The Big Book of Fractions

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

$$+ \quad \times \quad - \quad \div \quad = \qquad \frac{1}{3}$$
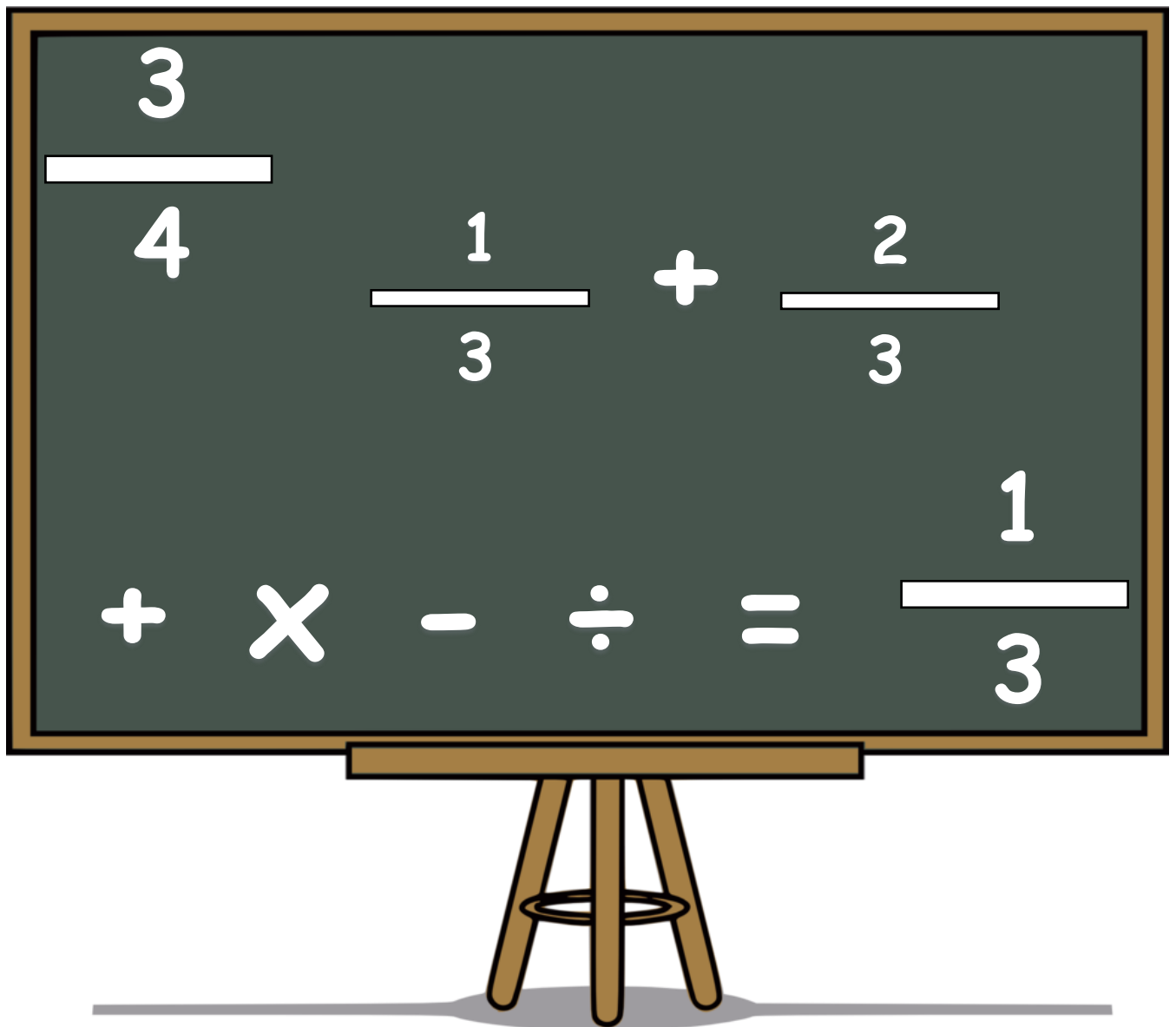
Fractions

Fractions are a small or tiny part, amount, or proportion of something, also known as being a numerical quantity that is not a whole number. We often divide things into fractions daily without even thinking about it.

Numerator

The top part of a fraction is called the numerator. This shows how many parts are being taken.
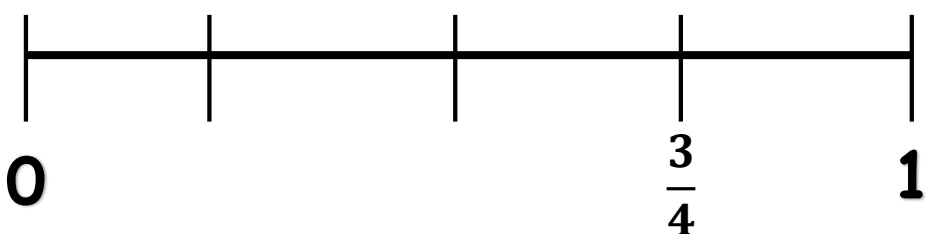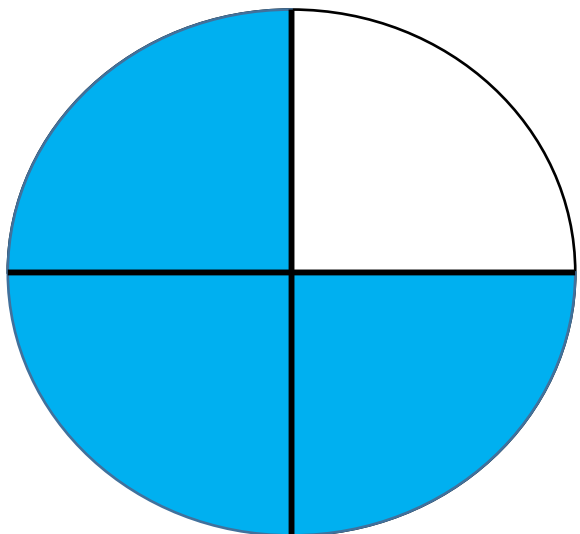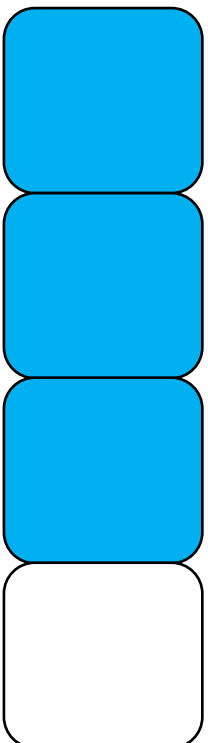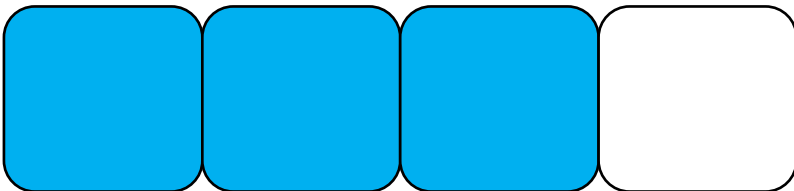
$$\frac{3}{4}$$

Denominator

The bottom part of a fraction is called the denominator. This shows how many parts you are dividing by.

Fractions are often represented in four particular ways:

$$\frac{3}{4}$$

Colouring Fractions

If you are given a fraction picture and you're asked to color a select fraction, you color the numerator in.
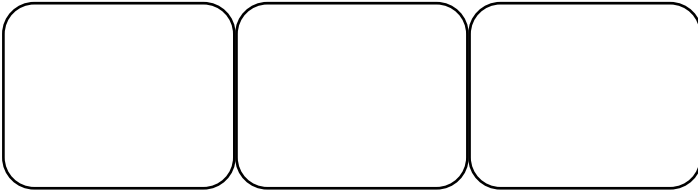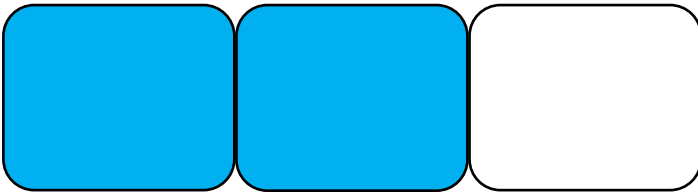
For example:
Color in 2/3

2 **Numerator**

3 **Denominator**

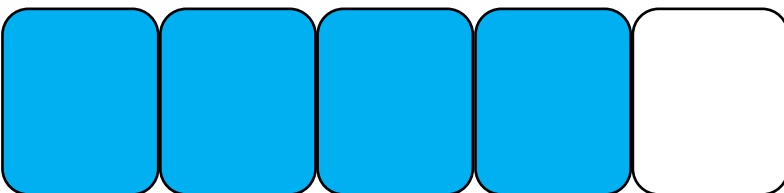As the numerator is 2, you will color in 2 of the 3 boxes.

For example:
Color in 4/5
As the numerator is 4, you will color in 4 of the 5 boxes.

Colour the fraction #1

1) $\dfrac{2}{5}$

2) $\dfrac{1}{4}$

3) $\dfrac{5}{6}$

4) $\dfrac{2}{3}$

5) $\dfrac{4}{7}$

6) $\dfrac{3}{5}$

Colour the fraction #2

1) $\dfrac{1}{5}$

2) $\dfrac{3}{4}$

3) $\dfrac{6}{6}$

4) $\dfrac{1}{3}$

5) $\dfrac{2}{7}$

6) $\dfrac{5}{5}$

Colour the fraction #3

1) $\dfrac{5}{8}$

2) $\dfrac{3}{10}$

3) $\dfrac{4}{9}$

4) $\dfrac{7}{10}$

5) $\dfrac{3}{8}$

6) $\dfrac{8}{9}$

Name: _____   Date: _____

Colour the fraction #4

1)
$$\frac{7}{8}$$

2)
$$\frac{9}{10}$$

3)
$$\frac{2}{9}$$

4)
$$\frac{1}{10}$$

5)
$$\frac{8}{8}$$

6)
$$\frac{5}{9}$$

Score: _____

Representing Fractions

If you are asked to represent a fraction, you will need to look carefully at your denominator.

3   **Numerator**

4   **Denominator**

As the denominator is 4, you need to divide something in to 4 equal pieces. The easiest way to do this is to draw 4 equal sized squares.

You would then finish off by coloring in 3 of the 4 squares.

Alternatively, you could do other shapes or represent it differently as long as they are equally divided pieces.

Representing Fractions

If you are asked to represent a fraction, you will need to look carefully at your denominator.
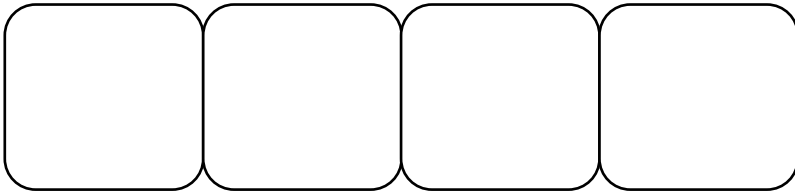
$$\frac{2}{5}$$

2 Numerator

5 Denominator

As the denominator is 5, you need to divide something in to 5 equal pieces. The easiest way to do this is to draw 5 equal sized squares.
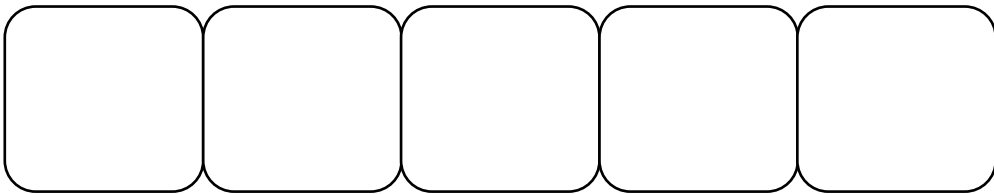
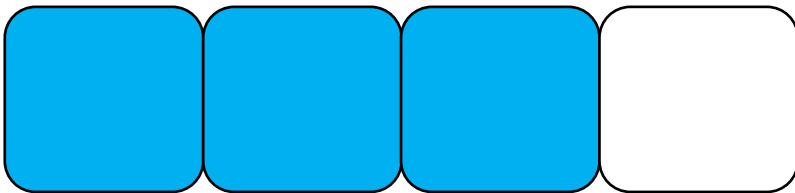You would then finish off by coloring in 2 of the 5 squares.
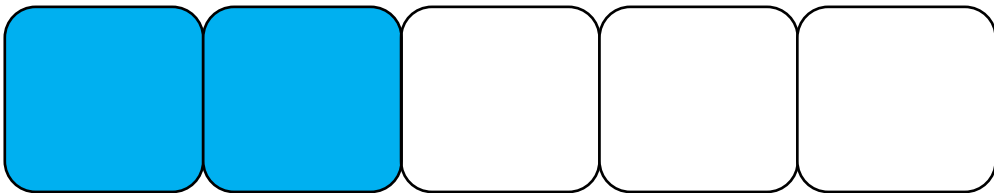
Draw a representation of 2/3.

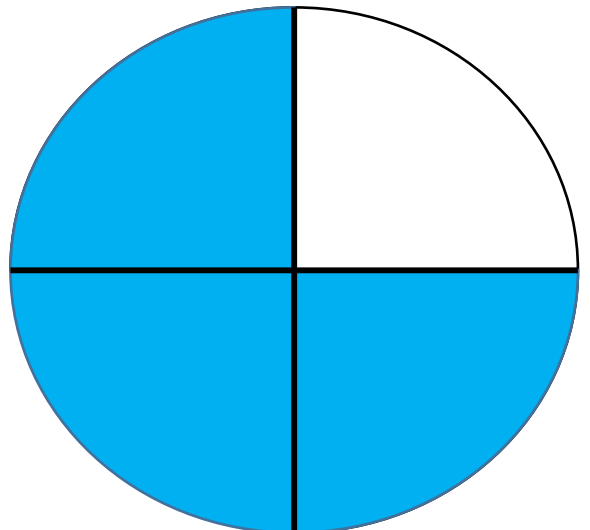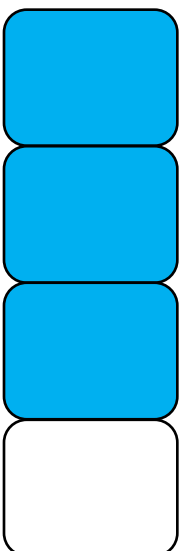As the denominator is 3, you need to divide something in to 3 equal pieces. The easiest way to do this is to draw 3 equal sized squares.
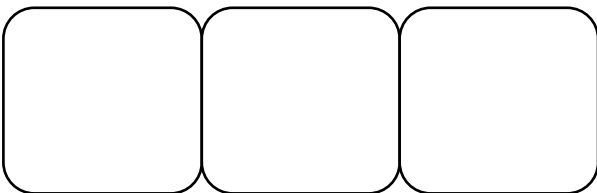
You would then finish off by coloring in 2 of the 3 squares.
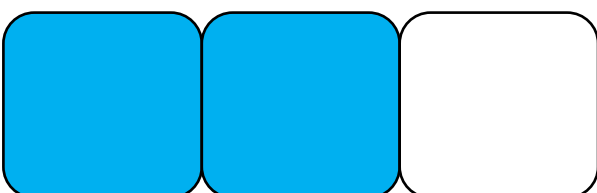
Represent the fraction #1

1) | $\dfrac{2}{3}$ | = ☐
☐

2) | $\dfrac{1}{4}$ | = ☐
☐

3) | $\dfrac{3}{5}$ | = ☐
☐

4) | $\dfrac{1}{2}$ | = ☐
☐

5) | $\dfrac{3}{4}$ | = ☐
☐

6) | $\dfrac{3}{3}$ | = ☐
☐

Score: _____

Represent the fraction #2

1) | $\dfrac{3}{5}$ | =

2) | $\dfrac{1}{6}$ | =

3) | $\dfrac{2}{4}$ | =

4) | $\dfrac{1}{5}$ | =

5) | $\dfrac{1}{3}$ | =

6) | $\dfrac{5}{6}$ | =

Represent the fraction #3

1) $\dfrac{2}{7}$ = ▭

2) $\dfrac{3}{8}$ = ▭

3) $\dfrac{6}{7}$ = ▭

4) $\dfrac{3}{6}$ = ▭

5) $\dfrac{5}{8}$ = ▭

6) $\dfrac{4}{7}$ = ▭

Score: _____

Represent the fraction #4

1) $\dfrac{2}{8}$ =

2) $\dfrac{5}{9}$ =

3) $\dfrac{1}{9}$ =

4) $\dfrac{7}{8}$ =

5) $\dfrac{4}{9}$ =

6) $\dfrac{3}{8}$ =

Representing Fractions

Fraction bars

Shade _____ parts

Number of equal parts

Parts of a group

Shade _____ out of _____

Total number of parts

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

Circle model

Shade _____ parts

Divided into _____ equal parts

Number line

Represents _____ parts of the whole

0   1
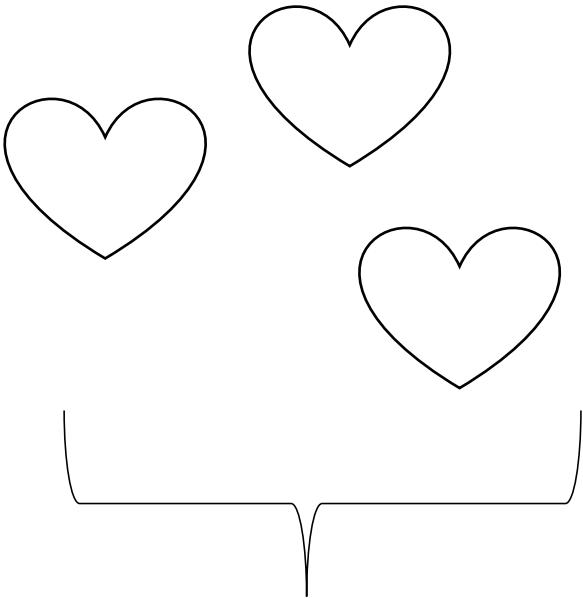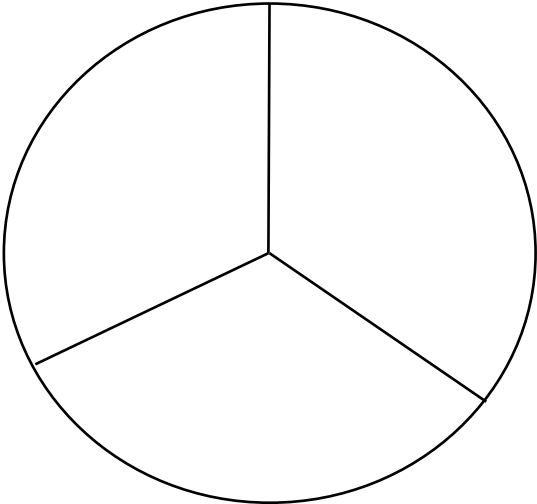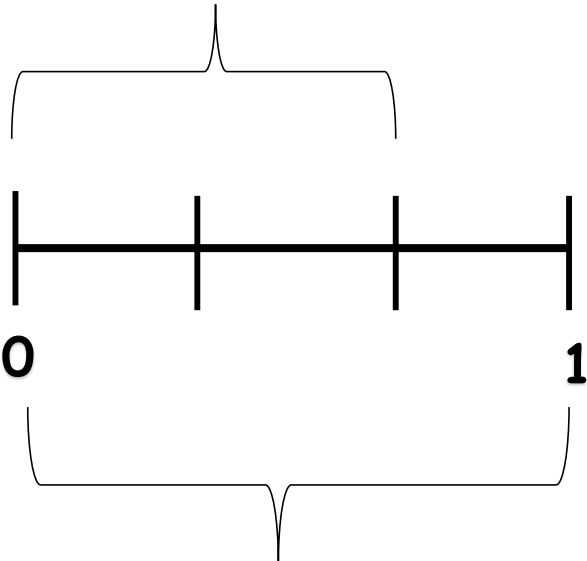
Represents the whole

How many parts is the whole divided in to?

Representing Fractions
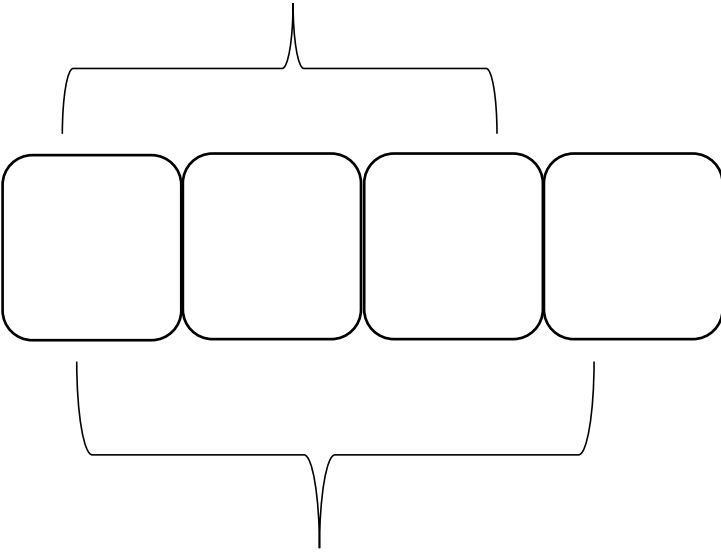
Fraction bars

Shade _____ parts

Number of equal parts

Parts of a group

Shade _____ out of _____

Total number of parts

$$\frac{3}{4}$$

Circle model

Shade _____ parts

Divided into _____ equal parts
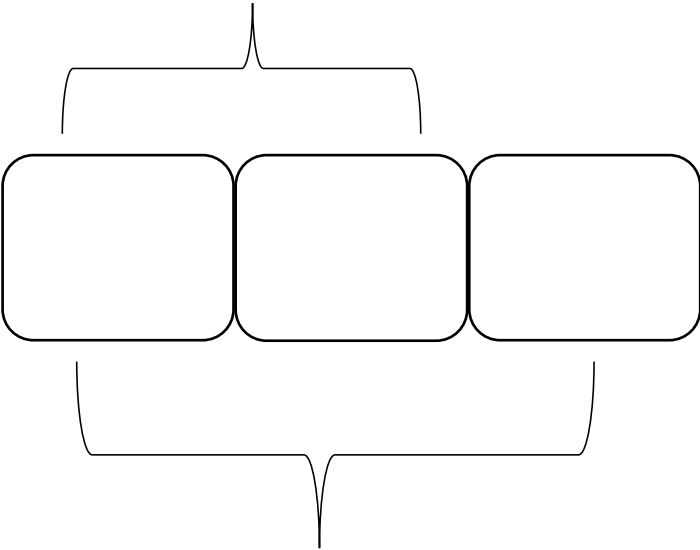
Number line

Represents _____ parts of the whole

0   1
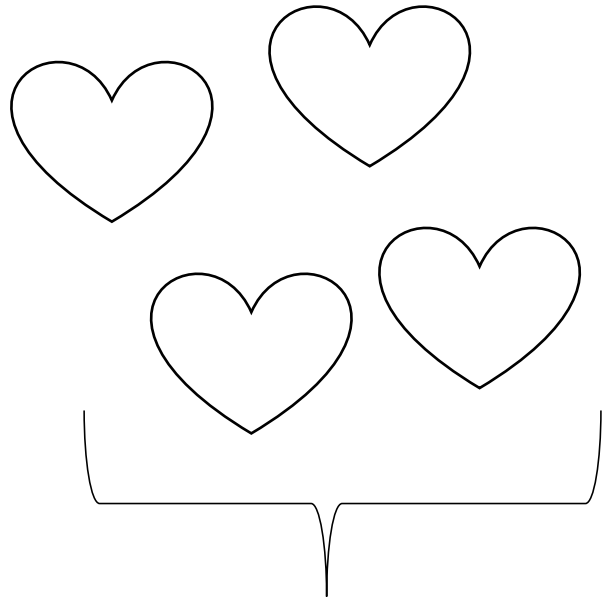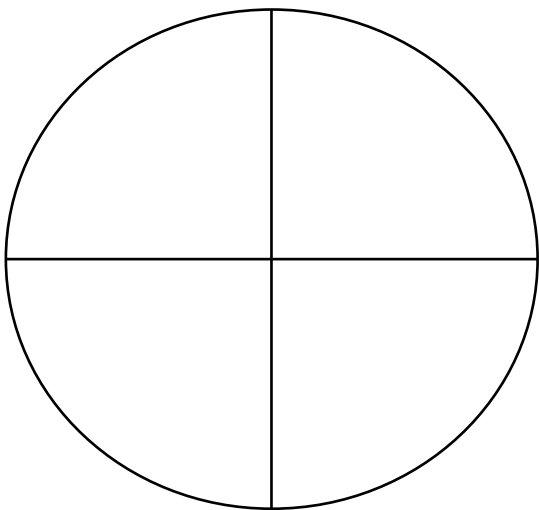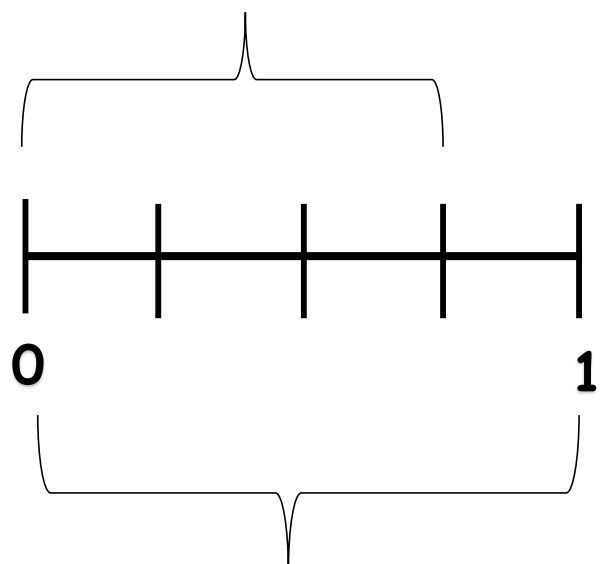
Represents the whole

How many parts is the whole divided in to?

Equivalent fractions

Equivalent fractions are fractions that may appear differently but are the same amount.

The easiest way to find an equivalent fraction is to multiply both the numerator and denominator by the same number.

For example:

Numerator
The top part of a fraction is called the numerator. This shows how many parts are being taken.

$$3$$

$$4$$

Denominator
The bottom part of a fraction is called the denominator. This shows how many parts you are dividing by.

$$\frac{3 \; \times 2}{4 \; \times 2} = \frac{6}{8}$$

$$\frac{3 \; \times 5}{4 \; \times 5} = \frac{15}{20}$$

Remember whatever you do to the numerator also needs to be done to the denominator.

$$\frac{3 \; \times 10}{4 \; \times 10} = \frac{30}{40}$$

Equivalent fractions

Find 5 equivalent fractions for each of these fractions:

1) 3/10

2) 3/4

3) 2/3

4) 4/5

5) 7/10

6) 6/7

7) 7/12

8) 2/5

9) 11/15

Simplifying fractions

You can also find equivalent fractions by simplifying. To simplify a fraction, both the numerator and denominator have to have a common factor (number that goes into both of them).

For example:

$$\frac{2}{4}$$

2 goes in to both 2 and 4 so we can divide them both by 2 to simplify the fraction.

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

$$\frac{4}{16}$$

4 goes in to both 4 and 16 so we can divide them both by 4 to simplify the fraction.

$$\frac{4 \div 4}{16 \div 4} = \frac{1}{4}$$

Simplifying fractions

Simplify these fractions to their simplest form:

1) 5/10

2) 15/20

3) 25/30

4) 3/9

5) 16/40

6) 40/70

7) 20/60

8) 42/68

9) 30/90

10) 12/28

Simplifying fractions

Simplify these fractions to their simplest form:

1) 24/36

2) 12/16

3) 62/100

4) 70/100

5) 36/90

6) 32/88

7) 30/75

8) 16/80

9) 33/99

10) 42/63

Simplifying fractions

1) Always, sometimes, never?
To simplify a fraction you divide the numerator and denominator by 2 over and over. Explain your answer using examples.

2) Andrew thinks that 2/5 in its simplest form is 1/2.5
Do you agree? Convince me.

3) Find three fractions that can be simplified 5 times.

4) What fraction has a denominator of 30 and when it is simplified it becomes 2/5? Find three other examples that simplify to 2/5.

5) David says that 10/30 in it's simplest form is 5/15 because he has just divided them both by 2. Explain why David is wrong.

Comparing fractions

Fractions are a small or tiny part, amount, or proportion of something, also known as being a numerical quantity that is not a whole number. We often divide things into fractions daily without even thinking about it.

Numerator

The top part of a fraction is called the numerator. This shows how many parts are being taken.

3

Denominator

The bottom part of a fraction is called the denominator. This shows how many parts you are dividing by.

4
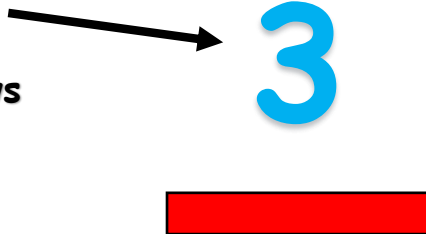
When the denominators are the same, we can simply look at the numerator to see which fraction is biggest.

$\dfrac{1}{5}$

$\dfrac{3}{5}$

We can see from the diagram and from the numerators, that 3/5 is bigger than 1/5

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

Comparing fractions

$\dfrac{3}{4}$
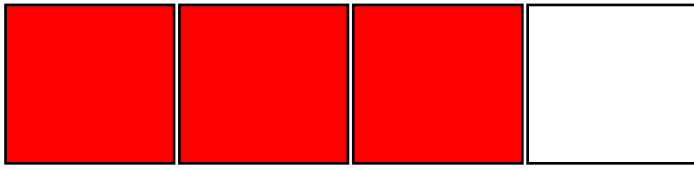
$\dfrac{2}{4}$
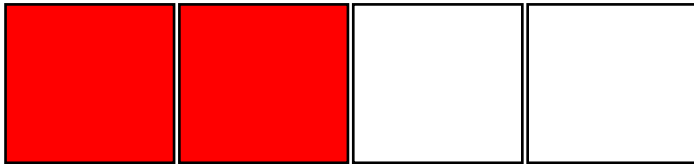
$$\dfrac{3}{4} \quad > \quad \dfrac{2}{4}$$

$\dfrac{5}{7}$

$\dfrac{4}{7}$

$$\dfrac{5}{7} \quad > \quad \dfrac{4}{7}$$

Comparing fractions

If fractions have a different denominator, then you need to make the denominators equivalent before being able to compare the fractions accurately.

e.g.:

$$\frac{3}{8} \qquad \frac{2}{4}$$

Because 4 is a multiple of 8, we can multiply 4 by 2 to make it so both denominators are 8.

Remember, whatever you do to the bottom you do to the top.

$$\frac{3}{8} \qquad \frac{2}{4} \quad \begin{array}{l} \times\,2 \\ \\ \times\,2 \end{array}$$
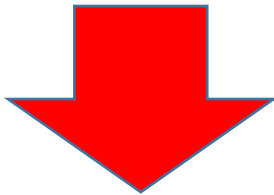
$$\frac{3}{8} \qquad \frac{4}{8}$$

Now the denominators are the same, we can compare the fractions accurately.

$$\frac{3}{8} \quad < \quad \frac{4}{8}$$

Comparing fractions

If fractions have a different denominator, then you need to make the denominators equivalent before comparing them.

e.g.:

$$\frac{3}{8} \qquad \frac{2 \ \times 2}{4 \ \times 2}$$

+
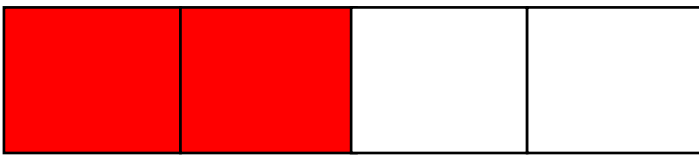
becomes:
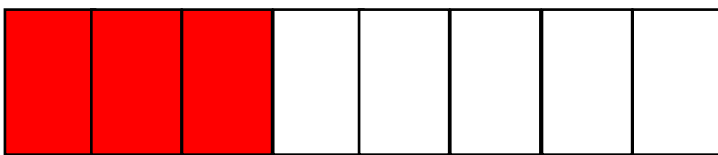
 $\frac{3}{8}$

 $\frac{4}{8}$

=

$$\frac{3}{8} \quad < \quad \frac{4}{8}$$

Comparing fractions

Use < and > to compare the fractions below.

1) 3/10   1/10

2) 4/5   2/5

3) 6/7   3/7

4) 5/6   2/6

5) 7/8   3/8

6) 4/7   6/7

7) 7/10   3/10

8) 8/9   4/9

9) 2/3   1/3

10) 6/9   5/9

11) 6/10   4/10

Comparing fractions

Use < ,> or = to compare the fractions below.

1) 7/10   4/5

2) 2/3   5/9

3) 11/15   3/5

4) 5/7   11/14

5) 3/4   6/8

6) 4/6   7/12

7) 11/12   5/6

8) 14/20   3/5

9) 8/9   17/18

10) 8/10   4/5

11) 7/8   13/16

Comparing fractions

Sort these fractions from smallest to biggest.

1) 3/5   5/10   11/20

2) 2/3   5/8   17/24

3) 13/15   2/3   3/5

4) 7/10   13/20   32/40

5) 4/7   17/21   2/3

6) 5/6   9/12   19/24

7) 3/4   11/16   27/32

8) 2/5   5/15   3/10

9) 1/2   3/7   4/5

10) 2/3   1/5   7/10   1/2

Comparing fractions

1) Write down five fractions that are greater than 2/5.

2) Use a diagram to show the difference between 1/2 and 1/4.

3) Andrew insists he has more pizza than his brother because he has had 6/8 of his and his brother has had 5/6. Is he correct? Explain how you know.

4) Anna says "All fractions are less than one." Do you agree? Convince me.

5) From 1 pizza, David ate 3/8 and Andrew ate 1/7. How much pizza was left over?

Comparing fractions

6) David thinks denominators with bigger numbers are bigger fractions. Prove to him that 1/3 is bigger than 1/6 using a diagram.

7) Which is greater?

4 2/3   or   **4** 3/4

8) Andrew says "I have the fraction **4** 2/5 so to make it 1 whole I need to add **5** 3/5." Do you agree? Explain your reasoning.

9) Use a diagram to show the difference between 1/2 and 1/4.

Finding fractions of amounts

You can find fractions of amounts by using a bar model to help you find the correct answer.

e.g.

$$\frac{1}{4} \text{ of } 420$$

Because the denominator is 4, this means you will divide the number into 4 equal pieces.

420

Because we have got 420 and 4 equal pieces from our denominator, we will do the calculation 420 divided by 4.

$$4 \overline{)4\,2^{2}0} = 1\,0\,5$$

This means each piece is worth 105. We can now see that 1/4 of 420 is 105.

105	105	105	105

Finding fractions of amounts

You can find fractions of amounts by using a bar model to help you find the correct answer.

e.g.

$$\frac{3}{4} \text{ of } 420$$

Because the denominator is 4, this means you will divide the number into 4 equal pieces. Our numerator (3) then shows us how many pieces we want.
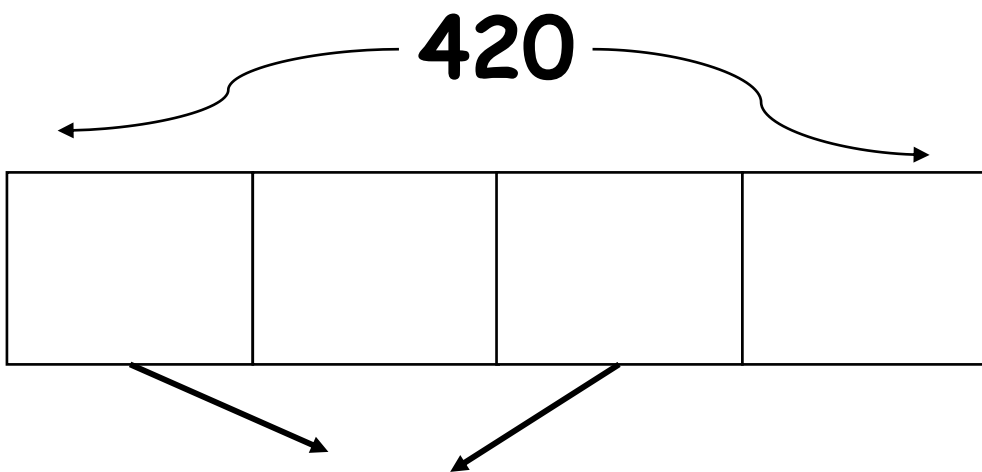
420

Because we have got 420 and 4 equal pieces from our denominator, we will do the calculation 420 divided by 4.

$$\begin{array}{r} 1\ 0\ 5 \\ 4\overline{)\ 4\ 2\ ^2 0} \end{array}$$

This means each piece is worth 105. Because we want 3 lots, we can then multiply 105 by 3.
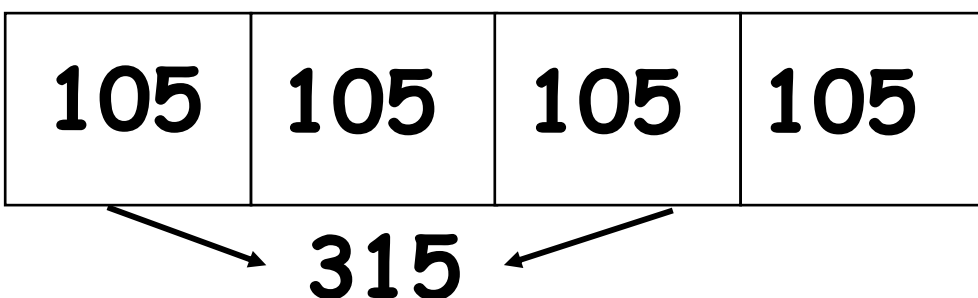
| 105 | 105 | 105 | 105 |

315

Finding fractions of amounts

Solve the questions below, using the bar model to help you.

1) 1/4 of 320

2) 1/3 of 210

3) 1/5 of 400

4) 1/4 of 216

5) 1/5 of 260

Finding fractions of amounts

Solve the questions below, using the bar model to help you.

1) 1/3 of 693

2) 1/4 of 220

3) 1/5 of 560

4) 1/3 of 411

5) 1/4 of 368

Finding fractions of amounts

Solve the questions below, using the bar model to help you.

1) 3/4 of 320

2) 2/3 of 210

3) 4/5 of 400

4) 2/4 of 216

5) 2/5 of 260

Finding fractions of amounts

Solve the questions below, using the bar model to help you.

1) 2/3 of 693

2) 3/4 of 220

3) 3/5 of 560

4) 2/3 of 411

5) 3/4 of 368

Finding fractions of amounts

Solve the questions below, using the bar model to help you.

1) 2/7 of 322

2) 3/5 of 880

3) 5/6 of 636

4) 7/8 of 408

5) 2/5 of 1220

Finding fractions of amounts

Sometimes, questions involving amounts of fractions can become more complex and involve more than one step.

e.g. Marisol made 300 tarts. She sold 3/4 of them and gave a 1/3 of the remainder to her neighbour. How many did she have left?

As the original fraction is 3/4, we have 4 equal boxes from our denominator.

300

3/4 were sold
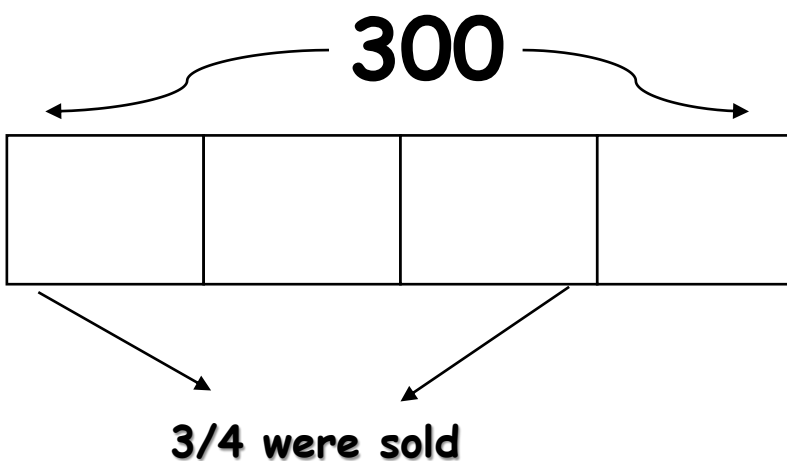
From the four boxes we can work out what each quarter is worth. 300 divided by 4 = 75

75	75	75	75

3/4 were sold

1/3 of the remainder were given away.
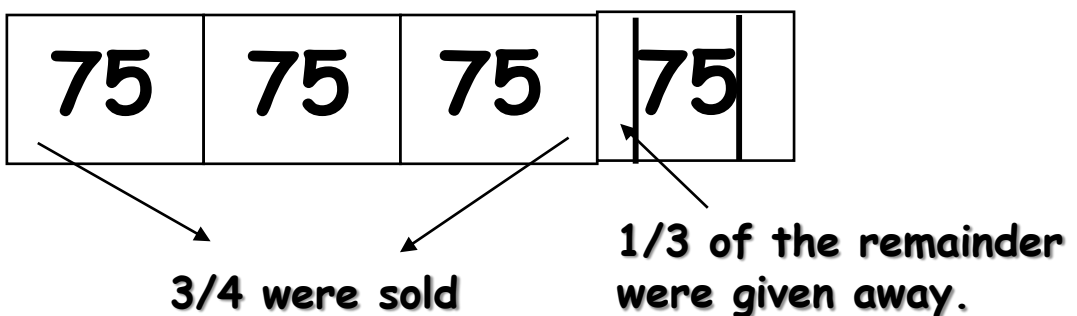
We know we are left with a ¼ or 75 tarts with a 1/3 of this being given away. Once this is divided into thirds we can see each bit was worth 25 meaning 25 were given away and 50 were left over.

75

25	25	25
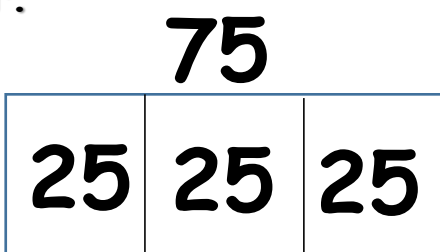
Finding fractions of amounts

Some questions may give you a fraction of an amount and ask you for the original number.

e.g. 3/5 of a number is 60. What is the original number? As before, we base our model on the denominator so we include 5 equal size boxes.

?

60
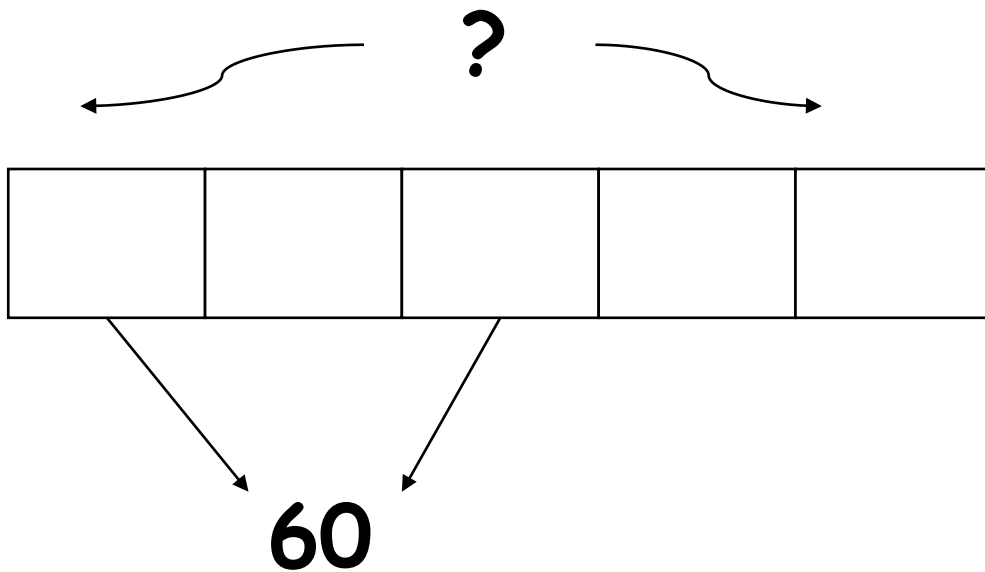
However this time, we are told 3/5 is 60 and we want to know the original number so we show that our 3 boxes are worth 60.

We can now see that 3 boxes are worth 60 so to work out what one box is worth we can divide 60 by 3.

$$3 \overline{)60} = 20$$

We can now see we have 5 boxes worth 20 each. If we multiply 20 by five, we will find the original number was 100
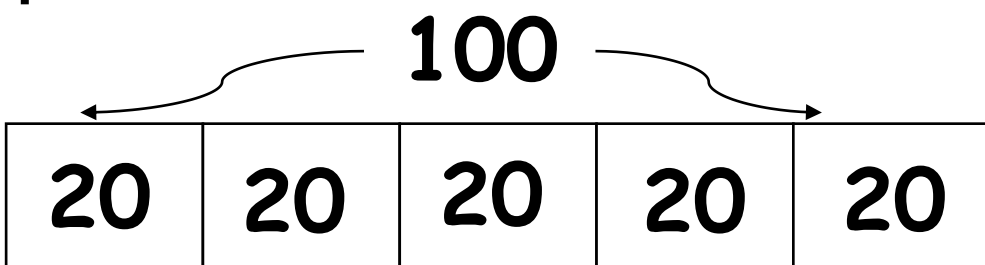
100

| 20 | 20 | 20 | 20 | 20 |

Finding fractions of amounts

Find the original numbers, using the bar model to help you.

1) 1/4 of a number is 35

2) 2/3 of a number is 50

3) 3/5 of a number is 33

4) 2/4 of a number is 68

5) 2/5 of a number is 80

Finding fractions of amounts

Find the original numbers, using the bar model to help you.

1) 2/3 of a number is 56

2) 3/4 of a number is 72

3) 4/5 of a number is 240

4) 1/3 of a number is 45

5) 1/4 of a number is 72

Finding fractions of amounts

Find the original numbers, using the bar model to help you.

1) 3/4 of a number is 132

2) 2/3 of a number is 78

3) 2/5 of a number is 120

4) 1/4 of a number is 34

5) 3/5 of a number is 330

Finding fractions of amounts

Find the original numbers, using the bar model to help you.

1) 1/3 of a number is 76

2) 3/4 of a number is 420

3) 1/5 of a number is 130

4) 2/3 of a number is 126

5) 1/4 of a number is 227

Finding fractions of amounts

Find the original numbers, using the bar model to help you.

1) 2/7 of a number is 56

2) 3/5 of a number is 513

3) 5/6 of a number is 220

4) 7/8 of a number is 497

5) 2/5 of a number is 340

Finding fractions of amounts

Find the original numbers, using the bar model to help you.

1) 4/7 of a number is 68

2) 4/5 of a number is 444

3) 1/6 of a number is 80

4) 3/8 of a number is 129

5) 2/5 of a number is 230

Finding fractions

1) True or false?

To find 3/5 of a number, divide by 3 and multiply by 5. Convince me.

2) The three squares below are 1/4 of a rectangle. Can you draw the rest of the rectangle? Can you do it more than one way?
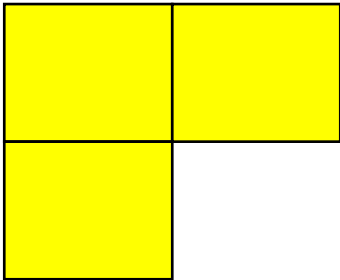
3) The local chip shop needs to buy some more potatoes. A large bag has 300 potatoes and a medium bag has 4/5 of a large bag.

The chip shop owner says "I need 260 potatoes, so I will have to buy a large bag." Is he correct? Explain your reasoning.

Finding fractions

4) David finds a fraction of an amount. He gets the answer 20. What could the original question have been?

5) Sarah says that 2/5 of 120 is 46. Is she right? Explain why.

6) Andrew says that it is possible to find 3/5 of 423. Explain why Andrew is wrong.

7) Sam bakes a variety of cakes. 1/3 are peanut, 1/2 are raisin and the remaining 12 were oat. How many biscuits did Sam bake?

Finding fractions

8) Sally has a bag of marbles. She gives 1/3 of them away to Rachel and then 1/4 of the remaining marbles to John. Sally then has 24 marbles left. How many did she begin with?

9) Sarah has 36 stickers. She gives 2/9 of them to David and 3/6 of her stickers to Andrew. How many stickers do they each have now?

10) If the answer to the question is 30, how many fraction questions can you think of with the answer 30?
e.g. 2/3 of 45 = 30

Mixed fractions to improper

$$2 \frac{3}{4}$$
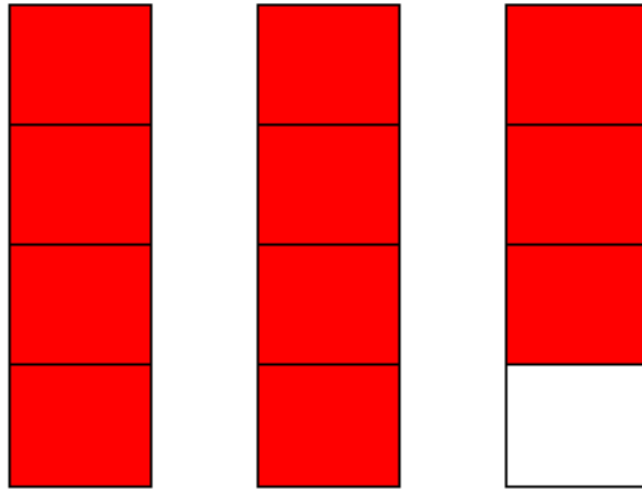
The whole number of 2 represents having 2 whole lots of 4 as the pieces are divided into 4. You then have 3 pieces on top of that to add on.

2 lots of 4 are 8 and then add the 3 on gives you 11.

$$\frac{11}{4}$$

Mixed fractions to improper

$$2\,\frac{3}{4}$$

A quicker way than drawing mixed fractions out is to calculate mathematically.

We know that the 2 means we have 2 whole lots of something.

As we have divided into 4 pieces, we have 2 lots of 4.

2 x 4 = 8

We also then have our 3 pieces of the numerator to add on.

8 + 3 = 11

$$\frac{8 + 3 = 11}{4}$$

$$2\,\frac{3}{4}$$

x   +

Mixed fractions to improper

Convert the following fractions from mixed number fractions to improper fractions.

1) 4 2/3

2) 2 3/5

3) 1 1/4

4) 3 4/7

5) 5 1/3

6) 2 1/2

7) 4 4/5

8) 1 5/8

9) 5 2/7

10) 3 3/4

Mixed fractions to improper

Convert the following fractions from mixed number fractions to improper fractions.

1) 4 1/8

2) 2 2/3

3) 1 7/9

4) 3 5/8

5) 5 2/5

6) 2 1/3

7) 4 6/7

8) 1 3/4

9) 5 1/2

10) 3 7/10

Improper fractions to mixed

$$\frac{7}{3}$$
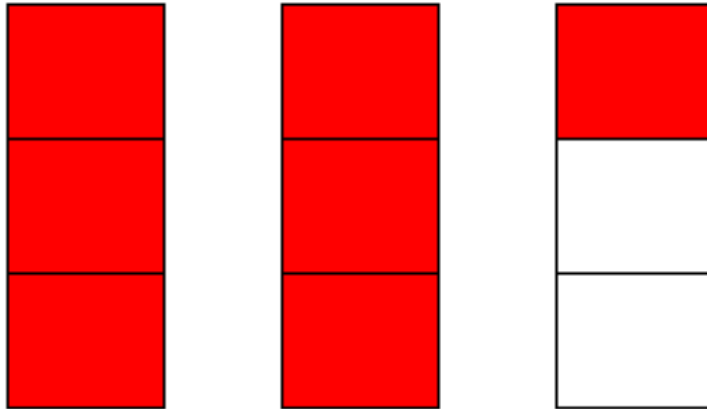
The seven shows us that we have seven pieces of something that has been divided into 3 equal pieces. We can see from the diagram that this leaves us with 2 whole lots and 1 piece on the final box.

This means we have: $2\frac{1}{3}$

Improper fractions to mixed

$$\frac{7}{3}$$

A quicker way than drawing mixed fractions out is to calculate mathematically.

Our line that separates 7 and 3 acts as a division symbol.

As 7 is our numerator, this is what will be divided.

As three is our denominator this is what we will be dividing by.

7 ÷ 3 = 2 with a remainder of 1.

This is the same as: $2\frac{1}{3}$

Improper fractions to mixed

Convert the following fractions from improper fractions to mixed numbers.

1) 27/5

2) 11/6

3) 13/3

4) 17/4

5) 29/7

6) 34/9

7) 15/6

8) 21/4

9) 37/7

10) 43/5

Improper fractions to mixed

Convert the following fractions from improper fractions to mixed numbers.

1) 11/2

2) 31/7

3) 17/3

4) 53/6

5) 45/4

6) 51/5

7) 23/6

8) 57/9

9) 39/4

10) 63/5

Converting Fractions

1) A pizza has 8 slices. At a party, 2 full pizzas and 3 slices are left over. Write this as an improper fraction.

2) Pencils are packed 8 to a box. A teacher hands them out and has 23/8 left. Write how many boxes she has left as a mixed number.

3) Use <, > and = to compare these fractions

13/4   3 2/4

12/5   1 3/5

37/7   5 4/7

14/3   4 2/3

40/6   6 5/6

20/8   2 3/8

4) True or false? A mixed number is not a whole number. Explain why.

Converting Fractions

5) Spot and explain the mistake:

13/5 = **3** 3/5

6) Sammy eats 7/4 of his sandwiches. Joey eats **1** 3/4 of his sandwiches. Aaron says that Sammy ate more because 7 is the bigger number. David says that Joey ate more because a whole sandwich is bigger. Explain why both Aaron and David are incorrect.

7) Two sets of friends order pizza. The pizza comes in 8 slices. One set of friends eat 22 slices of pizza. David says if you add on the **2** 2/8 we ate then between us we ate 5 pizzas. Is David correct? Explain your reasoning.

Converting Fractions

8) Sarah orders packs of bouncy balls with 10 in each. She hands out 43 bouncy balls to her friends. Write how many packs she handed out as a mixed number fraction.

9) A group of friends are making lemonade to sell for charity. They make 23 1/4 litres of lemonade. By the end of the day they only have 1 5/8 litres of lemonade left. How many litres of lemonade were sold?

10) If they sold the lemonade in 125ml glasses, for 40p each, how many glasses did they sell and how much did they make?
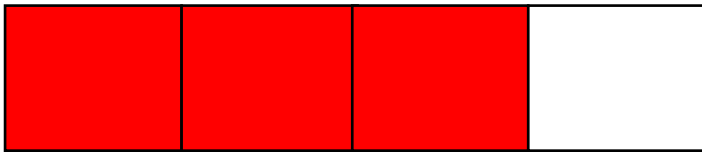
Adding Fractions

If fractions have the same denominator, then you can simply add the two numerators together.

e.g.:

Numerator

$$\frac{3}{4} \quad + \quad \frac{2}{4}$$

Denominator

You don't add the denominators together as you are still dividing into 4 pieces.
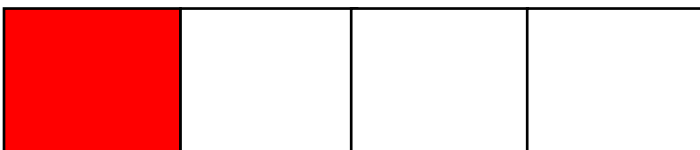

$$\frac{3}{4}$$

+

$$\frac{2}{4}$$

=

$$\frac{5}{4}$$

$$1\frac{1}{4}$$

Adding Fractions

If fractions have a different denominator, then you need to make the denominators equivalent before adding the numerator.
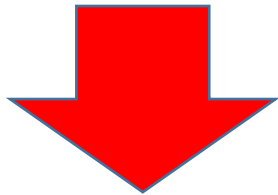
e.g.:

$$\frac{3}{8} \quad + \quad \frac{2}{4}$$

Because 4 is a multiple of 8, we can multiply 4 by 2 to make it so both denominators are 8.
Remember, whatever you do to the bottom you do to the top.

$$\frac{3}{8} \quad + \quad \frac{2}{4} \begin{array}{l} \times 2 \\ \\ \times 2 \end{array}$$

$$\frac{3}{8} \quad + \quad \frac{4}{8}$$

Now the denominators are the same, we can add the numerators.

$$\frac{3}{8} \quad + \quad \frac{4}{8} \quad = \quad \frac{7}{8}$$

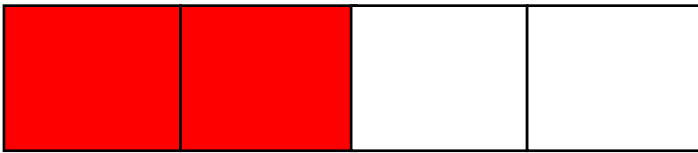You don't add the denominators together as you are still dividing into 8 pieces.

Adding Fractions

If fractions have a different denominator, then you need to make the denominators equivalent before adding the numerator.

e.g.:

$$\frac{3}{8} \quad + \quad \frac{2 \ \textcolor{red}{\times 2}}{4 \ \textcolor{red}{\times 2}}$$

+

becomes:
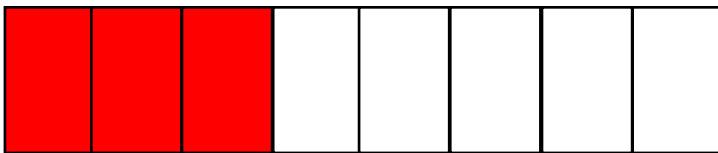
$$\frac{3}{8}$$

+

$$\frac{4}{8}$$

=

$$\frac{7}{8}$$
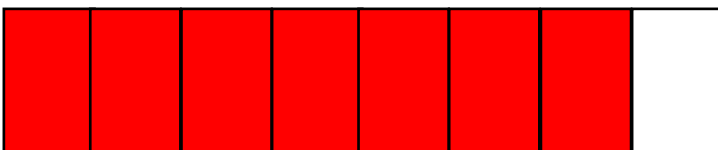
Adding Fractions

Solve these additions:

1) 3/4 + 2/4

2) 2/3 + 1/3

3) 4/5 + 2/5

4) 5/7 + 3/7

5) 2/5 + 1/5

6) 7/9 + 4/9

7) 3/10 + 8/10

8) 2/3 + 2/3

9) 4/10 + 7/10

10) 3/5 + 3/5

11) 3/8 + 7/8

Adding Fractions

Solve these additions:

1) 2/3 + 4/9

2) 3/4 + 5/8

3) 3/5 + 7/10

4) 12/14 + 3/7

5) 5/6 + 9/12

6) 3/4 + 7/12

7) 4/5 + 11/15

8) 11/16 + 3/4

9) 2/3 + 13/15

10) 1/4 + 17/20

11) 13/18 + 2/3

Subtracting Fractions

If fractions have the same denominator, then you can simply subtract the second numerator from the first numerator.
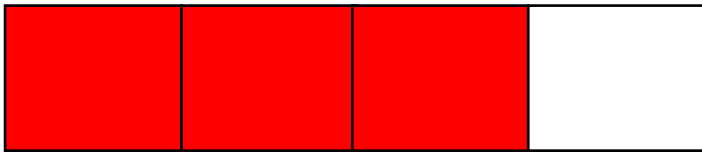
e.g.:

Numerator

$$\frac{3}{4} \quad - \quad \frac{2}{4}$$

Denominator

You don't subtract the denominators as you are still dividing into 4 pieces.

$$\frac{3}{4}$$

$+$

$$\frac{2}{4}$$

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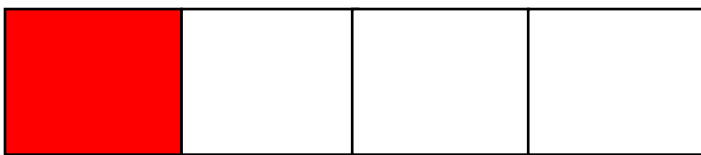
$$\frac{1}{4}$$

Subtracting Fractions

If fractions have a different denominator, then you need to make the denominators equivalent before subtracting the second numerator from the first.

e.g.:

$$\frac{7}{8} - \frac{2}{4}$$

Because 4 is a multiple of 8, we can multiply 4 by 2 to make it so both denominators are 8.
Remember, whatever you do to the bottom you do to the top.

$$\frac{7}{8} - \frac{2}{4} \begin{array}{l} \times 2 \\ \times 2 \end{array}$$

$$\frac{7}{8} - \frac{4}{8}$$

Now the denominators are the same, we can subtract the numerators.

$$\frac{7}{8} - \frac{4}{8} = \frac{3}{8}$$

You don't subtract the denominators as you are still dividing into 8 pieces.

Subtracting Fractions

If fractions have a different denominator, then you need to make the denominators equivalent before subtracting the second numerator from the first numerator.
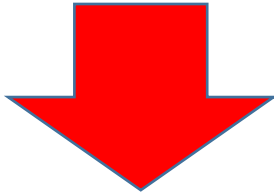
e.g.:

$$\frac{7}{8} \qquad - \qquad \frac{2 \;\; \times\, 2}{4 \;\; \times\, 2}$$

+
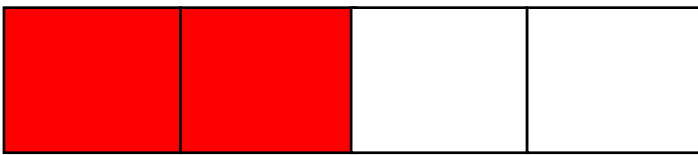
becomes:

$$\frac{7}{8}$$

-
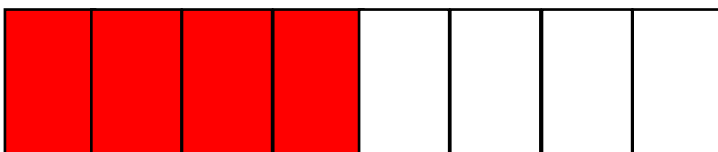
$$\frac{4}{8}$$

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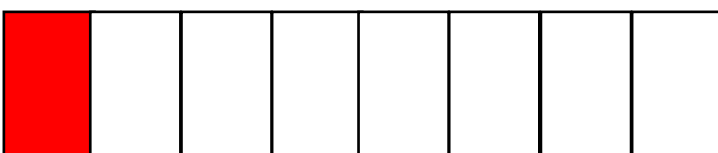
$$\frac{1}{8}$$

Subtracting Fractions

Solve these subtractions:

1) 3/4 – 2/4

2) 2/3 - 1/3

3) 4/5 - 2/5

4) 5/7 - 3/7

5) 4/5 - 1/5

6) 7/9 - 4/9

7) 7/10 - 4/10

8) 7/8 – 3/8

9) 9/10 – 5/10

10) 6/7 – 2/7

11) 11/12 – 6/12

Subtracting Fractions

Solve these subtractions:

1) 7/8 – 3/4

2) 2/3 – 2/6

3) 6/7 – 10/14

4) 3/4 – 5/8

5) 1/2 – 3/10

6) 12/15 – 3/5

7) 7/10 - 1/5

8) 7/8 – 11/16

9) 4/5 – 5/10

10) 7/9 – 15/27

11) 9/10 – 16/20

Adding and Subtracting Fractions

1) The answer is 4/7. What is the question?

2) True or false?

4/8 + 2/8 = 6/8

4/8 + 2/8 = 6/16

4/8 + 2/8 = 3/4

Explain your reasoning.

3) Sarah chooses two fractions and subtracts the smaller one away from the bigger one. Her answer is 1/5. What fractions could Sarah have chosen?
How many ways can you find to do it?
Can you do it with different denominators?

4) Fill in the missing fraction:

$$\frac{12}{5} \; + \; \frac{?}{?} \; = \; \frac{19}{5}$$

Adding and Subtracting Fractions

5) Sarah and Anna are given this missing number problem:

$$\frac{?}{?} \; - \; \frac{2}{5} \; = \; \frac{2}{5}$$

Sarah thinks the missing fraction is 4/5. Anna disagrees and thinks it's a different fraction. Explain why they could both be right.

6) Andrew says "I do not need to do any written calculations to solve 5/10 + 10/20."

Do you agree? Explain how you know.

7) A jug contains some lemonade. David pours 1/2 of the lemonade into a glass. He then pours another 4/10 of lemonade into another glass. What fraction of the lemonade is left?

Adding and Subtracting Fractions

8) Andrew doesn't understand why the denominator doesn't change when adding fractions but the numerator does. Can you explain why?

9) $2\dfrac{7}{8}$ - $1\dfrac{1}{4}$

$5\dfrac{2}{3}$ - $2\dfrac{5}{6}$

$3\dfrac{1}{4}$ - $1\dfrac{3}{8}$

10) Steven subtracts 4/7 away from a fraction and is left with the answer 7/28. What was the original question?

Multiplying Fractions by Whole Numbers

To multiply a fraction by a whole number, you multiply the **numerator** by the **whole number**.

For example:

$$5 \times \frac{3}{4} = 5 \times 3 = \frac{15}{4}$$

You don't multiply the denominator as you are still dividing into 4 pieces.

$$5 \times \frac{3}{4}$$

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

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

Multiplying Fractions by Whole Numbers

Answer the questions below:

1) 3/4 × 3

2) 2/5 × 8

3) 4/5 × 2

4) 7/8 × 5

5) 5/6 × 4

6) 7/9 × 7

7) 3/4 × 7

8) 4/5 × 5

9) 5/7 × 3

10) 2/3 × 9

Multiplying Fractions by Whole Numbers

Draw diagrams to represent the questions below:

1) $3 \times 2/3$

2) $3/7 \times 5$

3) $4 \times 2/5$

4) $1/6 \times 4$

5) $2/3 \times 7$

6) $3 \times 3/4$

Multiplying Fractions by Whole Numbers

1) David says, 'When I multiply a fraction by a whole number I turn the whole number into a fraction by adding /1 to it, for example 2 x 6/8 becomes 2/1 x 6/8.' Does this make a difference? Does it help? Explain why.

2) Fill in the missing fractions:

4/5 x ? = 20/5

2/3 x ? = 28/3

3/7 x ? = 18/7

7/10 x ? = 42/10

1/3 x ? = 9/3

3)

$$3\frac{3}{4} \times 3$$

$$2\frac{2}{5} \times 4$$

Multiplying Fractions by Whole Numbers

4) Multiply these mixed numbers by 5 and place them in order from the biggest to the smallest.

2 3/5   **2** 6/8   **2** 3/7   **2** 1/6

Did you think they would be in that order? Discuss.

5) Graham is serving pizzas at a party. Each person is given 2/3 of a pizza. How many pizzas would Graham need if he had 4 guests? 6 guests? 8 guests? 10 guests? When will he have pizza left?

6) If the answer is 15/7, what is the question? How many different questions can you come up with?

7) Anna says when she multiplies a fraction by a whole number she gets 24/5. What could have multiplied together to get this answer? Show your answer using a pictorial representation.

Multiplying Fractions by Fractions

To multiply a fraction by a fraction, you multiply the numerator by the numerator and the denominator by the denominator.

For example:

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

$$\frac{1}{2} \times \frac{1}{4}$$

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

Multiplying Fractions by Fractions

To multiply a fraction by a fraction, you multiply the numerator by the numerator and the denominator by the denominator.

For example:

$$\frac{1}{3} \times \frac{1}{4} = \frac{1}{12}$$

$$\frac{1}{3} \times \frac{1}{4}$$

$$\frac{1}{4} \qquad \frac{1}{3} = \frac{1}{12}$$

Multiplying Fractions by Fractions

Answer the questions below:

1) 7/9 × 3/7

2) 3/4 × 7/8

3) 4/5 × 3/5

4) 5/7 × 3/8

5) 2/3 × 7/9

6) 8/9 × 3/4

7) 5/6 × 5/6

8) 4/9 × 2/3

9) 7/8 × 4/5

10) 3/5 × 2/3

Multiplying Fractions by Fractions

Draw diagrams to represent the questions below:

1) 1/3 x 1/2 = 1/6

2) 1/3 x 1/3 = 1/9

3) 1/4 x 1/3 = 1/12

4) 1/6 x 1/3 = 1/18

5) 1/5 x 1/5 = 1/25

6) 1/4 x 1/5 = 1/20

Multiplying Fractions by Fractions

1) Jenny is multiplying the following sum: 1/5 x 1/6

The answer she gets is 2/30. Explain what she has done.

2) Michelle sees that when she multiplies 2 fractions together she ends up with a smaller fraction. She thinks she will eventually have a decimal number. Do you agree? Explain your answer.

3) If 1/4 x 1/2 = 1/8 does 2/8 x 2/4 = 2/16? Explain your answer.

4) If the answer is 1/12, what could the question be? How many options can you find?

Multiplying Fractions by Fractions

5) Jenny multiples 2/3 by 1/5. Steven says "She gets the answer 2/15." David says "She gets the answer 3/10." Who is right? Can you explain the mistake the other person has made?

6) If the answer is 12/18, what could the question be? How many options can you find?

7) Find the missing fractions:

4/5 x ?/? = 12/35

2/3 x ?/? = 12/21

3/7 x ?/? = 9/28

7/10 x ?/? = 21/50

1/3 x ?/? = 6/30

8) David says it is possible to multiply two fractions together and get the answer 1/5. Andrew says it isn't. Who is correct? Explain your reasoning.

Dividing Fractions by Whole Numbers

There are two ways to divide fractions by whole numbers.

The first way is to multiply the denominator by the number you are dividing by.

For example:

$$\frac{1}{2} \div 3 = 2 \times 3 = \frac{1}{6}$$

The reason you multiply the denominator by the dividing number is because the denominator already represents how many pieces it is divided in to. Therefore, by dividing again, you are dividing into even more pieces.

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

$$\div 3$$
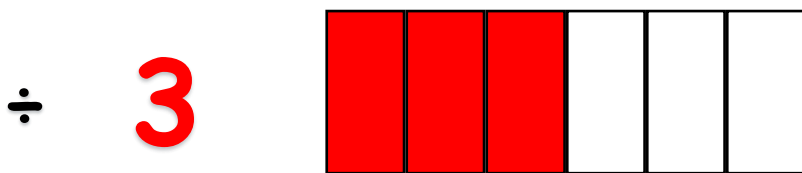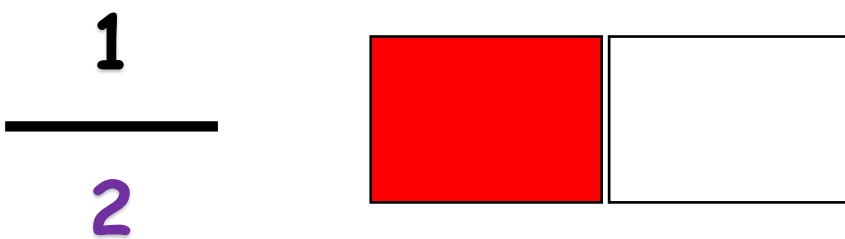
You can now see that each piece is 1 piece of 6. $= \frac{1}{6}$

Dividing Fractions by Whole Numbers

There are two ways to divide fractions by whole numbers.

The second way is that if the number you divide by goes into the numerator you can divide the numerator by the whole number.

For example:
Our numerator of 3 is divisible by our whole number of 3.

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

$$\frac{3}{5}$$

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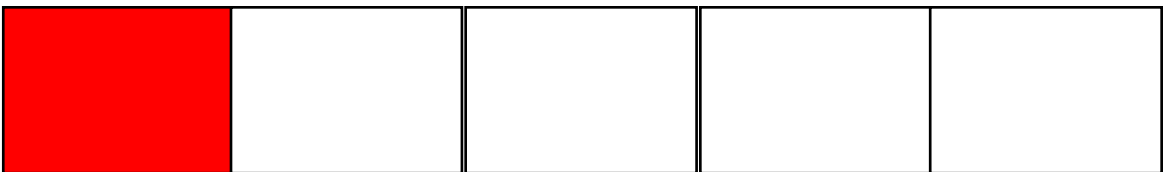
$$=\ \frac{1}{5}$$

Dividing Fractions by Whole Numbers

Answer the questions below:

1) 7/9 ÷ 3

2) 3/4 ÷ 7

3) 4/5 ÷ 5

4) 5/7 ÷ 3

5) 2/3 ÷ 9

6) 8/9 ÷ 4

7) 5/6 ÷ 5

8) 4/9 ÷ 3

9) 7/8 ÷ 5

10) 3/5 ÷ 2

Dividing Fractions by Whole Numbers

1) Half a bottle of lemonade is shared equally between 7 children. What fraction of the bottle did they each get?

2) Alfie has 5/8 of a pizza left. He shares it between 3 people. How much do they each get?

3) David says "When dividing fractions by a whole number, I just ignore the numerator."

Do you agree? Explain why.

4) Look at the calculation below. Work out the missing parts.

?/? ÷ ? = 4/36

How many different ways can you find?

Dividing Fractions by Whole Numbers

5) Beth's mum ordered a pizza for her and her friends. By the time they arrived home there was only 7/12 of it left. When she shared it among her friends they each got 7/72. How many friends did Beth have with her?

6) Solve the following calculations: What do you notice? Explain why the pattern has formed.

1/3 ÷ 4 =

1/4 ÷ 4 =

1/5 ÷ 4 =

1/6 ÷ 4 =

7) Half a bottle of lemonade is shared equally between 3 children. What fraction of the bottle did they each get?

8) Alfie has 4/6 of a pizza left. He shares it between 4 people. How much do they each get?

Fraction, decimals and percentages

1/3	0.33	33.33%
2/3	0.66	66.66%
1/4	0.25	25%
2/4	0.50	50%
3/4	0.75	75%
1/5	0.20	20%
2/5	0.40	40%
3/5	0.60	60%
4/5	0.80	80%

Fraction, decimals and percentages

1/8	0.125	12.5%
2/8	0.25	25%
3/8	0.375	37.5%
4/8	0.50	50%
5/8	0.625	62.5%
6/8	0.75	75%
7/8	0.875	87.5%

Fraction, decimals and percentages

1/10	0.10	10%
2/10	0.20	20%
3/10	0.30	30%
4/10	0.40	40%
5/10	0.50	50%
6/10	0.60	60%
7/10	0.70	70%
8/10	0.80	80%
9/10	0.90	90%

Fraction, decimals and percentages

Convert these fractions to decimals and percentages:

1) 1/5

2) 2/5

3) 3/5

4) 4/5

5) 1/4

6) 3/4

7) 1/2

8) 1/10

9) 7/10

10) 3/10

11) 9/10

12) 4/10

13) 10/25

14) 20/25

Fraction, decimals and percentages

1) There are 100 Malteasers in a bag. 56 were eaten. How many are left? Write this as a fraction and as a decimal.

2) There are 200 Lego pieces in a box. Ted uses 114 of them to build a robot. Write the amount he used as a percentage out of 100.

3) Fill in the missing blanks to make the statement true. ___% = __/100 = 0.1

4) There are 25 Smarties in a tube. 8 were eaten. How many are left? Write this as a fraction and as a decimal.

5) David reads 150 pages of her 500 page book. She says 'I have 350/500 pages left to read.' Can she write this as a percentage out of 100? Explain why.

Fraction, decimals and percentages

6) True or false? You can write 12.5% as a decimal. Explain your answer.

7) Anna has a 100 square. She colours in 25% of them and says 'I have coloured in 1/4.' Is she right? Explain why?

8) There are 400 Lego pieces in a box. Ted uses 248 of them to build a robot. Write the amount he used as a percentage out of 100.

9) There are 50 Smarties in a tube. 17 were eaten. How many are left? Write this as a fraction and as a decimal.

10) Lily has a 300 square. She colours in 35% of them and says 'I have coloured in 6/20.' Is she right? Explain why?

Glossary

Denominator – The number below the line in a fraction, also known as a divisor because it shows how many pieces something is divided into

Dividend – The number you are dividing e.g. 453 divided by 4 – The dividend is 453 because this is the number you will be dividing.

Divisor – The number you are dividing by e.g. 453 divided by 4 – The divisor is 4 as this is what you are dividing by.

Fraction - A fraction is a number that represents part of a whole. It is consisted of a numerator and a denominator

Improper fraction – A fraction where the numerator is bigger than the denominator e.g. 11/5

Mixed number fraction – Where a whole number and a fraction have been combined e.g. 1 3/4

Non-unit fraction – A fraction where the numerator is more than 1

Numerator – The number above the line in a fraction, showing how many parts indicated by the denominator are being taken e.g. 2 in 2/5

Percentage – A proportion or share in relation to a whole, generally being compared to 100

Proper fraction – A fraction where the numerator is smaller than the denominator and doesn't include a whole number e.g. 3/5

Unit fraction – A fraction where the numerator is 1