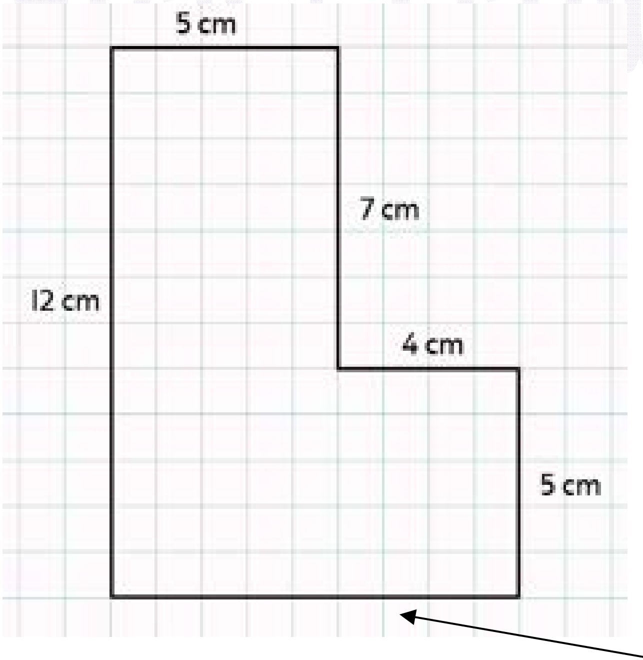
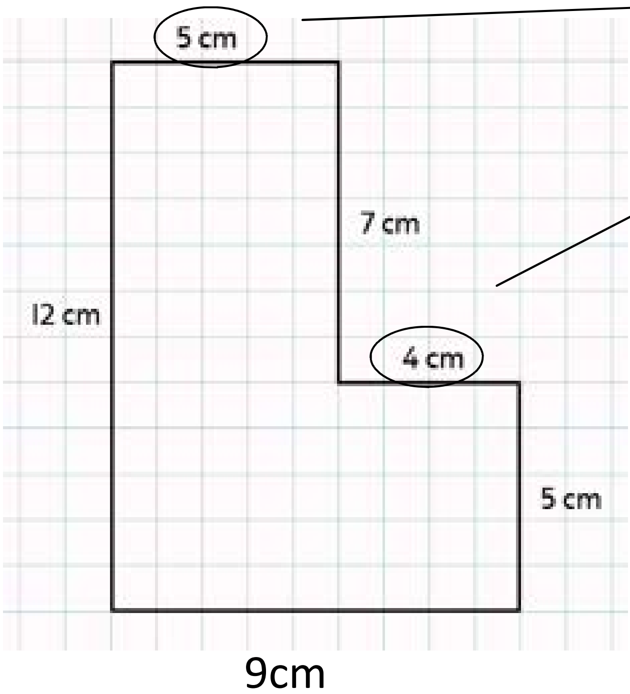
Area + Perimeter



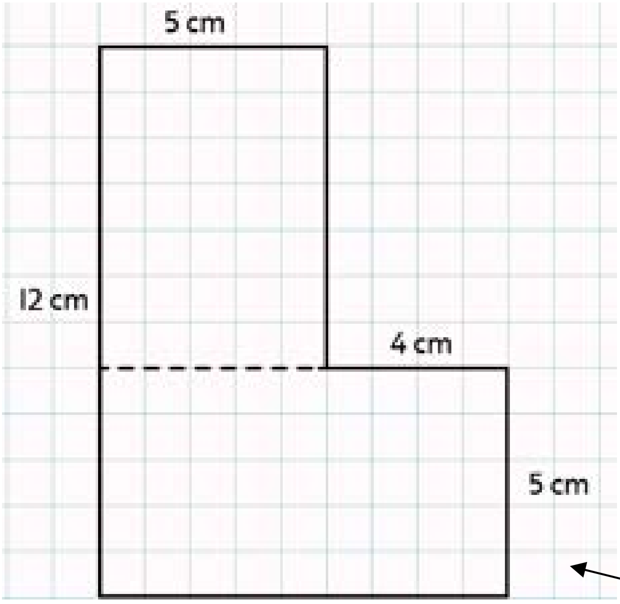
We add the lengths of each side together to get the total distance around the edge—**<u>Perimeter.</u>** How do we find the length of the bottom side?



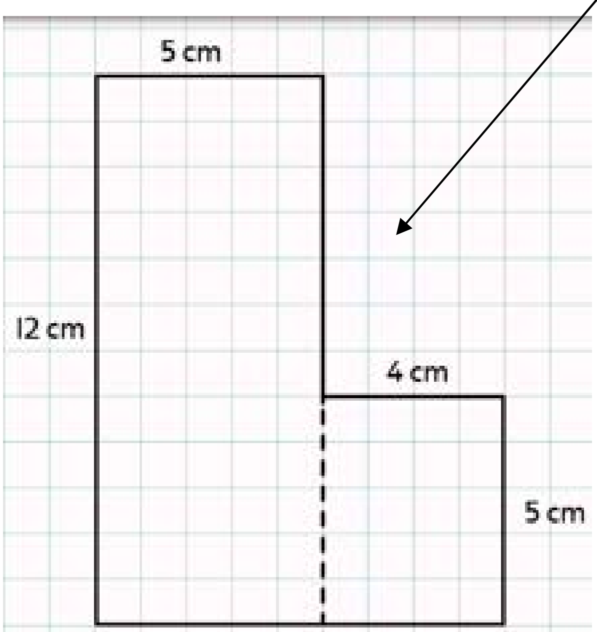
5cm+4cm=**9cm**

We now know the lengths of all of the sides of our shape.

Add them all together to find the perimeter. = 42cm



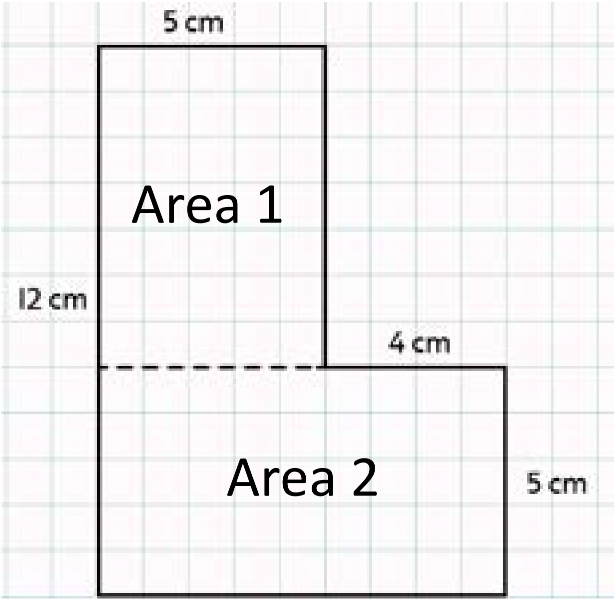
To make it easier to calculate the **area** of our shape, we can split the shape into two rectangles. It can be done like this, or this.



To calculate the **area**, we must:

we calculate the area of each rectangle by multiplying the length by the width. We then add these two shapes together to get the total area.

It does not matter which way the shape is split, the total area is the same.



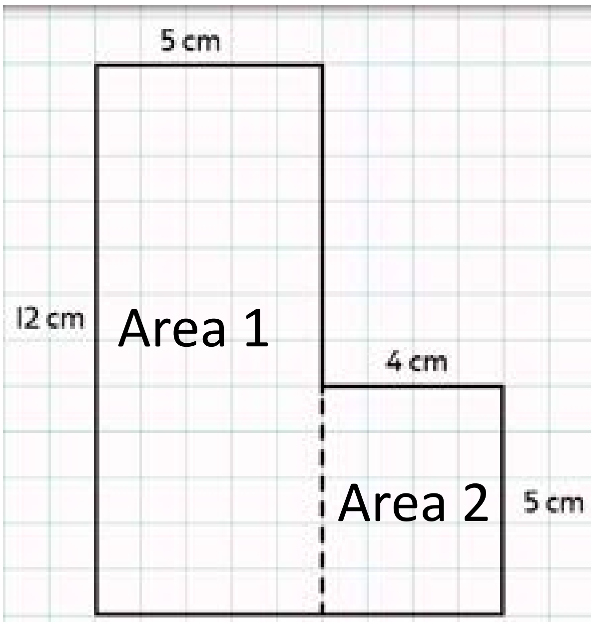
Area 1=

5cm x 7cm= $\underline{35cm^2}$

Area 2=

5cm x 9cm = $\underline{45cm^2}$

$\underline{35cm^2}$ + $\underline{45cm^2}$ = $\underline{\mathbf{80cm^2}}$



Area 1=

5cm x 12cm = $\underline{60cm^2}$

Area 2=

4cm x 5cm = $\underline{20cm^2}$

$\underline{60cm^2}$ + $\underline{20cm^2}$ = $\underline{\mathbf{80cm^2}}$

Both ways of splitting give an answer of $\underline{\mathbf{80cm^2}}$

Missing Number Problems

$a + 45 + b = 54$

$b - a = 3$

$a + b$ must equal 9. Looking at the second equation, $b - a$ must equal 3. So b must be 6 and a must be 3.

Think about what the numbers could be for the first equation in each pair. Use the clues in the second equation to find what the numbers are.

1	$c + 25 + d = 35$	$c - d = 2$	$c =$ ☐	$d =$ ☐
2	$a \times b \times 2 = 24$	$a - b = 1$	$a =$ ☐	$b =$ ☐
3	$34 - x - y = 27$	$x - y = 5$	$x =$ ☐	$y =$ ☐
4	$45 + g + h = 57$	$g \times h = 11$	$g =$ ☐	$h =$ ☐
5	$c \times d \times 3 = 60$	$d - c = 8$	$c =$ ☐	$d =$ ☐
6	$11 - m - n = 7$	$m \times n = 4$	$m =$ ☐	$n =$ ☐
7	$36 \div x = 3y$	$x + y = 8$	$x =$ ☐	$y =$ ☐

$34 + ? = 79$

$34 + a = 79$ $a = ?$

$12 + a = 80$ $a = ?$

$14 - b = 9$ $b = ?$

$35 \div b = 7$ $b = ?$

$c + 15 + c = 23$ $2c = ?$ $c = ?$

To solve the circled question:

- We are adding a missing number to **34** to get **79**.
- **34** + *a* = **79**. Point out that the letter *a* stands for the missing number in the same way that ? did. We know that the letter *a* stands for **45**. We could write *a* = **45**.
- Explain that we call **34** + *a* = **79** an equation and when we write *a* = **45**, we have solved the equation.
- Have a go at the problems above. The answers are revealed on the next page. There are questions on the previous page too!

$34 + 45 = 79$

$34 + a = 79$ | $a = 45$

$12 + a = 80$ | $a = 68$

$14 - b = 9$ | $b = 5$

$35 \div b = 7$ | $b = 5$

$c + 15 + c = 23$ | $2c = 8$ | $c = 4$

To solve 14 – *b* = 9, children took 9 away from 14.
To solve 35 ÷ *b* = 7, children divided 7 into 35.
In both cases, *b* turned out to have a value of 5.

Ask children to write an equation with *b* in it, where *b* has a value of 5.

Take feedback, e.g. *b* + 5 = 10 or 20 – *b* = 15 or 60 ÷ 12 = *b*. Point out that *b* can be anywhere in the sentence. It can be at the start, *b* – 4 = 1; in the middle, 4 × *b* = 20; or at the end, 7 – 2 = *b*.

Also point out that an equation may involve any operation: addition, subtraction, multiplication or division.

Final equation: *c* + 15 + *c* = 23.
This time the letter used to represent the missing number is *c*. Point out that our missing number occurs twice.
We will need to take 15 away from 23: 23 – 15 = 8.
This tells us that the *c* + *c* must be equal to 8.
c + *c* = 8. What must *c* be? *c* = 4.
Try this out in the equation. *c* + 15 + *c* = 23 and 4 + 15 + 4 = 23.
So *c* = 4 is correct.

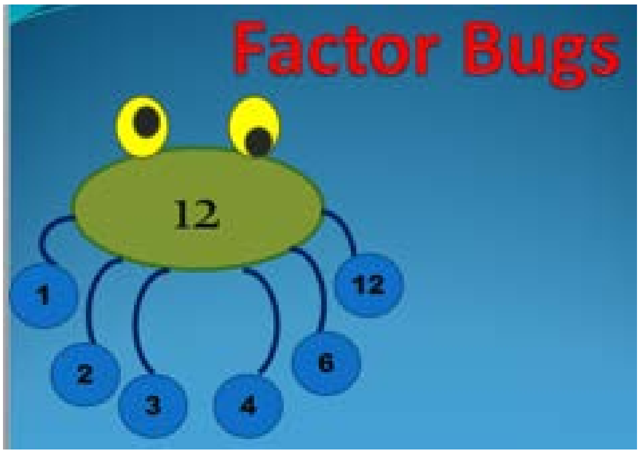
Factors

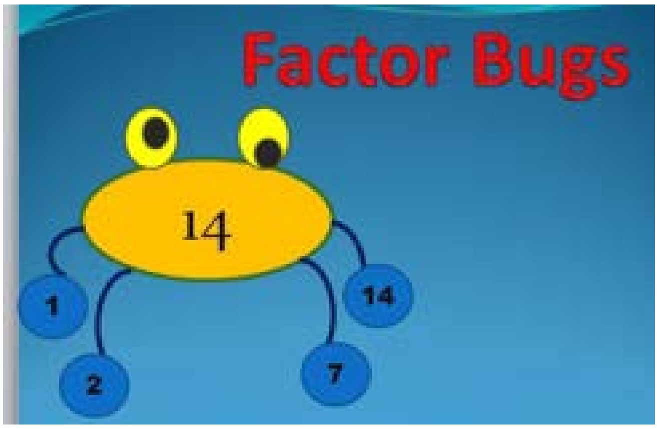
Factors are numbers that divide **exactly** into another number. The factors of 12, for example, are 1, 2, 3, 4, 6 and 12.
Factors can be shown in **pairs**. The factors of 12 can be shown:

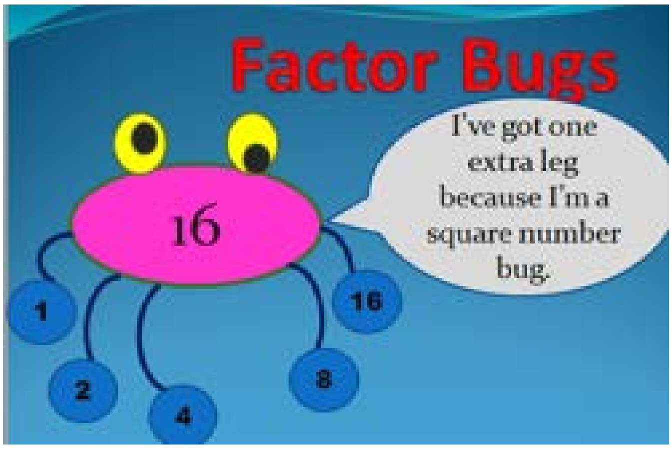
- 1 and 12   1 x 12 = 12
- 2 and 6   2 x 6 = 12
- 3 and 4   3 x 4 = 12

Each pair multiplies to make 12.

Factor Bugs are a great way to remember factors! See below:







Roman Num.

1	I	30	XXX
2	II	40	XL
3	III	50	L
4	IV	60	LX
5	V	70	LXX
6	VI	80	LXXX
7	VII	90	XC
8	VIII	100	C
9	IX	101	CI
10	X	150	CL
11	XI	200	CC
12	XII	300	CCC
13	XIII	400	CD
14	XIV	500	D
15	XV	600	DC
16	XVI	700	DCC
17	XVII	800	DCCC
18	XVIII	900	CM
19	XIX	1000	M
20	XX	1800	MDCCC

The Rules of Roman Numerals

In case you forgot, here is a quick rundown of the basic rules of Roman Numerals.

You Do Not Have More Than Three of The Same Numbers in a Row

Example: 3 is noted as III, but four is IV, not IIII

Example: 30 is XXX, 40 is XL, not XXXX

You Subtract to the Left and Add to the Right of the Biggest Numeral within the Numeral

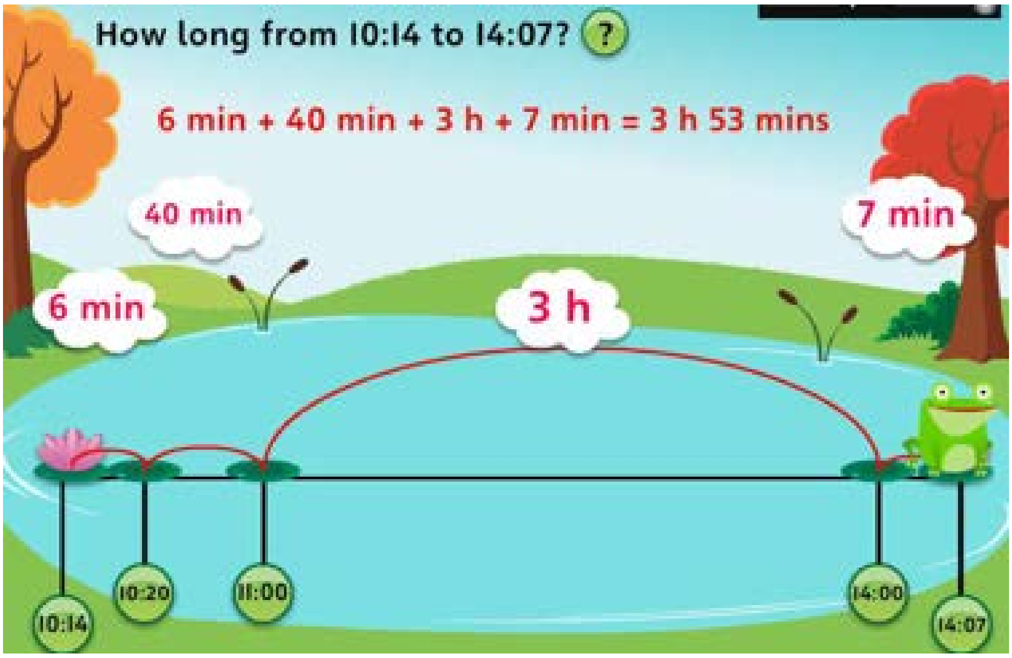
Example: 4 is IV or 5 – 1

Example: 7 is VII or 5 + 1 +1

Example: 75 is LXXV or 50 + 25 (10 +10+5)

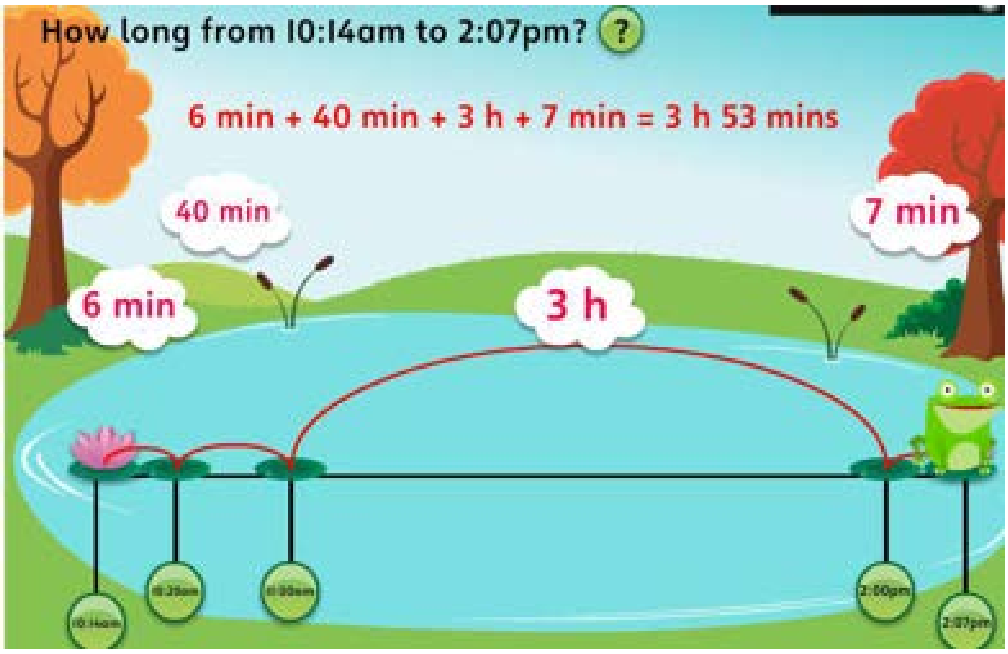
PEARSON

Time Difference



24hr clock

Frog jump



12hr clock

Frog jump

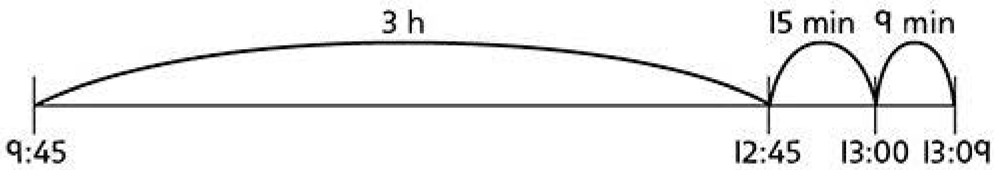
Explain that when hundreds or even thousands of people enter a marathon, their start times are often staggered, so there aren't too many people all starting at the same time. Show start and finish times of two long marathon runners (Jimmy: 10:14 —14:07, and Jill: 9:57 — 14:02. *Jimmy thinks he was faster than Jill. Do you think he was right? How could we find out?*

Use Frog Jumps to count up to find the difference between Jimmy's start and finish times—see the previous page top have a look at some examples of frog jumps.

Ask children to use Frog to find the difference between Jill's start and finish times. *So who was quicker?*

Ask children to think of a start and finish time which would give a time in between the two.

Say their friend Joanna has run lots of marathons, and finished in 3 h 24 min. She started at 9:45. Ask children to work out what time she finished.

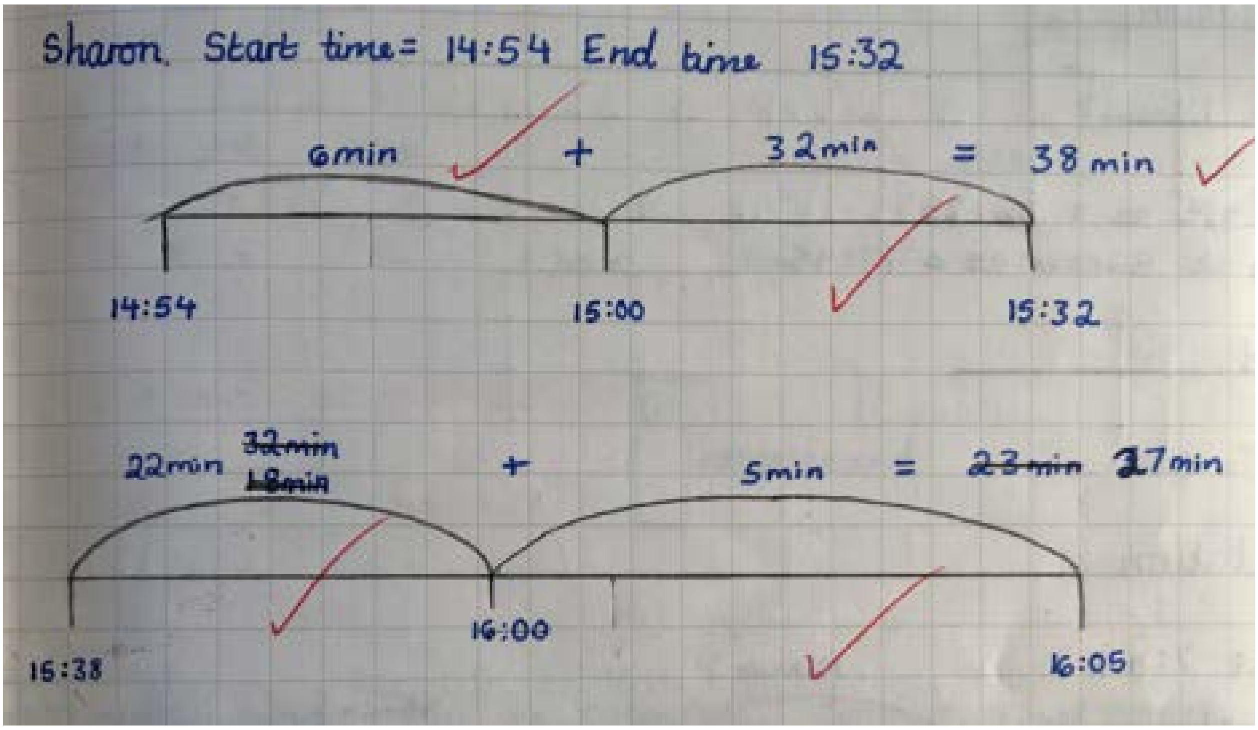


Above is an example of a drawn frog jump line. The time the children have jumped to is written at the bottom. The time differences are written at the top. Presentation is crucial, and aids the understanding of the children if written neatly. Finally, the time differences need to be added together to get a final time. See below.

Watch out for:

Children who have trouble bridging the hour.

Children who forget there are 60 minutes, not 100 minutes, in the hour.



+ and - Pos. and Neg. Numbers

1) Adding and Subtracting Negative Numbers

- If I tell you to do something, I am giving you a positive instruction
- If I tell you not to do something, I am giving you a negative instruction
- If I tell you not to not do something, I am actually giving you a positive instruction.

2) Adding and Subtracting Negative Numbers

- We apply certain rules to calculations involving negative numbers.
- These signs must be next to each other

Calculation	Becomes...
+ + - -	+
+ - - +	-

3) Adding and Subtracting Negative Numbers

a) 8 + - 3 = 5

b) 9 - + 5 = 4

c) 2 - - 9 = 11

d) 3 + - 4 = -1

e) 10 + - 16 = -6

f) -4 + - 7 = -11

g) -1 - - 6 = 5

h) -3 + 9 = 6

i) -7 – 4 = -11

j) -12 + - 11 = -23

4)

Assessment checker:

- add two positive numbers: 3 + 5 / add two negative numbers: ¯5 + ¯3
- add a positive to a negative number and vice versa: ¯5 + 6 = and 5 + ¯6
- subtract a lower positive number from a higher positive number: 9 − 5
- subtract a higher positive number from a lower positive number: 5 − 9
- subtract a negative number from a negative number and vice versa. ¯3 − ¯5 and ¯5 − ¯3

Assessment focus

Can children describe what happens when two negative numbers are added?

Can children describe what happens when positive and negative numbers are added?

Can children explain why, e.g. 5 − 9 is not the same as 9 − 5?

5)

When you add two positive numbers you get a higher positive number, e.g. 3 + 4 = 7.

When you add two negative numbers you get a lower negative number, e.g. ¯3 + ¯4 = ¯7.

When you add a negative number to a positive number it is the same as subtracting a positive number, e.g. 7 + ¯4 is the same as 7 − 4 = 3. The sign of the answer will match the sign of the larger digit: ¯3 + 5 will be positive but ¯5 + 3 will be negative

When you subtract a negative number from another negative number it is the same as adding a positive number to a negative number. (Two minuses make a positive.) E.g. ¯4 − ¯3 is the same as ¯4 + 3 = ¯1.

The order matters in subtraction: if the number being subtracted is larger, the answer will be negative; subtracting a negative number is the same as adding its positive equivalent, for example ¯3 −¯5 is the same as ¯3 + 5.

6)

When you add a positive number to a negative number you can get a negative or a positive number with the same value as the difference between the numbers and matching the sign of the larger digit, e.g. ¯7 + 3 = ¯4 or ¯4 + 7 = 3.

When you subtract a higher positive number from a lower positive number you always get a negative number, e.g. 4 − 7 = ¯3.

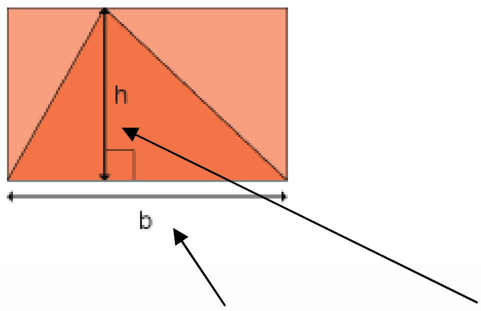
When you subtract a negative number from a positive number it is the same as adding two positive numbers. (Two minuses make a positive.) E.g. 4 − ¯3 = 7.

When you subtract a positive number from a negative number you get a lower negative number, e.g. ¯3 − 4 = ¯7.

Area of a Triangle

Triangles

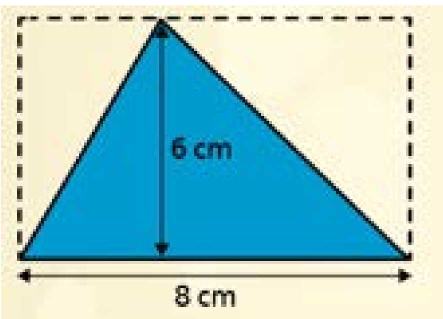
Look at the triangle below:



If you multiply the base by the perpendicular height, you get the area of a rectangle. The area of the triangle is **half** the area of the rectangle.

So to find the area of a triangle, multiply the base by the perpendicular height and divide by two. The formula is:

Area = $^{(b \times h)}/_{2}$



Can you work out the area of this triangle?

Times Decimals

81 x 90.3 =

Some of the children will use grid multiplication to work out the answer. If you are unfamiliar or unsure of this method, please see Autumn 1 skills.

x	80	1
90		
.3		

This is how to set up the sum. The numbers on the outside are the numbers that we will x together.

x	80	1
90	7200	90
.3		.3

To work out 80 x .3 (The last remaining box) we break the question down into two parts.

Firstly, we will x the decimal number by ten.

Then, we will x the answer by the amount of tens we have.

E.g. H T U. tths (We covered x 10 in Aut 1)

0 . 3

0 3 . 0 We get an answer of 3

Then, x 3 by 8 (the number of tens we had)

3 x 8 = 24 So, 80 x 0.3 = 24

x	80	1
90	7200	90
.3	24	.3

Can you answer these below?

1)

x	60	2
10		
.5		

Workings:

2)

x	10	7
6		
.6		

Workings:

Volume

Calculating the volume of cubes and cuboids

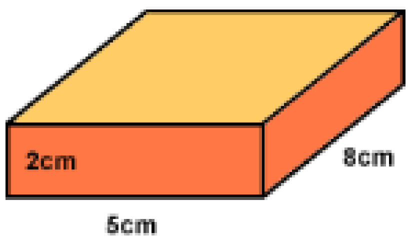
Volume is a measure of the space taken up by a shape and so is measured in mm^3, cm^3 etc

Volume can also be measured in litres with 1 litre = $1000cm^3$

Make sure you don't confuse volume and area.

The volume of a cuboid

The volume of a cuboid is found by multiplying **length x breadth x height.**



Volume = length x breadth x height

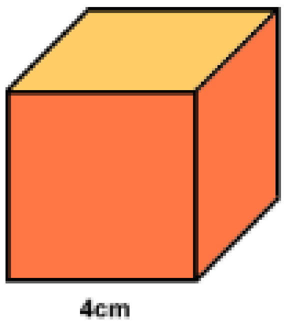
For this cuboid:

= $8 \times 5 \times 2$

= $80cm^3$

The volume of a cube

For a cube the length, breadth and height are all the same so the volume is found by multiplying **length x length x length.**



Volume = length x length x length

For this cube:

= $4 \times 4 \times 4$

= $64cm^3$

Ordering/Comparing Fractions

Ordering and comparing fractions

To compare fractions, you must first change them so they have the **same** denominator.

Compare $^{2}/_{3}$ and $^{3}/_{5}$ and find out which fraction is bigger.

- First look at the denominators (the bottom numbers).
- Find a new number that both denominators go into:
  - Try 9 - you can divide 9 by 3 but you can't divide 9 by 5.
  - Try 10 - you can divide 10 by 5 but not by 3, so that isn't right either.
  - Try 15 - you can divide 15 by 5 (which equals 3) and you can also divide 15 by 3 (which equals 5), so 15 is the new denominator.
- Now you have found a new denominator that is divisable by both numbers, you need to change the numerators (the top numbers).
- To change the numerators, simply multiply them by the number of times the denominator goes into 15.
  - So for $^{2}/_{3}$ - 3 goes into 15 five times, so you must multiply the numerator (2) by 5 which equals 10.
  - And for $^{3}/_{5}$ - 5 goes into 15 three times, so you must multiply the numerator (3) by 3 which equals 9.

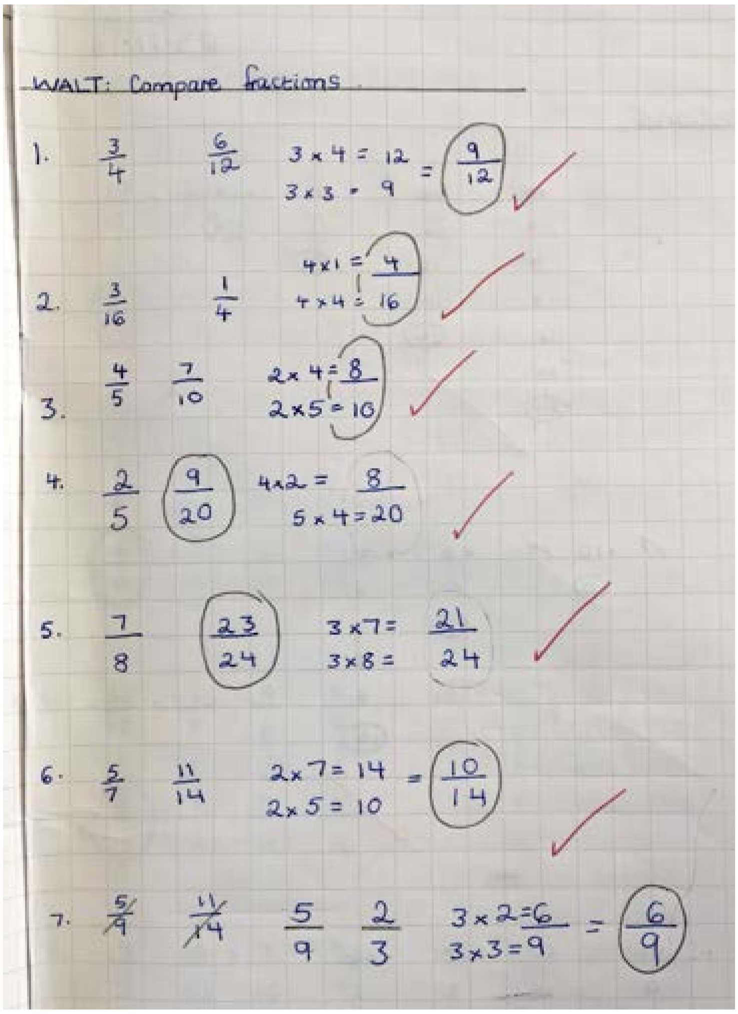
$$\frac{2}{3}\begin{matrix}\times 5\\ \times 5\end{matrix} = \frac{10}{15}$$

$$\frac{3}{5}\begin{matrix}\times 3\\ \times 3\end{matrix} = \frac{9}{15}$$

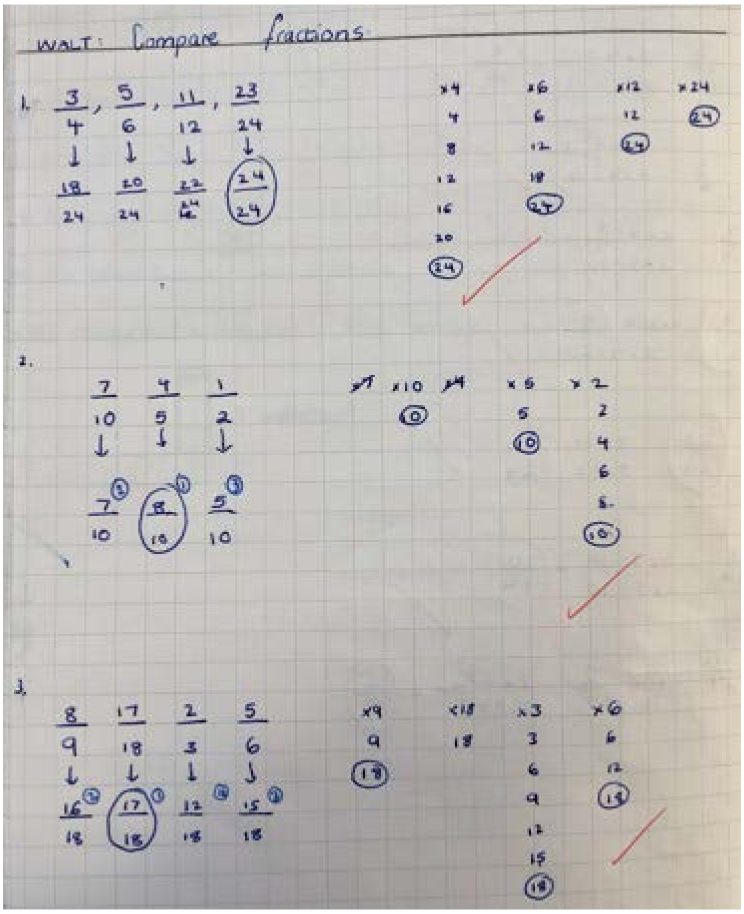
$$\frac{10}{15} \text{ is bigger than } \frac{9}{15}$$

$$\frac{2}{3} \text{ is bigger than } \frac{3}{5}$$

So now both fractions have been changed you can compare them to see which fraction is the biggest. $^{10}/_{15}$ is **bigger** than $^{9}/_{15}$ so the biggest original fraction is $^{2}/_{3}$.

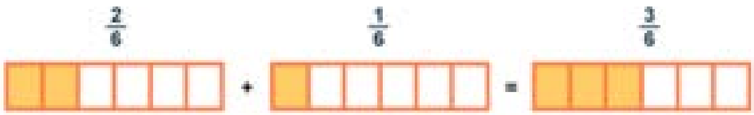


Here is an example of a child in year 6 who has made the denominators the same, and then compared them. They have then circled the biggest fraction.



Here, we have given the children 4 different fractions. They have to find the LCM (Lowest Common Multiple) of each denominator (to make them all the same) and then order and compare them. The LCMs are circled on the right of the page.

Adding and subtracting fractions



It is easy to add fractions when the numbers on the bottom are the same.

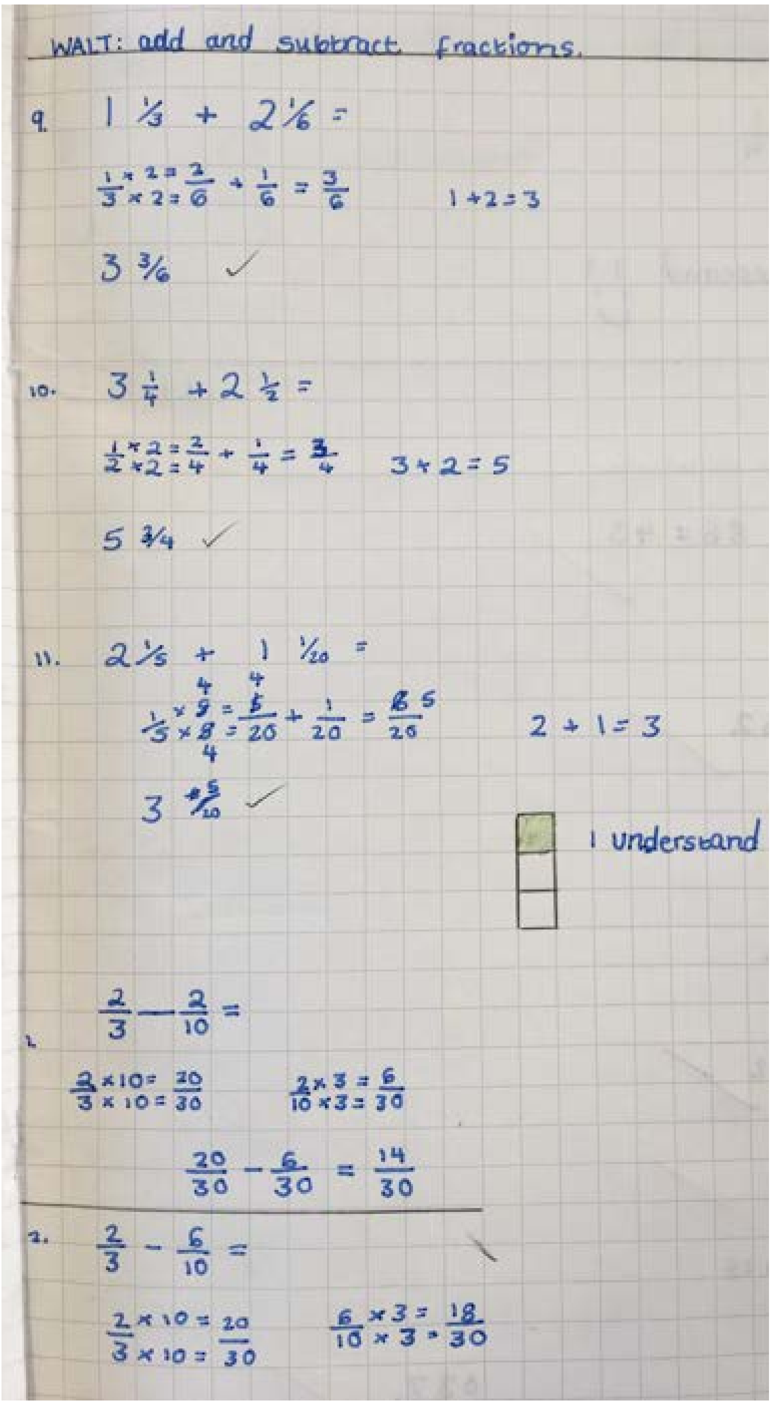
All you need to do is add the tops of the fractions together.

So $^2/_9 + {}^5/_9 = {}^7/_9$

Sometimes you need to cancel down the answer to its simplest terms.

$^3/_{10} + {}^1/_{10} = {}^4/_{10} = {}^2/_5$

When the numbers on the bottom are not the same to start with, you use equivalent fractions to make them the same.



This is an example where we have asked the children to add fractions in questions 9,10 and 11. Then, we have asked children to subtract fractions in questions 1 and 2 at the bottom of the page.

The workings next to the questions, clearly show the steps we have followed in order to get to the correct answers.

Fractions of amounts

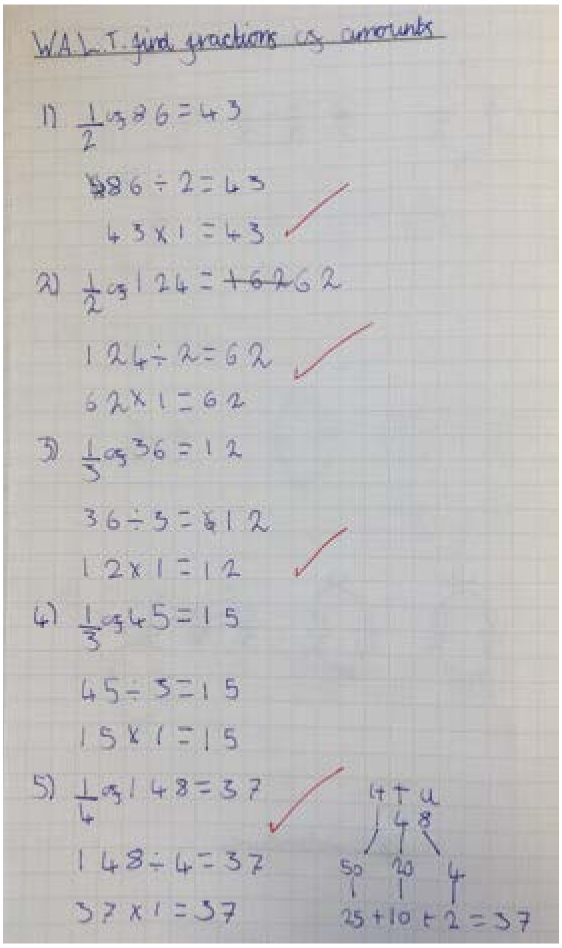
Fractions of quantities

To find a fraction of a quantity:

- Divide the quantity by the denominator
- Multiply the answer you get by the numerator

To find $^{2}/_{5}$ of £15, for example:

- Divide 15 by 5 (the denominator): 15 ÷ 5 = 3
- Multiply the answer 3 by 2 (the numerator): 3 x 2 = 6
- So $^{2}/_{5}$ of £15 is **£6**



This example shows the

fraction of the amount that is to be found.

The first line under the question is the denominator divided into the amount.

The second line is the answer x by the numerator.

Question 1:

E.g. 1/2 of 86 =

86 ÷ 2 = 43

43 x 1 = 43

1/2 of 86 = 43