now?

2. Sasha the baker has 8 buns left. She bakes 40 more and then puts all the buns into packs of 4. How many packs does she have?

3. Five books priced £11.99 are ordered from an internet site. Postage and packaging costs £3.95 for the total order. What is the total cost?

4. Five books are ordered from an internet site. The original price was £11.99 but they have been discounted by £3 each. The postage and packaging is free. What is the total cost?

1.

2.

3.

4.

Problem solving and reasoning questions

In relation to multi-part calculations, agree whether these statements are true or false:

- We leave the part in brackets until last.
- It does not matter which order you do the parts of the calculation not in brackets.
- We should always do the easiest parts of a calculation first.
- 12 + (3 x 4) gives the same answer if the brackets are removed.

Put a pair of brackets in three different places in this calculation to give three different answers.

4 + 5 x 12 – 7 =

Extra Practice:

https://www.transum.org/Maths/Game/BIDMAS/

http://www.math-play.com/Order-of-Operations-Millionaire/order-of-operations-millionaire.html

ADDITION AND SUBTRACTION MULTI-STEP PROBLEMS:

For a quick reminder of column addition and subtraction see:

https://www.bbc.co.uk/bitesize/topics/zy2mn39/articles/z3kmrwx

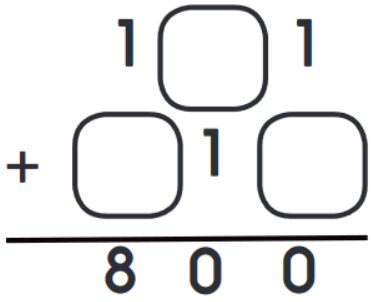
and

https://www.bbc.co.uk/bitesize/topics/zy2mn39/articles/zc78srd

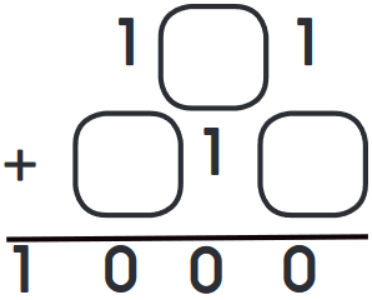
Addition and Subtraction practice (Hamilton)

1. 534 + 279 2. 837 + 425 3. 985 – 426 4. 837 – 253

5. Write the missing digits to make the addition correct.



6. Write the missing digits to make the addition correct.



1.

2.

3.

4.

5.

6.

The Catholic High School Chester

Now complete the following problems with addition and subtraction:

Dragon Word Problems

1. In January, there were 4,371 new-born dragons. In February, another 1,428 dragons were born. How many dragons were born altogether?

2. The Iron Swords Company employed 62,134 men, but then the industry experienced a boost, and more men were needed. The Iron Swords Company increased its employment of men by 3,761. How many men work at the Iron Swords Company now?

3. The great dragons of the west burnt 9,426 houses in their first week. They burnt 3,645 houses in their second week. What is the total amount of houses burnt?

4. The dragon master trained 3,417 dragons, but sadly, 1,259 of those dragons died. How many trained dragons are left?

5. Merlin trained 82,016 dragons, and Gandalf trained 3,427. What is the difference in the number of dragons trained?

6. The dragon keeper had 3,502 dragon eggs in a deep cave. A powerful magician had 419 dragon eggs less than the dragon keeper. How many dragon eggs does the magician have?

7. Merlin was selling 63,024 Dragon spikes a month. After a year, this decreased by 7,567 spikes. How many spikes does he sell a month now?

8. The Dragon Shop had a fantastic day of sales. In the morning, they made £314.27, and in the afternoon, they made £256.49. However, the shop was broken into and £29.17 was stolen. What was the total for the day?

9. Merlin rescued 4,143 dragons, and Gandalf rescued a further 78,986 dragons. Then 3,934 escaped. What was the sum of dragons rescued?

(Source – TES)

More practice:

https://www.topmarks.co.uk/maths-games/7-11-years/addition-and-subtraction

The Catholic High School Chester

ESTIMATION:

An estimate is a rough calculation. You can use an estimate to check your answer is correct. You will need to round the numbers involved first. If the answer to your calculation and the estimate are very different, you have probably made a mistake.

Watch this clip from BBC Bitesize for more information:

https://www.bbc.co.uk/bitesize/topics/zh8dmp3/articles/z874h39

Round to the nearest 5:

Question	Rounded Question	Estimated Answer	Actual Answer
312 + 487			
884 – 623			
59 ÷ 9			
655 + 472			
1221 – 495			
78 x 5			

Practice:

https://www.mathsisfun.com/numbers/estimation-game.php

https://www.topmarks.co.uk/Search.aspx?q=estimating

CHAPTER 3 – FRACTIONS, DECIMALS AND PERCENTAGES

SIMPLIFYING FRACTIONS:

*To simplify a fraction, divide the top and bottom by the **highest number** that can divide into both numbers exactly.*

$\frac{2}{10}$ 1 5

Simplifying Fractions

Simplifying (or *reducing*) fractions means to make the fraction as simple as possible.

Why say four-eighths ($\frac{4}{8}$) when we really mean half ($\frac{1}{2}$) ?

$\frac{4}{8}$ = $\frac{2}{4}$ = $\frac{1}{2}$

(Four-Eighths) (Two-Quarters) (One-Half)

(mathisfun.com)

For more information see this video:

https://www.bbc.co.uk/bitesize/topics/zhdwxnb/articles/zcdgxfr

SIMPLIFYING FRACTIONS SHEET 1

Write these fractions in their simplest form.

1) $\frac{5}{15} = \frac{5 \div 5}{15 \div 5} = \_\_\_\_$

2) $\frac{4}{10} = \frac{4 \div 2}{10 \div 2} = \_\_\_\_$

3) $\frac{8}{12} = \frac{8 \div 4}{12 \div 4} = \_\_\_\_$

4) $\frac{12}{20} = \frac{12 \div 4}{20 \div 4} = \_\_\_\_$

1.
2.
3.
4.

SIMPLIFYING FRACTIONS SHEET 2

Write these fractions in their simplest form.

1) $\frac{14}{20} =$

2) $\frac{4}{8} =$

3) $\frac{9}{12} =$

4) $\frac{12}{15} =$

1.
2.

3.

4.

SIMPLIFYING FRACTIONS SHEET 3

Write these fractions in their simplest form.

1) $\frac{18}{42}$ =

2) $\frac{21}{27}$ =

3) $\frac{25}{40}$ =

4) $\frac{16}{24}$ =

1.

2.

3.

4.

(Source – Math Salamanders)

Fractional triangles challenge: https://nrich.maths.org/2124

More practice:

https://www.topmarks.co.uk/Search.aspx?q=simplifying+fractions&p=2

https://www.math-play.com/simplifying-fractions-game/simplifying-fractions-game.html

COMPARING AND ORDERING FRACTIONS:

Things to remember:

- When comparing fractions, the denominators have to be the same.
- When comparing fractions with the same denominator, we look at the numerators and compare them like whole numbers.

- When ordering fractions, the denominators have to be the same.
- When ordering fractions with the same denominator, we look at the numerators and order them like whole numbers.

Which fraction is bigger: $\frac{3}{4}$ or $\frac{5}{7}$?

It is hard to answer this question just by looking at the fractions. However, if you write the fractions with the same bottom number, or denominator, the question will be easy.

$\frac{3}{4}$ has a denominator of 4, and $\frac{5}{7}$ has a denominator of 7.

4 and 7 both divide into 28, so rewrite the fractions with a denominator of 28.

$\frac{3}{4} = \frac{21}{28}$

$\frac{5}{7} = \frac{20}{28}$

$\frac{21}{28}$

$\frac{20}{28}$

It is easy to see that $\frac{21}{28}$ is bigger than $\frac{20}{28}$.

Therefore $\frac{3}{4}$ is bigger than $\frac{5}{7}$.

To compare fractions, first write them with the same bottom number, or denominator.

(BBC Bitesize)

Practice: Equivalent Fractions

Copy the below on to a sheet to complete:

Things you will need:
- A pencil

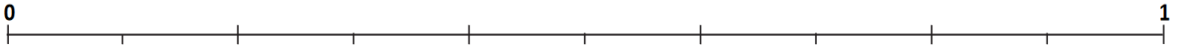
What to do:

1. Label the quarters above this line. Label the eighths below it.

Now write as many pairs of equivalent fractions as you can.

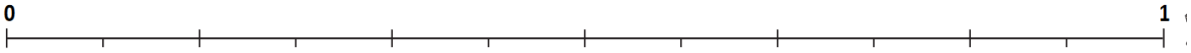
¼ = ⅜
¾ =

2. Label the fifths above this line. Label the tenths below it.



Now write as many pairs of equivalent fractions as you can.

3. Label the sixths above this line. Label the twelfths below it.



Now write as many pairs of equivalent fractions as you can.

Ordering fractions
Sheet 1

Write these fractions as $\frac{1}{6}$s. Then write them in order, starting with the smallest first.

$\frac{2}{3}$ $\frac{1}{2}$ $\frac{1}{3}$

Write these fractions as $\frac{1}{10}$s. Then write them in order, starting with the smallest first.

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

Write these fractions as $\frac{1}{12}$s. Then write them in order, starting with the smallest first.

$\frac{2}{3}$ $\frac{3}{4}$ $\frac{1}{4}$ $\frac{1}{3}$ $\frac{1}{6}$ $\frac{5}{6}$ $\frac{1}{2}$

1.

2.

3.

Comparing fractions

Sheet 2

Write these pairs of fractions as the same type of fraction to help compare them.

1. $\frac{1}{2}$ and $\frac{2}{5}$
2. $\frac{1}{3}$ and $\frac{2}{5}$
3. $\frac{2}{3}$ and $\frac{4}{5}$
4. $\frac{1}{4}$ and $\frac{2}{5}$
5. $\frac{3}{4}$ and $\frac{4}{5}$
6. $\frac{5}{6}$ and $\frac{7}{9}$
7. $\frac{5}{6}$ and $\frac{3}{4}$
8. $\frac{1}{3}$ and $\frac{2}{7}$

1.

2.

3.

4.

5.

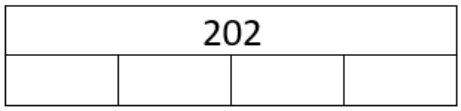
6.

7.

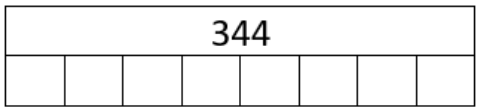
8.

The Catholic High School Chester

Challenge:



Find $^3/_4$ of 202.



$^3/_8$ of biscuits are wafers, $^5/_8$ are chocolate. How many of each?

ADDING AND SUBTRACTING FRACTIONS AND MIXED NUMBERS

To add or subtract fractions you first need to simplify the fractions, so that it has the same denominator (bottom number). You then add or subtract the numerators (top number) to get your answer.

Example:

$$\frac{2}{3} - \frac{1}{5} = \frac{10}{15} - \frac{3}{15} = \frac{7}{15}$$

To add or subtract mixed numbers:

A mixed number is a whole number and a fraction. To add or subtract mixed numbers

1. Change your mixed numbers into improper fractions.
2. Simplify the fractions.
3. Add or subtract the numerators and simplify your answer if necessary.
4. Convert this back to a mixed number if the question requires it.

Example:

Solve the following and give your answer as a mixed number

$$1\frac{1}{2} + 2\frac{3}{4} =$$

$$\frac{3}{2} + \frac{11}{4} =$$

$$\frac{6}{4} + \frac{11}{4} =$$

$$\frac{17}{4} =$$

4 ¼

The Catholic High School Chester

Find the value of each expression in lowest terms.

1. $2\frac{1}{5} + 1\frac{3}{4}$

5. $1\frac{1}{2} + 2\frac{3}{5}$

9. $3\frac{1}{2} - 1\frac{1}{2}$

1.

2.

3.

4.

5.

6.

7.

8.

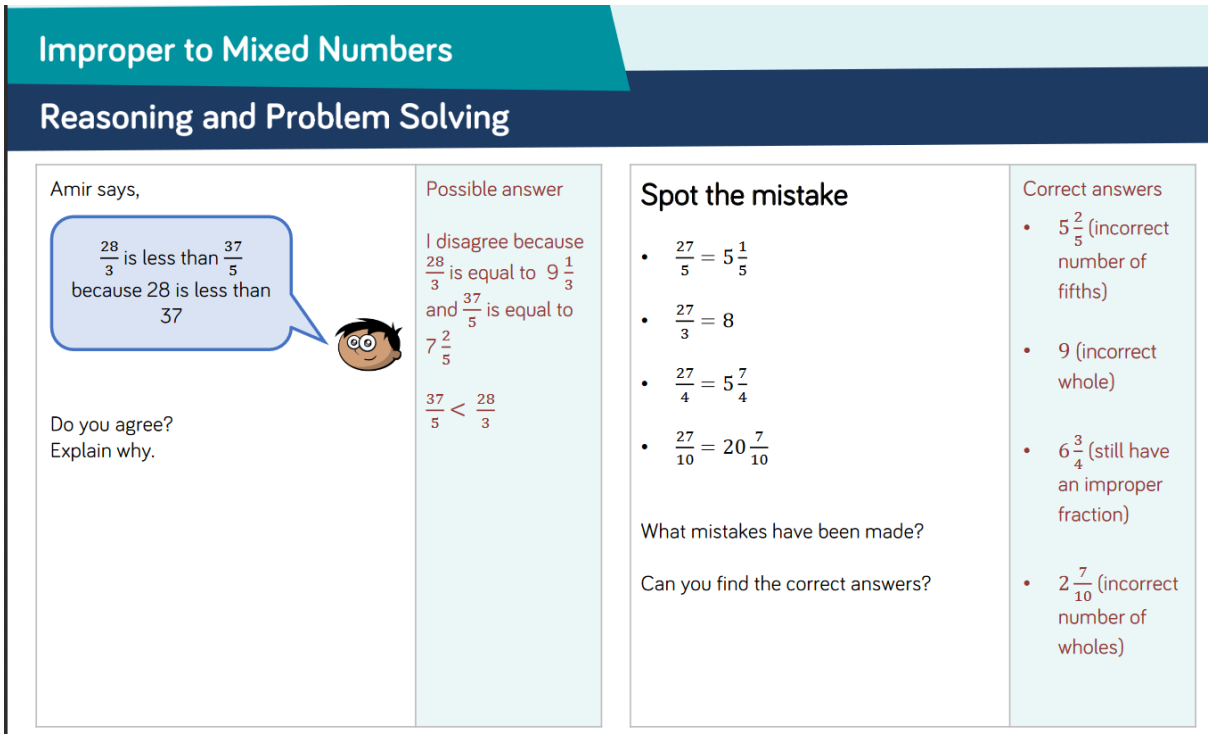
9.

10.

11.

12.

Problem-solving:



Improper to Mixed Numbers

Reasoning and Problem Solving

Amir says,

$\frac{28}{3}$ is less than $\frac{37}{5}$ because 28 is less than 37

Do you agree?
Explain why.

Possible answer

I disagree because $\frac{28}{3}$ is equal to $9\frac{1}{3}$ and $\frac{37}{5}$ is equal to $7\frac{2}{5}$

$\frac{37}{5} < \frac{28}{3}$

Spot the mistake

- $\frac{27}{5} = 5\frac{1}{5}$
- $\frac{27}{3} = 8$
- $\frac{27}{4} = 5\frac{7}{4}$
- $\frac{27}{10} = 20\frac{7}{10}$

What mistakes have been made?

Can you find the correct answers?

Correct answers

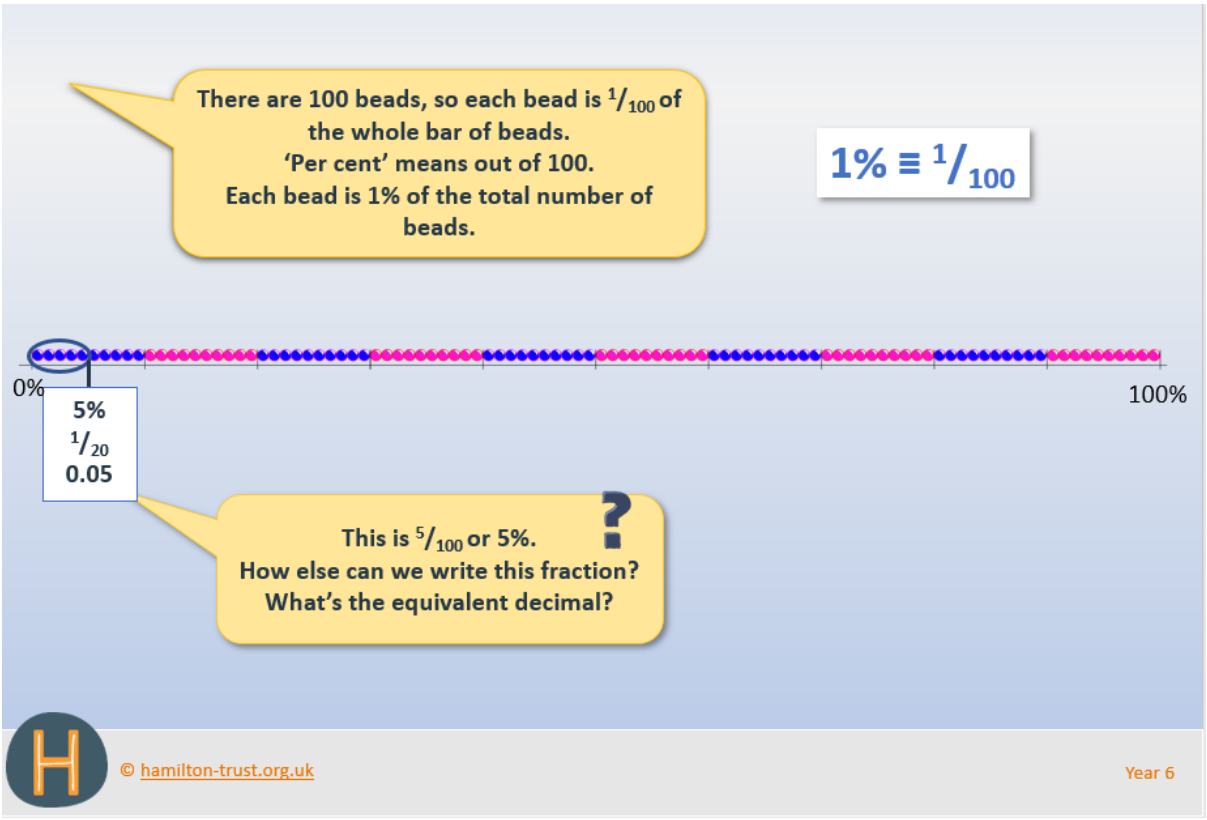
- $5\frac{2}{5}$ (incorrect number of fifths)
- 9 (incorrect whole)
- $6\frac{3}{4}$ (still have an improper fraction)
- $2\frac{7}{10}$ (incorrect number of wholes)

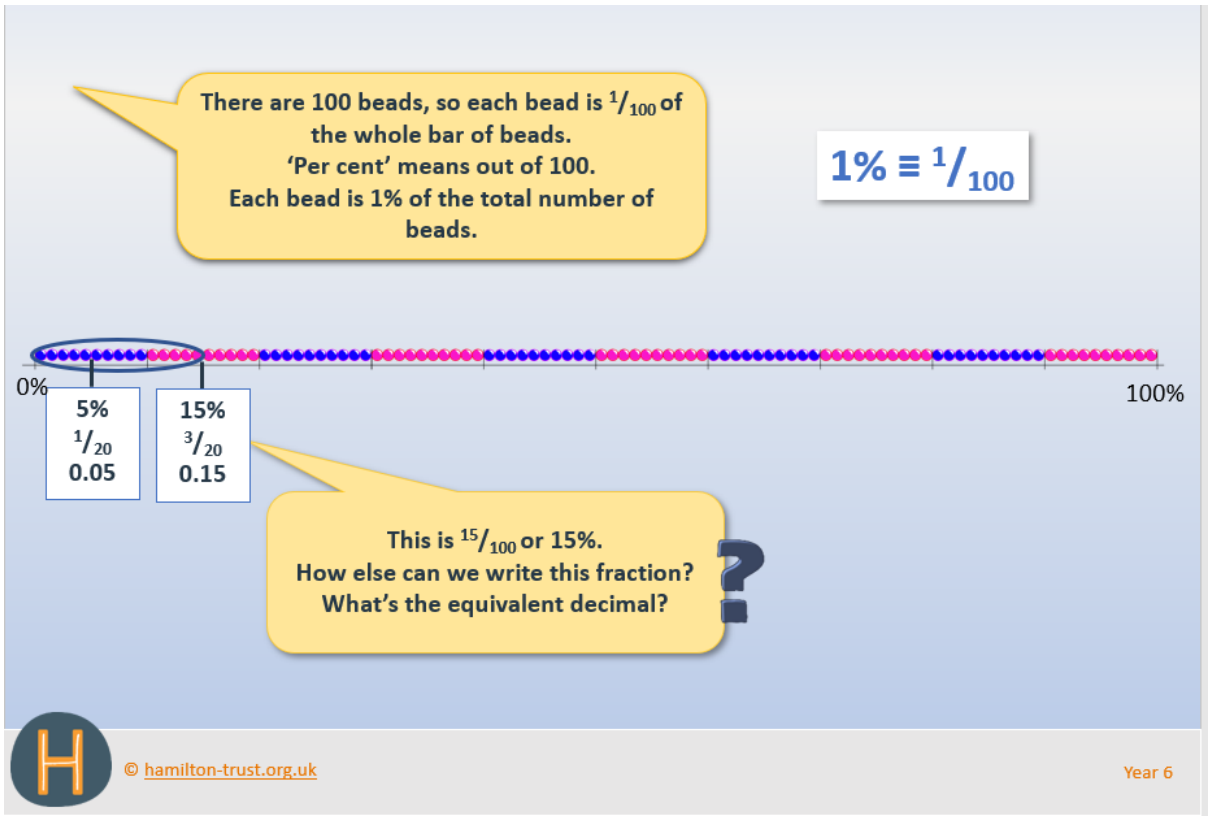
(Source: White Rose Maths)

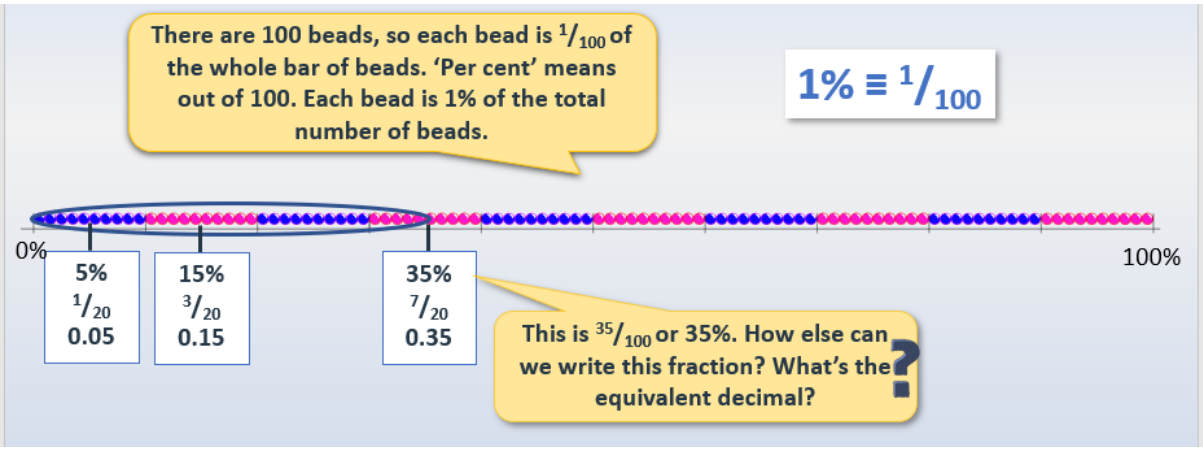
Extra practice – fractions:

https://whiterosemaths.com/wp-content/uploads/2019/01/Year-5-2018-19-Spring-Term-Block-2-FINAL.pdf

CALCULATING DECIMAL FRACTION EQUIVALENTS:




There are 100 beads, so each bead is 1/100 of the whole bar of beads.
'Per cent' means out of 100.
Each bead is 1% of the total number of beads.
1% ≡ 1/100
0%
100%
5%
1/20
0.05
15%
3/20
0.15
This is 15/100 or 15%.
How else can we write this fraction?
What's the equivalent decimal?
© hamilton-trust.org.uk
Year 6



The slides above show the equivalent fractions, percentages and decimals. Equivalent means the same.

For this section you need to be able to work out the equivalent fractions and decimals e.g.

1/10 = 0.10

3/20 = 0.15

¾ = 0.75

See below from BBC Bitesize:

- In fractions, the **numerator** is the number above the line and the **denominator** is the number below.
- The line in a fraction that separates the **numerator** and the **denominator** represents **division**.
- To **convert** a fraction to a decimal, divide the **numerator** by the **denominator**.

HOW TO CONVERT FRACTIONS TO DECIMALS

A fraction is made up of two parts: a **numerator** and a **denominator**. It is used to represent how many parts we have out of the total number of parts.

The line in a fraction that separates the numerator and denominator can be rewritten using the **division** symbol.

So, to convert a fraction to a decimal, divide the numerator by the denominator. If required, you can use a calculator to do this. This will give us our answer as a **decimal**.

Examples

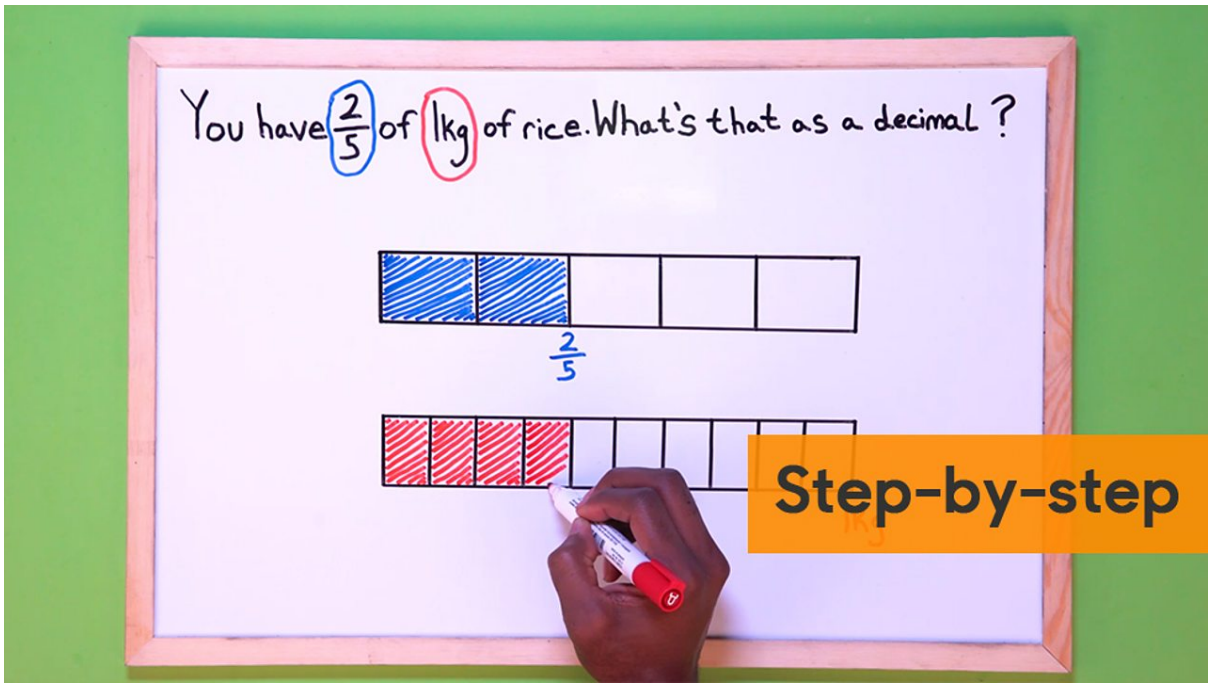
$^{4}/_{5}$ as a decimal is **4 ÷ 5 = 0.8**

$^{75}/_{100}$ as a decimal is **75 ÷100 = 0.75**

$^{3}/_{6}$ as a decimal is **3 ÷ 6 = 0.5**

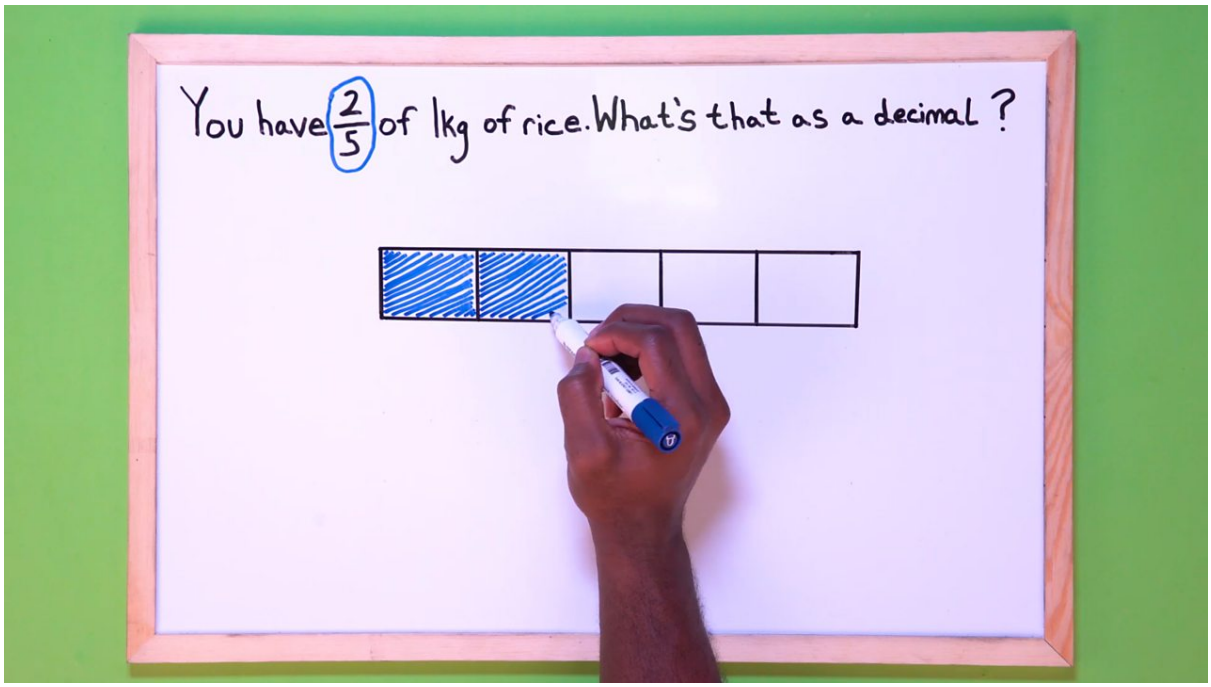
<u>Using bar models to visualise the conversion from a fraction to a decimal</u>

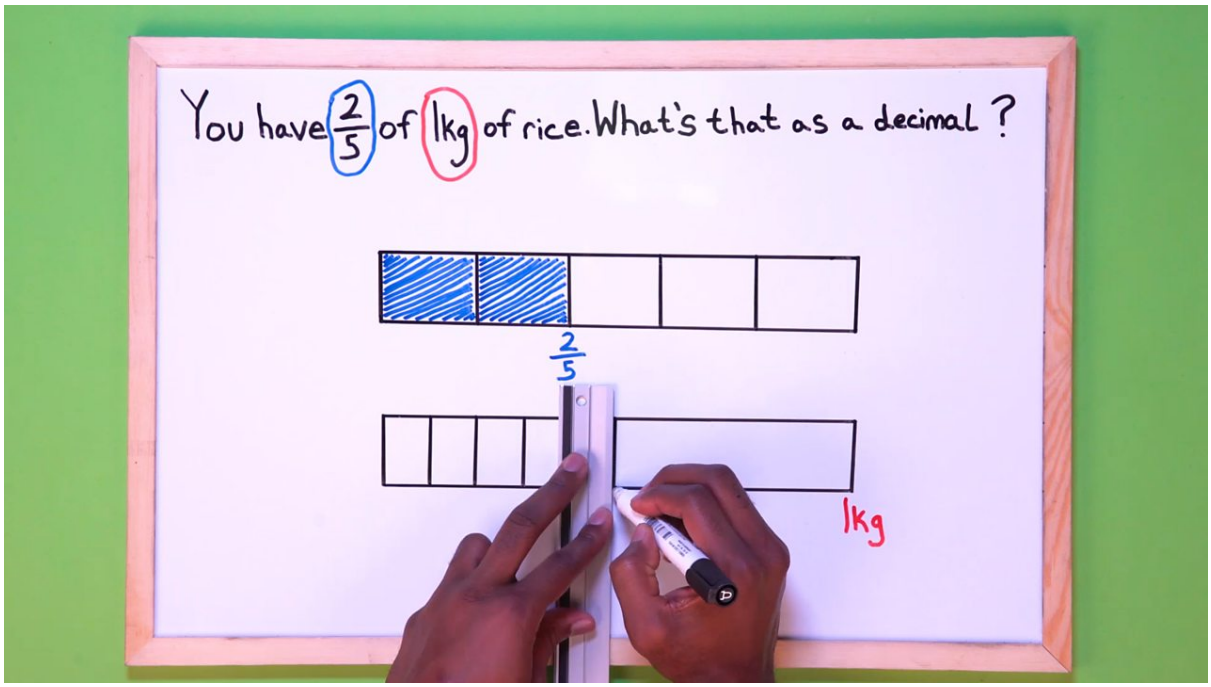
We can use bar models to represent the conversion from fractions to decimals. Use the step-by-step guide to work through this.

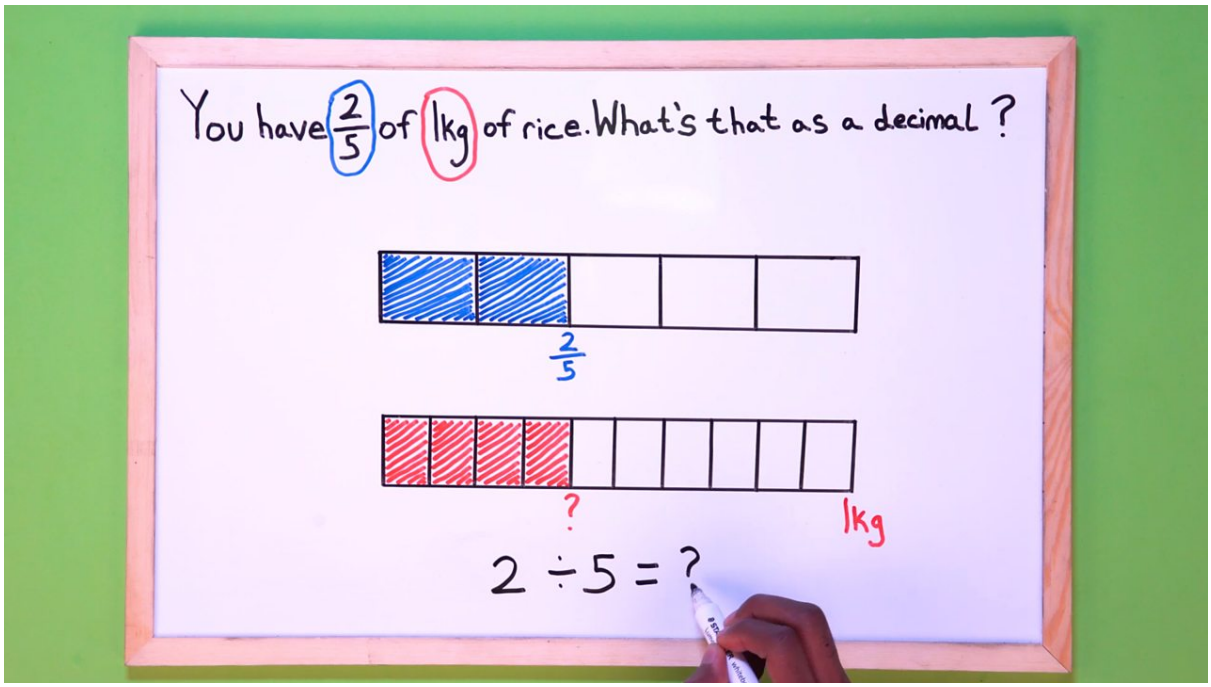


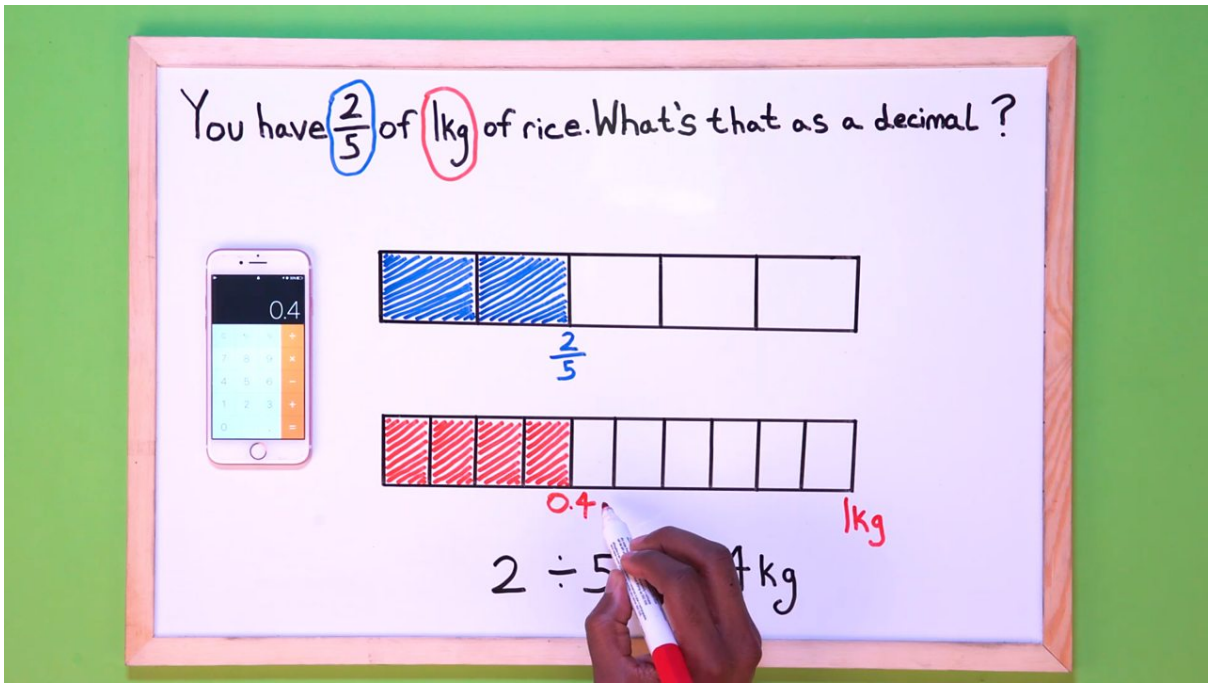
Click to see a step-by-step slideshow.

1 of 5


You have 2/5 of 1kg of rice. What's that as a decimal ?


You have 2/5 of 1kg of rice. What's that as a decimal ?
2/5
1kg


You have 2/5 of 1kg of rice. What's that as a decimal ?
2/5
?
1kg
2 ÷ 5 = ?



Converting between fractions and decimals at work

Converting between fractions and decimals can be used in real life when measuring out quantities.

We can usually see fractionally how much of an ingredient is left in a pack. However, electronic scales measure weight in decimals. This makes converting between fractions and decimals a useful skill in cooking.

Fill in the missing fractions, decimals and percentages.

Fraction	Decimal	Percentage
$\frac{1}{2}$	0.5	
$\frac{3}{4}$		75%
	0.1	10%
$\frac{1}{5}$		20%
$\frac{9}{10}$	0.9	
$\frac{2}{5}$	0.4	
$\frac{1}{4}$		25%

1.

2.

3.

4.

5.

6.

7.

Write >, < or = between each pair.

$\frac{1}{4}$ ☐ 0.3

$\frac{7}{10}$ ☐ 80%

$\frac{2}{5}$ ☐ 0.25

$\frac{3}{5}$ ☐ 60%

Challenge

Order these amounts, smallest to biggest:

77% 1.7 0.17 $\frac{1}{7}$ 1.07

Extra practice:

http://www.thegreatmartinicompany.com/Math-Quick-Quiz/decimal-conversion-quiz.html

https://www.mathsisfun.com/converting-fractions-decimals.html

GIVING ANSWERS UP TO 3 DECIMAL PLACES:

You will often be asked to give your answer to a specific number of decimal places, this may be written as 3 d.p.

You can use a place value chart to help you:

Hundreds	Tens	Ones	Tenths	Hundredths	Thousandths

The decimal place is between the ones and the tenths.

Complete the sentences.

There are ____ ones, ____ tenths, ____ hundredths and ____ thousandths.
The number in digits is _____

Write down the value of the 3 in the following numbers.

0.53 362.44 739.8 0.013 3,420.98

(White Rose Maths)

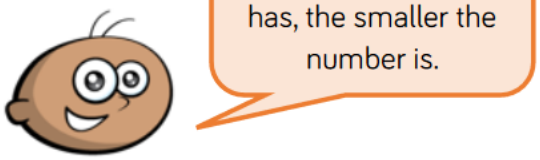
1.

2.

3.

4.

5.

Tommy says,  Do you agree? Explain why.	Possible answer: I do not agree with this as the number 4.39 is smaller than the number 4.465, which has more decimal places.
Alex says that 3.24 can be written as 2 ones, 13 tenths and 4 hundredths. Do you agree? How can you partition 3.24 starting with 2 ones? How can you partition 3.24 starting with 1 one? Think about exchanging between columns.	Possible answer: I disagree; Alex's numbers would total 3.34. I could make 3.24 by having 2 ones, 12 tenths and 4 hundredths or 1 one, 22 tenths and 4 hundredths.

Four children are thinking of four different numbers.

Teddy: "My number has four hundredths."

Alex: "My number has the same amount of ones, tenths and hundredths."

Dora: "My number has less ones that tenths and hundredths."

Jack: "My number has 2 decimal places."

Match each number to the correct child.

(White Rose Maths)

Teddy =

Alex =

Dora =

Jack =

The Catholic High School Chester

Place value addition and subtraction

Sheet 1

1. 4.538 + 0.2
2. 4.538 + 0.03
3. 4.538 – 0.004
4. 4.538 – 0.02
5. 6.231 + 0.11
6. 6.231 + 0.101
7. 6.231 + 0.011
8. 5.846 – 0.211
9. 5.846 – 0.13
10. 5.846 – 0.013
11. 5.846 – 0.204
12. 4.789 + 0.001

1.
2.
3.

4.

5.

6.

7.

8.

9.

10.

11.

12.

Multiplying and dividing by 10, 100 and 1000

Sheet 2

1. $4326 \div \square = 432.6$
2. $4326 \div \square = 4.326$
3. $7840 \div \square = 78.4$
4. $7840 \div \square = 7.84$
5. $783 \div \square = 0.783$
6. $783 \div \square = 7.83$
7. $4.535 \times \square = 453.5$
8. $4.535 \times \square = 4535$
9. $\square \times 1000 = 786$
10. $\square \times 100 = 78.6$

1.

2.

3.

4.

5.

6.

7.

8.

9.

10.

Challenge:

What number is one hundred times smaller than 0.4?

Write three numbers, two with 3 digits and one with four digits, that round to 4 as the nearest whole number.

Extra Practice:

https://www.topmarks.co.uk/Search.aspx?q=decimal

https://www.bbc.co.uk/bitesize/topics/zsjqtfr

CHAPTER 4 – RATIO AND PROPORTION

RELATIVE SIZE OF TWO QUANTITIES:

A ratio shows how much of one thing there is compared to another. Ratios are written in the form a: b e.g. there is 1:7 ratio of squash to water in that drink.

For more on ratio see:

https://www.bbc.co.uk/bitesize/topics/zsq7hyc/articles/z8kfnbk

Proportion tells us about a portion or part in relation to a whole. You can express proportion as a fraction e.g. Tina ate 1/8 of the cake.

See the following videos about ratio and proportion:

https://www.youtube.com/watch?v=0Y-tmGqcAg0&t=160s

https://youtu.be/xFU-1lKmmek

Ratio and proportion can be used to solve problems like the on the following page:

This is a 750 ml bottle of concentrated orange squash.

It is enough to make fifteen 250 ml glasses of diluted orange drink.

How much water is needed to make 10 litres of this drink?

Step 1: Figure out how much squash is in each glass:

750/15 = 50

There is 50ml of squash in each glass.

Step 2: How much water is in each glass?

250ml-50ml = 200ml

Step 3: How many drinks are needed to make 10 litres?

1 litre – 1000ml

10 litres = 1000ml x 10 = 10000ml

1 drink – 250ml

10000/250 = 40 drinks

Step 4: How much water is in 40 drinks?

1 drink = 200ml

40 drinks = 200ml x 40 = 8000ml

Answer – 8 litres of water is needed for 10 litres of drink

We can check this answer is correct using ratio (1-part squash to 4 parts water (1:4))

1:4 = 2 litres squash to 8 litres water

Total – 10 litres of drink

Solve the following problems:

This recipe makes 10 flapjacks.

Flapjacks

120 g butter
100 g brown sugar
4 tablespoons golden syrup
250 g oats
40 g sultanas

Amir has 180 g butter.

What is the largest number of flapjacks he can make?

How much of the other ingredients will he need?

Alex has two packets of sweets.

In the first packet, for every 2 strawberry sweets there are 3 orange.

In the second packet, for one strawberry sweet, there are three orange.

Each packet has the same number of sweets.

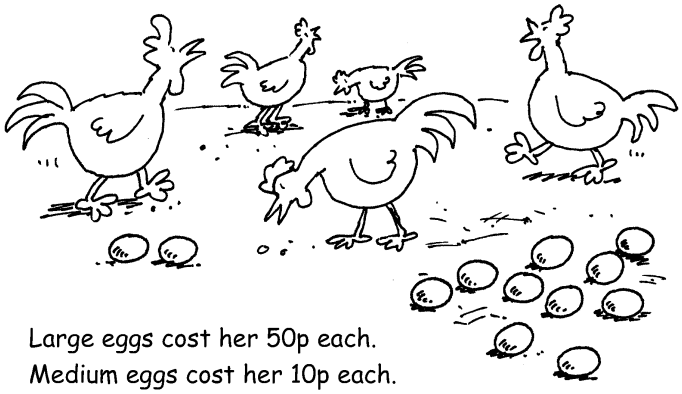
The second packet contains 15 orange sweets.

How many strawberry sweets are in the first packet?

(White Rose Maths)

Eggs

Mrs Choy spent exactly £10 on 100 eggs for her shop.



Large eggs cost her 50p each.
Medium eggs cost her 10p each.
Small eggs cost her 5p each.

For two of the sizes, she bought the same number of eggs.
How many of each size did she buy?

Large:

Medium:

Small:

Extra Practice:

https://www.topmarks.co.uk/Search.aspx?q=ratio%20rumble

https://www.doodlemaths.com/wp-content/uploads/2020/01/YR4-NFRA-6.jpg

CALCULATING AND COMPARING PERCENTAGES:

We can use percentages to express a proportion e.g. 30% of 40 children surveyed preferred chicken nuggets to burgers.

40 children	
30% preferred chicken nuggets	70% preferred burgers

30% of 40 = 12 children	70% of 40 = 28 children

Copy the following out and calculate the percentage and number of children:

30 children were asked to vote for cycling, swimming or football as their favourite weekend activity.

Fraction	Percentage	Number of children
$\frac{1}{2}$ of children prefer swimming		
$\frac{3}{10}$ of children prefer cycling		
The rest prefer football		

30 children were asked to vote for oranges, bananas or apples as their favourite fruit.

Fraction	Percentage	Number of children
$\frac{2}{5}$ of children prefer bananas		
$\frac{3}{10}$ of children prefer apples		
The rest prefer oranges		

30 children were asked to vote for dogs, cats or rabbits as their ideal pet.

Fraction	Percentage	Number of children
$\frac{1}{2}$ of children prefer dogs		
$\frac{1}{5}$ of children prefer cats		
The rest prefer rabbits		

Problem solving and reasoning questions

Complete the bar models.

32 children	
$^1/_4$? chn	$^3/_4$? chn

40 children

40% ? chn	60% ? chn

Orange paint is mixed using this ratio of red and yellow paints:

red: yellow

2: 7

Sam uses 4 litres of red.

Assuming he uses the correct amount of yellow, how many litres of orange paint will he make?

If 6 children in a class do not like sport, and there are 30 children in the class, what proportion *do* like sport?

Give your answer as a fraction *and* as a percentage.

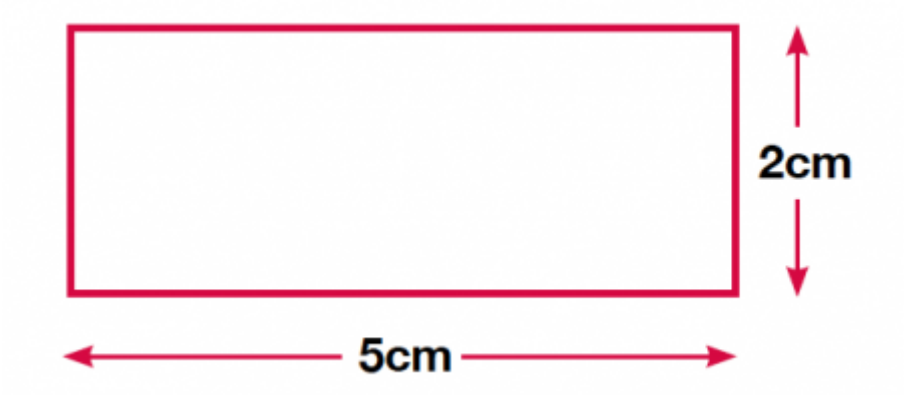
Extra Practice:

http://thesynaptictrust.org/files/Year-6---Spring---Block-2---Percentages.pdf

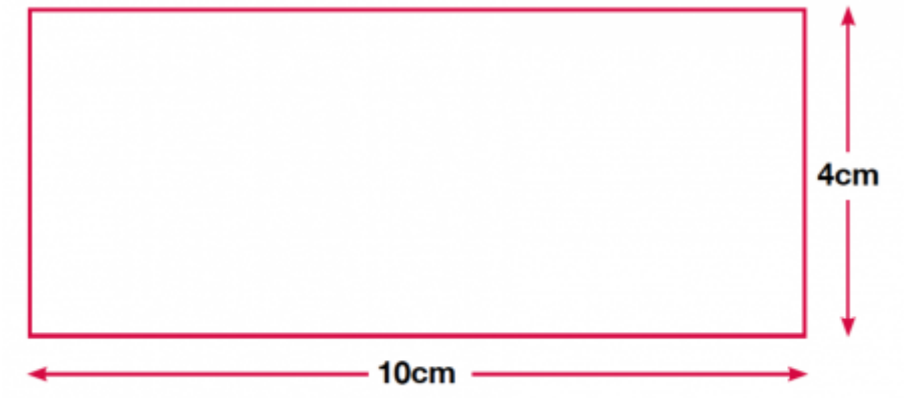
PROBLEM-SOLVING WITH SHAPES:

We use **scale factor** when we talk about increasing the size of a 2D shape. The size by which we make the shape larger is described by its scale factor.

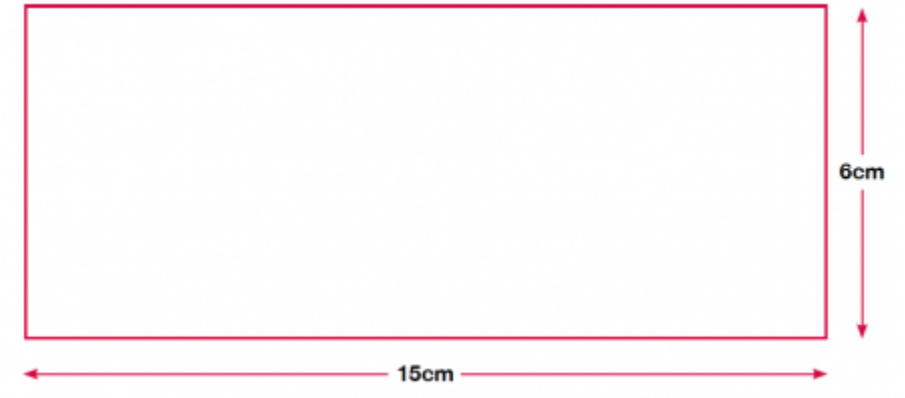
For example, this rectangle has the measurements 5cm and 2cm (not shown to scale):



If we increase this rectangle by a scale factor of 2, we double both the sides:



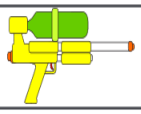
If we increase the original rectangle by a scale factor of 3, then we multiply each measurement by 3 to end up with this shape:



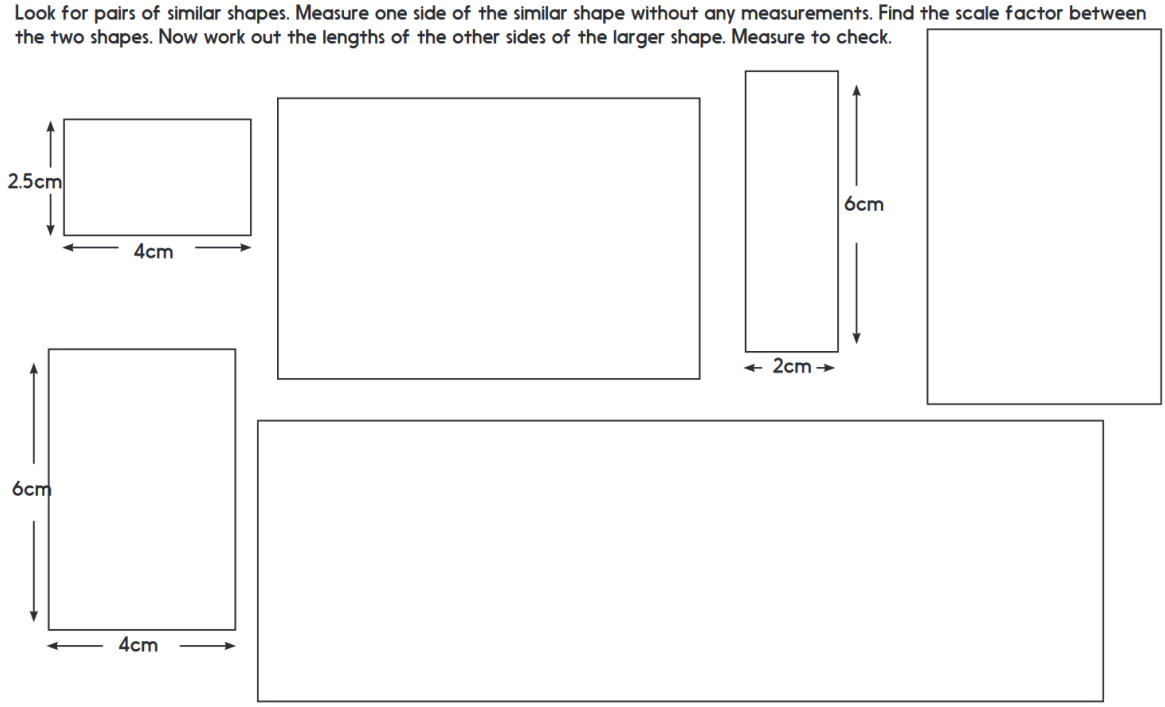
(Source – www.theschoolrun.com)

Copy and complete the following chart:

A toy designer has drawn sketches to scale. Use the scale factor to work out the length and height of the actual toy or drawing.

Toy	Drawn width and height	Scale factor	Actual width and height
	7cm by 4.5cm	x 4	
	5cm by 8cm	x 3	
	16cm by 24cm	x 1.5	
	10cm by 6cm	x 2.5	
		x 2	32cm by 12cm
		x 4	18cm by 24cm

Look for pairs of similar shapes. Measure one side of the similar shape without any measurements. Find the scale factor between the two shapes. Now work out the lengths of the other sides of the larger shape. Measure to check.



(Hamilton Trust)

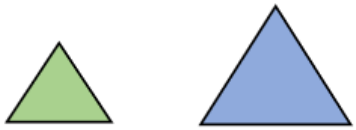
Challenge:

Draw a rectangle 3 cm by 4 cm.

Enlarge your rectangle by scale factor 2.

Compare the perimeter, area and angles of your two rectangles.

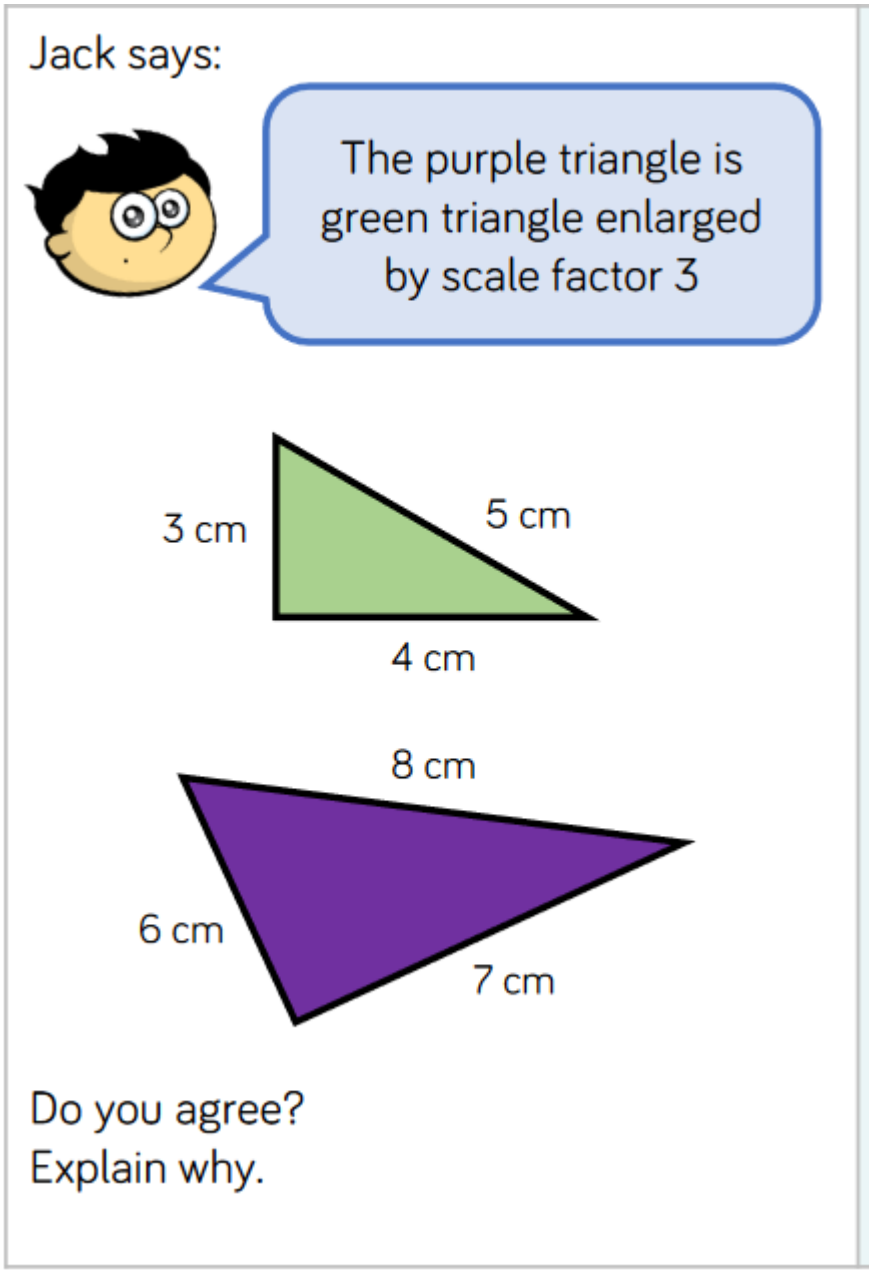
Here are two equilateral triangles.
The blue triangle is three times larger than the green triangle.



5 cm

(Not drawn to scale)

Find the perimeter of both triangles.



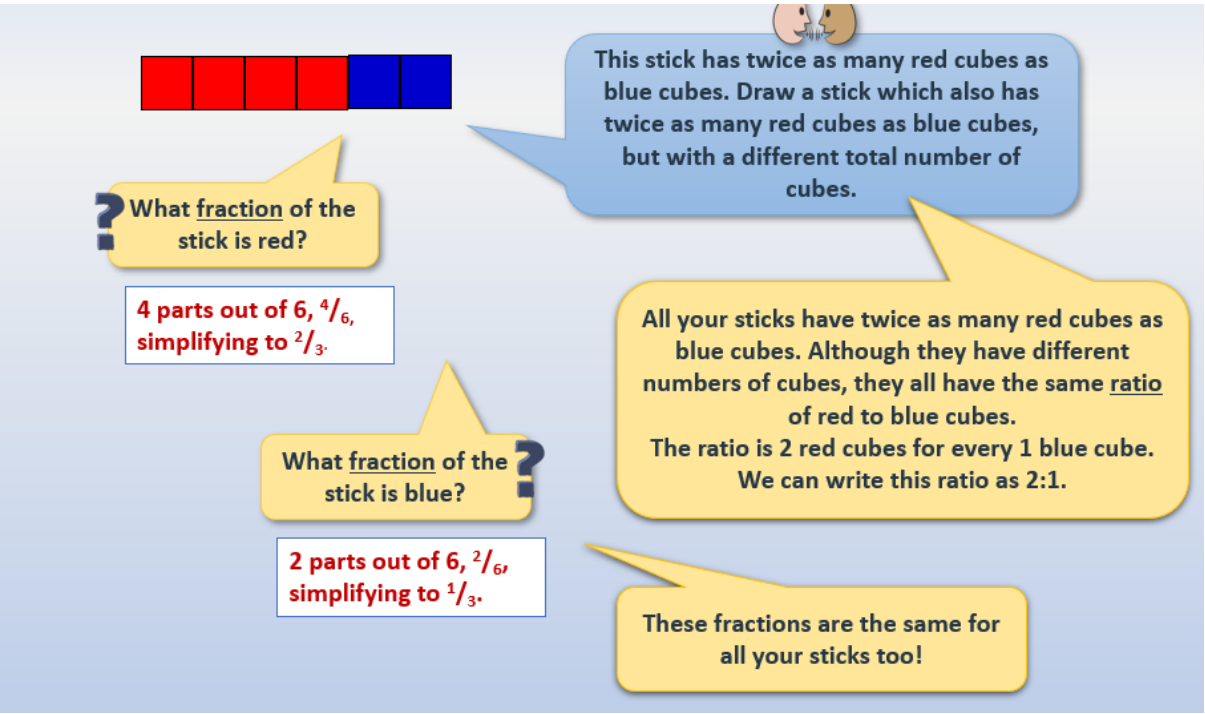
Extra practice:
https://nrich.maths.org/public/topic.php?group_id=12&code=137

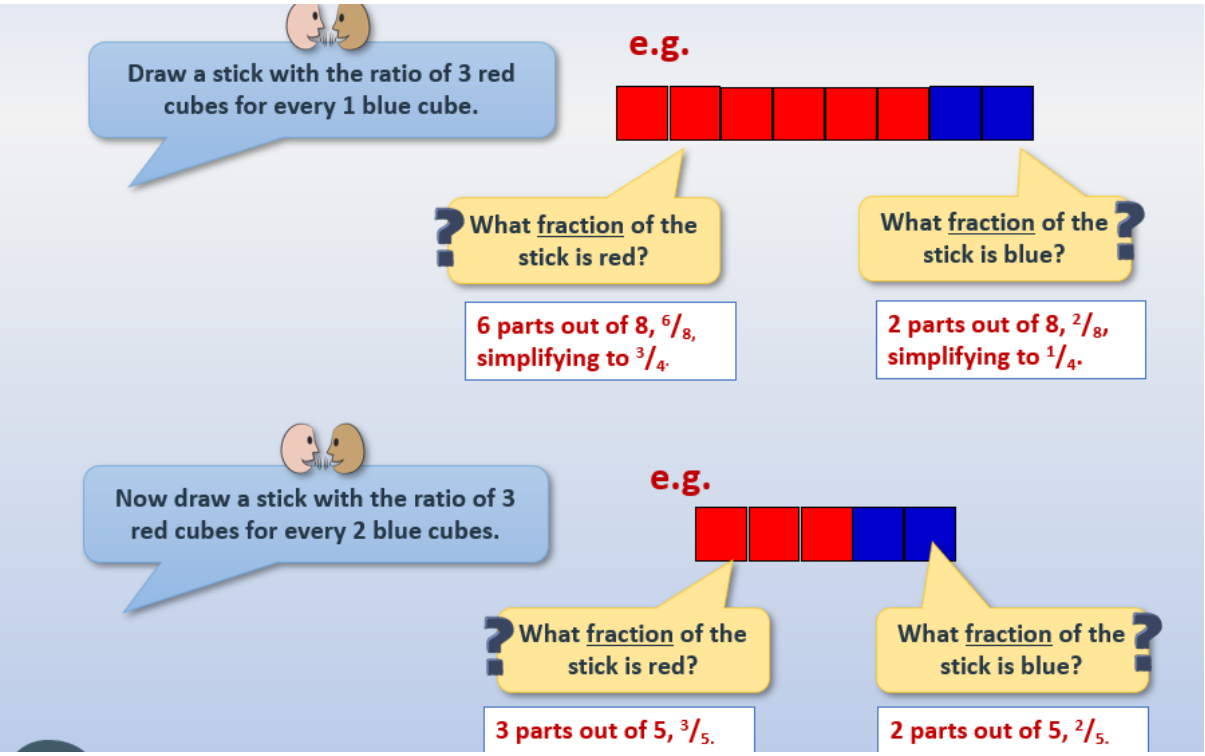
https://www.stem.org.uk/resources/community/collection/14795/ratio-and-scale-factors

https://whiterosemaths.com/wp-content/uploads/2019/SoLs/Primary/Year-6-2018-19-Spring-Term-Block-6-FINAL.pdf

UNEQUAL SHARING AND GROUPING:

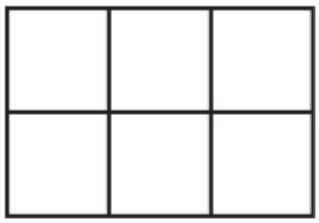
You can solve problems involving unequal sharing or grouping using your knowledge of fractions and multiples (groups). For example, you might be sharing out biscuits, but unequally, so one child gets 1 biscuit for every 2 that the other child gets (ratio 1:2). So, the first child will get ½ as many biscuits or the second child will get 2 times as many.

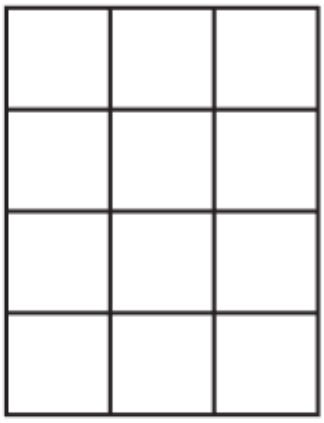




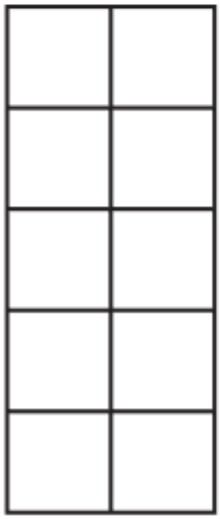
(Hamilton Trust)

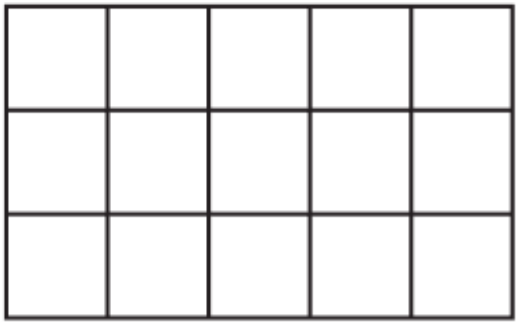
Colour 2 red to 1 blue





Colour 4 blue to 1 red





The Catholic High School Chester

christofid

High School

For every 5 girls in a small school there are 2 boys.
There are 35 girls in the school.
How many boys are there in the school?

Jack has a bag of 18 sweets.
He gives a third of his sweets to his friend.
How many sweets does he have left?

Challenge:

A 50-seater coach travels to the match. Most of the seats are taken. Junior tickets cost £13 and Adult tickets cost £23. The only people on the coach are Juniors and Adults. The total amount paid for tickets is approximately £900. How many people on the coach were adults and how many were juniors?

Extra practice:

https://www.transum.org/Software/SW/Starter_of_the_day/starter_January10.ASP

http://www.langshott-surrey.co.uk/attachments/download.asp?file=1025&type=pdf

CHAPTER 5 – ALGEBRA

USING SIMPLE FORMULAE:

A formula is a way to write a calculation. It can use a letter to represent a variable (a letter like x or y which is used for a number we don't know yet). For example, in x + 2 = 6, the variable is x. We can calculate the value of x by rearranging the formula:

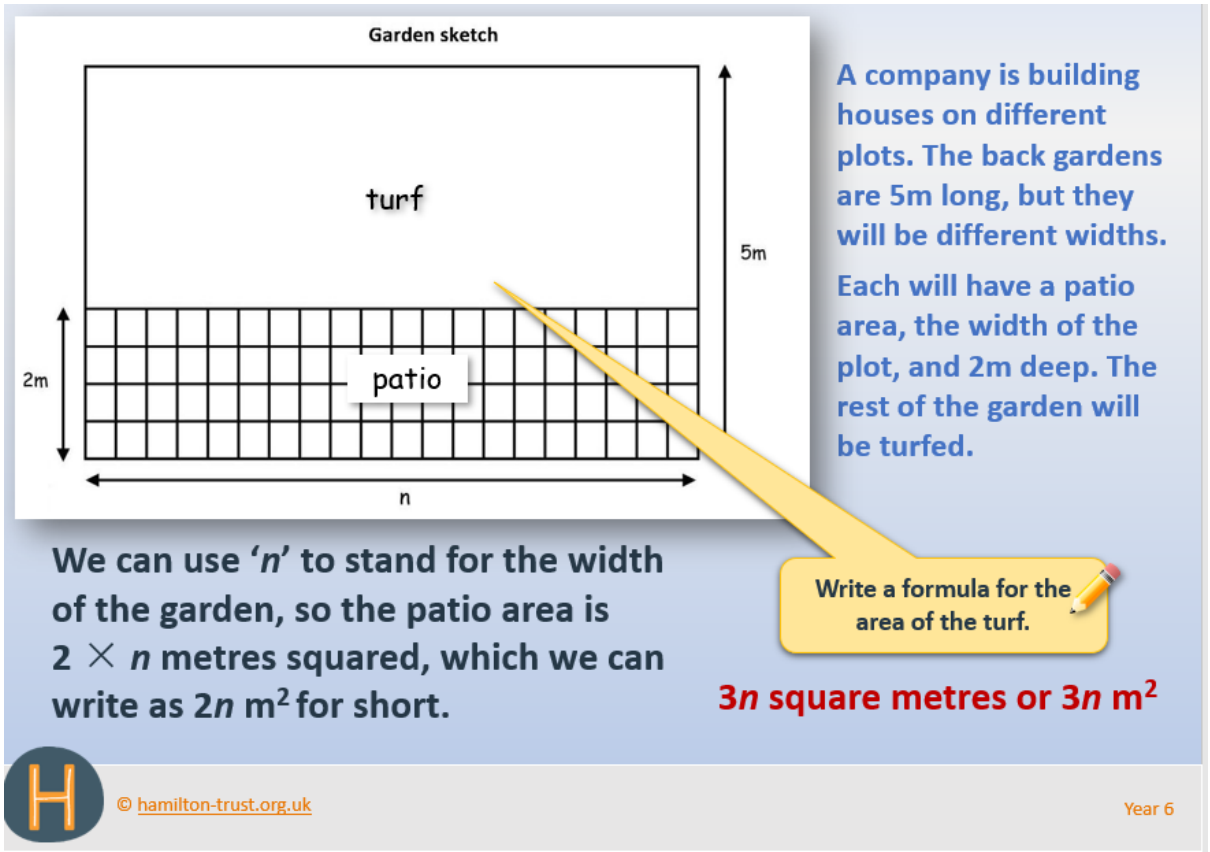
X + 2 = 6

Bring the 2 across and invert the addition to subtraction:

X = 6-2

X = 4

You can use other letters to represent a variable. The next example uses n to represent the unknown variable:



So, if the garden was 5 metres wide, they would need the following turf:

$3n\ m^2$

$= 3(5)\ m^2$

$= 15m^2$

Calculate how much turf would be needed if n =

1. 4
2. 7
3. 12
4. 15

Function machines:

A function machine takes an input, applies a series of mathematical operations to it, and then outputs a result.

Example: Below is a function machine.

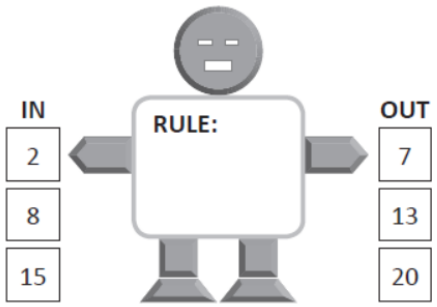
Complete the following:

1

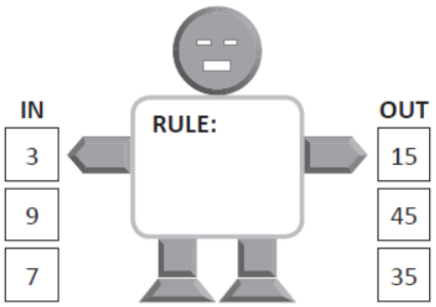
1.

Look carefully at the numbers going *in* these function machines and the numbers coming *out*. What rule are they following each time?

a

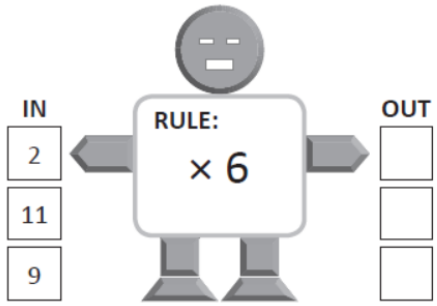


b

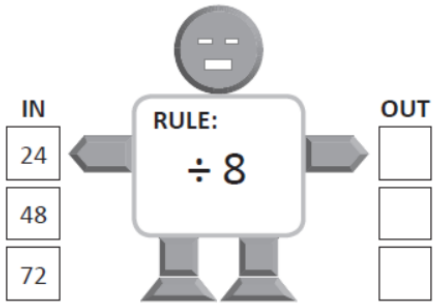


What numbers will come *out* of these function machines?

a



b



2

(Source: Gary Hall)

1a.

1b.

2a.

2b.

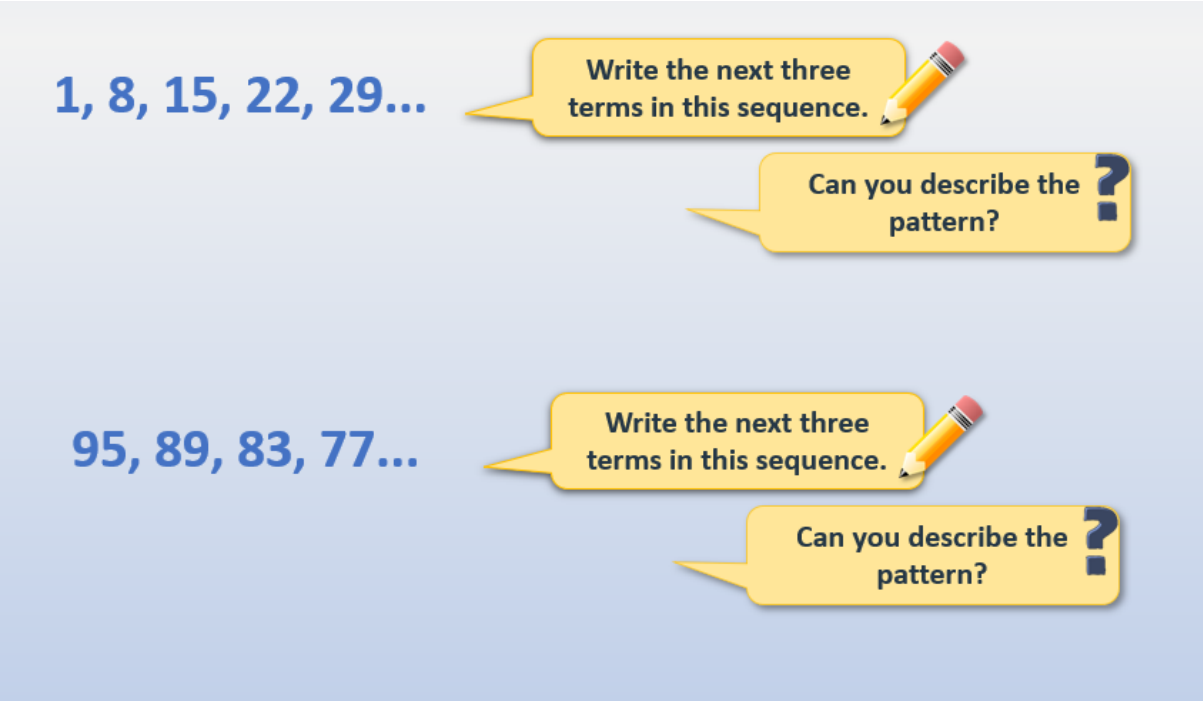
Extra practice:

https://garyhall.org.uk/maths-objectives/224/use-simple-formulae

https://nrich.maths.org/2727

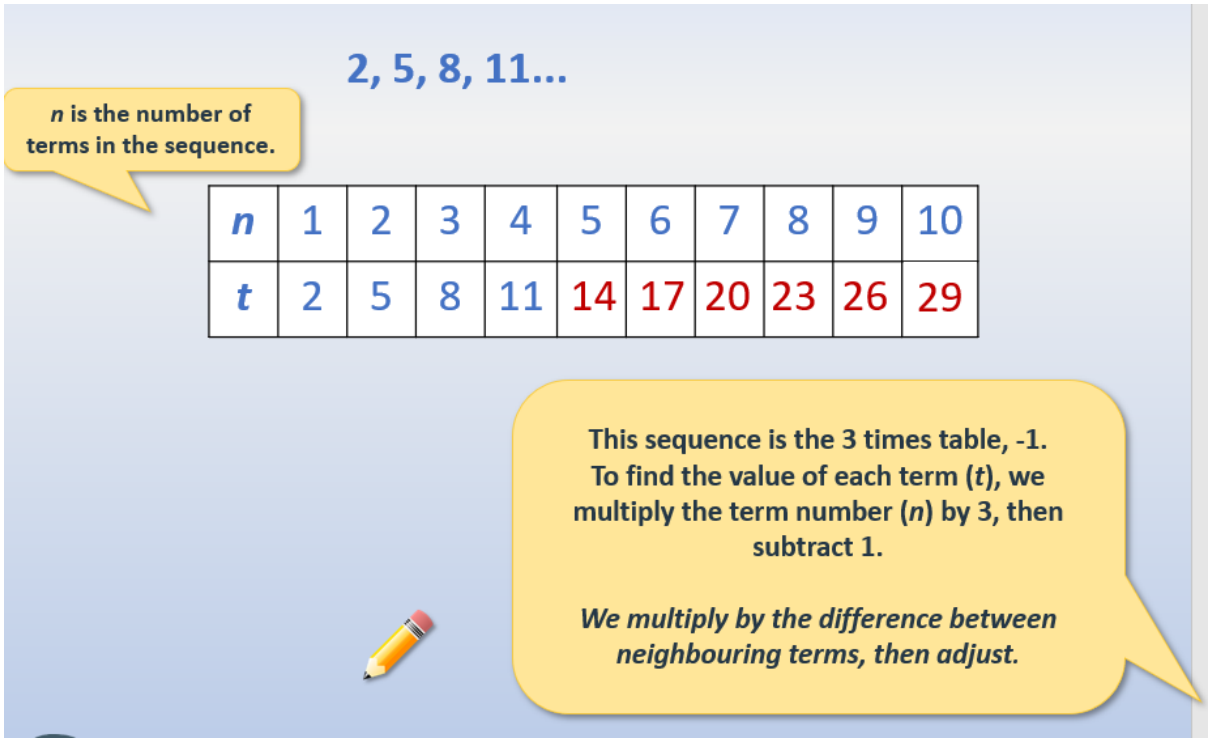
LINEAR NUMBER SEQUENCES:

- Linear sequences go up or down by the same amount each time.
- We are adding if the numbers are getting bigger going to the right.
- We are subtracting if the numbers are getting smaller going to the right.



1,8,15,22,29, _____, _____, _____

95, 89, 83, 77, _____, _____, _____


2, 5, 8, 11...
n is the number of terms in the sequence.
n 1 2 3 4 5 6 7 8 9 10
t 2 5 8 11 14 17 20 23 26 29
This sequence is the 3 times table, -1.
To find the value of each term (t), we multiply the term number (n) by 3, then subtract 1.
We multiply by the difference between neighbouring terms, then adjust.

The Catholic High School Chester

christofid

High School

1. This is part of a number sequence. The numbers increase by the same amount each time. Write the next three numbers.

   18, 26, 34, 42, 50, ____, ____, ____

2. Circle ALL of the numbers which will appear in this number sequence:

1.

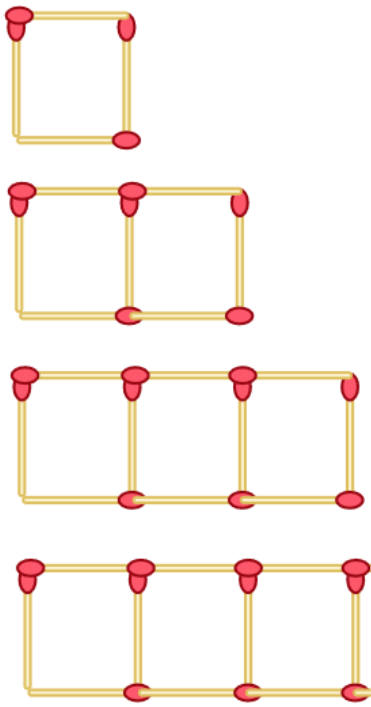
2.

3.

4.

5.

Here is a sequence made from squares. Complete the table.



Number of squares	Number of matchsticks
1	4
2	7
3	
4	
5	
10	

How many matchsticks will be in the pattern which has 20 squares? _____

Challenge

Solve these equations:

13. r + s = 14
    r and s are positive whole numbers. List all the possible pairs of numbers.
14. n x p = 16
    n and p are positive whole numbers. List all the possible pairs of numbers.
15. 12 – t = u
    t and u are positive whole numbers. List all the possible pairs of numbers.

Practice:

https://garyhall.org.uk/maths-objectives/225/generate-and-describe-linear-number-sequences

MISSING NUMBER PROBLEMS:

To solve missing number problems, you need to use the inverse (opposite) of the sign to find the missing number e.g.

_____ + 21 = 64

To find out the missing number you need to bring the 21 across to the other side of the equation and change the + to a – sign

_____ = 64 -21

43 = 64 – 21

You can check your answer is correct by substituting it into your original calculation:

43 + 21 = 64

It works in the same way for multiplication and division:

_____ x 3 = 24

Bring the 3 across and change the multiplication to division

_____ = 24/3

8 = 24/3

The Catholic High School Chester

Check by substitution:

8 x 3 = 24

1. Write in the missing numbers.

 + 75 = 90

4 × ☐ = 200

2. Write in the missing numbers.

 + 65 = 125

6 × ☐ = 120

3. Write in the missing numbers.

 + 32 = 80

8 × ☐ = 400

Solve the following word problems using inverse operations. Start by choosing the matching equation from the box below.

£50 + △ = £130	△ − 70 m = 38 m	£83 + £100 + △ = £300

a Jack had a piece of rope and cut off 70 metres. He was left with 38 metres. How long was the rope?

b Tom found £50 on the bus on Monday and was given birthday money by his Gran on Wednesday. How much did his Gran give him if he ended up with £130?

a.

b.

Remember in algebra the missing number is represented by a letter. So, the equation to find a missing number might be:

n + 25 = 79

You will calculate it in the same way as above using the inverse.

You might be asked to write your own equation e.g. John bought y cakes costing £1 each and 3 drinks (n)

costing 55p each. If he spent £3.65 altogether how many cakes did he buy?

_____y + 3n = £3.65

_____y = £3.65 – 3n

_____y = £3.60 – £1.65

_____y = £2.00

2y = £2.00

John bought 2 drinks.

Challenge:

> Eva spends 92p on yo-yos and sweets
>
> She buys y yo-yos costing 11p and s sweets costing 4p.
>
> Can you write an equation to represent what Eva has bought?
>
> How many yo-yos and sweets could Eva have bought?

Equation:

How many? (there are two possible answers)

Extra practice:

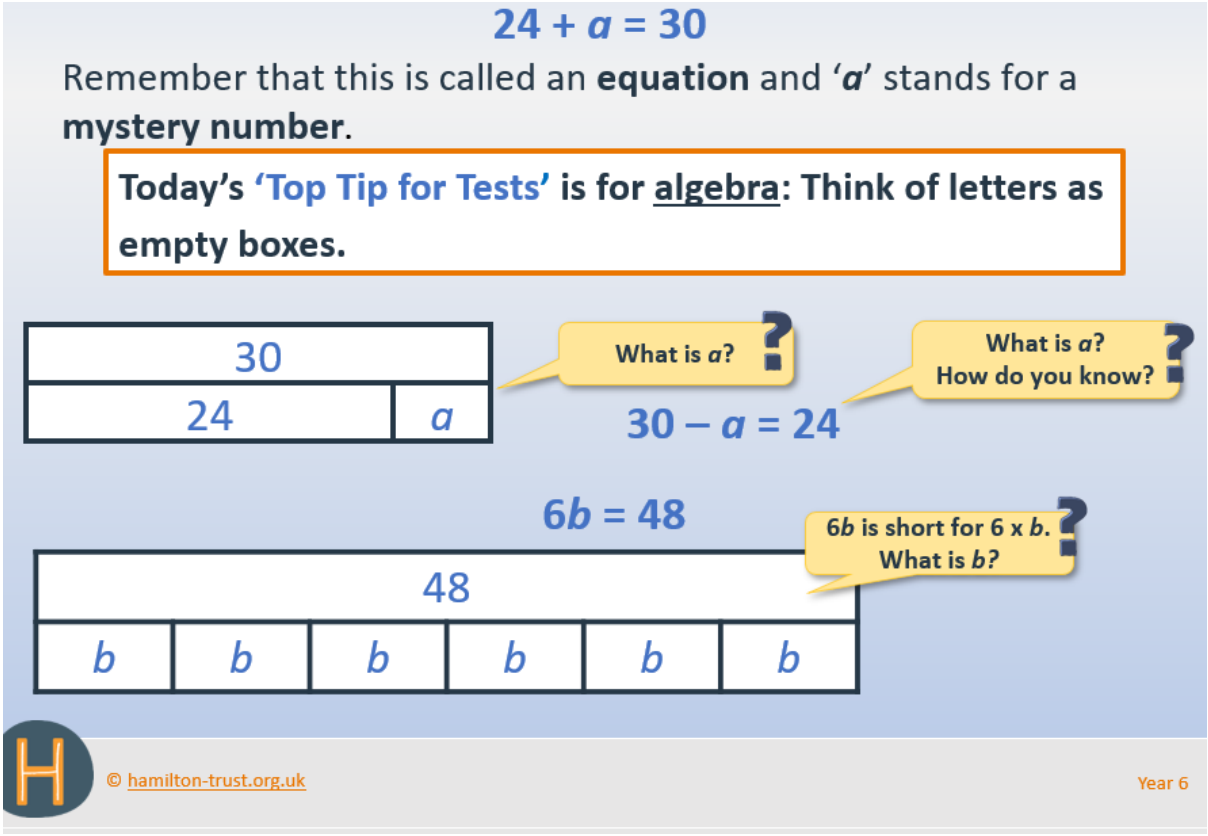
https://www.bbc.co.uk/bitesize/topics/zghp34j/articles/z2p6tyc

https://whiterosemaths.com/wp-content/uploads/2019/SoLs/Primary/Spring-Year-6-2018-19-Block-3-FINAL.pdf

EQUATIONS WITH TWO UNKNOWNS:

The following video will remind you what an equation is:

https://www.bbc.co.uk/bitesize/topics/zghp34j/articles/z2qmrwx



$x + y = 12$

x and ***y*** are whole positive numbers, and this time there is not one solution, but many.

x	*y*
12	0
11	1
10	2
9	3
8	4
7	5
6	6
5	7
4	8
3	9
2	10
1	11
0	12

$m \times n = 24$

m and n are whole positive numbers

m	n
1	24
2	12
3	8
4	6
6	4
8	3
12	2
24	1

In the examples above the letters represent 2 unknown numbers. In these cases, there may be more than one correct answer to solve the equation e.g. m x n = 24, in this equation m and n could equal 1 and 24, 2 and 12, 2 and 6, 3 and 8 etc.

Solve the following equations with two unknowns:

1. Find five different solutions to this equation:

   $f + g = 8$

2. Find five different solutions to this equation:

   $m + n = 3$

3. Find all the solutions to this equation, using positive integers:

   $u + v = 4$

4. How many different answers could you find for question 3?

5. Find all the solutions to this equation, using positive integers:

   $j + k = 6$

Challenge questions!

A. Find ***one*** solution that is true for ***both*** these equations:

$$m + n = 12$$
$$m - n = 2$$

B. Find ***one*** solution that is true for ***both*** these equations:

$$a + b = 18$$
$$2a - b = 3$$

CHAPTER 6 - MEASUREMENT

PROBLEM SOLVING AND CONVERSION - UNITS OF MEASURE:

There are lots of different units of measure (cm, g, ml etc.) and we use different measurements to measure different things e.g. length, weight, volume.

You can find lots of information about units of measure here:

https://www.bbc.co.uk/bitesize/topics/zcpnb9q

Choose the unit of measure that would be the most appropriate to measure the items.

cm kg km g tonnes ml mm litres

- The weight of an elephant
- The volume of water in a bath
- The length of an ant
- The length of a football pitch
- The weight of an apple

Estimate how much juice the glass holds:

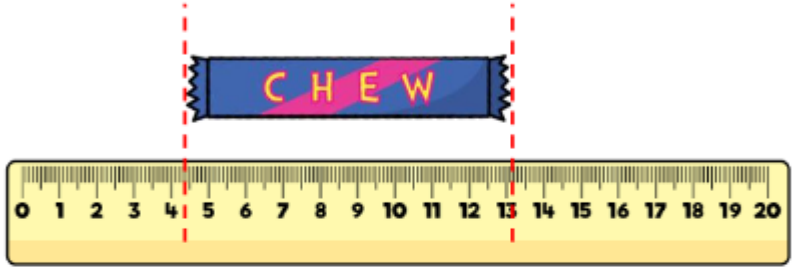
250 ml 2 litres 0.5 litres $\frac{1}{2}$ kg

Estimate the height of the door frame:

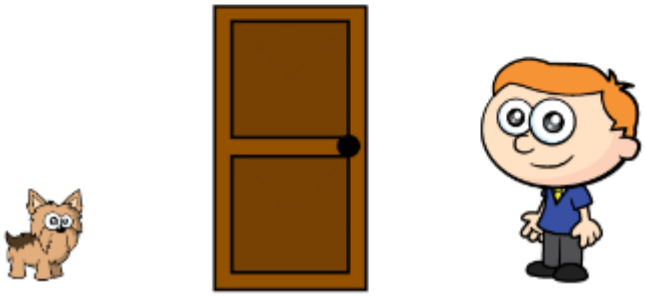
20 mm 20 cm 20 m 2 km 2 m 0.2 km

Teddy thinks his chew bar is 13.2 cm long.

Do you agree? Explain why.



Ron's dog is about $\frac{1}{4}$ of the height of the door.
Ron is three times the height of his dog.
Estimate the height of Ron and his dog.



(White Rose Maths)

There are 1000ml in 1 litre. Using this information convert the capacity of the following bottles to litres or millilitres. Then write in order from smallest to largest:


1 litre
OLIVE Oil
900 ml
168 ml
1.5 litres
1250 ml
0.5 litres
100 ml
0.25 litres
OLIVE Oil
750 ml
200 ml
1.6 litres
2 litres

The Catholic High School Chester

Converting between centimetres and inches

Sheet 1

30 cm is approximately 12 inches.

1.a) b) c) d)

2.a) b) c) d)

3.a) b) c)

Challenge

Use the information to order these children by height, from shortest to tallest.

Table of heights

Name	Height
Ben	6 feet and 3 inches
Mia	125 cm
Miriam	60 inches
Lucas	1.5 m
Chan	5 feet 6 inches
Sarah	1 m 70 cm

(Hamilton Trust)

CONVERSION – MILES AND KILOMETRES:

5 miles is approximately the same as 8 kilometres.

5 miles ≈ 8 kilometres

Use this fact to complete:

- 15 miles ≈ _____ km
- 30 miles ≈ _____ km
- _____ miles ≈ 160 km

If 10 miles is approximately 16 km, 1 mile is approximately how many kilometres?

- 2 miles ≈ _____ km
- 4 miles ≈ _____ km
- 0.5 miles ≈ _____ km

In the United Kingdom, the maximum speed on a motorway is 70 miles per hour (mph).
In France, the maximum speed on a motorway is 130 kilometres per hour (km/h).
Which country has the higher speed limit, and by how much? Give your answer in both units.

The Catholic High School Chester

Converting between miles and kilometres

Sheet 1

1.

2.

3.

4.

5.

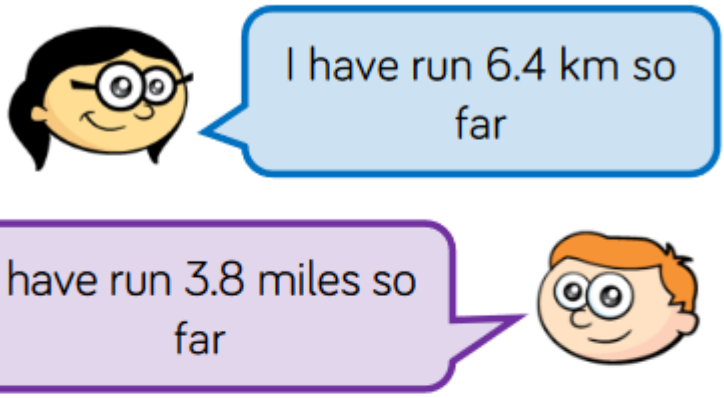
6.

7.

8.

Challenge:

Ron and Annie are running a 5 mile race.



Who has the furthest left to run?

The distance between Cardiff and London is 240 km.

A car is travelling at 60 mph.

How long will it take them to get to London from Cardiff?

Extra practice:

https://whiterosemaths.com/wp-content/uploads/2019/SoLs/Primary/SOL-Year-6-2018-19-Spring-Term-Block-4-FINAL.pdf

https://www.splashlearn.com/measurement-games

FORMULAE – AREA AND PERIMETER:

To find the area of the following shapes use these formulae giving your answer in units squared e.g. cm^2:

The Catholic High School Chester

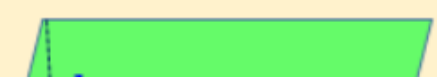
christofid

High School

Area

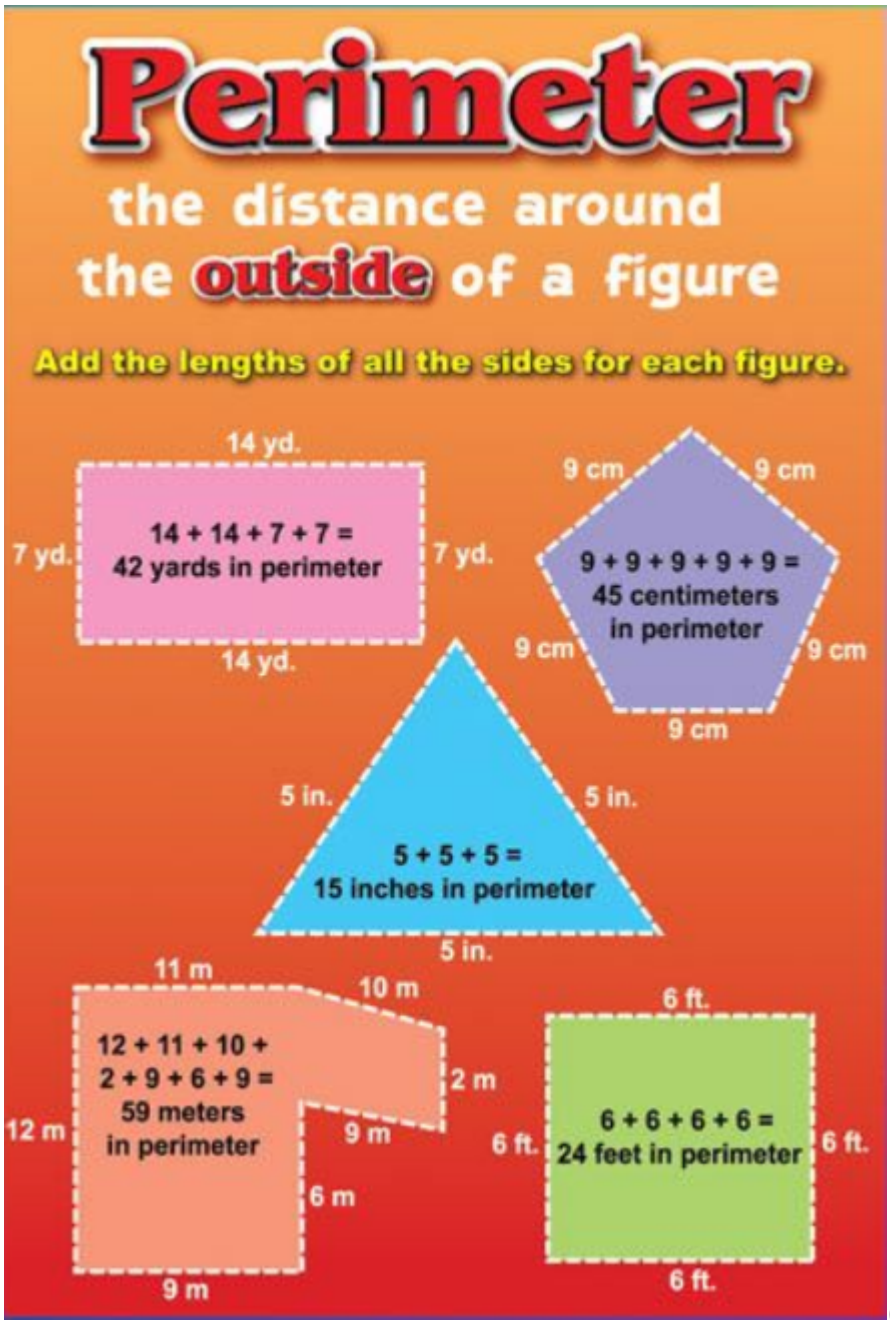
rectangle

parallelogram



(Source – onlinemathlearning.com)

Perimeter is the distance around the outside of a 2D shape. This is calculated as follows:



(msroysmaths.com)

The following video explains about area:

https://www.bbc.co.uk/bitesize/topics/zjbg87h/articles/zwqt6fr

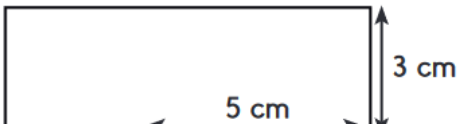
The Catholic High School Chester

christofid

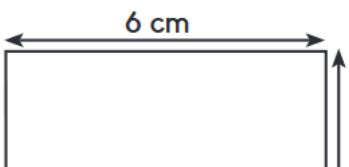
High School

Calculate the area and perimeter of each rectilinear shape.

1.



2.



1.

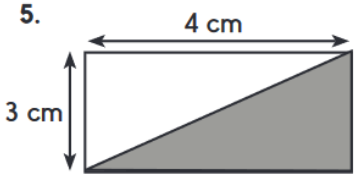
2.

3.

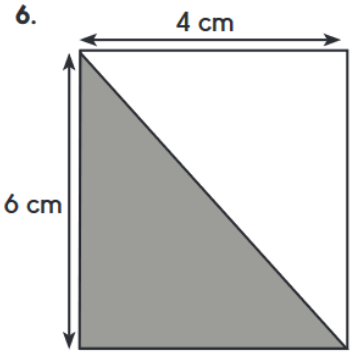
4.

Calculate the area of the shaded triangles.

5.

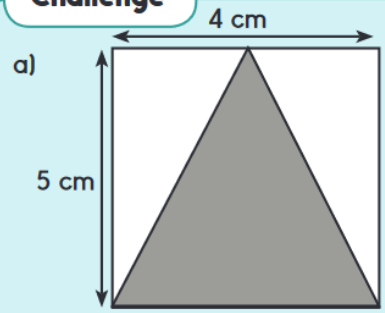


6.

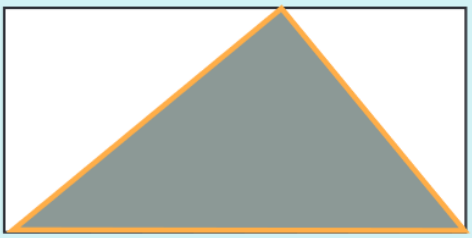


Challenge

a)



b) The area of this triangle is 17.5m^2. What are the dimensions of the rectangle that encloses it?



practice_more-revision_6073_day1

5.

6.

Challenge:

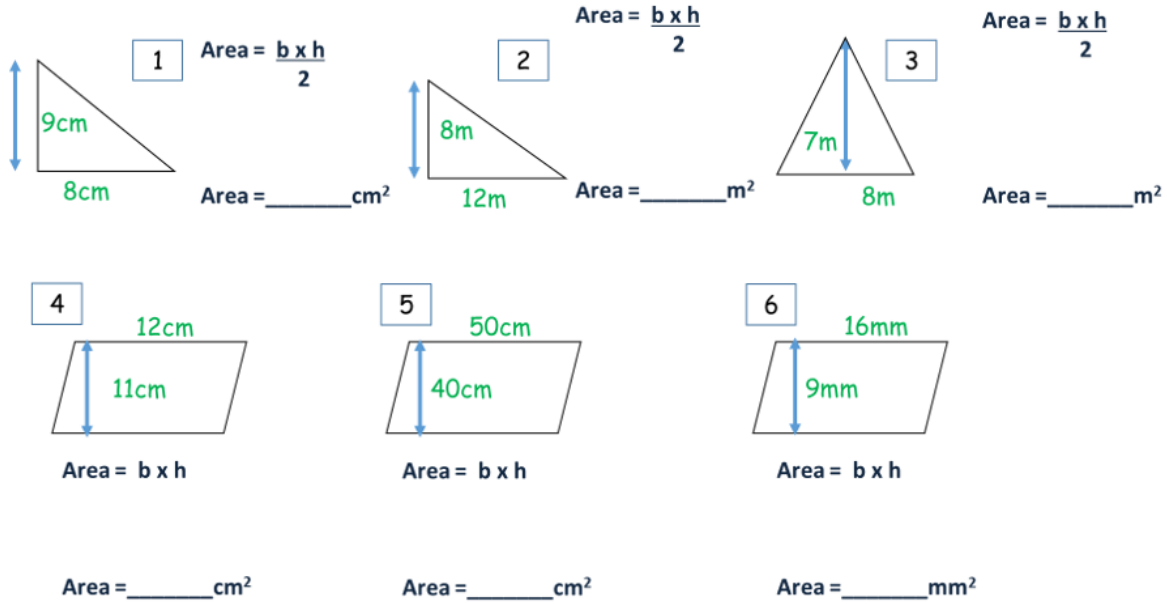
Extra Practice:

https://whiterosemaths.com/wp-content/uploads/2019/SoLs/Primary/Year-6-2018-19-Spring-Term-Block-5-FINAL.pdf

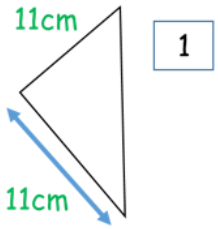
https://www.topmarks.co.uk/Search.aspx?q=area+and+perimeter

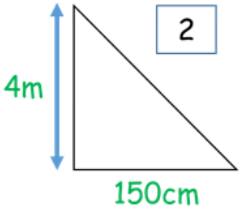
AREA – PARALLELOGRAMS AND TRIANGLES:

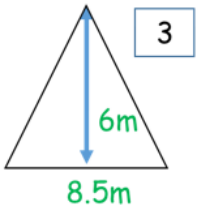
Using the formulae provided above, calculate the area of the following parallelograms and triangles:

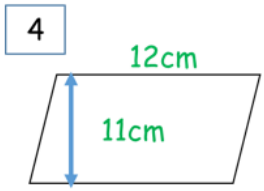


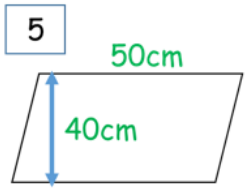
1.
2.
3.
4.
5.
6.

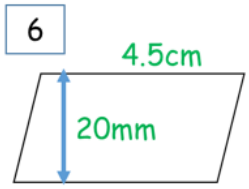










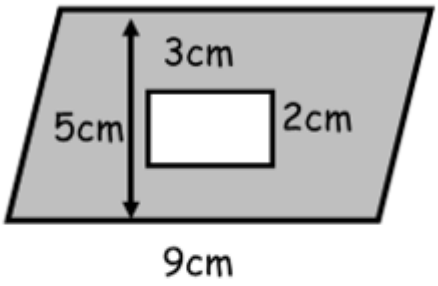


1.
2.
3.
4.
5.
6.

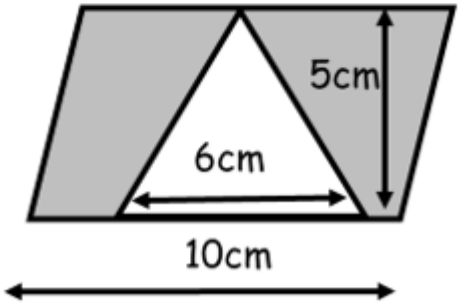
Challenge:

Find the shaded areas

1

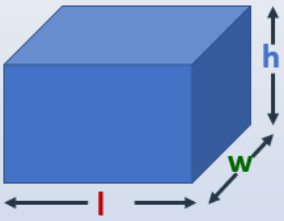


2



VOLUME – CUBES AND CUBOIDS:

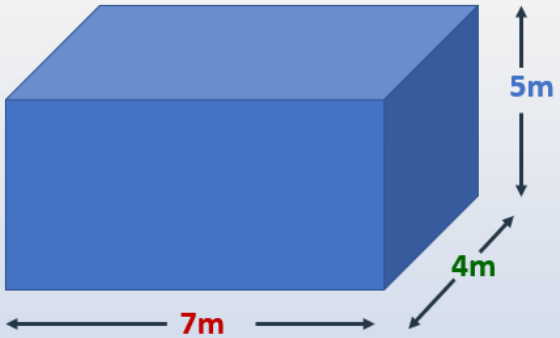
Each of the cubes in our cuboid is cm^3, so the volume, the amount of space taken up by the shape is $60cm^3$.



We can use a formula to describe this efficiently:
length × width × height, or l × w × h for short

We measure volume in centimetres cubed (cm^3) or metres cubed (m^3) or millimetres cubed (mm^3) or even kilometres cubed (km^3).

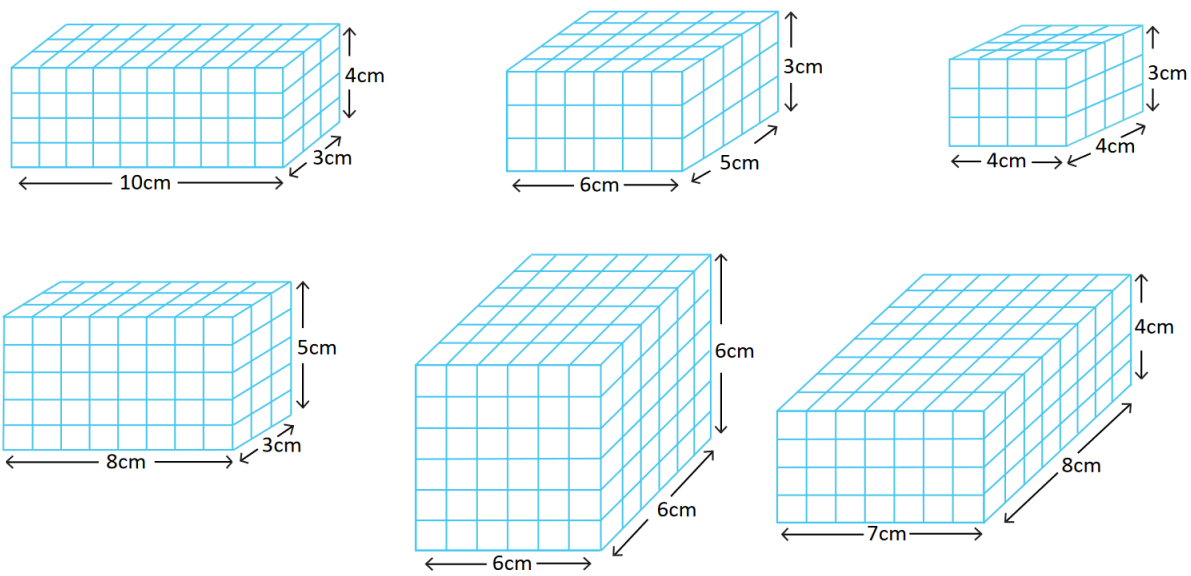
The small '3' after cm, stands for cubed, or 3 dimensions.



Calculate the volume in m^3.

$5m \times 4m \times 7m = 140m^3$

Using the formula above (l x w x h) calculate the volume of the following, giving your answer in units cubed (e.g. cm^3):



1.

2.

3.

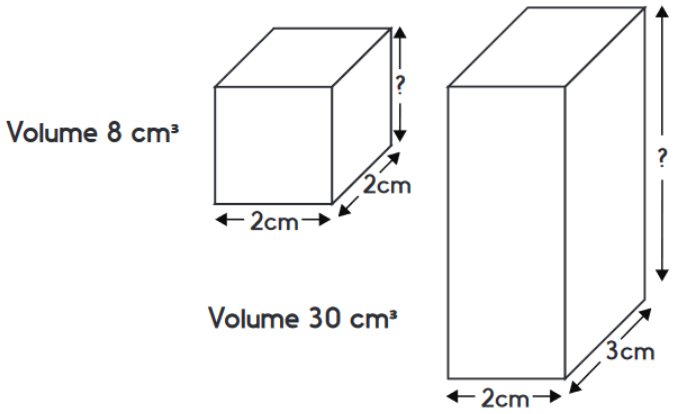
4.

5.

6.

Challenge:

Work out the length of the missing edge of these cuboids:



1.

2.

Extra practice:

https://www.mathsisfun.com/cuboid.html

https://www.nctm.org/Classroom-Resources/Illuminations/Interactives/Cubes/

https://www.topmarks.co.uk/Search.aspx?q=volume

CHAPTER 7 – GEOMETRY

DRAWING 2-D SHAPES:

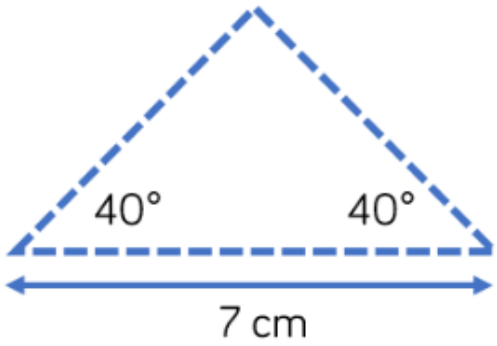
It is important to be able to draw shapes accurately, using correct measurements and angles. Knowing the properties of shapes will help you to draw them. You can ensure your measurements are accurate by using squared paper, a ruler, set square and a protractor (to measure angles). If you are drawing triangles on plain paper then a protractor will be helpful.

On a piece of squared paper, accurately draw the shapes.

- A square with perimeter 16 cm.
- A rectangle with an area of 20 cm^2.
- A right-angled triangle with a height of 8 cm and a base of 6 cm.
- A parallelogram with sides 3 cm and 5 cm.

Rosie has been asked to draw this triangle on plain paper using a protractor.

Create a step-by-step plan to show how she would do this.



The Catholic High School Chester

Use a ruler to measure the shapes. Label the length of each side and each right angle.

christofid

ool

Shape instructions	**Draw the shapes** Use a ruler and set square to draw the shapes below. Try to be as accurate as possible.
3.5cm x 6cm rectangle	
2.4 cm square	
3.7cm x 7.4cm rectangle	

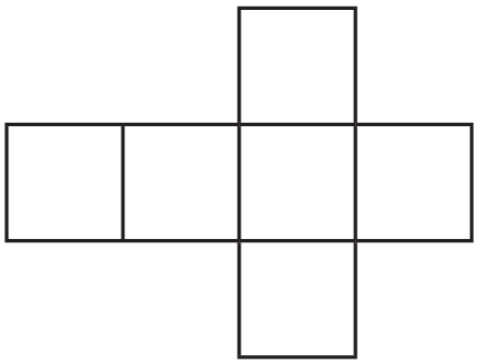
Extra practice:

https://garyhall.org.uk/maths-objectives/229/draw-2-d-shapes-using-given-dimensions-and-angles

http://www.primaryresources.co.uk/maths/pdfs/2D_shapes_dominoes.pdf

3D SHAPES:

The net of a 3D shape is what it looks like flattened:



You can watch the following video on BBC Bitesize to find out more:

https://www.bbc.co.uk/bitesize/topics/zt7xk2p/articles/z247tv4

Nets, like shapes, have the following features:

Faces: a flat surface on a solid object

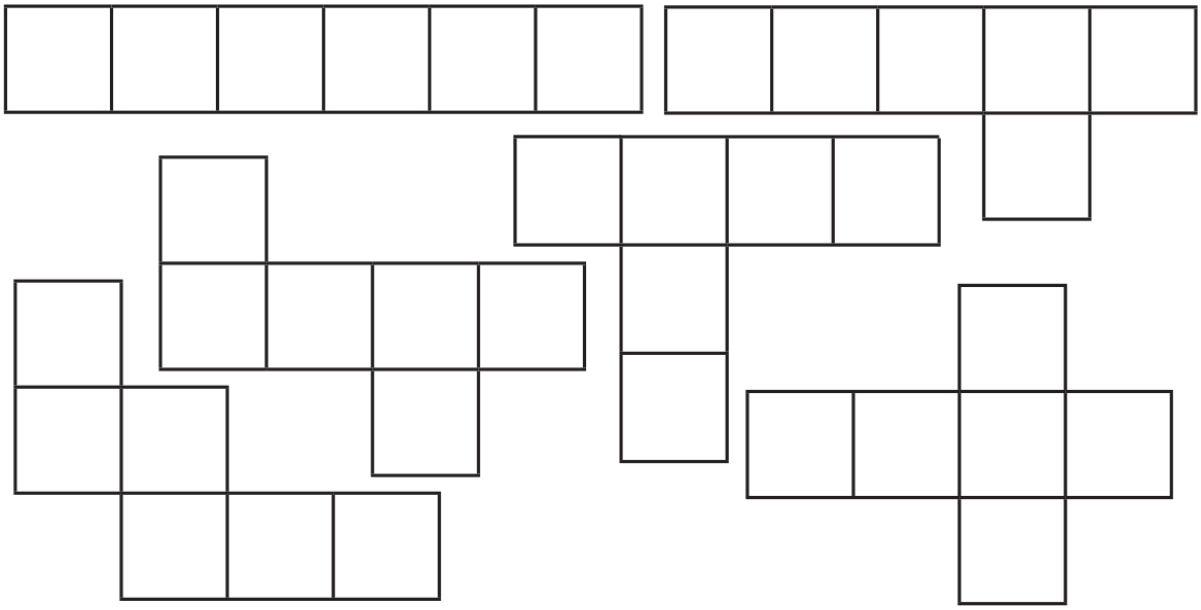
Vertices: a vertex is a point where two or more lines meet (corner)

Edges: a line joining one vertex to another

Nets

Which of these nets do you think will make a cube?
Choose one that you think will work and make a cube.

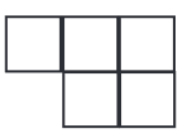
Write its properties in your book, including number and shape of faces, vertices, edges and pairs of parallel faces.



The Catholic High School Chester

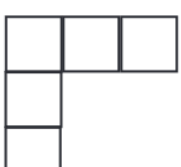
1. Which of these would make an open cube (a cube with no 'top')?

A

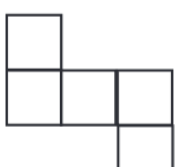


B

C



D



3. Here are some shapes describing themselves. Which one is the cube?
   a. I have 4 vertices, 6 edges and 4 faces.
   b. I have 12 vertices, 18 edges and 8 faces.
   c. I have 6 vertices, 12 edges and 8 faces.
   d. I have 8 vertices, 12 edges and 6 faces.

4. Here are some more shapes describing themselves. Which one is **not** a cube? What shape is it?
   a. Each corner of each of my faces is a right angle.
   b. I have 3 pairs of parallel faces.
   c. Every point on my surface is an equal distance from my centre.
   d. I am a regular polyhedron with 6 faces.

Challenge

Can you make up some more puzzles like these about cubes?

 practice_shape_6263_day1

There are different 3D pyramids and prisms, with different 2D shapes at their bases or ends. This video explains the difference between a pyramid and a prism:

https://www.youtube.com/watch?v=NWiOD8DMzP0

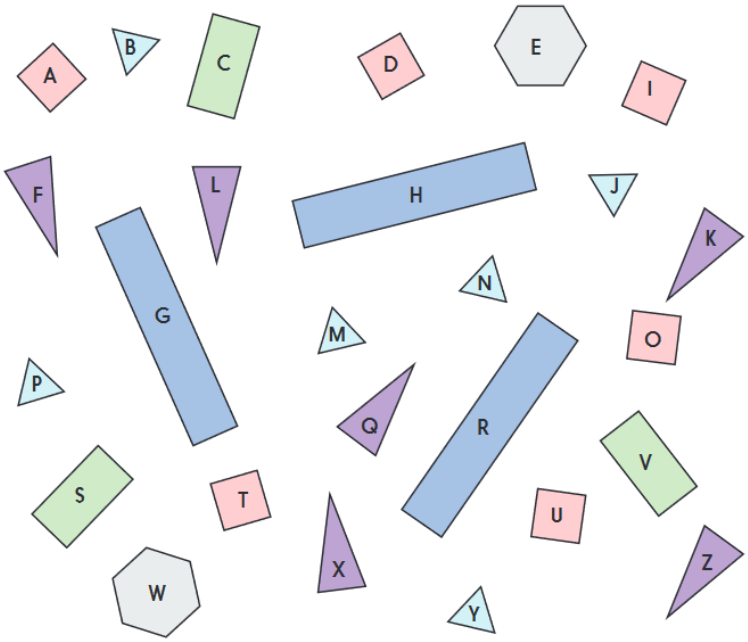
These interactive resources have animations of different prisms and pyramids and lots of information about these shapes:

https://www.learner.org/wp-content/interactive/geometry/prisms/

https://www.learner.org/wp-content/interactive/geometry/pyramids/

- *What do prisms have in common?* The 2 end faces are the same (polygons – shapes with straight sides) and are joined by rectangles (which could include squares).
- What do pyramids have in common? *They have a polygon as 1 face and triangles as the other faces.*

What different 3D shapes can you make using the faces below?
Write the name of each shape (e.g. triangle-based pyramid) and list the faces that would be on it. How many different 3D shapes can you find?
All shapes are drawn to scale.



(Hamilton Trust)

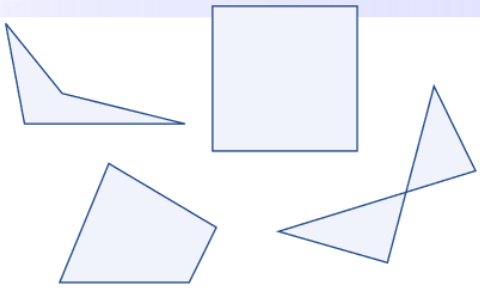
Extra practice:

https://www.topmarks.co.uk/maths-games/7-11-years/shape-position-and-movement

https://www.math-salamanders.com/3d-geometric-shapes.html

COMPARE AND CLASSIFY GEOMETRIC SHAPES:

Quadrilaterals



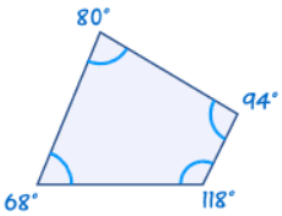
Quadrilateral just means "four sides"
(*quad* means four, *lateral* means side).

A Quadrilateral has four-sides, it is **2-dimensional** (a flat shape), **closed** (the lines join up), and has **straight** sides.

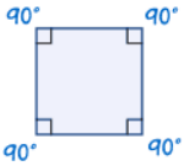
Properties

A quadrilateral has:

- four sides (edges)
- four vertices (corners)
- interior angles that add to **360 degrees**:



$68° + 118° + 94° + 80° = 360°$

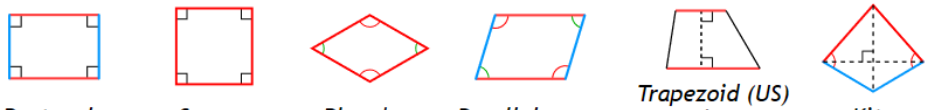


$4 \times 90° = 360°$

Try drawing a quadrilateral, and measure the angles. They should add to **360°**

Types of Quadrilaterals

There are special types of quadrilateral:

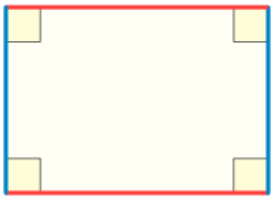


Rectangle	*Square*	*Rhombus*	*Parallelogram*	*Trapezoid (US)* *Trapezium (UK)*	*Kite*
All angles 90° Opposite sides equal	All angles 90° All sides equal	All sides equal Opposite sides parallel	Opposite sides parallel and equal	Two sides parallel	Adjacent pairs of sides equal

Some types are also included in the definition of other types! For example a **square**, **rhombus** and **rectangle** are also ***parallelograms***. See below for more details.

Let us look at each type in turn:

The Rectangle

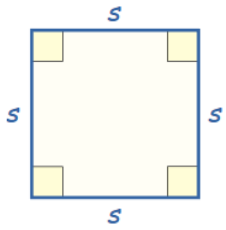


the little squares in each corner mean "right angle"

A rectangle is a four-sided shape where every angle is a right angle (90°).

Also **opposite sides** are parallel and of equal length.

The Square



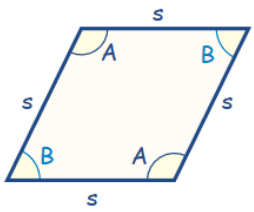
the little squares in each corner mean "right angle"

A square has equal sides (marked "s") and every angle is a right angle (90°)

Also opposite sides are parallel.

A square also fits the definition of a **rectangle** (all angles are 90°), and a **rhombus** (all sides are equal length).

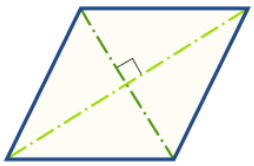
The Rhombus



A rhombus is a four-sided shape where all sides have equal length (marked "s").

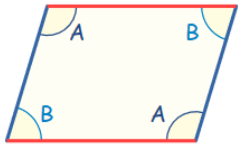
Also opposite sides are parallel *and* opposite angles are equal.

Another interesting thing is that the diagonals (dashed lines) meet in the middle at a right angle. In other words they "bisect" (cut in half) each other at right angles.



A rhombus is sometimes called a **rhomb** or a **diamond**.

The Parallelogram



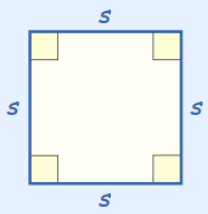
A parallelogram has opposite sides parallel and equal in length. Also opposite angles are equal (angles "A" are the same, and angles "B" are the same).

NOTE: Squares, Rectangles and Rhombuses are all Parallelograms!

Example:

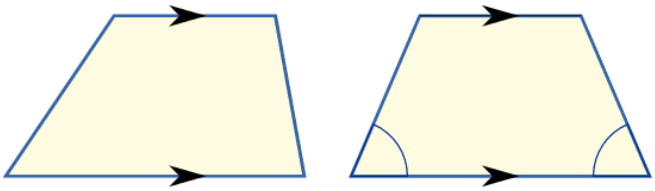
A **parallelogram** with:

- all sides equal and
- angles "A" and "B" as right angles



is a **square**!

The Trapezoid (UK: Trapezium)



Trapezoid Isosceles Trapezoid

A trapezoid *(called a trapezium in the UK)* has a pair of opposite sides parallel.

And a **trapezium** *(called a trapezoid in the UK)* is a quadrilateral with NO parallel sides:

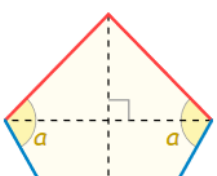
	Trapezoid	Trapezium
In the US:	a pair of parallel sides	NO parallel sides
In the UK:	NO parallel sides	a pair of parallel sides

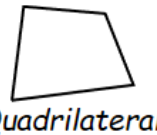
(the US and UK definitions are swapped over!)

An **Isosceles** trapezoid, as shown above, has left and right sides of equal length that join to the base at equal angles.

The Catholic High School Chester

The Kite





Quadrilateral

(https://www.mathsisfun.com/quadrilaterals.html)

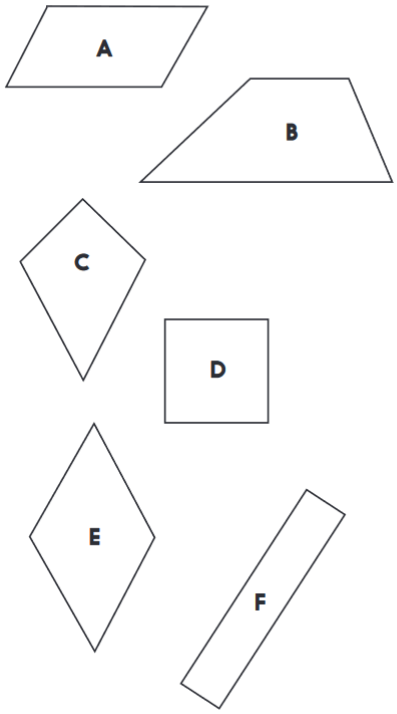
An interactive resource is available here:

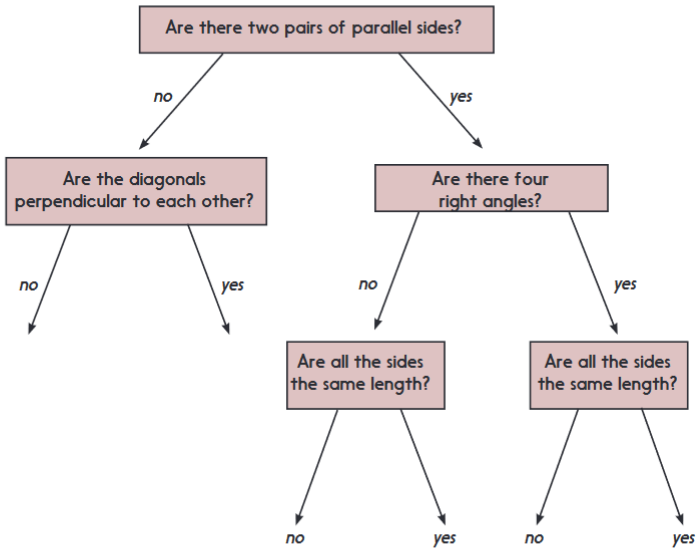
https://www.mathsisfun.com/geometry/quadrilaterals-interactive.html

Quadrilateral sort

Sheet 1

Sort each of the shapes using the diagram - what is the name of each?





practice_shape_6229 _day2

Quadrilateral challenge

Sheet 2

Discuss the questions below with a partner. Write your answers in your book, and use diagrams to illustrate your answers.

Can you draw a...

1. Quadrilateral with exactly 3 right angles? If so can you name it?
2. Quadrilateral with exactly 2 right angles? If so can you name it?
3. Symmetrical quadrilateral with exactly 1 right angle? If so can you name it?
4. Quadrilateral with exactly 3 equal sides? If so can you name it?
5. Quadrilateral with no right angles and two pairs of equal sides that are next to each other. If so, can you name it?
6. Quadrilateral with two pairs of opposite equal sides and no right angles. If so can you name it?
7. Trapezium with no lines of symmetry.
8. A quadrilateral with no equal sides or angles.

1.

2.

3.

4.

5.

6.

7.

8.

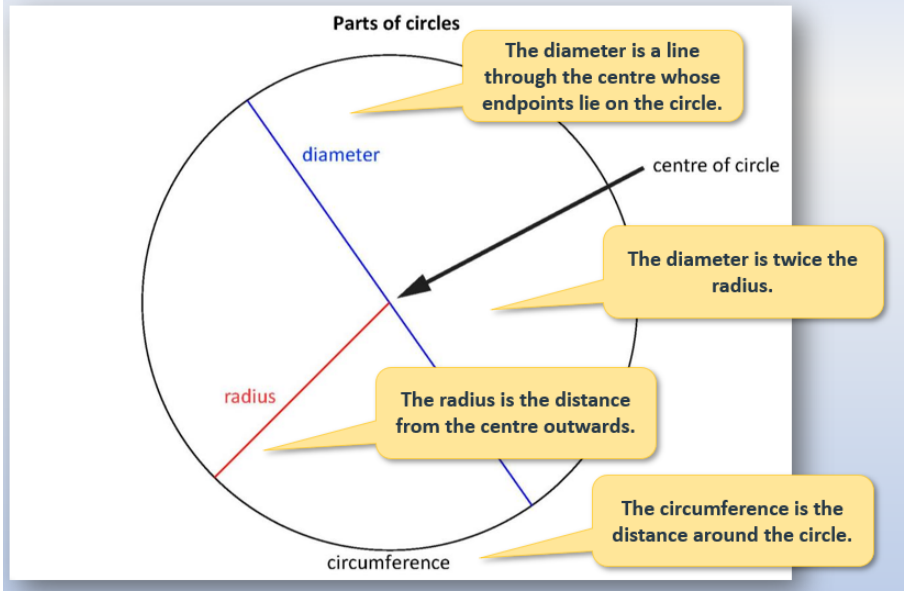
Extra practice:

https://garyhall.org.uk/maths-objectives/231/compare-and-classify-geometric-shapes-based-on-their-properties-and-sizes-and-find-unknown-angles-in-any-triangles-quadrilaterals-and-regular-polygons

PARTS OF A CIRCLE:

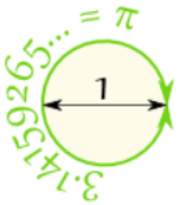
The following video explains what parts you can find in a circle:

https://www.bbc.co.uk/bitesize/topics/zvmxsbk/articles/z8c7qty



When we divide the circumference by the diameter we get 3.141592654...
which is the number π (Pi)

So when the diameter is 1, the circumference is 3.141592654...

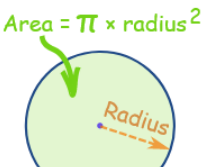


The Catholic High School Chester

christofid

Area

High School



(Source- mathisfun.com/Hamilton Trust)

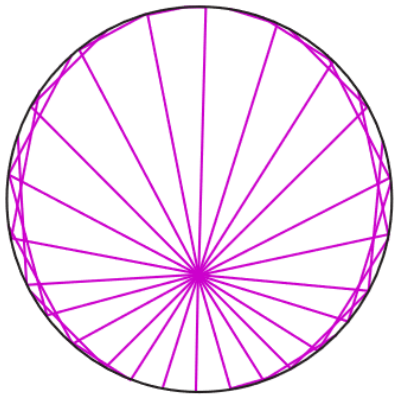
Taking a value of 3.1 for π (or 3.14 if you are happy multiplying with 2 decimal places), use this formula to answer these questions:

1. What is the circumference of a circle with diameter 10cm?
2. What is the circumference of a circle with diameter 100cm?
3. What is the circumference of a circle with diameter 3cm?
4. What is the circumference of a circle with radius 4cm?
5. What is the circumference of a circle with diameter 12cm?

1.	2.	3.
4.	5.	

Ellipse in a circle

1. Draw a circle of radius 5cm.
2. Pick a point about 1.5 or 2cm in from the circumference of the circle at the bottom. Draw straight line rays to the edge of the circle. You need to draw about 24 of these.



3. Using a sharp coloured pencil draw a line at right angles to the ray, where each ray reaches the circle. Draw it so that this line touches the circumference of the circle.
4. Sometimes you will need to draw this line from the ray to the left and sometimes you will need to draw it to the right.
5. When you have drawn all 24 lines, you will have created an ellipse.

Extra Practice:

https://garyhall.org.uk/maths-objectives/232/illustrate-and-name-parts-of-circles-including-radius-diameter-and-circumference-and-know-that-the-diameter-is-twice-the-radius

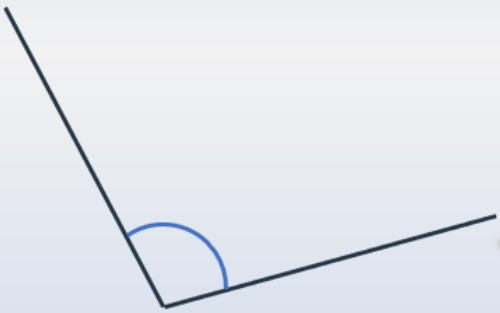
ANGLES:

An angle is a measure of a turn, measured in **degrees or °**. There are **360°** in a full turn. You can find out the size of an angle using a protractor.

- An angle less than 90° is **acute**.
- An angle between 90° and 180° is **obtuse**.
- An angle greater than 180° is **reflex**.
- An angle of exactly 90° is a **right-angle**.

Watch the following BBC Bitesize video to find out more about angles:

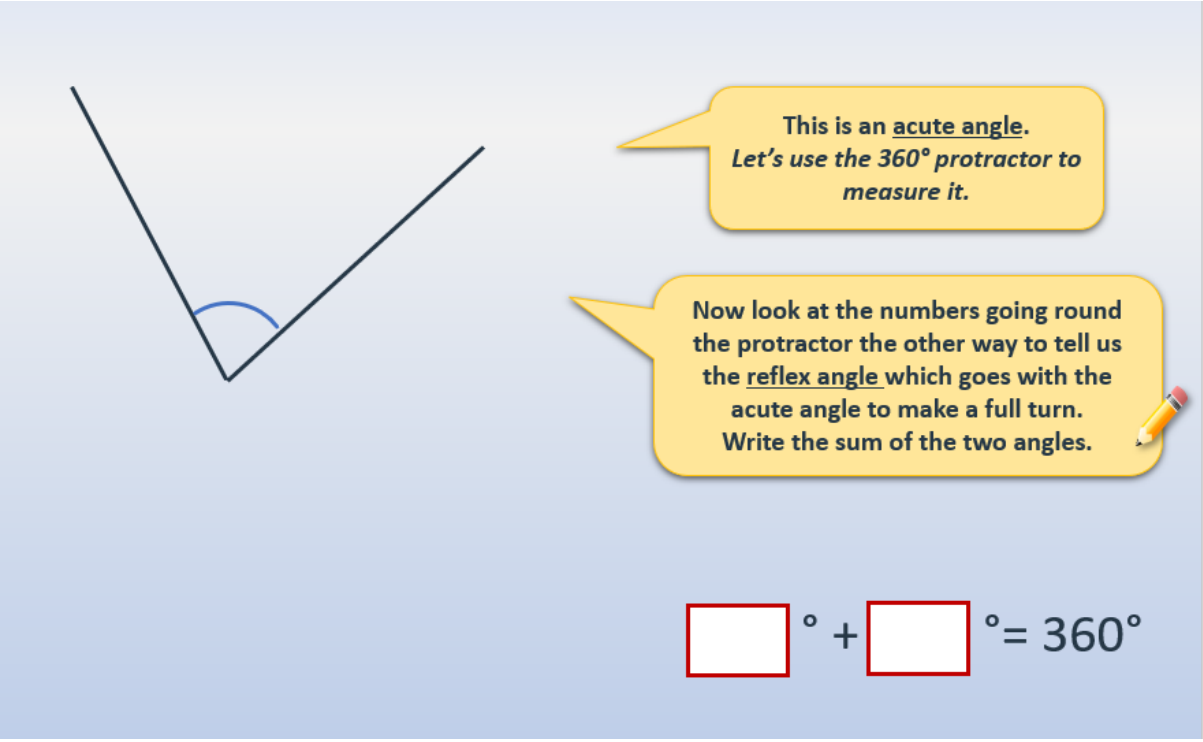
https://www.bbc.co.uk/bitesize/topics/zb6tyrd/articles/zg68k7h



This is an obtuse angle.
Let's use the 360° protractor to measure it.

See the numbers going round the protractor the other way? This tells us the reflex angle which goes with the obtuse angle to make a full turn.
Remember that angles round a point always add up to 360°.
Write the sum of the two angles.

□° + □° = 360°

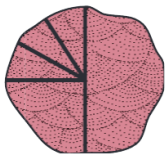


Use the following resource to identify the missing angle. Click the dice to change the angle (a) shown and take it away from 360° to find the missing angle:

https://www.visnos.com/demos/basic-angles

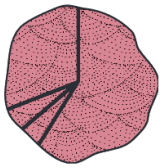
Padma is designing patterns for a fabric. She uses angles round a point. She worked out the sizes of the angles going clockwise round the circle each time. But she has got confused! One of A, B, C and D is impossible as it doesn't add to 360. Identify the one in each set which *cannot* work.

1.



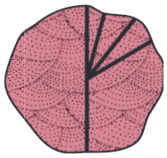
A. 180°, 90°, 30°, 29°, 31°
B. 180°, 90°, 27°, 32°, 41°
C. 180°, 90°, 34°, 36°, 20°
D. 180°, 90°, 39°, 18°, 33°

2.



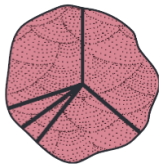
A 222°, 15°, 13°, 110°
B 231°, 14°, 18°, 108°
C 214°, 23°, 24°, 99°
D 224°, 28°, 13°, 95°

3.



A 15°, 24°, 39°, 102°, 180°
B 16°, 25°, 40°, 99°, 180°,
C 11°, 23°, 33°, 113°, 180°
D 10°, 12°, 41°, 126°, 180°

4.



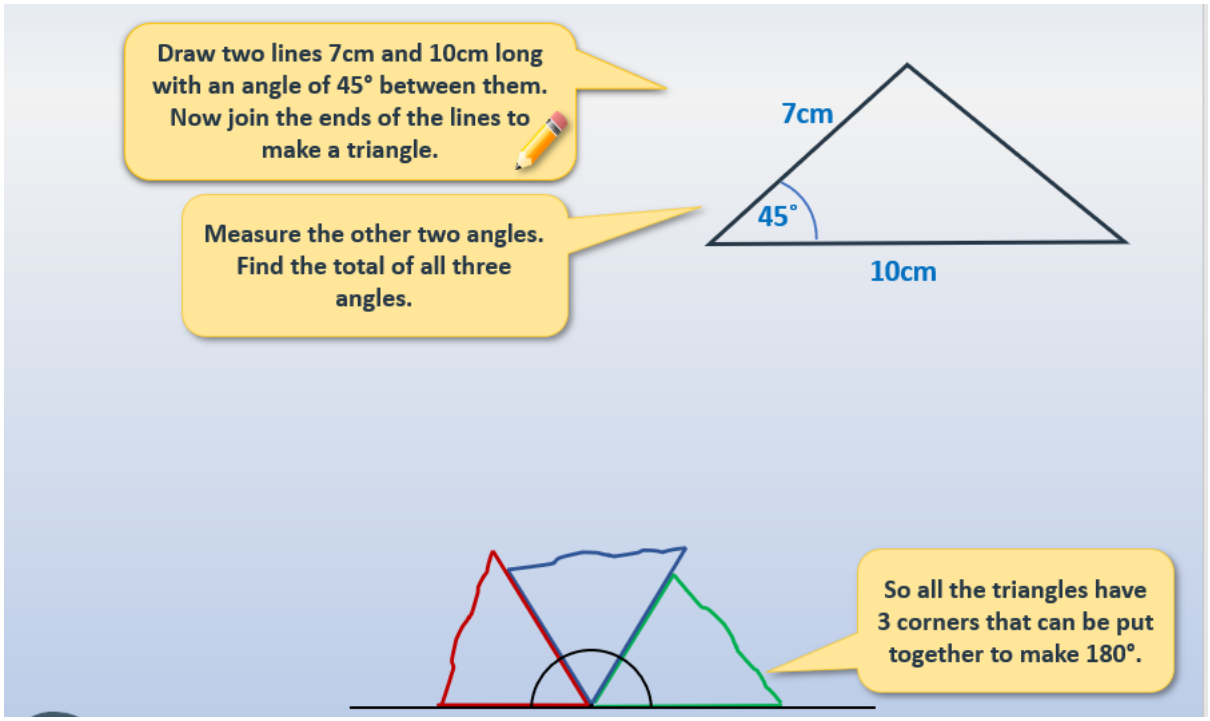
A 122°, 102°, 14°, 37°, 90°
B 120°, 95°, 31°, 24°, 90°
C 118°, 94°, 29°, 29°, 90°
D 124°, 96°, 9°, 41°, 90°

1.

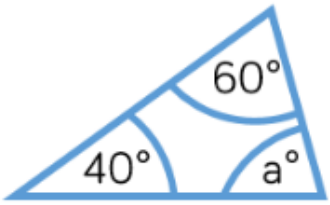
2.

3.

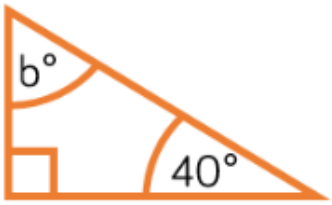
4.



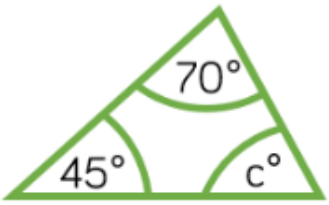
Calculate the missing angles.



1.

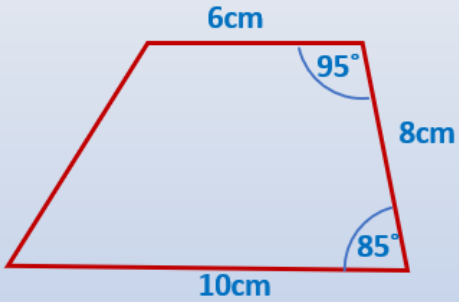


2.

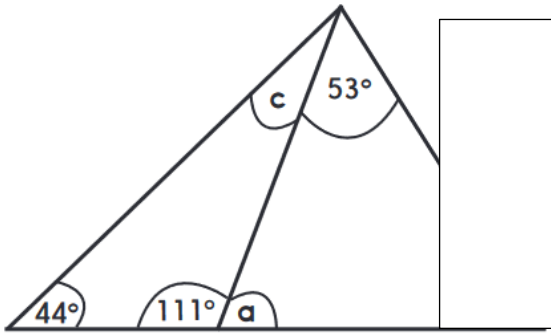


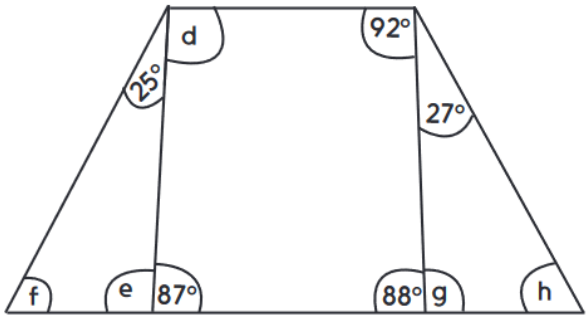
3.

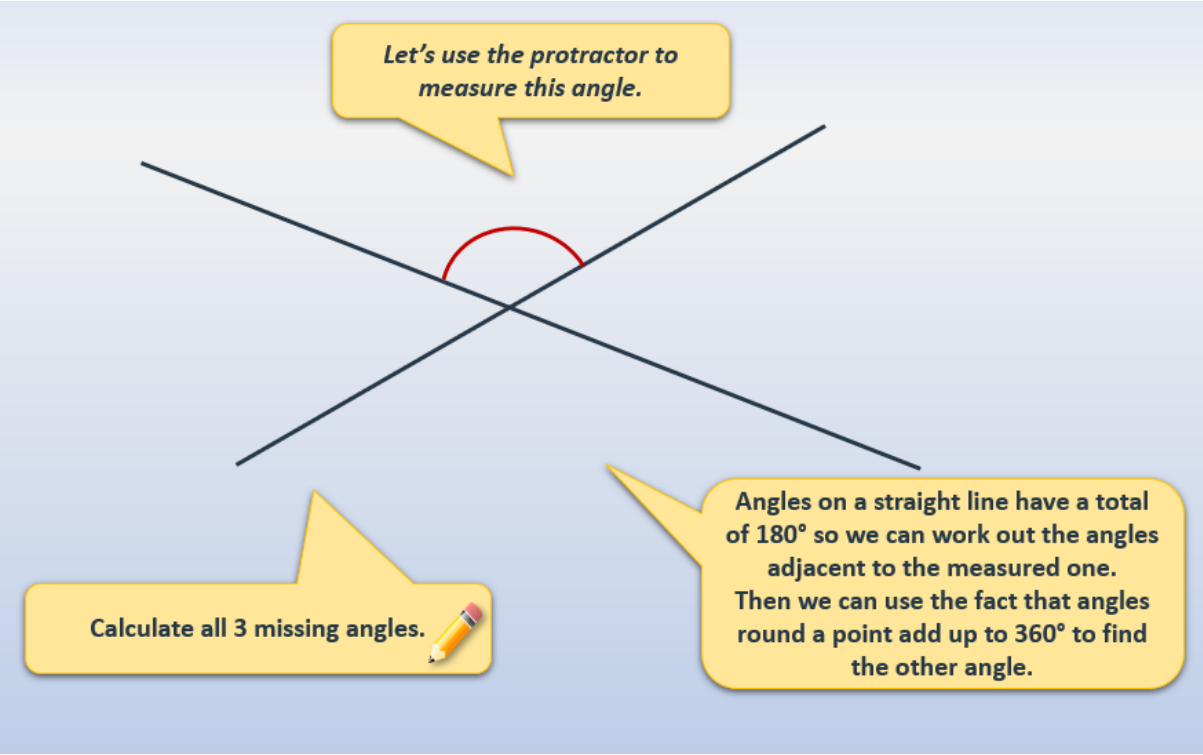
- ***We can use the fact the angles inside a quadrilateral always total 360° to find missing angles too.***
- **Draw a quadrilateral with 3 sides 6cm, 8cm and 10cm, and angles 95° and 85° between them. Join the ends to form a quadrilateral.**
- **Measure one unknown angle; then work out the last.**



Work out the missing angles:

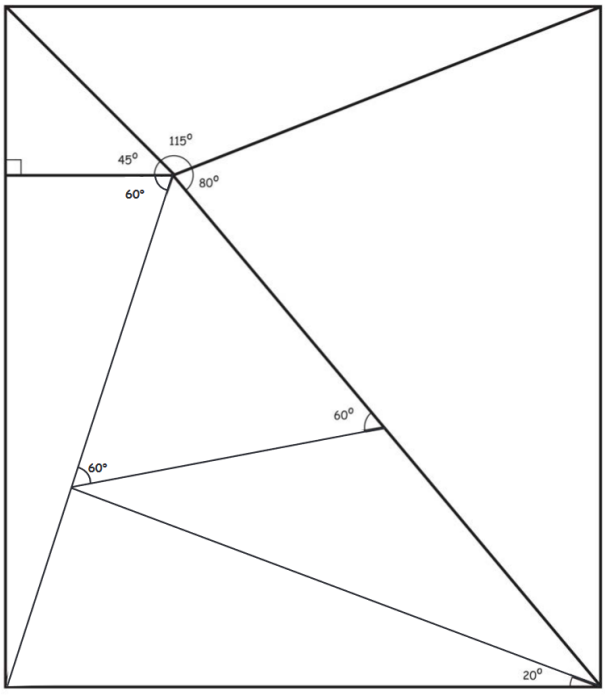

c
53°
44°
111°
a


d
92°
25°
27°
f
e
87°
88°
g
h


Let's use the protractor to measure this angle.
Calculate all 3 missing angles.
Angles on a straight line have a total of 180° so we can work out the angles adjacent to the measured one. Then we can use the fact that angles round a point add up to 360° to find the other angle.

Remember that angles in a triangle add up to 180° and angles on a straight line add up to 180°.

Use these two facts to help you to work out all the missing angles in this triangular jigsaw.



Extra practice:

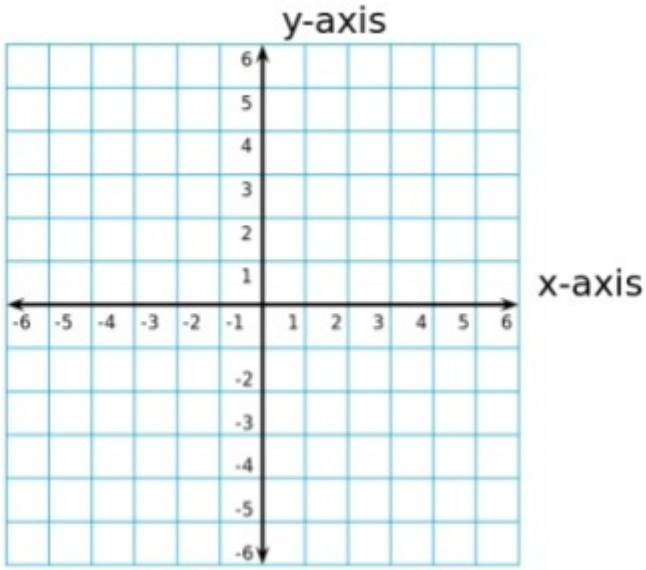
https://whiterosemaths.com/wp-content/uploads/2019/SoLs/Primary/Summer_Term_SOL/Year-6-2018-19-Summer-Block-1-Properties-of-Shape.pdf

https://www.topmarks.co.uk/Flash.aspx?a=activity16

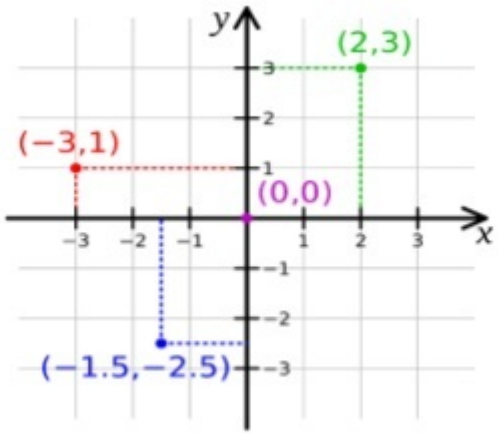
POSITION ON A GRID:

What are coordinates?

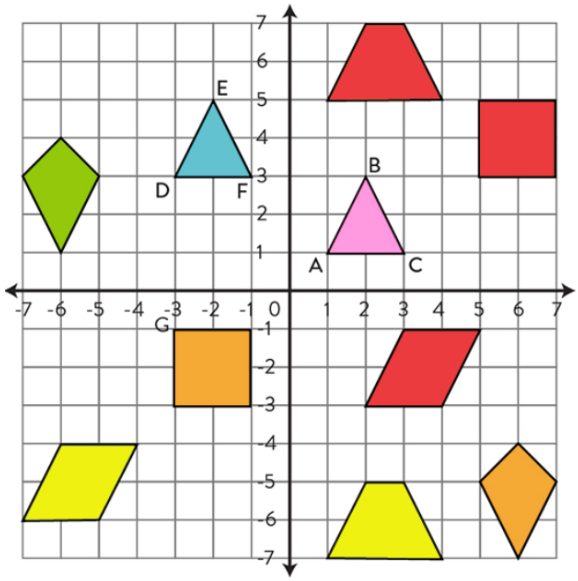
Coordinates are two numbers (Cartesian coordinates), or sometimes a letter and a number, that locate a specific point on a grid, known as a coordinate plane. A coordinate plane has four quadrants and two axes: the x axis (horizontal) and y axis (vertical).



The point at which the two axes intersect is called the **origin** – the coordinates of this point are (0, 0). Coordinates are written as (x, y) meaning the point on the x axis is written first, followed by the point on the y axis.



REMEMBER **'along the corridor, up the stairs'**, meaning follow the x axis first and then the y. (Third Space Learning)



1) Coordinate B is (2,3). What are the missing coordinates A and C?
2) What are the coordinates for each point of the red square?
3) What about the coordinates for the yellow trapezium?

4) Coordinate E is (-2,5). What are the missing coordinates for the blue triangle?
5) What are the coordinates for each point on the green kite?
6) If coordinate G is (-3,-1), what are the missing coordinates for the orange square?
7) Name the coordinates for each point of the rhombus in the third quadrant.

8) True or false: the translation of the blue triangle to the pink triangle is "2 down, 4 across".
9) What is the translation from the yellow to red rhombus? How do you know?

(Doodle Maths)

1)

2)

3)

4)

5)

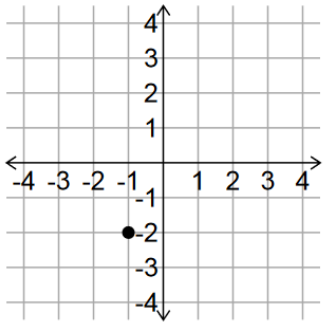
6)

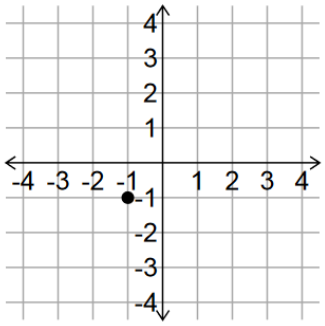
7)

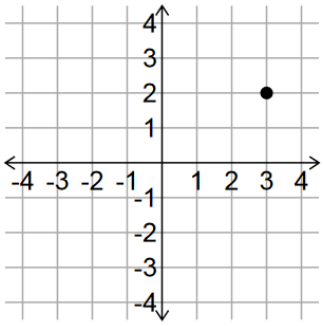
8)

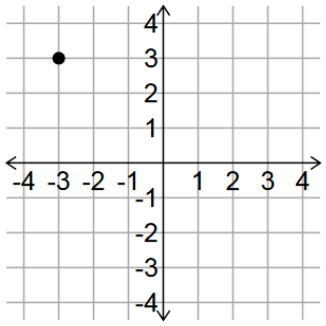
9)

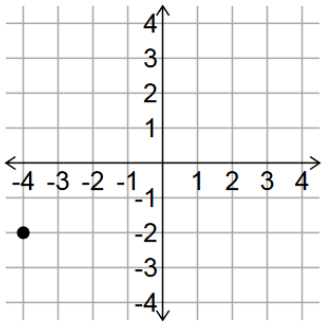
♦ Provide the coordinates for each point.

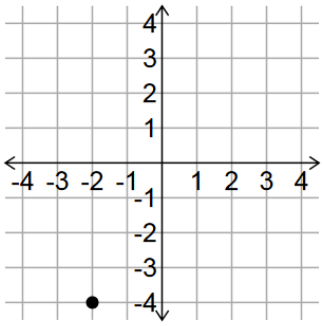
1. 

2. 

3. 

4. 

5. 

6. 

(Snappy Maths)

Extra practice:

https://garyhall.org.uk/maths-objectives/234/describe-positions-on-the-full-coordinate-grid-all-4-quadrants

https://www.thenational.academy/year-6/maths/to-describe-coordinate-positions-on-a-grid-year-6-wk4-1

https://www.educationquizzes.com/ks2/maths/position-year-6/

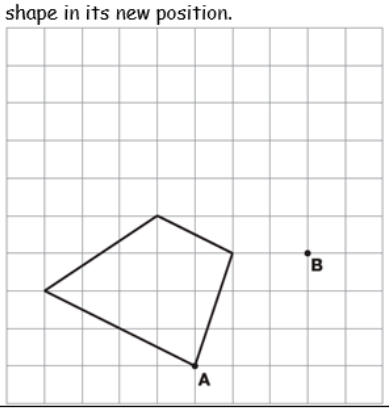
https://nrich.maths.org/9024

TRANSLATING SHAPES:

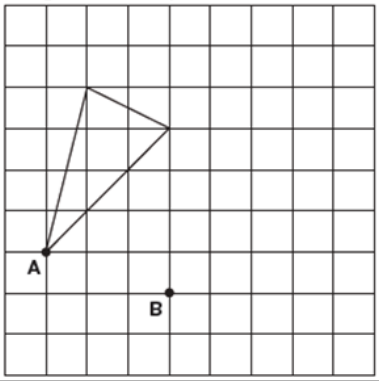
Translating a shape means moving it to a different position without changing the shape. The following video explains translation, reflection and rotation:

https://youtu.be/GPKJMM-GeAg

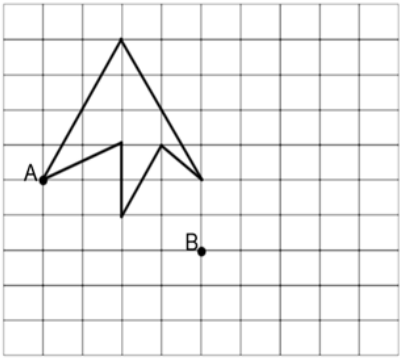
1. Here is a quadrilateral on a square grid.
The shape is translated so that point **A** moves to point **B**.
Draw the shape in its new position.



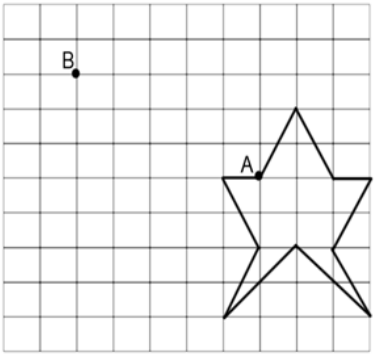
2. Here is a triangle on a square grid.
The triangle is translated so that point A moves to point B.
Draw the triangle in its new position.



3. This irregular hexagon is translated so that point **A** moves to point **B**. Draw the shape in its new position.



4. This irregular decagon is translated so that point **A** moves to point **B**. Draw the shape in its new position.

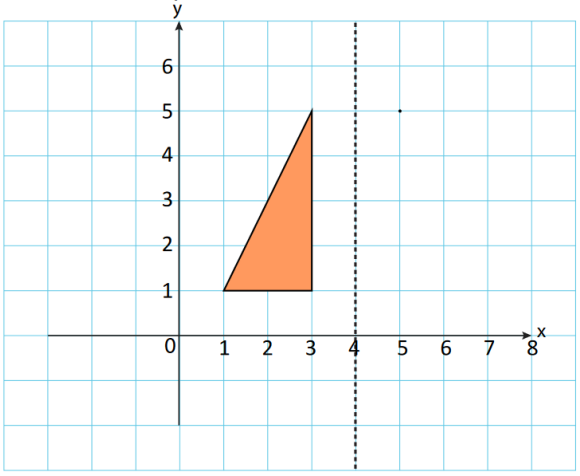


Copy the shapes above and translate them to point B.

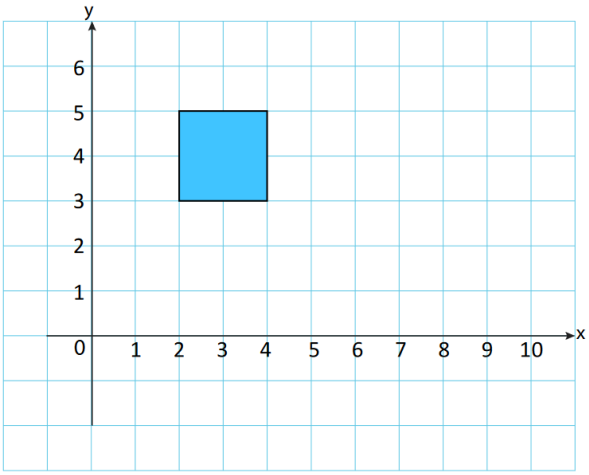
The following tutorial online will give you more examples of translations:

http://www.emaths.co.uk/images/tutorials/translation/Translation/Presentation_Files/index.html

4. Reflect this shape in the mirror line and label the co-ordinates of its vertices.

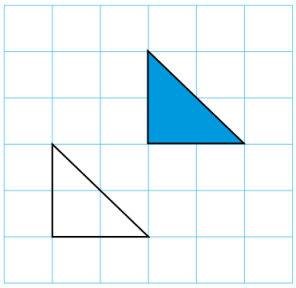


5. Move this shape four squares to the right and down two squares. Write the new co-ordinates of its vertices.

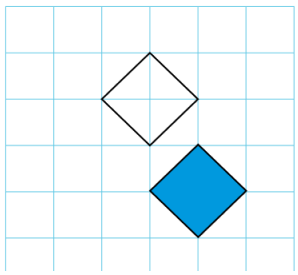


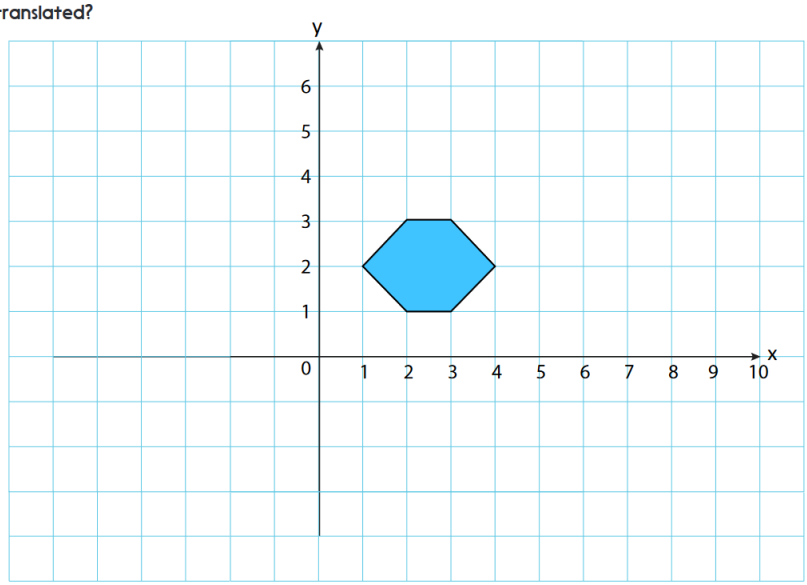
6. How have these blue shapes been translated?

a)



b)





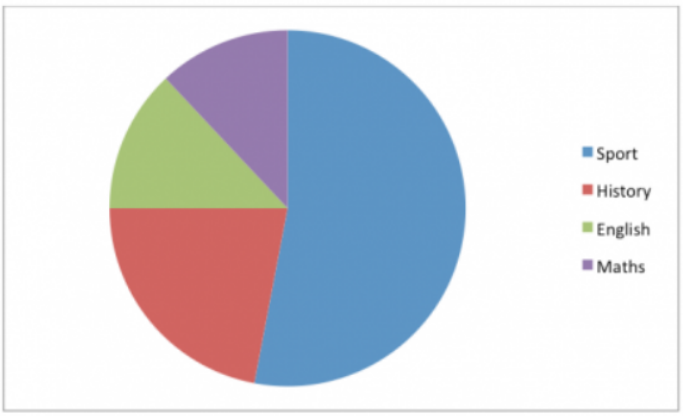
7. Translate this shape down 4 squares, then reflect in the y-axis. Label the co-ordinates of the vertices each time.

CHAPTER 8 - STATISTICS

PIE CHARTS:

Pie charts are used in data handling and are **circular charts divided up into segments which each represent a value.**

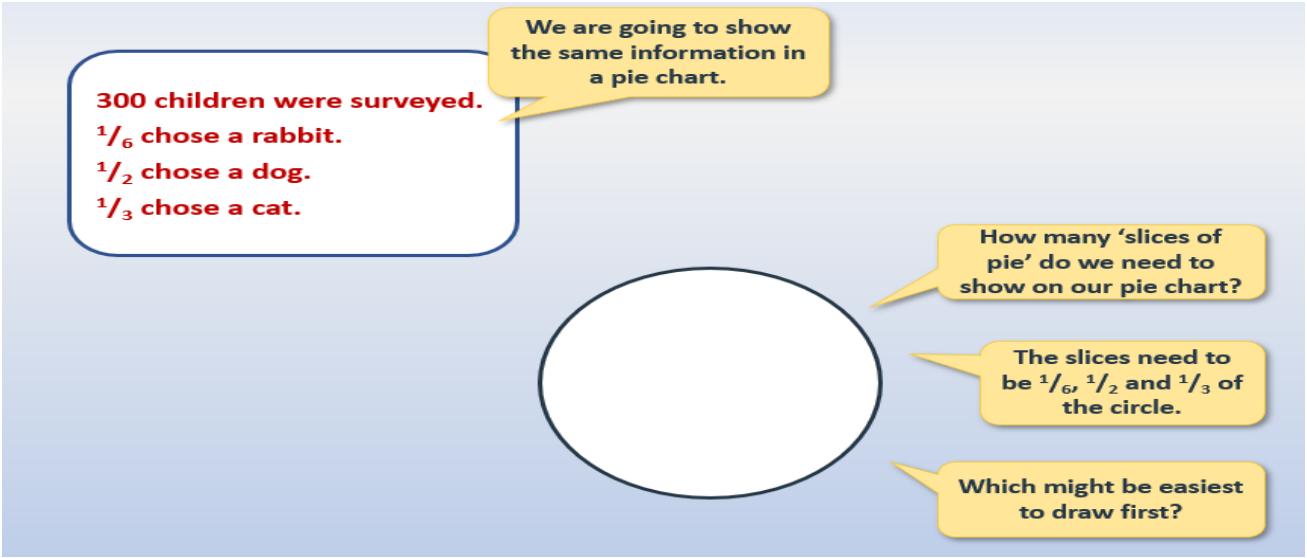
Pie charts are divided into sections (or 'slices') to represent values of different sizes. For example, in this pie chart, the circle represents a whole class. Each member of the class was asked what their favourite subject was, so each segment of the circle represents a different favourite subject:



Pie charts are a **visual device to help us understand data more easily**. For example, in this pie chart we can see that sport was the most popular subject as more than half of the class said it was their favourite subject.

(theschoolrun.com)

You can use your knowledge of fractions when you are asked to create a pie chart. A fraction of the total will represent each section of the pie chart. If the fractions have different denominators it may be easier to change them all to the same denominator before dividing up the pie chart.



The Catholic High School Chester

christofid

1. The children in Year 6 were asked to name their favourite fruit.

High School

a)

b)

c)

d)

2. All 32 children in class 6 chose their favourite jacket potato fillings.

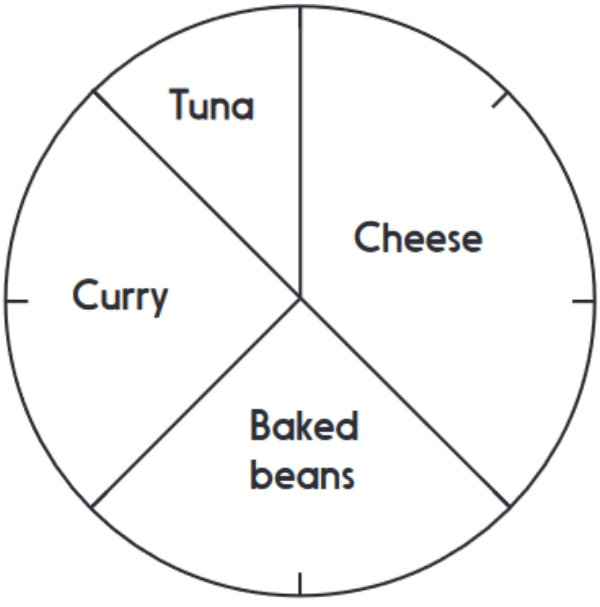
   For each statement below put a tick if it is correct and a cross if it is not correct.

   16 children like baked beans best.

   25% of the children prefer curry.

   $\frac{3}{5}$ of the children like tuna.

   8 children like cheese best.



Extra practice:

https://uk.ixl.com/math/year-6/pie-charts

https://garyhall.org.uk/maths-objectives/236/interpret-and-construct-pie-charts-and-line-graphs-and-use-these-to-solve-problems

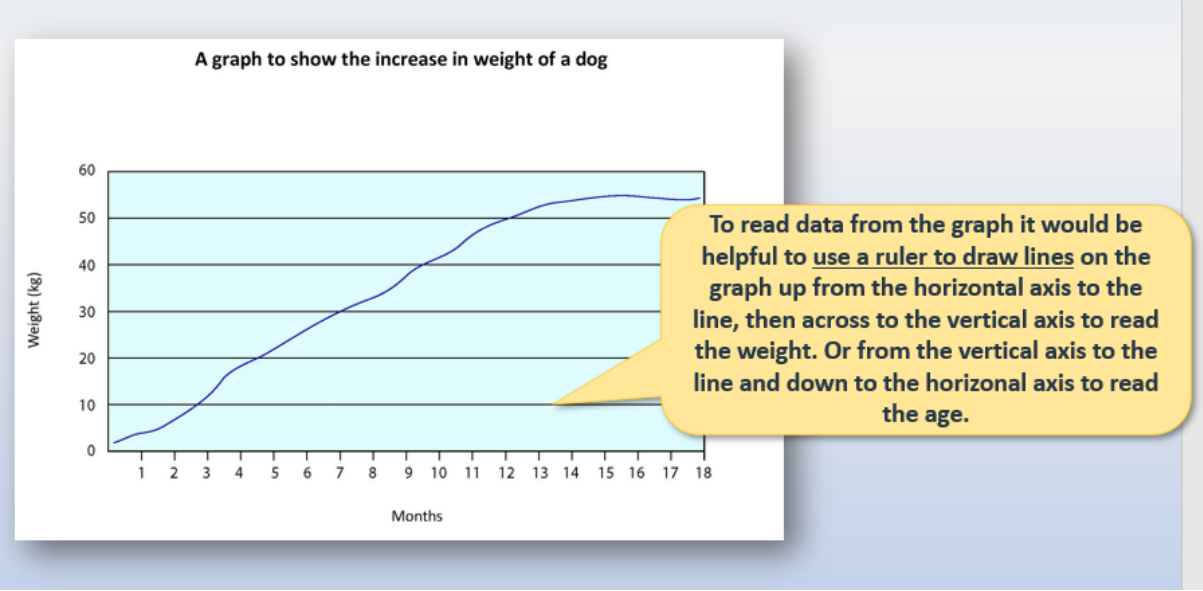
https://www.bbc.co.uk/teach/class-clips-video/maths-ks2-pie-and-pie-again-pie-charts/zbbhf4j

LINE GRAPHS:

A line graph shows information which is connected e.g. change over time.

The following BBC Bitesize page has information about lots of different charts, including line graphs, and their uses:

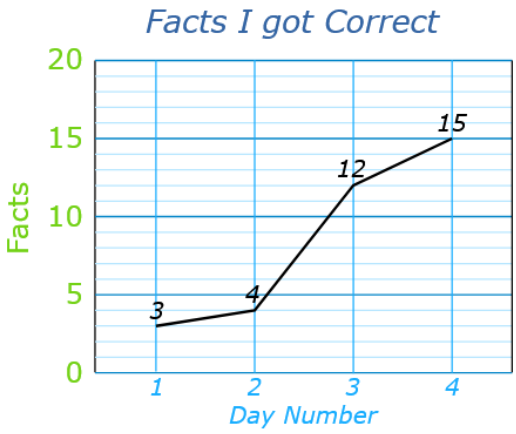
https://www.bbc.co.uk/bitesize/topics/zf2f9j6/articles/z83wjxs


A graph to show the increase in weight of a dog
Weight (kg)
0
10
20
30
40
50
60
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18
Months
To read data from the graph it would be helpful to use a ruler to draw lines on the graph up from the horizontal axis to the line, then across to the vertical axis to read the weight. Or from the vertical axis to the line and down to the horizonal axis to read the age.

You are learning facts about dogs, and each day you do a short test to see how good you are. These are the results:

Table: Facts I got Correct			
Day 1	**Day 2**	**Day 3**	**Day 4**
3	4	12	15

And here is the same data as a Line Graph:

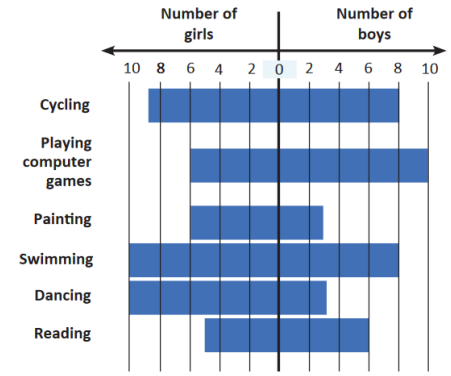


1. Some children chose their favourite hobby.

Which hobby was chosen by most children?

How many more girls than boys chose dancing?

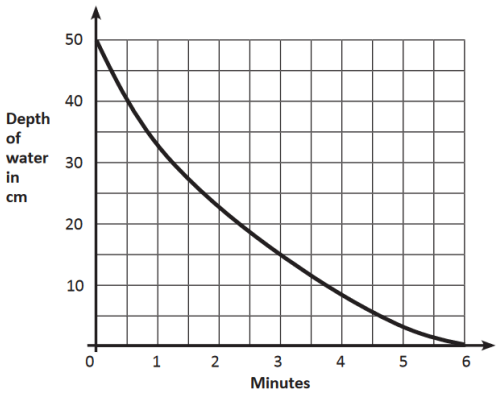
Write all the hobbies that were chosen by more boys than girls.



2. This graph shows the depth of water in a bath as it drains away.

What is the depth of water after 3 minutes?

How long does it take for the level to drop from 50cm to 45cm?



The Catholic High School Chester

christofid

This graph shows the temperature in °C from 2am to 3pm on a winter day:

High School

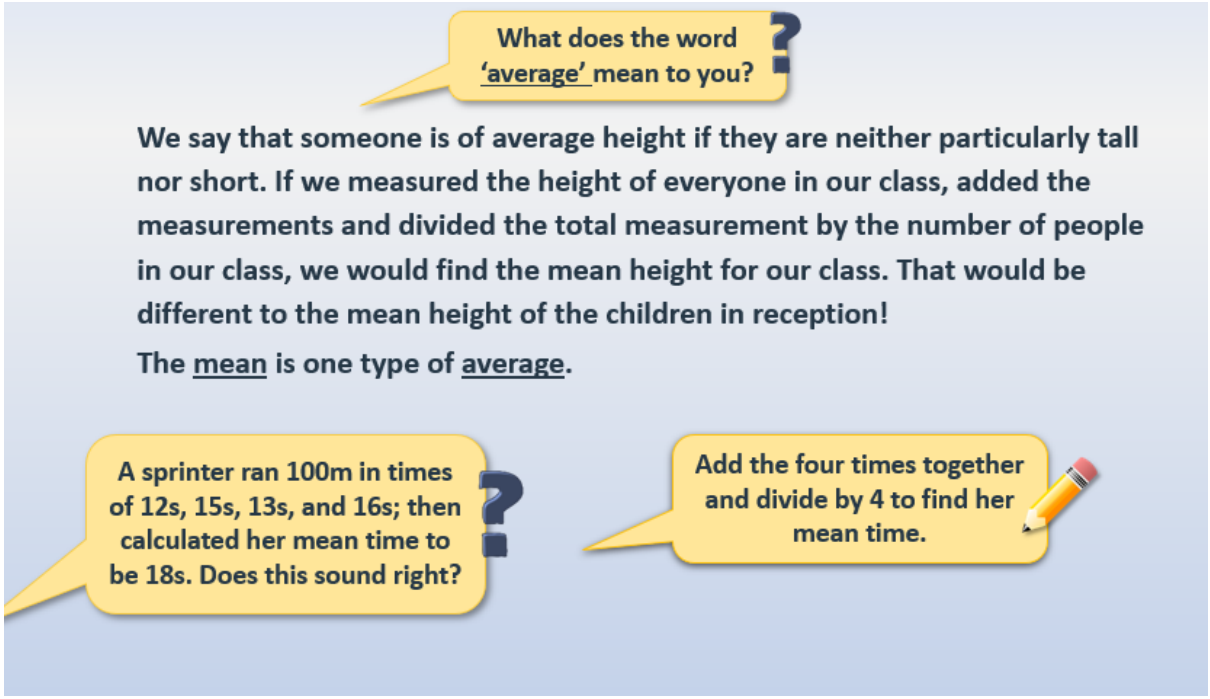
Extra practice:

https://www.ncetm.org.uk/resources/49421

https://uk.ixl.com/math/year-6/interpret-line-graphs

https://mathsframe.co.uk/en/resources/resource/111/itp-line-graph

MEAN AS AN AVERAGE



(Hamilton)

The mean is one type of average – the following video introduces the mean:

https://www.bbc.co.uk/bitesize/topics/zm49q6f/articles/z99jpbk

Kieran wrote down the score he got for his spelling test for the first six weeks of term:

Week 1	*Week 2*	*Week 3*	*Week 4*	*Week 5*	*Week 6*
8	*6*	*9*	*8*	*10*	*7*

Here, the total is 48, which is then be divided by 6 to make an average (mean) score of 8.

1. These are Sarah's last four scores in her spelling tests.
   23, 19, 21, 17
   Calculate her mean (average) score.

2. Class 6 measured the rainfall each day (see graph).
   Calculate the mean daily rainfall.

3. There are 4 classes in KS2 at Chestnut School.

Year	Number in the class
3	28
4	25
5	32
6	27

   Calculate the mean class size.

4. Six people's index fingers are the following lengths:
   8cm, 9cm, 8cm, 7cm, 7cm, 9cm.
   What is the mean length?

1.

2.

3.

4.

5. Write four numbers with a mean of 10. ☐ ☐ ☐ ☐

6. The following four numbers have a mean of 10.
Which number is missing?

8 10 ☐ 11

5.

6.

Challenge:

1. The temperature for UK on a holiday website is found by taking the mean average from 8 different parts of the country. What should they put up if the temperature in the 8 locations are: 12^0C 18^0C 9^0C 12^0C 15^0C 20^0C 21^0C 13^0C ?

2. 6 friends are going on holiday and it works out to be £120 each. 1 of them is the birthday boy so his friends decide to cover his cost. How much do all 5 friends need to pay each now?

3. 4 people have the following number of counters: 4, 6, 3, 7. If we were to share the counters equally between them, how many would they get each?

4. Tickets to the cinema cost £6 each. 5 Friends go and they have the following amounts of money each; £3 £8 £6 £4 £3 Do they have enough money between them to go to the cinema? (Show your working)

Extra practice:

https://garyhall.org.uk/maths-objectives/237/calculate-and-interpret-the-mean-as-an-average

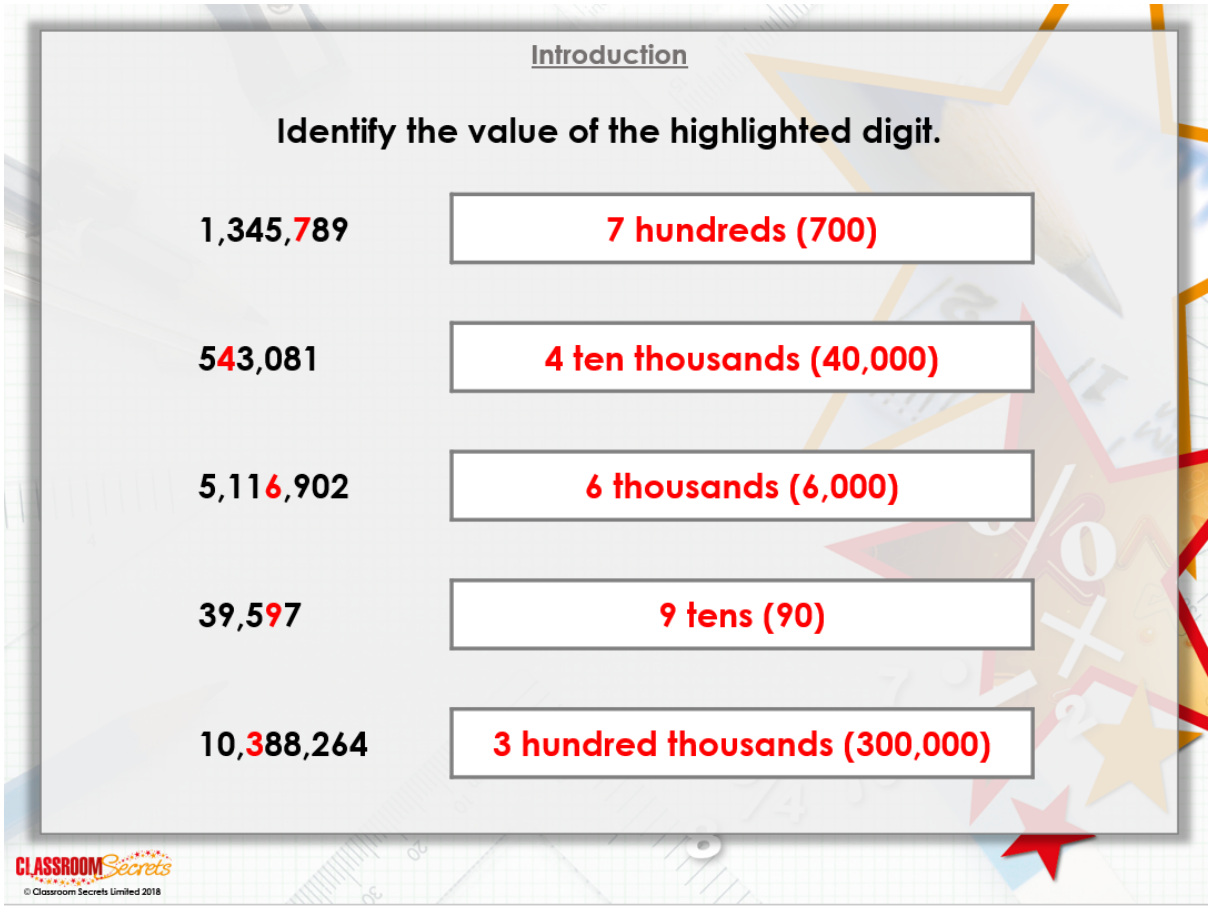
https://whiterosemaths.com/wp-content/uploads/2019/05/Year-6-2018-19-Summer-Block-3-Statistics.pdf

ANSWERS:

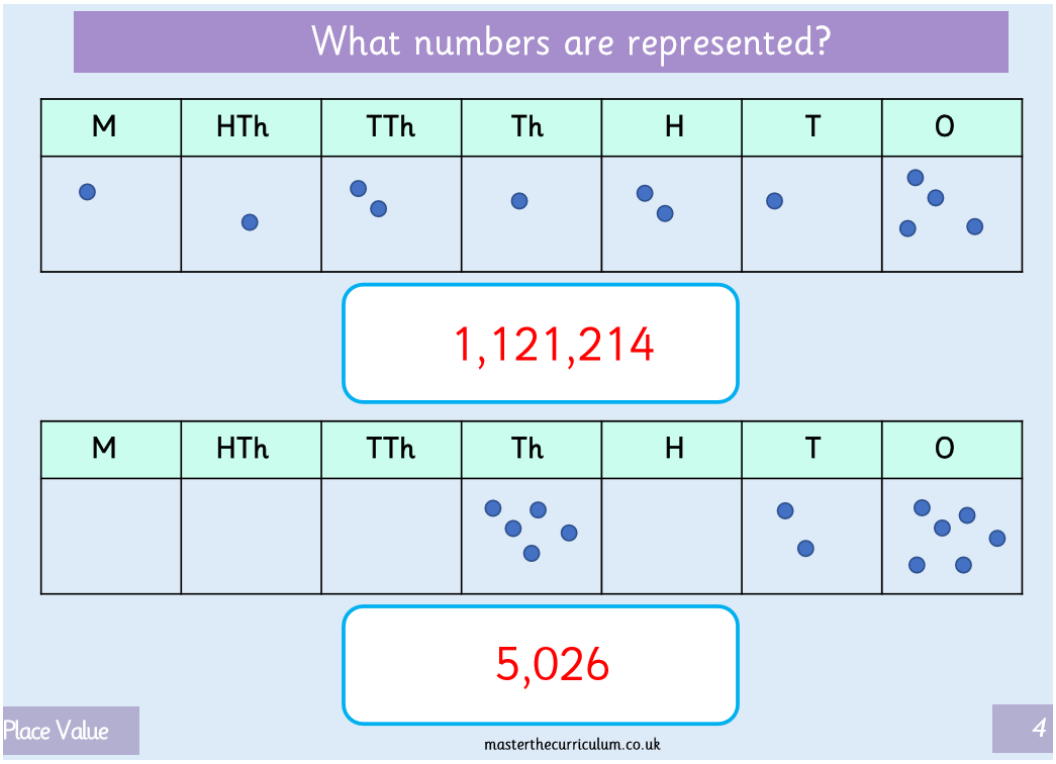
Chapter 1:

Place value:

Q1.


Introduction
Identify the value of the highlighted digit.
1,345,789
7 hundreds (700)
543,081
4 ten thousands (40,000)
5,116,902
6 thousands (6,000)
39,597
9 tens (90)
10,388,264
3 hundred thousands (300,000)
CLASSROOM Secrets
© Classroom Secrets Limited 2018

Q2.


What numbers are represented?
M
HTh
TTh
Th
H
T
O
1,121,214
M
HTh
TTh
Th
H
T
O
5,026
Place Value
masterthecurriculum.co.uk
4

Q.3

The Catholic High School Chester

christofid

High School

Match the words to the numbers in digits.

one million, four hundred and nine thousand, two hundred and sixteen

1,419,216

4a. 200,320 + 3,265,006 = 3,465,326
1,405,326 + 2,060,000 = 3,465,326
3,005,306 + 460,020 = 3,465,326
3,460,026 + 5,300 = 3,465,326

5a. Dennis is correct because the only columns you would need to change are the ten thousands, hundred thousands and million columns. For example, 999,999 + 50,000 = 1,049,999.

4b. 7,024,605 + 400,040 = 7,424,645
110,040 + 7,314,605 = 7,424,645
6,400,605 + 1,024,040 = 7,424,645
6,304,640 + 1,120,005 = 7,424,645

5b. Simon is incorrect because as soon as you cross the ten boundary, multiple columns will need to change. For example, 999,999 + 96,002 = 1,096,001.

Rounding:

Rounding to the nearest 10:

1) 63 = 60
2) 549 = 550
3) 173 = 170
4) 428 = 430

Rounding to the nearest 100:

1) 85 = 100
2) 527 = 500
3) 819 = 800
4) 2486 = 2500

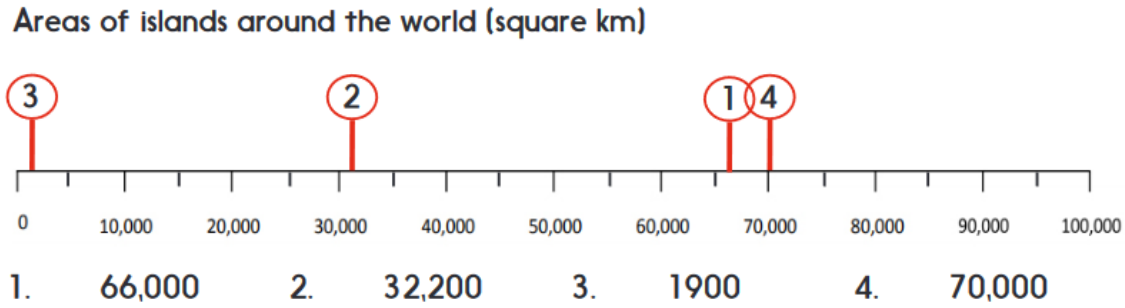
Rounding to the nearest 1000.

1) 549 = 1000
2) 284 = 0

3) 2719 = 3000

4) 6475 = 6000

Areas of islands around the world:



1. 66,000 2. 32,200 3. 1900 4. 70,000

5. 600,000

6. 740,000

7. 821,000

Challenges:

How many numbers round to 550,000 as the nearest 10,000 and to 555,000 as the nearest 1000?

500 numbers.

All of the numbers 554,500-554,999.

My answer has six digits. Four of the digits are identical and the other two are both 9. It rounds to 560,000 as the nearest 10,000. Write two different possible answers.

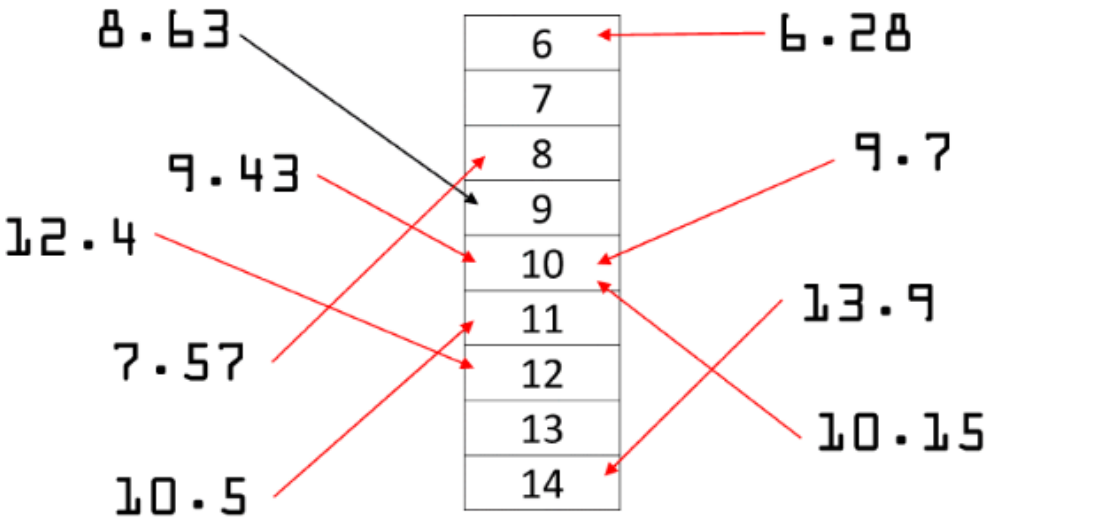
The number must begin 55 in order to round to 560,000 so must have four 5s. There are 6 possibilities:

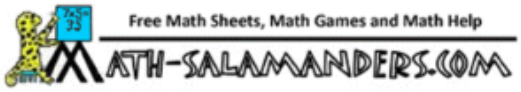
559,955 559,595 559,559 555,995 555,959 555,599

Round to the nearest whole number:

1) 5.7 → 6	2) 2.8 → 3	3) 6.5 → 7
4) 8.4 → 8	5) 1.4 → 1	6) 9.0 → 9
7) 4.5 → 5	8) 2.4 → 2	9) 5.7 → 6
10) 9.6 → 10	11) 12.3 → 12	12) 14.1 → 14
13) 17.1 → 17	14) 26.6 → 27	15) 32.5 → 33
16) 22.4 → 22	17) 14.8 → 15	18) 40.6 → 41
19) 9.6 → 10	20) 63.4 → 63	21) 35.3 → 35
22) 4.37 → 4	23) 8.72 → 9	24) 2.48 → 2

Draw an arrow to match each number to its nearest whole.





CHALLENGE A

- I am between 10 and 20.
- I am 15 rounded to the nearest whole.
- I have 4 digits.
- My ones digit is even.

Who am I?

12.7	15.24	16.6	13.58
14.57	16.08	14.9	15.48

CHALLENGE B

- I have 3 digits.
- I am less than half of 16.
- When rounded to the nearest whole, I round down not up.
- All my digits are odd.

Who am I?

9.35	3.28	1.39	1.55
6.3	1.74	4.71	7.1

Negative numbers:

Q1.

We get ice outside once the temperature drops below 0 degree Celsius, so it could be -1 degrees Celsius or below. This is because water freezes below 0 degrees C.

Q.2 -10 degrees Celsius

Q.3 10 degrees

Q4. 14 degrees

Thursday was the coldest night.
Tuesday was the mildest night.
On Monday, the temperature fell by 8 degrees.
On Friday, the temperature fell by 2 degrees.
The day with the biggest drop in temperature was Monday.

Lighthouse:

1. 6m

2. 3m
3. -8m
4. 6m
5. 7m
6. -5m
7. 3m
8. 8m
9. 4m

Challenge:

The temperature at 6pm is given first and then the fall during the night until 5am. Write the night temperatures for each weekday.

Monday: 5°C Falls 9° -4°

Tuesday: 3°C Falls 8° -5°

Wednesday: 8°C Falls 10° -2°

Thursday: 3°C Falls 7° -4°

Friday: 2°C Falls 3° -1°

On which night was the temperature lowest? Tuesday.

On Saturday, the temperature fell 15° overnight to -6°C.

What was the temperature at 6pm? 9°C

On Sunday, the temperature was 13°C at 6pm and -5°C at 5am. How much did it fall overnight? -18°

Chapter 2:

Long multiplication:

1. 240000

2. 240000

3. 200000

4. 36 x 467 = 16,812
5. 21 x 4235 = 88,935
6. 32 x 6314 = 202,048
7. 35 x 4328 = 151,480
8. 43 x 2139 = 91,977

(Hamilton Trust)

Dana uses:

65x47=3055

120x36=4320

3055+4320=7375 beads

Challenges:

True or false?

- 12 x 4345 is the same as 3 x 4345 plus double 8690

  False, that would be 11 x 4345. It is the same as double 8690 plus another 8690. (12 x 4345 = 52,140).

- 1448 x 24 is the same as 36,200 – 1448. True since 36,200 is the answer to 1448 x 25. 1448 x 24 = 34,752.

- 36 x 478 gives the same product as 9 x 478 doubled twice. True since 9 x 2 x 2 (multiplying by 9 and doubling twice) = 36. 36 x 478 = 17,208.

Estimate the answer to 195 x 18 by doing 200 x 18 3,600.

Use grid or long multiplication to find an exact answer. 3510.

Check by subtracting 18 lots of 5 from your original estimate.

Long division:

DIVISION – 4 DIGITS BY 2 DIGITS
SHEET 1 ANSWERS

1) $15\overline{)4215}$ = 281

2) $24\overline{)3168}$ = 132

3) $43\overline{)1333}$ = 31

4) $26\overline{)6214}$ = 239

5) $35\overline{)1715}$ = 49

6) $14\overline{)8218}$ = 587

(Math Salamanders)

Challenge:

Which of the following divisions give an answer which ends $^{1}/_{4}$ or .25?

- 3750 ÷ 24 $156^{6}/_{24}$ or $156^{1}/_{4}$ or 156.25
- 2223 ÷ 18 $123^{9}/_{18}$ or $123^{1}/_{2}$ or 123.5
- 7300 ÷ 16 $456^{4}/_{16}$ or $456^{1}/_{4}$ or 456.25
- 8669 ÷ 19 $456^{5}/_{19}$ or 456.263

What do you notice about the two divisors in the two divisions which gave an answer ending $^{1}/_{4}$? They are multiples of 4 (24 and 16).

Divide these numbers by 17:

425 547 697

Divide these numbers by 18:

394 774 936

Divide these numbers by 21:

295 483 720

425/17 = 25

547/17 = 32 r3

697/17 = 41

394/18 = 21 r16

774/18 = 43

936/18 = 52

295/21 = 14 r1

483/21 = 23

720/21 = 34 r6

1. $200 \div 15 = 13\ r5\ 13\frac{5}{15}\ 13\frac{1}{3}$
2. $250 \div 15 = 16\ r10\ 16\frac{10}{15}\ 16\frac{2}{3}$
3. $365 \div 15 = 24\ r5\ 24\frac{5}{15}\ 24\frac{1}{3}$
4. $620 \div 15 = 41\ r5\ 41\frac{5}{15}\ 41\frac{1}{3}$
5. $545 \div 15 = 36\ r5\ 36\frac{5}{15}\ 36\frac{1}{3}$
6. $440 \div 15 = 29\ r5\ 29\frac{5}{15}\ 29\frac{1}{3}$

(Source: Hamilton Trust)

Answers – Word Problems (TES)

1. 3.125m
2. 6.5 miles
3. 22.4cm
4. £95.60
5. 482.75km

Common multiples of 3 and 4: 12, 24, 36
Common multiples of 3 and 5: 15, 30
Common multiples of 4 and 6: 12, 24, 36

Common factors of 12 and 16: 2, 4
Common factors of 24 and 30: 2, 3, 6
Common factors of 18 and 27: 3, 9

The prime numbers between 20 and 30 are: 23 and 29.
Numbers that can be made by multiplying two prime numbers together:
4 = 2 × 2
6 = 2 × 3
10 = 2 × 5
14 = 2 × 7
15 = 3 × 5
22 = 2 × 11
25 = 5 × 5
26 = 2 × 13
33 = 3 × 11
34 = 2 × 17
35 = 5 × 7

Problem solving and reasoning questions

Which pair(s) of numbers under 20 have the largest number of common factors? What is the highest common factor?

6 and 12 and 8 and 16 each have four common factors:

6 and 12 have common factors of 1, 2, 3 and 6 (highest).

8 and 16 have common factors of 1, 2, 4 and 8 (highest).

Write common multiples of 4 and 6 up to 60. What is the lowest common multiple? 12 (lowest), 24, 36, 48 and 60.

Use this information to find the lowest common multiple of 8 and 12.
24: the common multiples of 8 and 12 are double those of 4 and 6.

True or false

- The lowest common multiple of two prime numbers, a and b is always a x b. True, since they are prime numbers, they will have no other factors so cannot have any other multiples in common.
- The highest common factor of two multiples of 6 is always 6.
  False as long as one of the numbers is a multiple of the other there will be a higher common factor, e.g. 12 and 24.

(Source – Hamilton Trust)

Day 1 Order of operations, including brackets Sheet 1

1. (4 + 6) ÷ 2 = 5
2. 10 x (5 - 3) = 20
3. 20 ÷ (3 + 2) = 4
4. (10 – 8) x 4 = 8
5. 4 x 3 – 2 = 10
6. 15 ÷ 3 + 4 = 9
7. 10 – 3 x 2 = 4
8. 10 - 6 ÷ 3 = 8
9. 4 + 2 x 5 = 14
10. 17 + 12 ÷ 4 = 20

Challenge

9 – 6 – 8 or 9 – (6 + 8) = -5
(9 x 6) - 8 = 46
9 ÷ 6 x 8 = 12; 8 ÷ 6 x 9 = 12;
8 x 9 ÷ 6 = 12

1. (20 + 3) x 10 = 230
2. 20 + 3 x 10 = 50
3. 20 x 3 + 10 = 70
4. 20 x (3 + 10) = 260
5. 20 x 3 + 20 x 10 = 260
6. (20 - 3) x (20 + 10) = 510

1. Matt has 18 packs of buns now.
2. Sasha has 12 packs of buns.
3. The total cost of the order is £63.90.
4. The total cost of the order is £44.95.

In relation to multi-part calculations, agree whether these statements are true or false:

- We leave the part in brackets until last. False – should be first.
- It does not matter which order you do the parts of the calculation not in brackets. False – these is a set order which should be followed.
- We should always do the easiest parts of a calculation first. False, see previous statement.
- 12 + (3 x 4) gives the same answer if the brackets are removed. True, in both cases the multiplication will be done first. Compare with (12 + 3) x 4.

Put a pair of brackets in three different places in this calculation to give three different answers.

4 + 5 x 12 – 7 =

(4 + 5) x 12 – 7 = 101

4 + (5 x 12) – 7 = 57

4 + 5 x (12 – 7) = 29

Addition and Subtraction:

1. $534 + 279 = 813$
2. $837 + 425 = 1262$
3. $985 - 426 = 559$
4. $837 - 253 = 584$
5. $\begin{array}{r} 181 \\ +\,619 \\ \hline 800 \end{array}$
6. $\begin{array}{r} 181 \\ +\,819 \\ \hline 1000 \end{array}$

Dragon Word Problems

1. In January, there were 4,371 new-born dragons. In February, another 1,428 dragons were born. How many dragons were born altogether? 5799

2. The Iron Swords Company employed 62,134 men, but then the industry experienced a boost, and more men were needed. The Iron Swords Company increased its employment of men by 3,761. How many men work at the Iron Swords Company now? 66075

3. The great dragons of the west burnt 9,426 houses in their first week. They burnt 3,645 houses in their second week. What is the total amount of houses burnt? 13071

4. The dragon master trained 3,417 dragons, but sadly, 1,259 of those dragons died. How many trained dragons are left? 2158

5. Merlin trained 82,016 dragons, and Gandalf trained 3,427. What is the difference in the number of dragons trained? 78589

6. The dragon keeper had 3,502 dragon eggs in a deep cave. A powerful magician had 419 dragon eggs less than the dragon keeper. How many dragon eggs does the magician have? 3083

7. Merlin was selling 63,024 Dragon spikes a month. After a year, this decreased by 7,567 spikes. How many spikes does he sell a month now? 55457

8. The Dragon Shop had a fantastic day of sales. In the morning, they made £314.27, and in the afternoon, they made £256.49. However, the shop was broken into and £29.17 was stolen. What was the total for the day? £541.62

9. Merlin rescued 4,143 dragons, and Gandalf rescued a further 78,986 dragons. Then 3,934 escaped. What was the sum of dragons rescued? 79195

Question	Rounded Question	Estimated Answer	Actual Answer
312 + 487	310 + 490	800	799
884 – 623	885-625	260	261
59 ÷ 9	60 / 10	6	6.55
655 + 472	660 + 470	1130	1127
1221 - 495	1220 - 495	725	726
78 x 5	80 x 5	400	390

Chapter 3:

Simplifying fractions:

SIMPLIFYING FRACTIONS SHEET 1 ANSWERS

Write these fractions in their simplest form.

1) $\frac{5}{15} = \frac{5 \div 5}{15 \div 5} = \frac{1}{3}$

2) $\frac{4}{10} = \frac{4 \div 2}{10 \div 2} = \frac{2}{5}$

3) $\frac{8}{12} = \frac{8 \div 4}{12 \div 4} = \frac{2}{3}$

4) $\frac{12}{20} = \frac{12 \div 4}{20 \div 4} = \frac{3}{5}$

SIMPLIFYING FRACTIONS SHEET 2 ANSWERS

Write these fractions in their simplest form.

1) $\frac{14}{20} = \frac{7}{10}$

2) $\frac{4}{8} = \frac{1}{2}$

3) $\frac{9}{12} = \frac{3}{4}$

4) $\frac{12}{15} = \frac{4}{5}$

SIMPLIFYING FRACTIONS SHEET 3 ANSWERS

Write these fractions in their simplest form.

1) $\frac{18}{42} = \frac{3}{7}$

2) $\frac{21}{27} = \frac{7}{9}$

3) $\frac{25}{40} = \frac{5}{8}$

4) $\frac{16}{24} = \frac{2}{3}$

Ordering and comparing fractions:

The Catholic High School Chester

Day 3 Ordering fractions Sheet 1

$\frac{2}{3} = \frac{4}{6}$
$\frac{1}{2} = \frac{3}{6}$
$\frac{1}{3} = \frac{2}{6}$

Order smallest first: $\frac{1}{3}$ $\frac{1}{2}$ $\frac{2}{3}$

$\frac{1}{2} = \frac{5}{10}$
$\frac{2}{5} = \frac{4}{10}$
$\frac{3}{5} = \frac{6}{10}$

Order smallest first: $\frac{2}{5}$ $\frac{1}{2}$ $\frac{3}{5}$

$\frac{2}{3} = \frac{8}{12}$
$\frac{3}{4} = \frac{9}{12}$
$\frac{1}{4} = \frac{3}{12}$
$\frac{1}{3} = \frac{4}{12}$
$\frac{1}{6} = \frac{2}{12}$
$\frac{5}{6} = \frac{10}{12}$
$\frac{1}{2} = \frac{6}{12}$

Order smallest first: $\frac{1}{6}$ $\frac{1}{4}$ $\frac{1}{3}$ $\frac{1}{2}$ $\frac{2}{3}$ $\frac{9}{12}$

Day 3 Comparing fractions Sheet 2

1. $\frac{1}{2} = \frac{5}{10} > \frac{2}{5} = \frac{4}{10}$
2. $\frac{1}{3} = \frac{5}{15} < \frac{2}{5} = \frac{6}{15}$
3. $\frac{2}{3} = \frac{10}{15} < \frac{4}{5} = \frac{12}{15}$
4. $\frac{1}{4} = \frac{5}{20} < \frac{2}{5} = \frac{8}{20}$
5. $\frac{3}{4} = \frac{15}{20} < \frac{4}{5} = \frac{16}{20}$
6. $\frac{5}{6} = \frac{45}{54} = \frac{15}{18} > \frac{7}{9} = \frac{42}{54} = \frac{14}{18}$
7. $\frac{5}{6} = \frac{20}{24} = \frac{10}{12} > \frac{3}{4} = \frac{18}{24} = \frac{9}{12}$
8. $\frac{1}{3} = \frac{7}{21} < \frac{2}{7} = \frac{14}{21}$

Challenge:

202			
50.5	50.5	50.5	50.5

Find $^3/_4$ of 202. $^1/_4$ of 202 = 50.5 or $50^1/_2$ so $^3/_4$ = 151.5 or $151^1/_2$.

344							
43	43	43	43	43	43	43	43

$^3/_8$ of biscuits are wafers, $^5/_8$ are chocolate. How many of each?

$^1/_8$ of 344 is 43 so $^3/_8$ is 129 and $^5/_8$ is 215.

(Source- Hamilton Trust)

The Catholic High School Chester

Find the value of each expression in lowest terms.

1. $2\frac{1}{5} + 1\frac{3}{4}$
$= \frac{79}{20} = 3\frac{19}{20}$

5. $1\frac{1}{2} + 2\frac{3}{5}$
$= \frac{41}{10} = 4\frac{1}{10}$

9. $3\frac{1}{2} - 1\frac{1}{2}$
$= 2$

(Mathdrills.com)

Day 1 Equivalent fractions, decimals and percentages Sheet 1

Fraction	Decimal	Percentage
$\frac{1}{2}$	0.5	50%
$\frac{3}{4}$	0.75	75%
$\frac{1}{10}$	0.1	10%
$\frac{1}{5}$	0.2	20%
$\frac{9}{10}$	0.9	90%
$\frac{2}{5}$	0.4	40%
$\frac{1}{4}$	0.25	25%

$\frac{1}{4}$ < 0.3

$\frac{7}{10}$ < 80%

$\frac{2}{5}$ > 0.25

$\frac{3}{5}$ = 60%

Challenge

$\frac{1}{7}$ < 0.17 < 77% < 1.07 < 1.7

Write down the value of the 3 in the following numbers.

0.53 362.44 739.8 0.013 3,420.98

(White Rose Maths)

1. 3 hundredths (0.03)
2. 3 hundred (300)
3. 3 tens (30)
4. 3 thousandths (0.003)
5. 3 thousand (3000)

Teddy: 4.345

Alex: 4.445

Dora: 3.454

Jack: 3.54

Day 1 Place value addition and subtraction Sheet 1

1.	4.538 + 0.2 = 4.738	2.	4.538 + 0.03 = 4.568
3.	4.538 - 0.004 = 4.534	4.	4.538 - 0.02 = 4.518
5.	6.231 + 0.11 = 6.341	6.	6.231 + 0.101 = 6.332
7.	6.231 + 0.011 = 6.242	8.	5.846 - 0.211 = 5.635
9.	5.846 - 0.13 = 5.716	10.	5.846 - 0.013 = 5.833
11.	5.846 - 0.204 = 5.642	12.	4.789 + 0.001 = 4.79

Day 2 Multiplying and dividing by 10, 100 and 1000 Sheet 2

1.	4326 ÷ 10 = 432.6	2.	4326 ÷ 1000 = 4.326
3.	7840 ÷ 100 = 78.4	4.	7840 ÷ 1000 = 7.84
5.	783 ÷ 1000 = 0.783	6.	783 ÷ 100 = 7.83
7.	4.535 × 100 = 453.5	8.	4.535 × 1000 = 4535
9.	0.786 × 1000 = 786	10.	0.786 × 100 = 78.6

What number is one hundred times smaller than 0.4? 0.004.

The 4 has moved 2 place value columns to the right.

Write three numbers, two with 3 digits and one with four digits, that round to 4 as the nearest whole number.

Various – Draw a number line from 3 to 5 to check.

3-digit numbers should be between 3.51 and 4.49.

4-digit number should be between 3.501 and 4.499.

(Hamilton Trust)

Chapter 4:

Ratio and Proportion –

He has enough butter to make 15 flapjacks.
He will need 150 g brown soft sugar, 6 tablespoons golden syrup, 375 g oats and 60 g sultanas.

Second packet:
15 orange
5 strawberry.

So there are 20 sweets in each packet.

First packet:
8 strawberry
12 orange

The first packet contains 8 strawberry sweets.

73 Eggs

Mrs Choy bought:
10 large eggs at 50p each,
10 medium eggs at 10p each,
80 small eggs at 5p each.

Swimming 50%	15 children
Cycling 30%	9 children
Football 20%	6 children
Bananas 40%	12 children
Apples 30%	9 children
Oranges 30%	9 children
Dogs 50%	15 children
Cats 20%	6 children
Rabbits 30%	9 children

Problem solving and reasoning answers

Complete the bar models.

32 children	
$^1/_4$ 8 ch'n	$^3/_4$ 24 ch'n

40 children	
40% 16 ch'n	60% 24 ch'n

Orange paint is mixed using this ratio of red and yellow paints:

red: yellow

2: 7

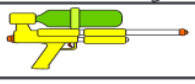
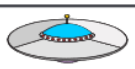
Sam uses 4 litres of red.

Assuming he uses the correct amount of yellow, how many litres of orange paint will he make? 18 litres, if he uses 4 litres of red then he must use 14 litres of yellow to maintain the red: yellow ratio.

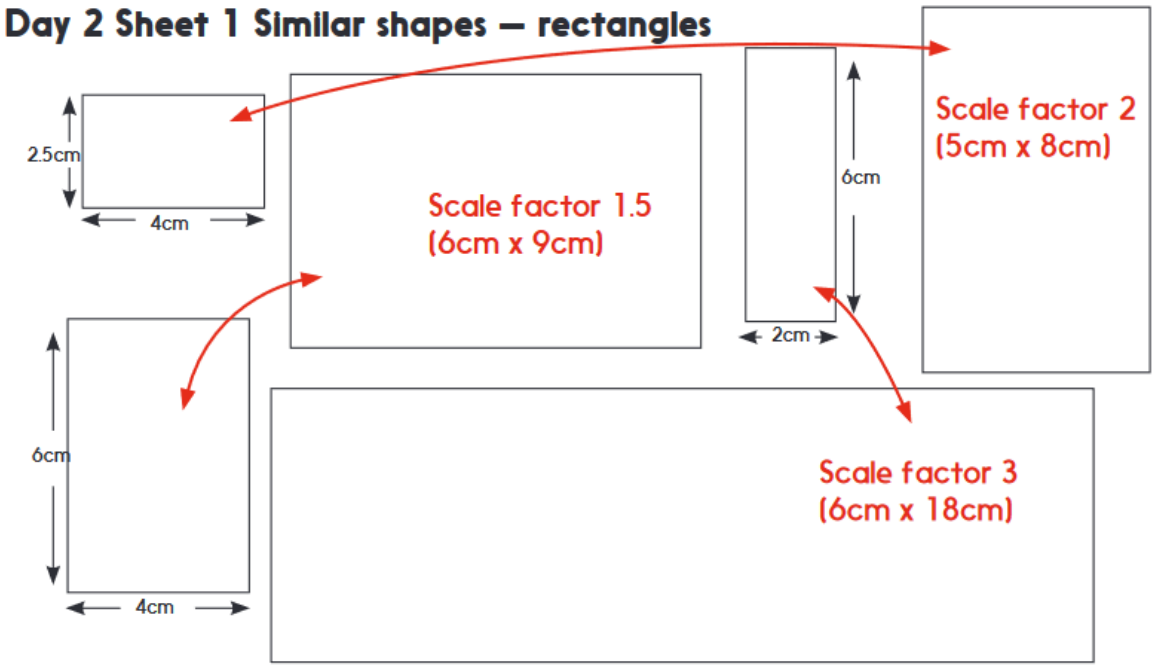
If 6 children in a class do not like sport, and there are 30 children in the class, what proportion *do* like sport?

Give your answer as a fraction *and* as a percentage.

24 *like* sport which is $^{24}/_{30}$ or $^{4}/_{5}$ as a fraction and 80% as a percentage.

Toy	Drawn width and height	Scale factor	Actual width and height
	7cm by 4.5cm	× 4	28cm by 18cm
	5cm by 8cm	× 3	15cm by 24cm
	16cm by 24cm	× 1.5	24cm by 36cm
	10cm by 6cm	× 2.5	25cm by 15cm
	16cm by 6cm	× 2	32cm by 12cm
	4.5cm by 6cm	× 4	18cm by 24cm

Day 2 Sheet 1 Similar shapes – rectangles



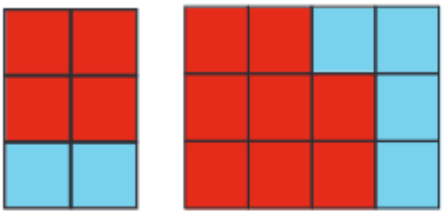
The perimeter has doubled, the area is four times as large, the angles have stayed the same.

The blue triangle has a perimeter of 15 cm.

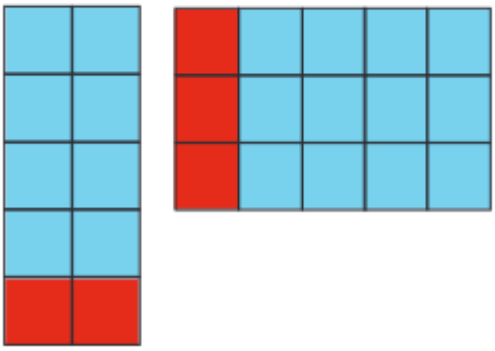
The green triangle has a perimeter of 5 cm.

Possible answer
I do not agree because Jack has increased the green shape by adding 3 cm to each side, not increasing it by a scale factor of 3

Colour 2 red to 1 blue



Colour 4 blue to 1 red



14

12

12

3

For every 5 girls in a small school there are 2 boys. There are 35 girls in the school. How many boys are there in the school?	Jack has a bag of 18 sweets. He gives a third of his sweets to his friend. How many sweets does he have left?

Challenge:

There could be different answers to this question. However, the most of each is 25 adults and 24 children. This assumes that one adult is accompanying each child, plus one extra adult. Nearly all of the 50 seats were taken (49 people) and the total price paid then would be (24 x £13 = £312 and 25 x £23 = £575 (Total £887)). If the bus was full with 25 adults and 25 children it would cost £900, but then all the seats would be taken.

Chapter 5 – Algebra

Simple Formulae:

Calculate how much turf would be needed if n =

1. 4 = 3(4) m^2 = 12 m^2

2. 7 = 3(7) m^2 = 21 m^2

3. 12 = 3(12) m^2 = 36 m^2

4. 15 = 3 (15) m^2 = 45 m^2

1a. n + 5 = y

1b. n x 5 = y

2a. 12,66,99

2b. 3, 6, 9

1. 18, 26, 34, 42, 50, 58, 66, 74

2. 275, 425 and 1025 will also appear in the sequence.
The sequence contains any number which ends in 25 or 75.

3. -9, -7, -5, -3, -1, 1, 3, 5, 7, 9
11 would also fit in the number pattern.

4. 1.2, 2.4, 3.6, 4.8, 6, 7.2, 8.4, 9.6

5. Describe this sequence. 80, 73, 66, 59, 52, 45 Subtract 7 each time.
Write the missing numbers before 80 and after 45 in this pattern.
101, 94, 87 38, 31, 24.

Number of squares	Number of matchsticks
1	4
2	7
3	10
4	13
5	16
10	31

There will be 61 matchsticks in the pattern which has 20 squares.

Challenge

Solve these equations:

13. r + s = 14
    r and s are whole numbers. List all the possible pairs of numbers.
    0 and 14, 1 and 13, 2 and 12, 3 and 11, 4 and 10, 5 and 9, 6 and 8, 7 and 7, 8 and 6, 9 and 5, 10 and 4, 11 and 3, 12 and 2, 13 and 1, 14 and 0.
14. n x p = 16
    n and p are whole numbers. List all the possible pairs of numbers.
    1 and 16, 2 and 8, 4 and 4, 8 and 2, 16 and 1
15. 12 – t = u
    t and u are whole numbers. List all the possible pairs of numbers.
    0 and 12, 1 and 11, 2 and 10, 3 and 9, 4 and 8, 5 and 7, 6 and 6, 7 and 5, 8 and 4, 9 and 3, 10 and 2, 11 and 1, 12 and 0.

Missing number problems:

1. 15

50

2. 60

20

3. 48

50

a. 108 meters
b. £80

$92 = 11y + 4s$

She could have bought 1 sweet and 8 yo-yos or 4 yo-yos and 12 sweets.

Equations with two unknowns:

1. Find five different solutions to this equation:

$f + g = 8$ eg. $3+5=8$, $-5+13=8$, $2.1+5.9=8$, $6\frac{1}{2}+1\frac{1}{2}=8$ etc

2. Find five different solutions to this equation:

$m + n = 3$ $2+1=3$, $3+0=3$, $-2+5=3$, $1.5+1.5=3$ etc

3. Find all the solutions to this equation, using positive integers:

$u + v = 4$ $1+3$, $2+2$, $3+1$

4. How many different answers could you find for question 3? 3

5. Find all the solutions to this equation, using positive integers:

$j + k = 6$ $1+5$, $2+4$, $3+3$, $4+2$, $5+1$

Challenge questions!

A. Find a solution that is true for both these equations:

$m + n = 12$ $m = 7$

$m - n = 2$ $n = 5$

B. Find a solution that is true for both these equations:

$a + b = 18$ $a = 7$

$2a - b = 3$ $b = 11$

(Source: tes)

Chapter 6 – Measurement

Problem-solving:

Teddy is wrong because he has not lined up the end of his chew bar with zero.
It is actually 8.8 cm long.

Door = 2 m (200 cm)
Dog = 50 cm
Ron = 150 cm

The Catholic High School Chester

Day 3 Converting between centimetres and inches Sheet 1

1. a) 36 inches
   b) 120 inches
   c) 54 inches
   d) 90 inches

2. a) 10 feet
   b) $5\frac{1}{2}$ feet
   c) 8 feet
   d) $3\frac{1}{2}$ feet

3. a) 10 cm
   b) 25 cm
   c) 60 cm
   d) 17.5 cm

Challenge

Name	Height
Ben	6 feet and 3 inches = 187.5 cm
Mia	125 cm
Miriam	60 inches = 150 cm
Lucas	1.5 m = 150 cm
Chan	5 feet 6 inches = 165 cm
Sarah	1 m 70 cm = 170 cm

Shortest to tallest:
Mia
Miriam = Lucas
Chan
Sarah
Ben

Day 2 Converting between miles and kilometres Sheet 1

1. 8 km
2. 12 km
3. 10 km
4. 24 km
5. 2 miles
6. 10 miles
7. 12 miles
8. 13 miles

Annie has 1 mile left to run, whereas Ron has 1.2 miles left to run.
Ron has the furthest left to run.

240 km ≈ 150 miles
$150 \div 60 = 2\frac{1}{2}$ hours
Or
60 miles ≈ 96 km
$240 \div 96 = 2\frac{1}{2}$ hours

(Hamilton Trust) (White Rose)

Area and perimeter:

Day 1 Finding areas and perimeters Sheet 1

1. Perimeter = 28cm Area = 33cm^2
2. Perimeter = 28cm Area = 40cm^2
3. Perimeter = 24cm Area = 27cm^2
4. Perimeter = 24cm Area = 20cm^2

5. 6cm^2
6. 12cm^2

Challenge

a.) 10 cm^2

b.) Two measurements that multiply together to give 35m^2 (double the area of the triangle), e.g. 7m x 5m or 10m x 3.5m.

Area: Parallelogram and Triangles

Amber

1. 36cm^2
2. 48m^2
3. 28m^2
4. 132cm^2
5. 2000cm^2
6. 144mm^2

Green

1. 60.5cm^2
2. 3m^2
3. 25.5m^2
4. 132cm^2
5. 2000cm^2
6. 9cm^2

Star

1. 39cm^2
2. 35cm^2

(Source – tes)

Volume cube and cuboids:

10cm x 3cm x 4cm = 120cm^2
6cm x 5cm x 3cm = 90cm^2
4cm x 4cm x 3cm = 48cm^2
8cm x 3cm x 5cm = 120cm^2
6cm x 6cm x 6cm = 216cm^2
7cm x 8cm x 4cm = 224cm^2

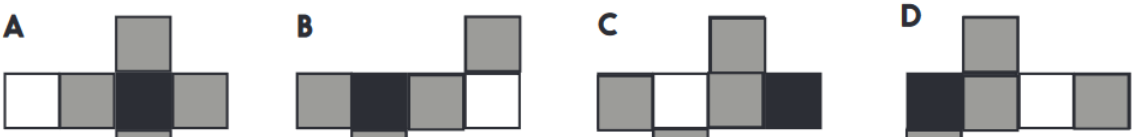
Volume 8cm^2 Edges are: 2 x 2 x 2cm
Volume 30cm^2 Edges are: 2 x 3 x 5cm

3D Shapes:

The Catholic High School Chester

Day 1 All about the cubes Sheet 1

1. D
2.



Cube = A, D, T, U, I, O
Tetrahedron = B, J, M, N (or P or Y)
Triangle-based pyramid = B (or J, M, N, P or Y) with any three of F, L, K, Q, X or Z
Square-based pyramid = A (or D, I, O, T or U) with any four of F, L, K, Q, X or Z
Triangular prism = any two of B, J, M, N, P and Y with either C, S and V or G, H and R

Day 2 Quadrilateral sort Sheet 1
A = Parallelogram
B = Trapezoid
C = Kite
D = Square
E = Rhombus

Day 2 Quadrilateral challenge Sheet 2
1. No quadrilateral can have exactly 3 right angles. Exactly 2 are possible (see Q2), as are exactly 4, but not 3.
2. Shapes created will either be a form of trapezium, or a kite, or an irregular quadrilateral.
3. Kite
4. No quadrilateral can have exactly 3 equal sides. Exactly 2 are possible (e.g. trapezoid), as are exactly 4 (square, rhombus) but not 3.
5. Kite
6. Parallelogram

Parts of a circle:

1. 3.14 x 10 = 31.4cm (or 31cm if Pi is 3.1).
2. 3.14 x 100 = 314cm (or 310cm if Pi is 3.1).
3. 3.14 x 3 = 9.42cm (or 9.3cm if Pi is 3.1).
4. Diameter = 2 x 4 therefore 3.14 x 8 = 25.12cm (or 24.8cm if Pi is 3.1).
5. 3.14 x 12 = 37.68cm (or 37.2 cm if Pi is 3.1).

Angles:

1. B will not work.
2. B will not work.
3. D will not work.
4. A will not work.

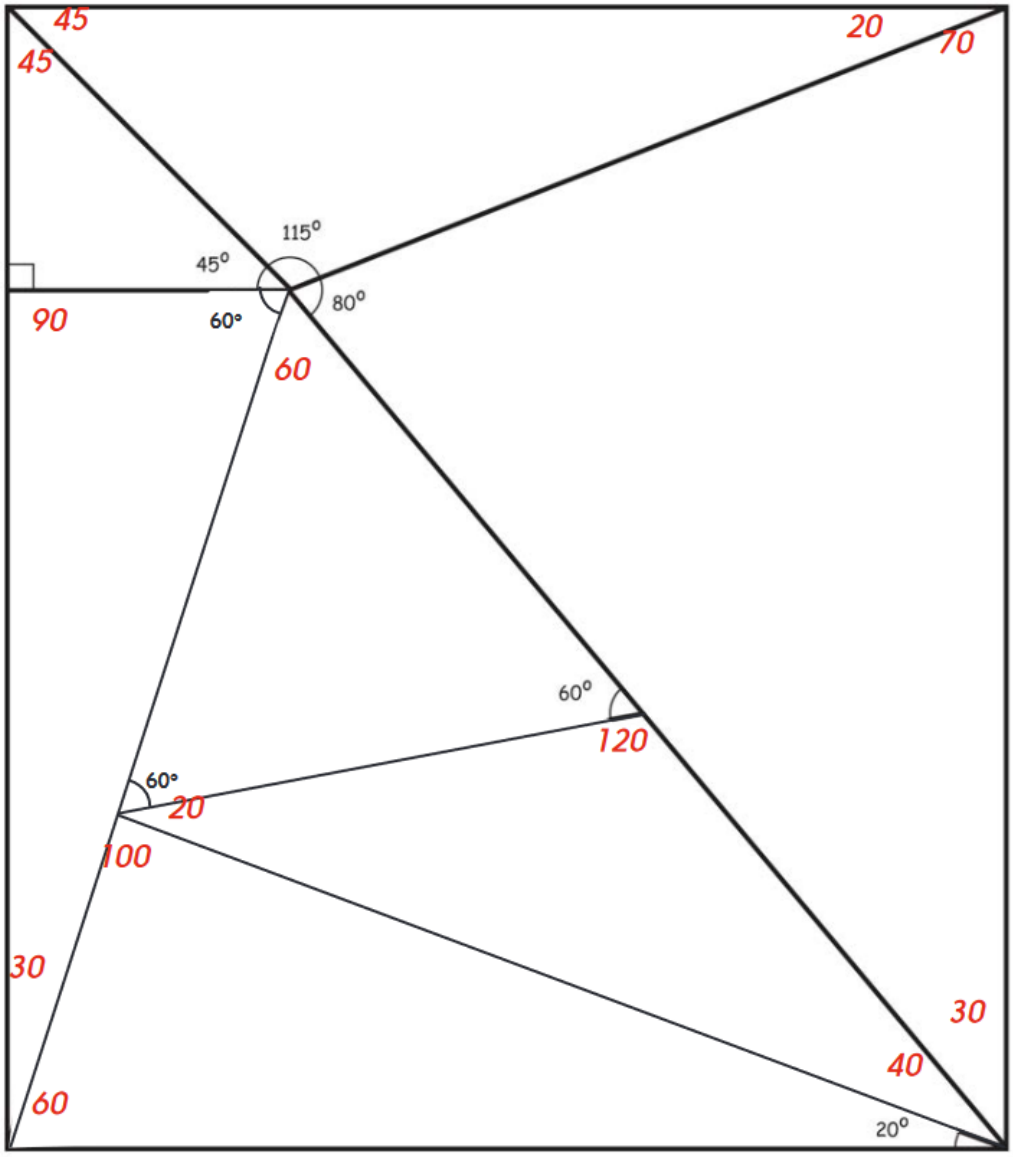
1.80°

2. 50°

3. 65°

1. a = 69°
   b = 58°
   c = 25°

2. d = 93°
   e = 93°
   f = 62°
   g = 92°
   h = 61°



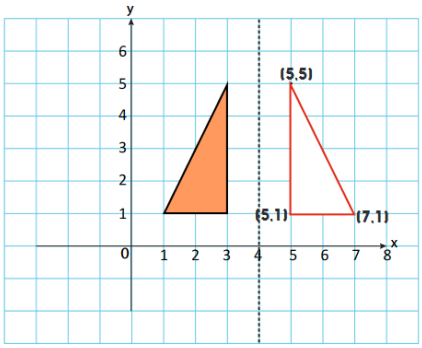
(Hamilton Trust/White Rose Maths)

Positions on a grid:

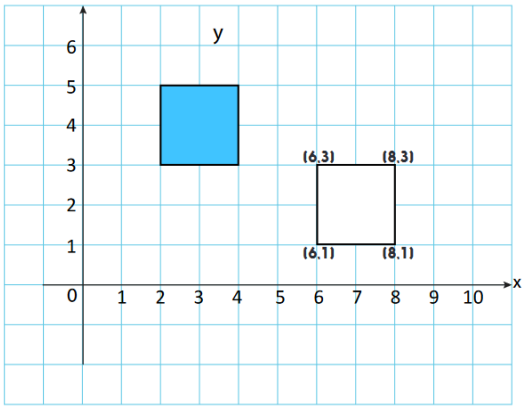
1) A= (1,1) C (3,1)
2) A= (5,3) B= (5,5) C= (7,5) D= (7,3)
3) A= (1, -7) B = (2, -5) C= (3, -5) D= (4, -7)
4) D= (-3,3) and F= (-1,3)
5) A= (-6, 4) B = (-5,3) C= (-6,1) D= (-7, 3)
6) H= (-1, -1) I= (-3, -3) J= (-1, -3)
7) (3, -1) (5, -1) (2, -3) (4, -3)
8) True
9) 3 up 9 across

1. (-1, -2)
2. (-1, -1)
3. (3, 2)
4. (-3, 3)
5. (-4, -2)
6. (-2, -4)

4.



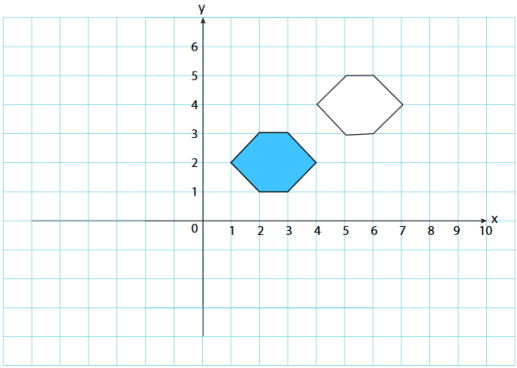
5.



6. a) Down 2 squares

b) Left 2 squares

7.



Chapter 8 – Statistics

Pie Charts:

The Catholic High School Chester

1. a) How many children were in Year 6? **60**

b) What fraction of children chose each fruit?

Strawberries $\frac{15}{60} = \frac{1}{4}$ Oranges $\frac{15}{60} = \frac{1}{4}$ Raspberries $\frac{10}{60} = \frac{1}{6}$ Bananas $\frac{20}{60} = \frac{1}{3}$

c) How many more children chose bananas than strawberries? **5**

d) Sketch a pie chart to show the same information.

Line Graphs:

1. Which hobby was chosen by most children? **Swimming (18)**

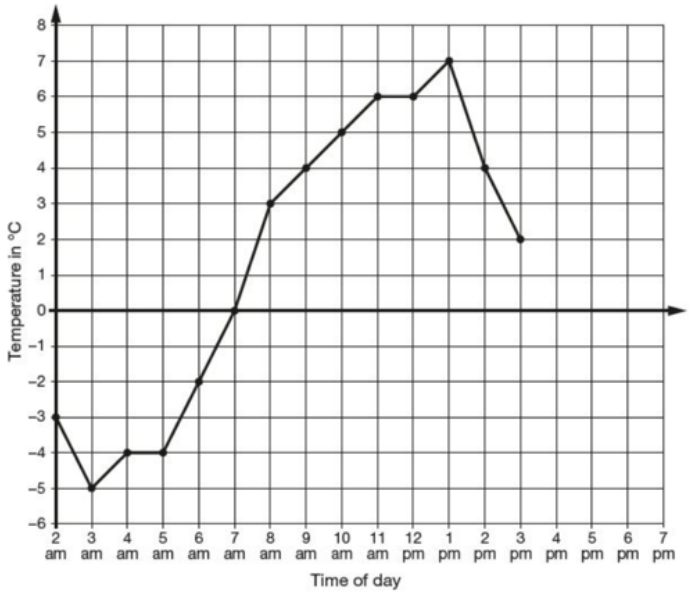
   How many more girls than boys chose dancing? **7 (girls 10, boys 3**

   Write all the hobbies that were chosen by more boys than girls? **Computer games (boys 10, girls 6) Reading (boys 6, girls 5)**

2. What is the depth of water after 3 minutes? **15cm**

   How long does it take for the level to drop from 50cm to 45cm? **15 seconds**

This graph shows the temperature in °C from 2am to 3pm on a winter day:



How many degrees warmer was it at 12pm than at 4am?

10°C (the difference between 6° and -4°).

What is the difference between the minimum and maximum observed temperatures?

12°C (the difference between 7° and -5°).

At 7pm, the temperature was 10 degrees lower than at 2pm. What was the temperature at 7pm?

-6°C.

What was the mean temperature between 2am and 11am? 0°C.

Find the sum of each of the 10 temperatures and divide by 10. The 10 temperatures are respectively: -3°C, -5°C, -4°C, -4°C, -2°C, 0°C, 3°C, 4°C, 5°C and 6°C. The total is 0°C.

Mean:

1. Sarah's average score in her spelling test is **20**.
   23 + 19 + 21 + 17 = 80 80 ÷ 4 = 20

2. Mean rainfall is **9mm**.
   12mm + 6mm + 4mm + 0mm + 23mm = 45mm 45mm ÷ 5 days = 9mm

3. Mean KS2 class size at Chestnut School is **28**.
   28 + 25 + 32 + 27 = 112 112 ÷ 4 = 28

4. Mean index finger length is **8cm**
   8cm + 9cm + 8cm + 7cm + 7cm + 9cm = 48cm 48cm ÷ 6 = 8cm

5. e.g. 8, 12, 16, 4 have a mean of 10. 15,12, 9, 4 also have a mean of 10.

6. **11** is the missing number.

1. 4 people have the following number of counters: 4, 6, 3, 7. If we were to share the counters equally between them, how many would they get each?

   4 + 6 + 3 + 7 = 20
   20/4 = 5

2. The temperature for UK on a holiday website is found by taking the mean average from 8 different parts of the country. What should they put up if the temperature in the 8 locations are: 12°C 18°C 9°C 12°C 15°C 20°C 21°C 13°C ?

   12 + 18 + 9 + 12 + 15 + 20 + 21 + 13 = 120
   120/8 = 15°C

3. 6 friends are going on holiday and it works out to be £120 each. 1 of them is the birthday boy so his friends decide to cover his cost. How much do all 5 friends need to pay each now?

   Total cost: £120 x 6 = £720
   Each need to pay £720/5 = £144

4. Tickets to the cinema cost £6 each. 5 Friends go and they have the following amounts of money each; £3 £8 £6 £4 £3 Do they have enough money between them to go to the cinema? (Show your working)

3 + 8 + 6 + 4 + 3 = £24
£24/5 = £4.80
Therefore, they do not have enough money

(TES)