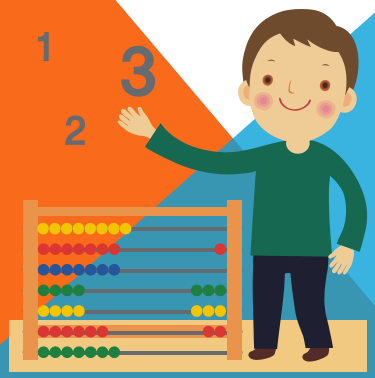
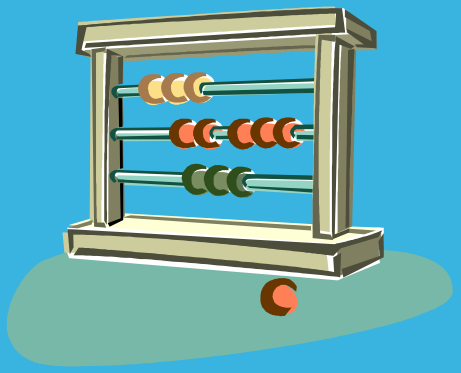
- ✓ Divide by 10 to find 10%
- ✓ Then half to find 5%
- ✓ Or Multiply to find other multiples of 10 e.g. 20%, 30%, 40%
- ✓ Divide by 1000 to find 1%.





31% of 1800

26% of 1200

43% of 1100

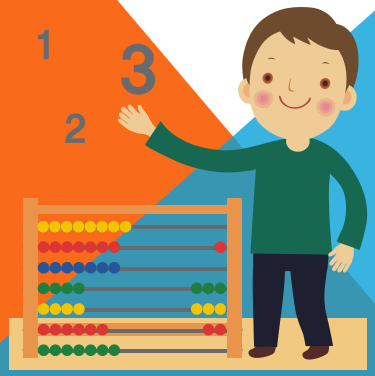
21% of 1400

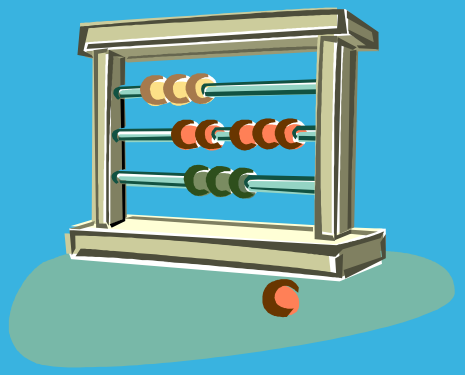
52% of 800

38% of 900

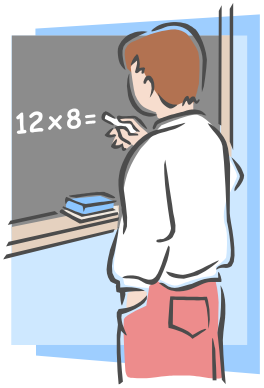
29% of 700

46% of 600





Learning Objective



To know the difference between ratio, proportion and Fractions

First Thoughts …

There's lots of differences between the classes in your school –

… Some have more boys than girls

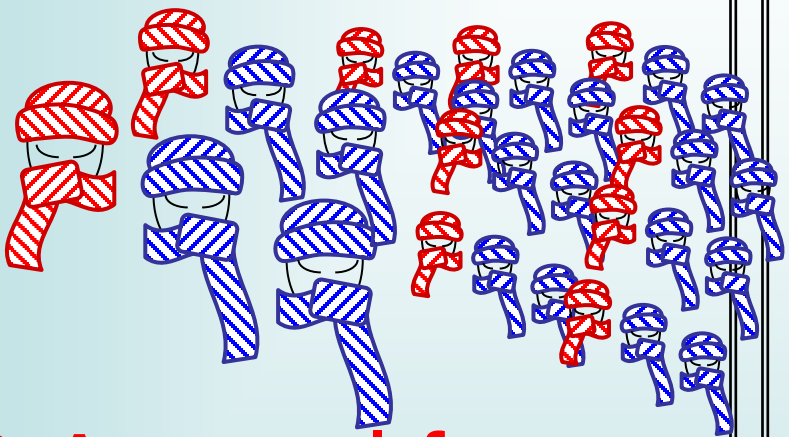
… Less Chelsea fans than Arsenal fans

… More cat-lovers than dog-lovers

… Less pizza-munchers than chicken-dippers

First Thoughts …

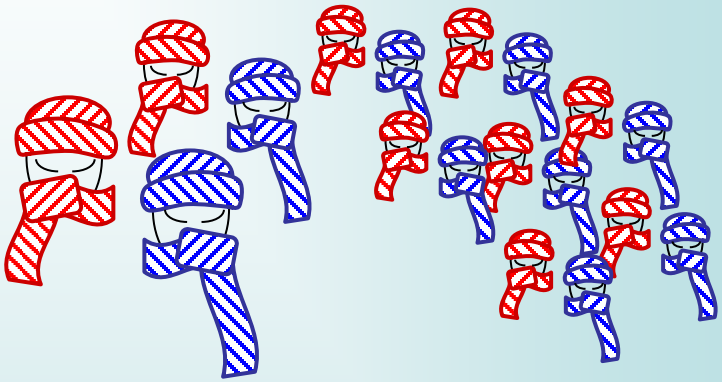
Class 6 has 30 pupils:



10 Arsenal fans

20 Chelsea fans

Class 5 has 18 pupils:



9 Arsenal fans

9 Chelsea fans

You're a Arsenal fan.

Which class would you rather be in?

Discuss and take a class vote.

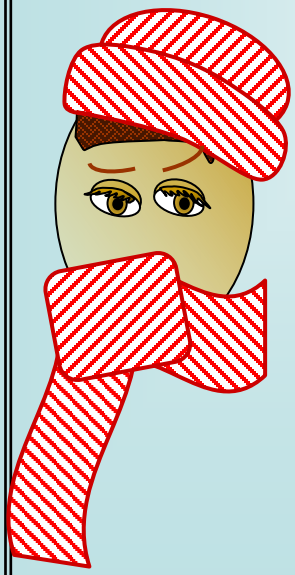
Did You Pick 6?

6: 10 + **20** = **30**

5: 9 + **9** = **18**

–

Matt, a mad Arsenal fan, picked 6:



“10 is bigger than 9,

so there’s more Arsenal fans in 6 than 5.

Yay!”

Did You Pick 5?

6: 10 + 20 = 30 5: 9 + 9 = 18

- But other red A…s picked 5:

third and *half* are **fractions**

2 to 1 is a **ratio**

1 out of 3 is a **proportion**

CIARA SAYS

"I'm not going to 6 - I'd be outnumbered 2 Chelsea to every 1 Arsenal fan!"

MEGAN SAYS:

"Only one third of 6 Arsenal fans. It's one half in 5.

OLIVIA SAYS:

"6 only has 10 out of 30 Arsenal fans. That's 1 out of 3."

All answers are correct! But - 3 different sorts of answer.

Which do you prefer? Why?

Recap – 3 Ways to Compare Numbers

"6 only has 10 out of 30 Arsenal fans. That's 1 out of 3."

"I'm not going to 6. I'd be outnumbered 2 to every 1."

"Only one third of 6 Arsenal fans. It's one half in 5."

Which question is a …

Fraction?

Ratio?

Proportion?

What's the Difference - Summing Up:

3 different ways to say the same thing

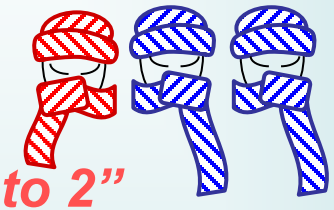
3 different ways to compare numbers

"1 to every 2" is a Ratio

*"1 Arsenal fan **to every** 2 Chelsea fans"*

"The ratio of Arsenal to Chelsea fans is 1 to 2"

"The ratio of Chelsea to Arsenal fans is 2 to 1"



Ratios compare PART WITH PART

"1 out of 3" is a Proportion

*"1 **out of every** 3 fans is a Arsenal fan"*

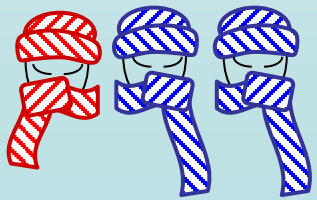
"The proportion of Arsenal fans is 1 out of 3"

Proportions compare PART WITH WHOLE

"One third" is a Fraction

"One third of all fans are Arsenal fans

"1/3 of all fans are Arsenal fans"



Fractions compare PART WITH WHOLE using shorthand such as **1/3**

Ratio, Proportion or Fraction?

two out of five

This is a … proportion

two fifths

This is a … fraction

four tenths

This is a … fraction

four to every ten

This is a … ratio

ten to every four

This is a … ratio

four out of ten

This is a … proportion

4/10

This is a … fraction

4:10

This is a … ratio

Ratio, Proportion or Fraction?

3 Chelsea fans to every 2 Rangers fans

This is a … ratio

9 girls out of 10 use soap

This is a … proportion

3 boys out of 10 use deodorant

This is a … proportion

The dinner queue

Ratio of girls to boys?

4 girls to every 8 boys

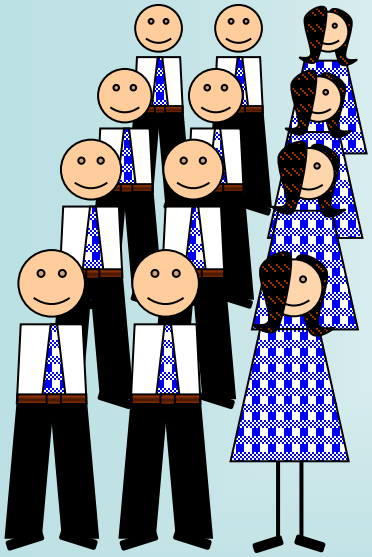
girls : boys = 4 : 8

But the simplest ratio is still 1 : 2

3 girls to every 6 boys

girls : boys = 3 : 6

But the simplest ratio is still 1 : 2



2 girls to every 4 boys

girls : boys = 2 : 4

But the simplest ratio is still 1 : 2

1 girl to every 2 boys

girls : boys = 1 : 2

This is the simplest ratio is 1 : 2

The dinner queue

Ratio of boys to girls?

8 boys to every 4 girls

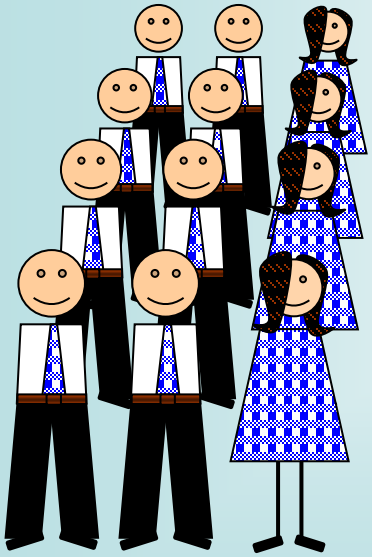
boys : girls = 8 : 4

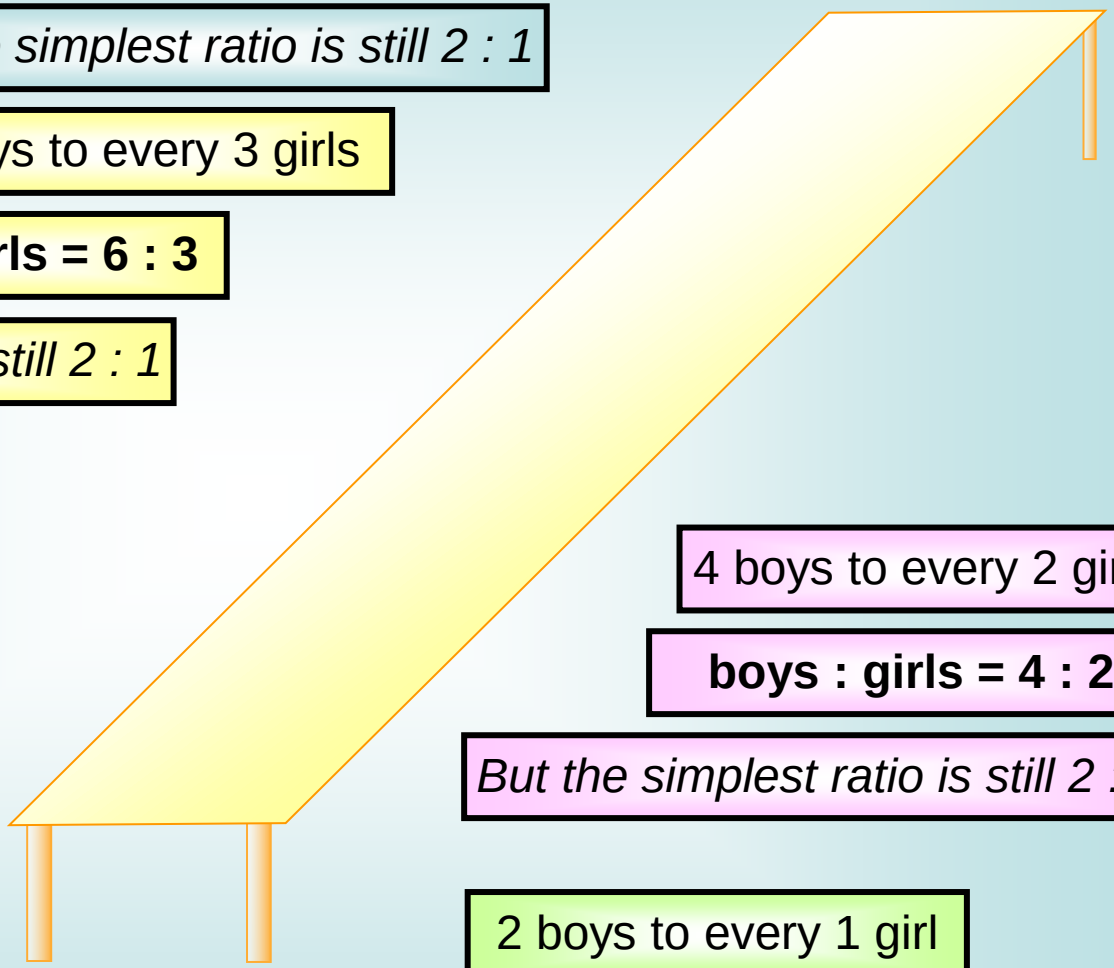
But the simplest ratio is still 2 : 1

6 boys to every 3 girls

boys : girls = 6 : 3

But the simplest ratio is still 2 : 1





4 boys to every 2 girls

boys : girls = 4 : 2

But the simplest ratio is still 2 : 1

2 boys to every 1 girl

boys : girls = 2 : 1

This is the simplest ratio is 2 : 1

Simplest ratios

2 : 1 is a simpler ratio than 4 : 2

but

They both mean the same

2 : 1 = 4 : 2

Can you explain why

2 : 1 = 6 : 3 ?

2 : 1 = 8 : 4 ?

2 : 1 = 100 : 50 ?

The dinner queue

What proportion is girls?

4 girls out of 12

Simplest proportion of girls is still 1 out of 3

3 girls out of 9

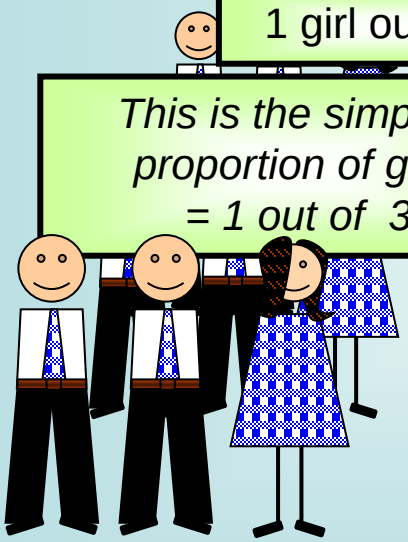
Simplest proportion of girls is still 1 out of 3

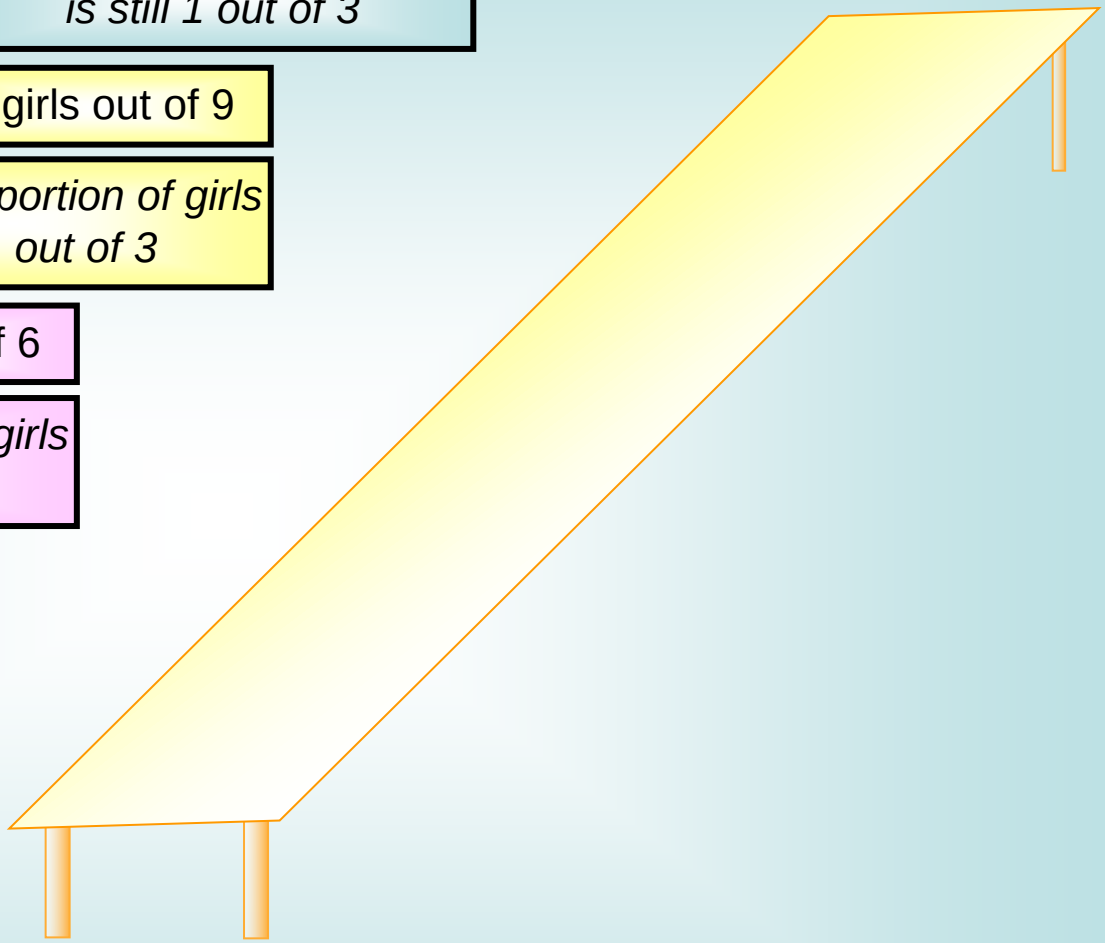
2 girls out of 6

Simplest proportion of girls is still 1 out of 3

1 girl out of 3

This is the simplest proportion of girls = 1 out of 3





Does order matter?

There are 20 boys and 10 girls in Year 6 .

Which of these are correct?

b) girls : boys = 2 : 1

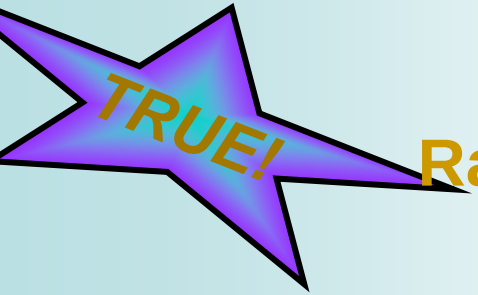
a) boys : girls = 2 : 1

c) boys : girls = 1 : 2

boys : girls = 2 : 1 *means* 2 boys to every girl
girls : boys = 2 : 1 *means* 2 girls to every boy

ORDER MATTERS!
Be careful what you write!

True or Not True?



Ratio of teachers to pupils = 30 : 1

Ratio of fans to players = 1 : 1000

This would mean all the players would be sitting in the stadium!

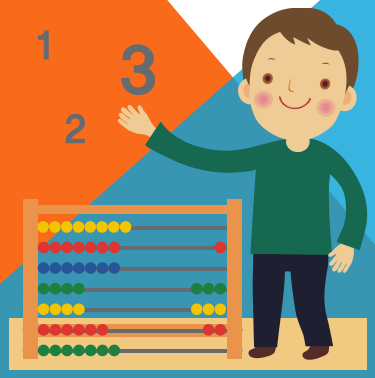
Ratio of weekdays to weekend days = 2 : 5

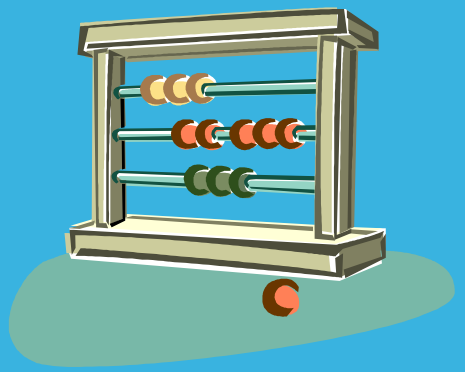
You wish!

Ratio of porridge lovers to pizza guzzlers = 100 : 1

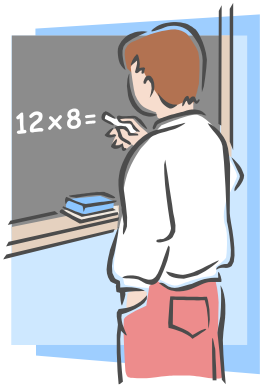
- Not until they invent Porridge Takeaways ..

FRACTION	1/2		1/10	1/5	2/5	3/10			
PERCENTAGE	50 %						70%	1%	25%





Learning Objective



To scale proportion up or down using multiplication and division.

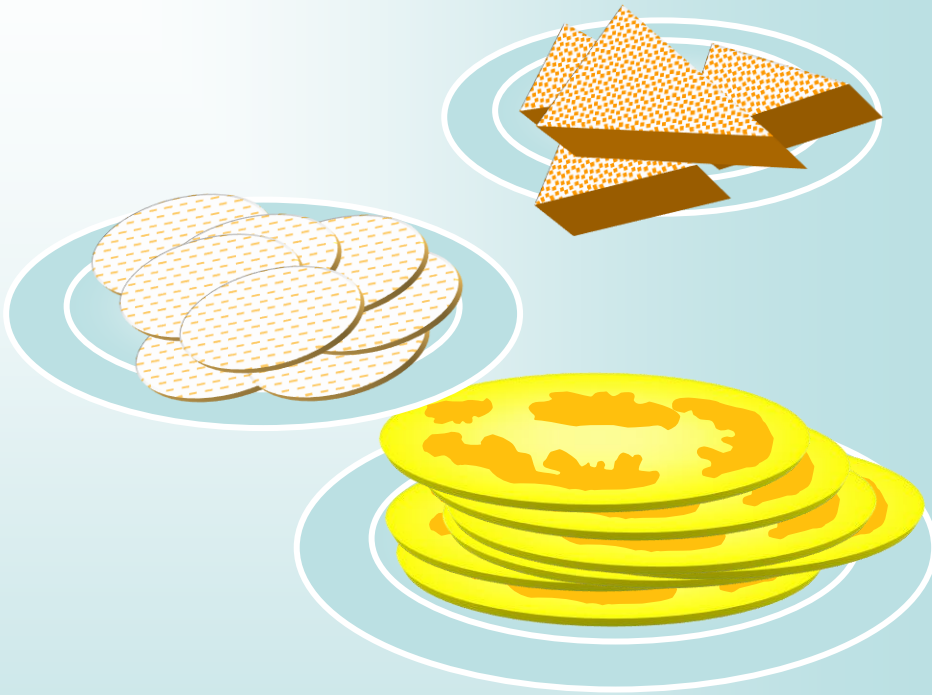
Biscuits and Bananas Skins

Enjoy cooking?
Check out these fantastic recipes!

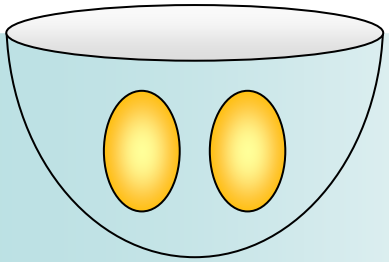
Some of them need changing
to suit the number of people,

- But remember to
keep them in proportion,

- And watch out for the



It's supper time! You make a simple omelette like this:



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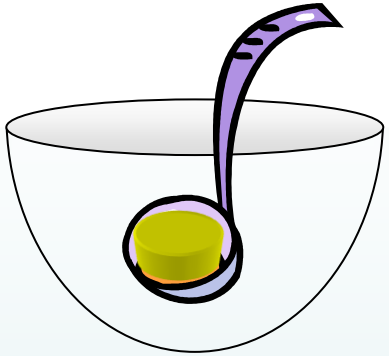

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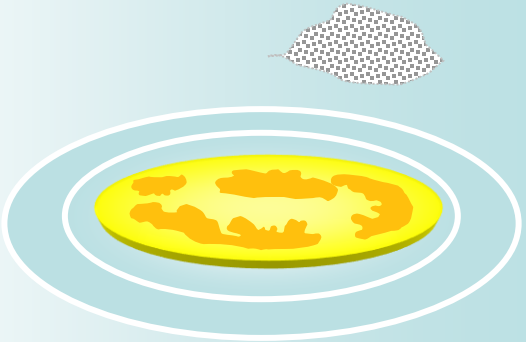


2 eggs + 1 teaspoon of butter = 1 omelette

Your omelette tastes amazing! - So of course your mates start turning up.

Can you scale up your ingredients to feed them all?

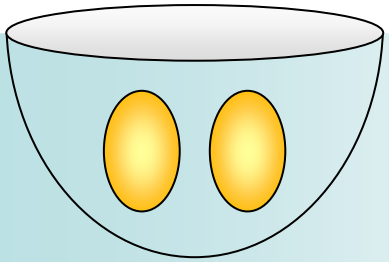
4 eggs + 2 tsp of butter = 2 omelettes

6 eggs + 3 tsp of butter = 3 omelettes

8 eggs + 4 tsp of butter = 4 omelettes

10 eggs + 5 tsp of butter = 5 omelettes

And the next week …



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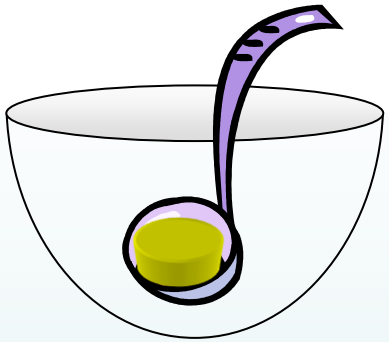

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2 eggs + 1 teaspoon of butter = 1 omelette

… word's getting around and more mates turn up the next day.

*Can you **scale up** your ingredients to feed them?*

4 eggs + 2 tsp of butter = 2 omelettes

10 eggs + 5 tsp of butter = 5 omelettes

20 eggs + 10 tsp of butter = 10 omelettes

22 eggs + 11 tsp of butter = 11 omelettes

Recipe for Shortbread Biscuits

Makes 20 shortbread biscuits

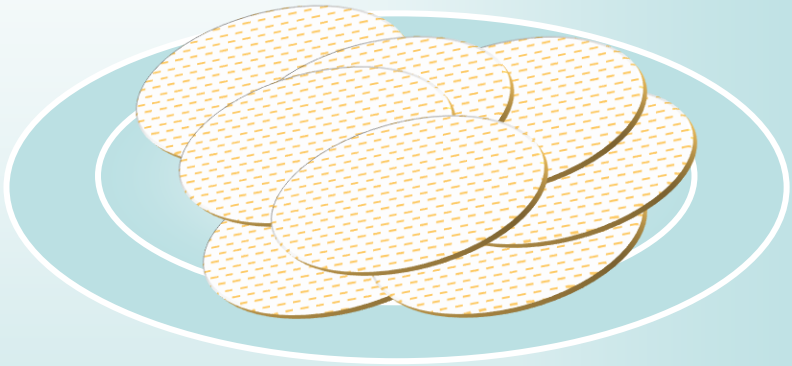
Ingredients

200g butter

200g plain flour

100g golden caster sugar

100g fine semolina



Pre-heat the oven to gas mark 2, 300°F (150°C).

You will also need an 8 in (20 cm) diameter fluted flan tin, 1¼ in (3 cm) deep with a loose base.

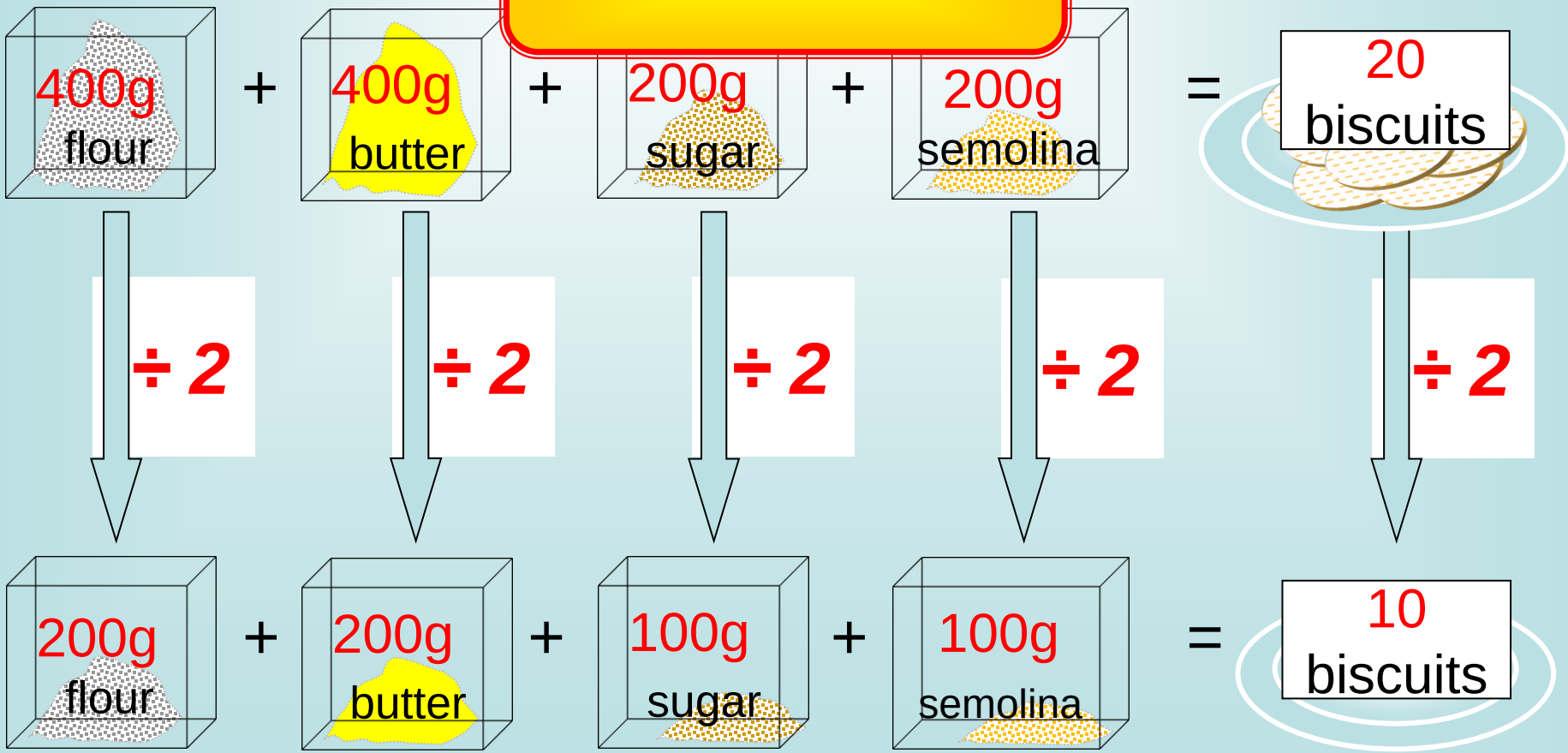
10 Mouth-watering Shortbread Biscuits!

biscuits. Can you scale

STEP 1: Choose the maths!
x or ÷ ?
BIGGER means X
SMALLER means ÷

STEP 2: Do the maths!
DO THE SAME X or ÷ to ALL ingredients

STEP 3: CHECK the maths!
- using ratio.
Eg: The weight of the butter is always 2 times the weight of the sugar.



STEP 1: CHOOSE the maths!

CHOOSE FROM x or ÷

... BIGGER means X

... SMALLER means ÷

STEP 2: DO the maths!

DO THE SAME X or ÷ to ALL ingredients

STEP 3: CHECK the maths!

- using ratio.

Eg: If the weight of the butter is always 2 times the weight of the sugar...

Whoops !

… Nirmal makes 2 shortbread biscuits

Mistake in STEP 1: Choose the maths!

Check his working out

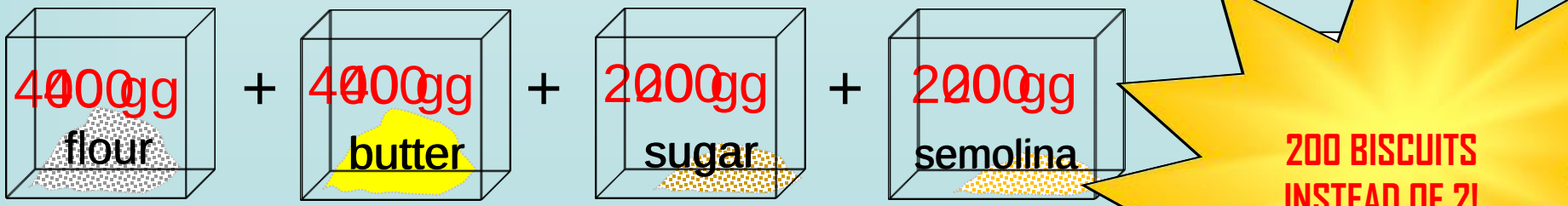
Then click to see if you're right

…don't taste right!

Did h… …in proportion?

÷ 10 ÷ 10 ÷ 10 ÷ 10 ÷ 10

x 10



200 BISCUITS INSTEAD OF 2!

STEP 1: CHOOSE the maths!

CHOOSE FROM x or ÷

... BIGGER means X

... SMALLER means ÷

STEP 2: DO the maths!

DO THE SAME X or ÷ to ALL ingredients

STEP 3: CHECK the maths!

- using ratio.

Eg: If the weight of the butter is always 2 times the weight of the sugar...

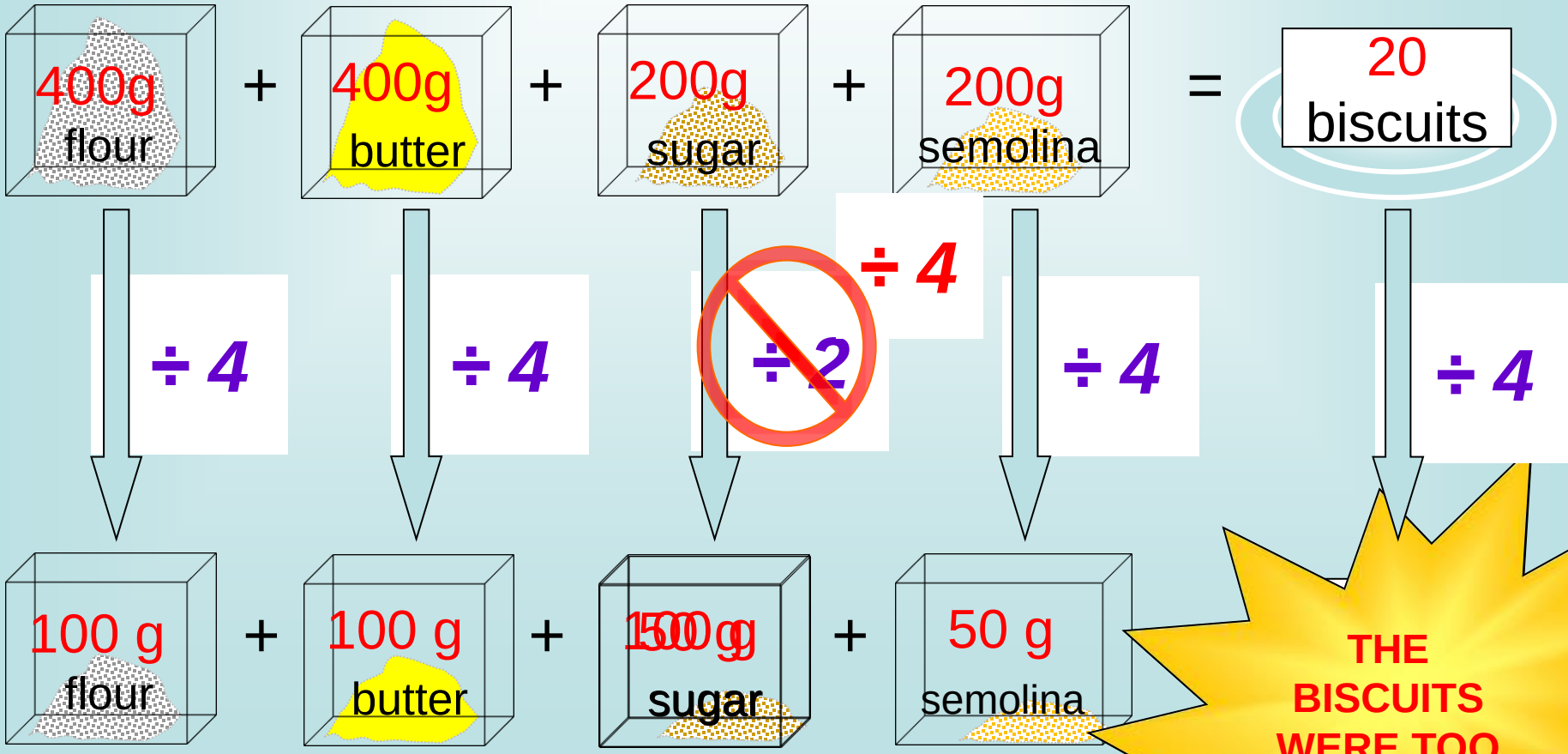
Whoops!

… Liana makes 5 shortbread biscuits

Mistake in STEP 2: Do the maths!
DO THE SAME X or ÷ to ALL ingredients
BUT …Liana did not do ÷ 2 to the sugar.

… don't taste right!

Did s… in proportion?



THE BISCUITS WERE TOO SWEET!

STEP 1: CHOOSE the maths!

CHOOSE FROM x or ÷

... BIGGER means X

... SMALLER means ÷

STEP 2: DO the maths!

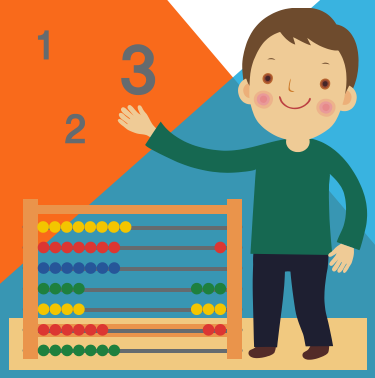
DO THE SAME X or ÷ to ALL ingredients

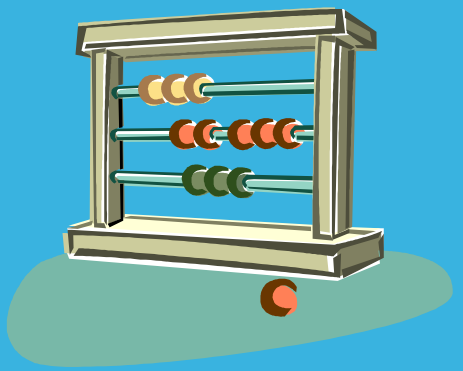
STEP 3: CHECK the maths!

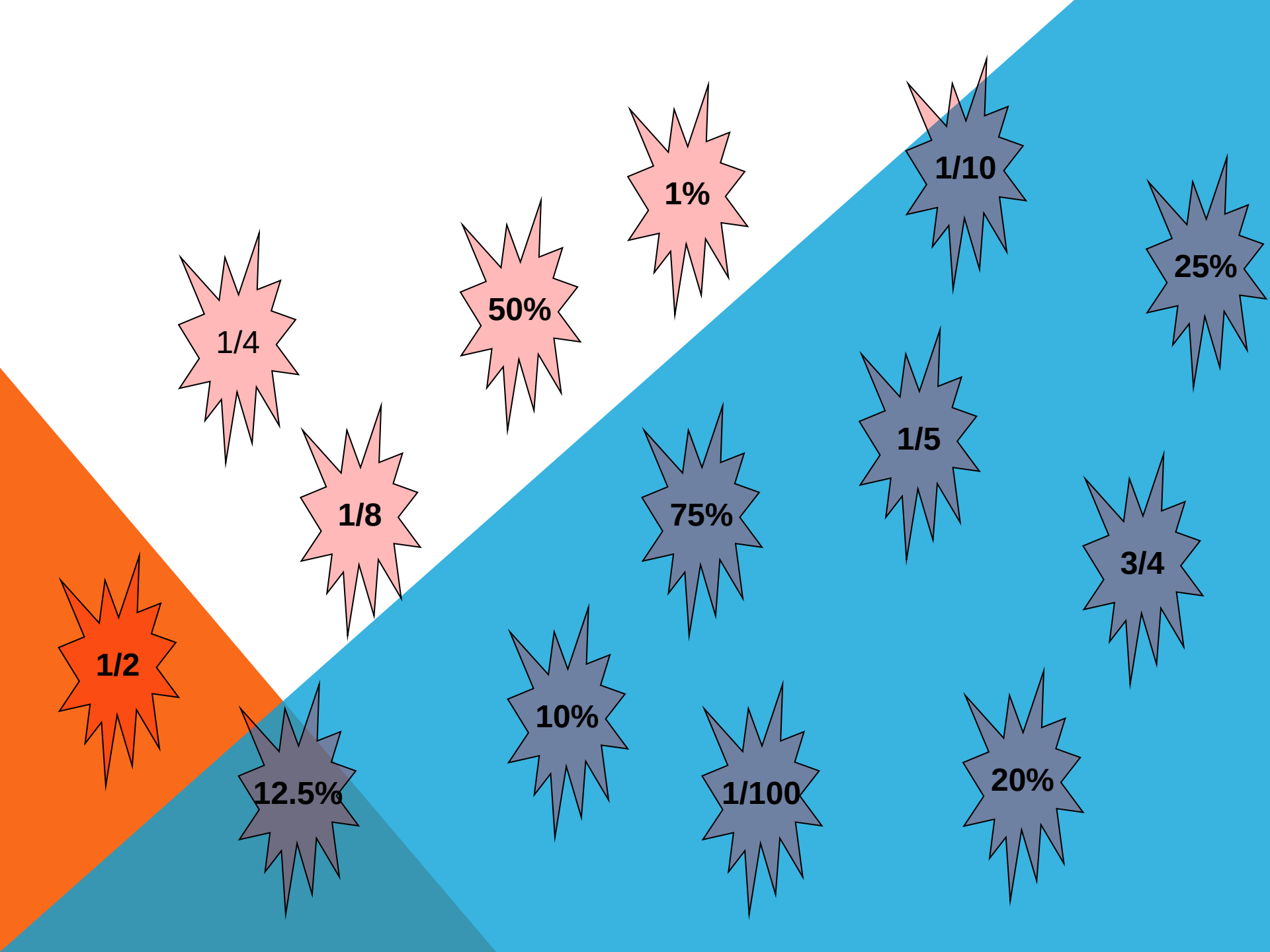
- using ratio.

Eg: If the weight of the butter is always 2 times the weight of the sugar...

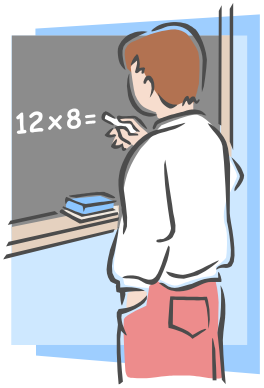
Find equivalent fractions and percentages.






1/4
50%
1%
1/10
25%
1/8
1/5
75%
3/4
1/2
10%
12.5%
1/100
20%

Learning Objective



To scale proportion up or down using multiplication and division.

Further Practical Examples

Recipe No.1 Melon Merenga

Serves 8 people

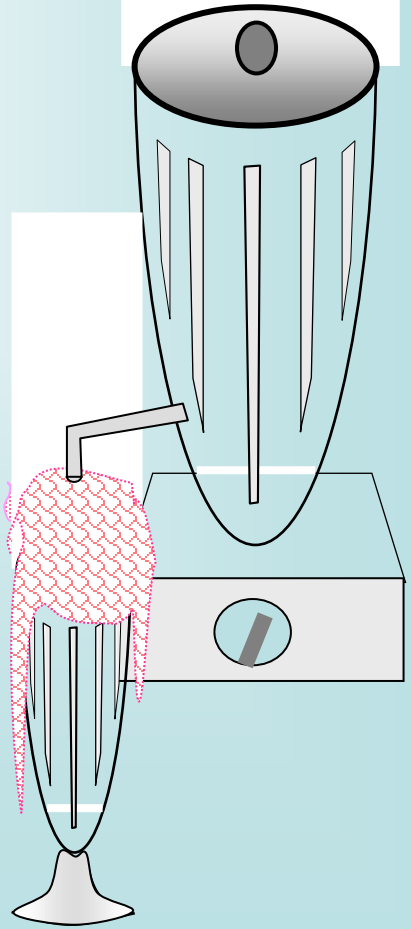
Ingredients

300 g raspberries
200 g bananas
100 g melon

Method

Place ingredients in a juicer and switch on power for 30 seconds.

Pour and serve with ice or ice-cream.



STEP 1: Choose the maths!

x or ÷ ?

BIGGER means X

SMALLER means ÷

STEP 2: Do the maths!

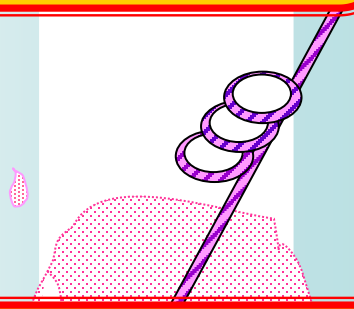
DO THE SAME X or ÷ to ALL ingredients

STEP 3: CHECK the maths!

- using ratio.

Eg: The bananas' weight is ALWAYS twice the melons' weight.

600 g	+	400 g	+ 200 g =	Melon Merenga for 8
300 g	+	200 g	+ 100 g =	Melon Merenga for 4
150 g	+	100 g	+ 50 g =	Melon Merenga for 2
75 g	+	50 g	+ 25 g =	Melon Merenga for 1
450 g	+	300 g	+ 150 g =	Melon Merenga for 6



General Method:

1) Work out the recipe for 1.
2) Multiply by the number you need

Shortcut:

1) Work out from the quantities for 2 people.
2) X 3 (easier than X6)

Further Practical Examples

Recipe No.2 Raspberry Fruitloop

(Same ingredients. Different amounts)

Serves 10 people

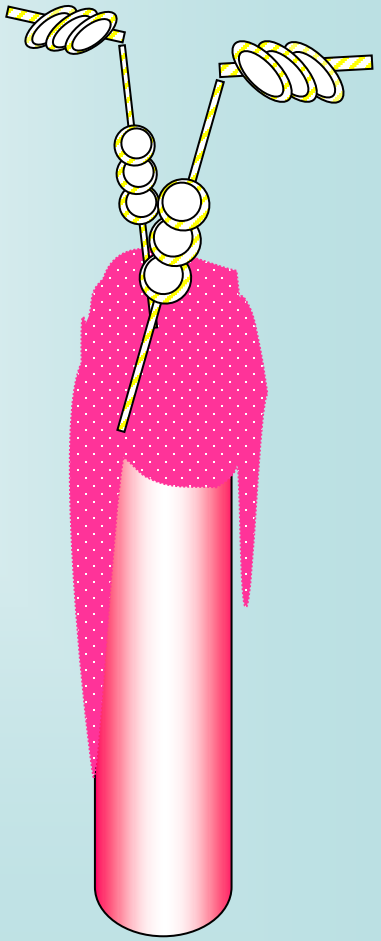
Ingredients

500 g raspberries
250 g bananas
150 g melon

Method

Place ingredients in a juicer and switch on power for 30 seconds.

Pour and serve with fresh raspberries



STEP 1: Choose the maths!

x or ÷ ?

BIGGER means X

SMALLER means ÷

STEP 2: Do the maths!

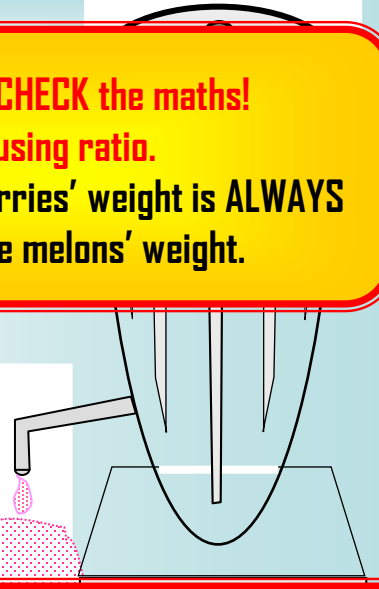
DO THE SAME X or ÷ to ALL ingredients

STEP 3: CHECK the maths!

- using ratio.

Eg: The raspberries' weight is ALWAYS twice the melons' weight.

500 g	+ 250 g	+ 150 g	=	Raspberry Fruitloop for 10
250 g	+ 125 g	+ 75 g	=	Raspberry Fruitloop for 5
50 g	+ 25 g	+ 15 g	=	Raspberry Fruitloop for 1
200 g	+ 100 g	+ 60 g	=	Raspberry Fruitloop for 4
400 g	+ 200 g	+ 120 g	=	Raspberry Fruitloop for 8



General Method:

1) Work out the recipe for 1.
2) Multiply by the number you need

Shortcut:

1) Work out from the quantities for 4 people.
2) Just double it!

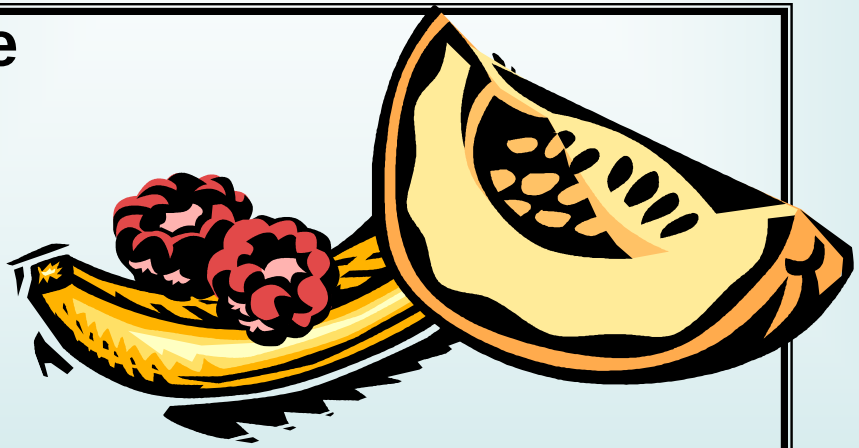
(Easier than X8)

Further Practical Examples

Recipe No.3 Bombastic Banana Boat

(Same ingredients. Different amounts)

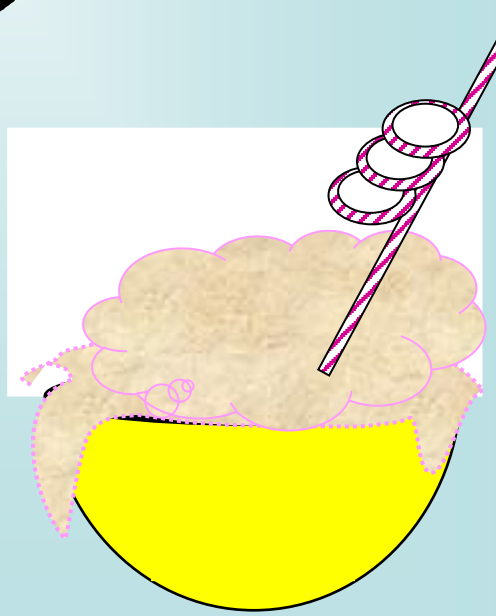
Serves 12 people



Ingredients
120 g raspberries
600 g bananas
120 g melon

Method
Place ingredients in a juicer and switch on power for 30 seconds.

Pour into a scooped out melon half . Serve with fresh raspberries



STEP 1: Choose the maths!

x or ÷ ?

BIGGER means X

SMALLER means ÷

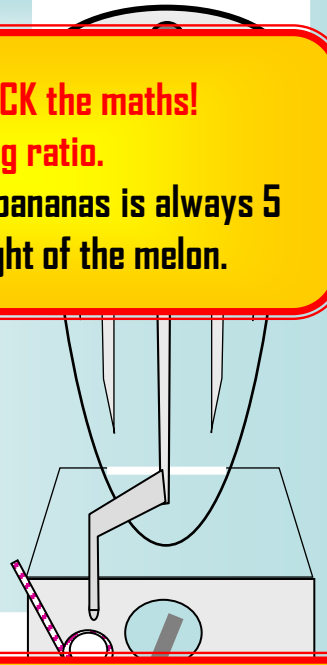
STEP 2: Do the maths!

DO THE SAME X or ÷ to ALL ingredients

STEP 3: CHECK the maths!

- using ratio.

Eg: The weight of bananas is always 5 times the weight of the melon.



120 g	+	600 g	+ 120 g =	**Banana Boat for 12**
60 g	+	300 g	+ 60 g =	**Banana Boat for 6**
40 g	+	200 g	+ 40 g =	**Banana Boat for 4**
10 g	+	50 g	+ 10 g =	**Banana Boat for 1**
80 g	+	400 g	+ 80 g =	**Banana Boat for 8**

General Method:

1) Work out the recipe for 1.
2) Multiply by the number you need

Shortcut:

1) Work out from the quantities for 4 people.
2) Just double it! *(Easier than X8)*

Ratio and proportion – A SATs question

Mari is the presenter of a weekly radio show.

She plays five new songs for every two old songs.
Last week she played 15 new songs.
How many songs did she play altogether?

Ratio and proportion

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How many songs did she play altogether?

Ratio and proportion

Mari is the presenter of a weekly radio show.

five new : two old

15 new : ?

Ratio and proportion

Mari is the presenter of a weekly radio show.

5 new : 2 old
15 new : ?

Ratio and proportion

Mari is the presenter of a weekly radio show.

5 : 2

15 : ?

Ratio and proportion

Mari is the presenter of a weekly radio show.

X 3

5 : 2

15 : ?

Ratio and proportion

Mari is the presenter of a weekly radio show.

X 3

5 : 2

15 : 6

X 3

Ratio and proportion

Mari is the presenter of a weekly radio show.

How many songs did she play altogether?

She played 6 old songs and 15 new songs.

Ratio and proportion

Mari is the presenter of a weekly radio show.

How many songs did she play altogether?

She played 21 songs altogether.

Ratio and proportion – Another SATs question

Here is a recipe for raspberry ice cream.

rasberry ice cream for 8 people
$\frac{1}{2}$ litre of cream
1kg rasberries
250g sugar

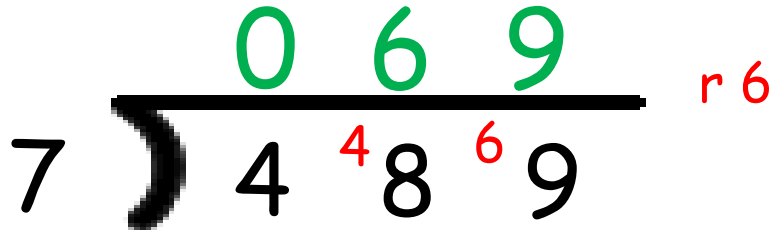
This recipe is for 8 people. Josie makes enough raspberry ice cream for 12 people. How much cream does she use?

Fred makes raspberry ice cream in the same way. He uses 2½ kg of raspberries. How much sugar does he use?

Long Division

The space saver method

Let's try 489 ÷ 7



Long Division

The space saver method

Let's try 4729 ÷ 28

$$
\begin{array}{r}
0\ 1\ 6\ 8 \\
28\overline{)\ 4\ {}^{4}7\ {}^{19}2\ {}^{24}9}
\end{array}
\quad r\ 25
$$

These might be useful: 28, 56, 84, 112, 140, 168, 196, 224, 252, 280

Long Division

The space saver method

Let's try 46283 ÷ 36

$$
\begin{array}{r}
0\ \ 1\ 2\ \ 8\ \ 5 \\
\hline
36\,\big)\,4^{4}\,6^{10}\,2^{30}\,8^{20}\,3
\end{array}
\qquad \text{r } 23
$$

These might be useful: 36, 72, 108, 144, 180, 216, 252, 288, 324, 360

Division practise

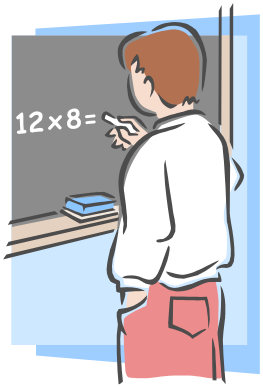
3682 divided by 6 613 r 4

6741 divided by 12 561 r 9

2065 divided by 32 64 r 17

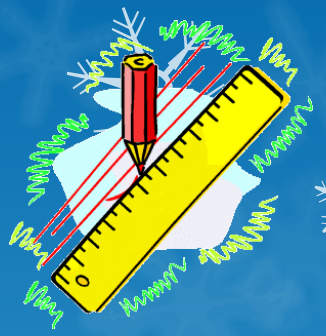
3927 divided by 24 163 r 15

Learning Objective



To find the ratio or proportions of amounts

Ratio & Proportion



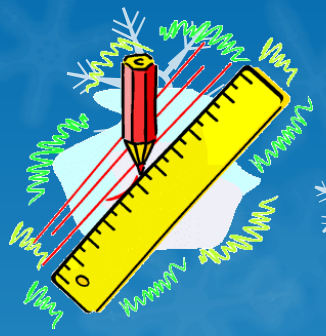
Ratio Calculations

Example : The ratio of boys to girls is 4:5.
If there are 16 boys, how many girls are there?

	boys	girls	
	4	5	
x 4			x 4
	16	20	

Ratio & Proportion

Ratio Calculations

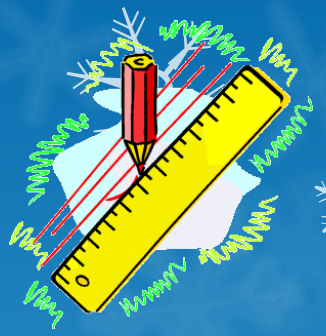


Example : The ratio of cars to buses is 3:7. If there are 49 buses, how many cars are there?

cars	buses
3	7
x 7	x 7
21	49

Ratio & Proportion

Proportional Division



Example : Bill and Ben share a raffle win of £400 in the ratio 3:5. How much does each get ?

Step 1 : Since the ratio is 3:5, there are :

3+5 = 8 shares

Step 2 : Each share is worth : $8 \overline{)\,400}$ = 50

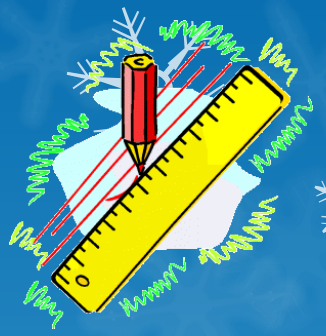
Step 3 : Bill gets 3 x 50 = £150

Ben gets 5 x 50 = £250

Check !
150 + 250 = 400

Ratio & Proportion

Proportional Division



Example : Ryan and Ross share 24 cakes in the ratio 3:1. How many cakes does each get ?

Step 1 : Since the ratio is 3:1, there are :

3+1 = 4 shares

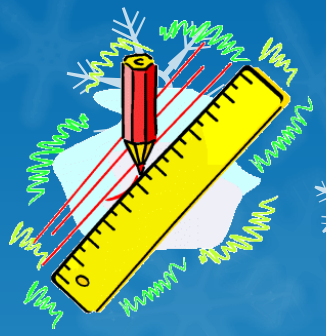
Step 2 : Each share is worth : $4\overline{)24}$ → 6

Step 3 : Ryan gets 3 x 6 = 18

Ross gets 1 x 6 = 6

Check !
18 + 6
= 24

Ratio & Proportion



Example : The proportion of cats in the vets is one out of four. How many cats will we see if there are:

24 animals

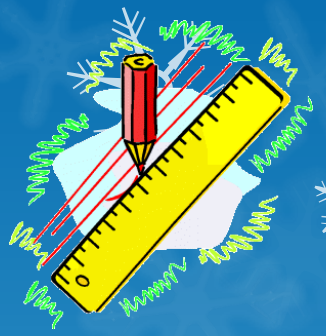
32 animals

16 animals

48 animals

120 animals

Ratio & Proportion



There 40 children in the playground. The Proportion of girls is 3/10.

How many girls are there?
How many boys are there?