

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

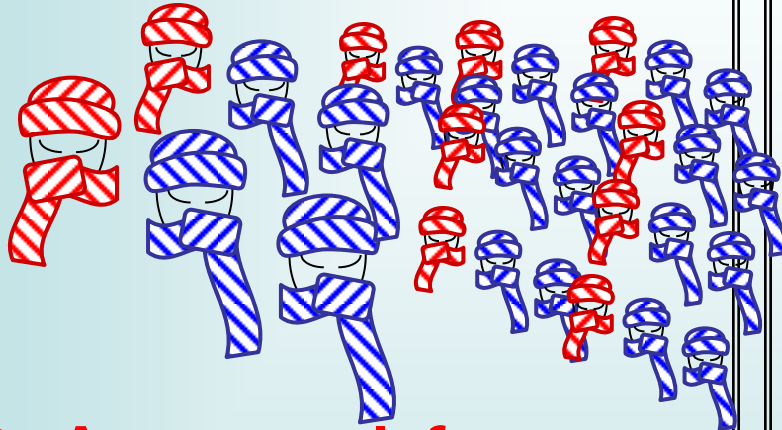
... Less Chelsea fans than Arsenal fans

... More cat-lovers than dog-lovers

... Less pizza-munchers than chicken-dippers

First Thoughts ...

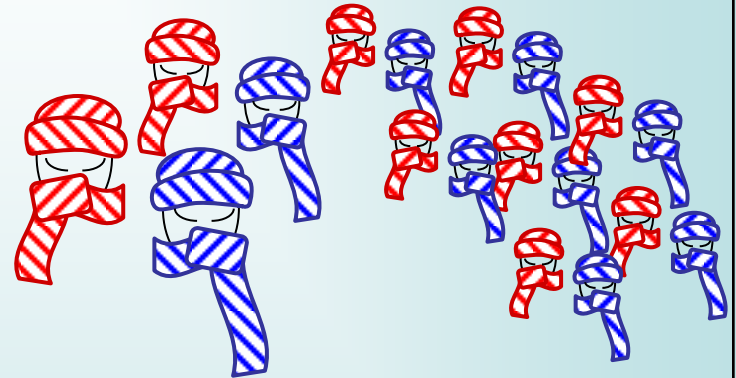
Class 6 has 30 pupils:



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

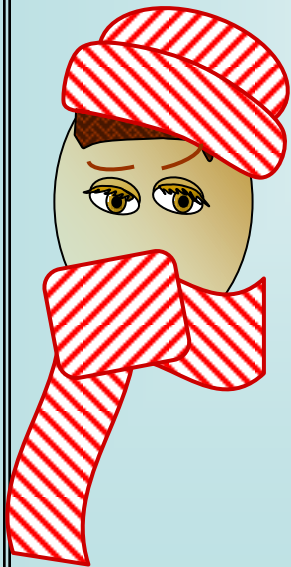


9



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?

$$6:10 + 20 = 30 \quad 5:9 + 9 = 18$$

- But other red Arsenal fans 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.”

Which question
is a ...

Fraction?

Ratio?

Proportion?



“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.”



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 $\frac{1}{3}$

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

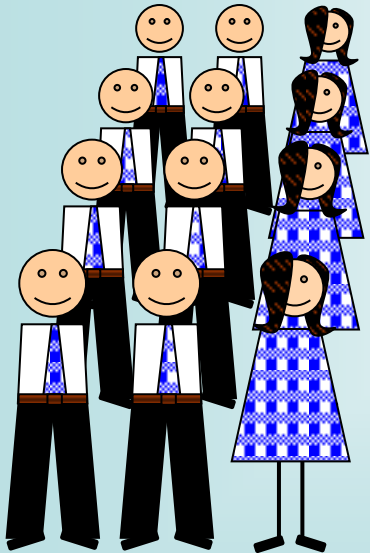
girls : boys = 4 : 8

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

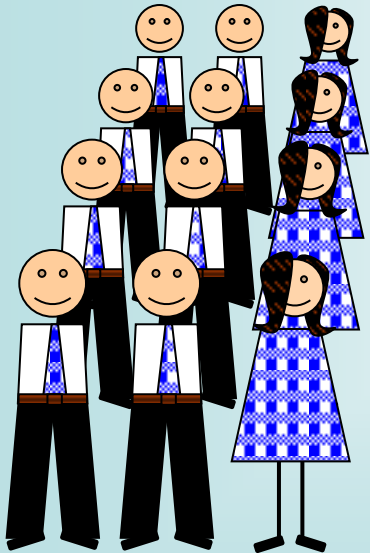
boys : girls = 8 : 4

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

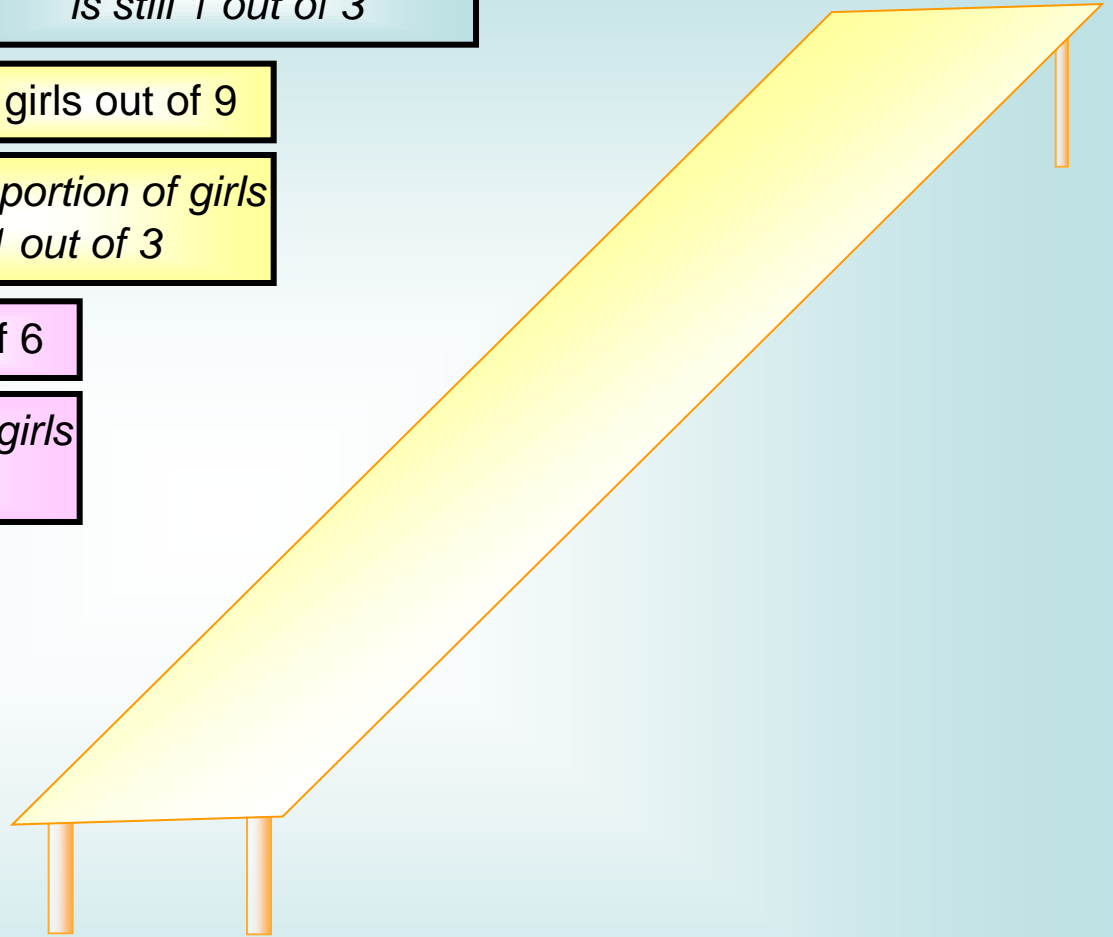
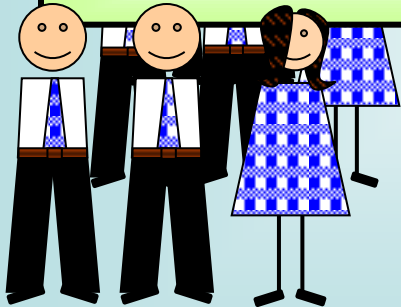
*Simplest proportion of girls
is still 1 out of 3*

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

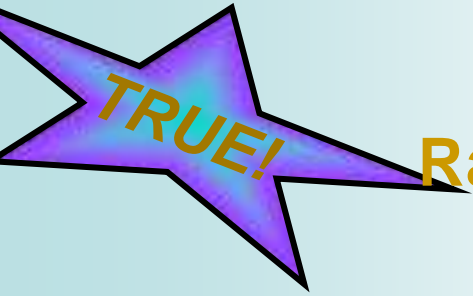
boys : girls = 2 : 1 *means* 2 boys to every girl

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

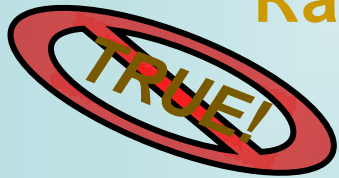


Ratio of fans to players = 1 : 1000



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

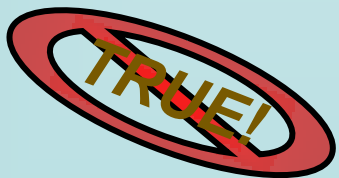
Ratio of weekdays to weekend days = 2 : 5



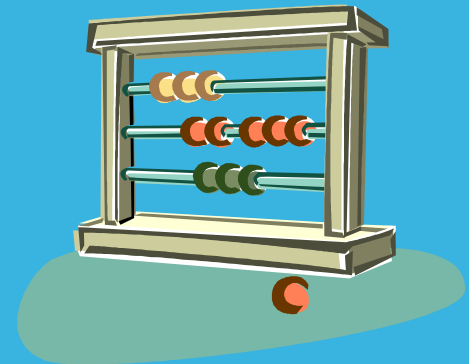
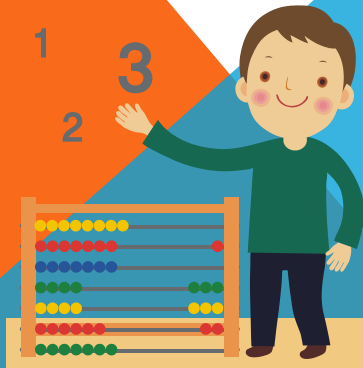
You wish!

Ratio of porridge lovers to pizza guzzlers = 100 : 1

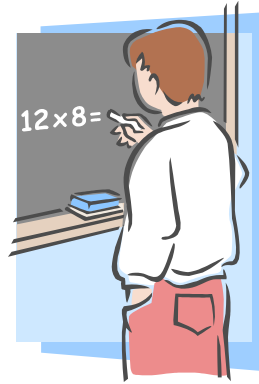
- Not until they invent Porridge Takeaways ..



FRACTION	$\frac{1}{2}$		$\frac{1}{10}$	$\frac{1}{5}$	$\frac{2}{5}$	$\frac{3}{10}$			
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!*

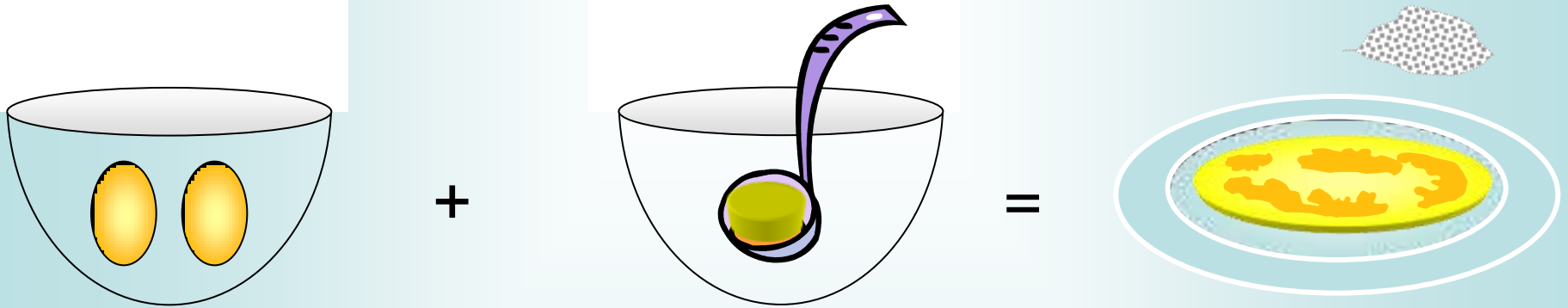
*Some of them need changing
to suit the number of people,*

*- But remember to
keep them in proportion,*

- And watch out for the



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



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?*

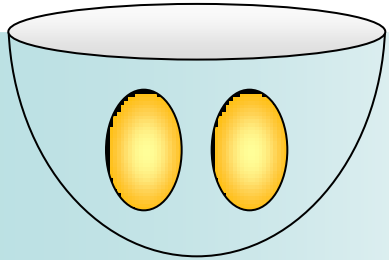
4 eggs + 2 tsp of butter = 2 omelettes

6 eggs + 3 tsp of butter = 3 omelettes

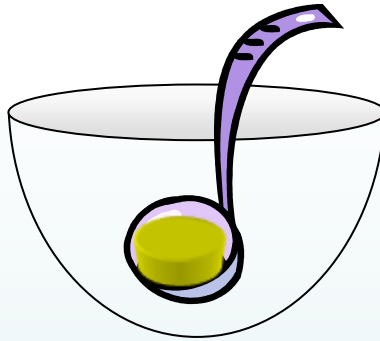
8 eggs + 4 tsp of butter = 4 omelettes

10 eggs + 5 tsp of butter = 5 omelettes

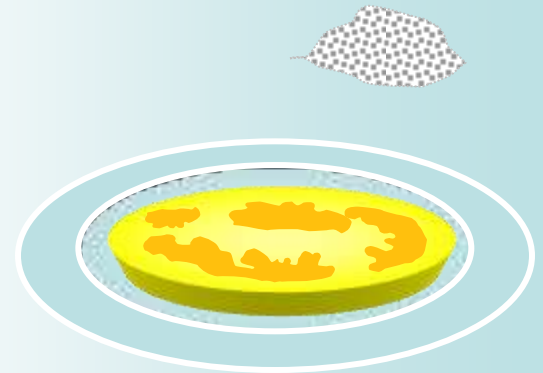
And the next week ...



+



=



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

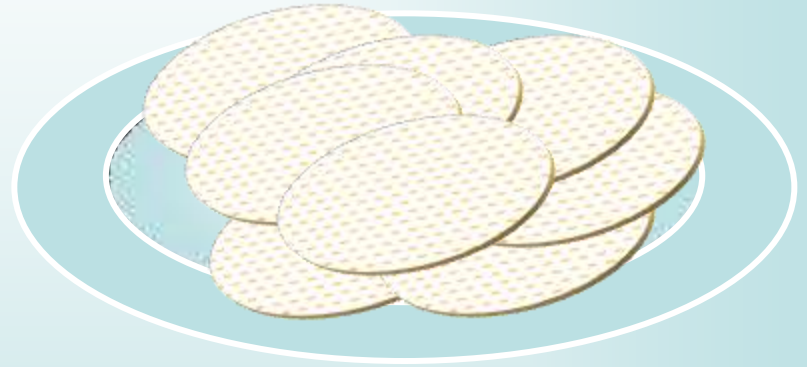
Ingredients

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!

STEP 1: Choose the maths!

x or ÷ ?

BIGGER means X

SMALLER means ÷

biscuits. Can you scale

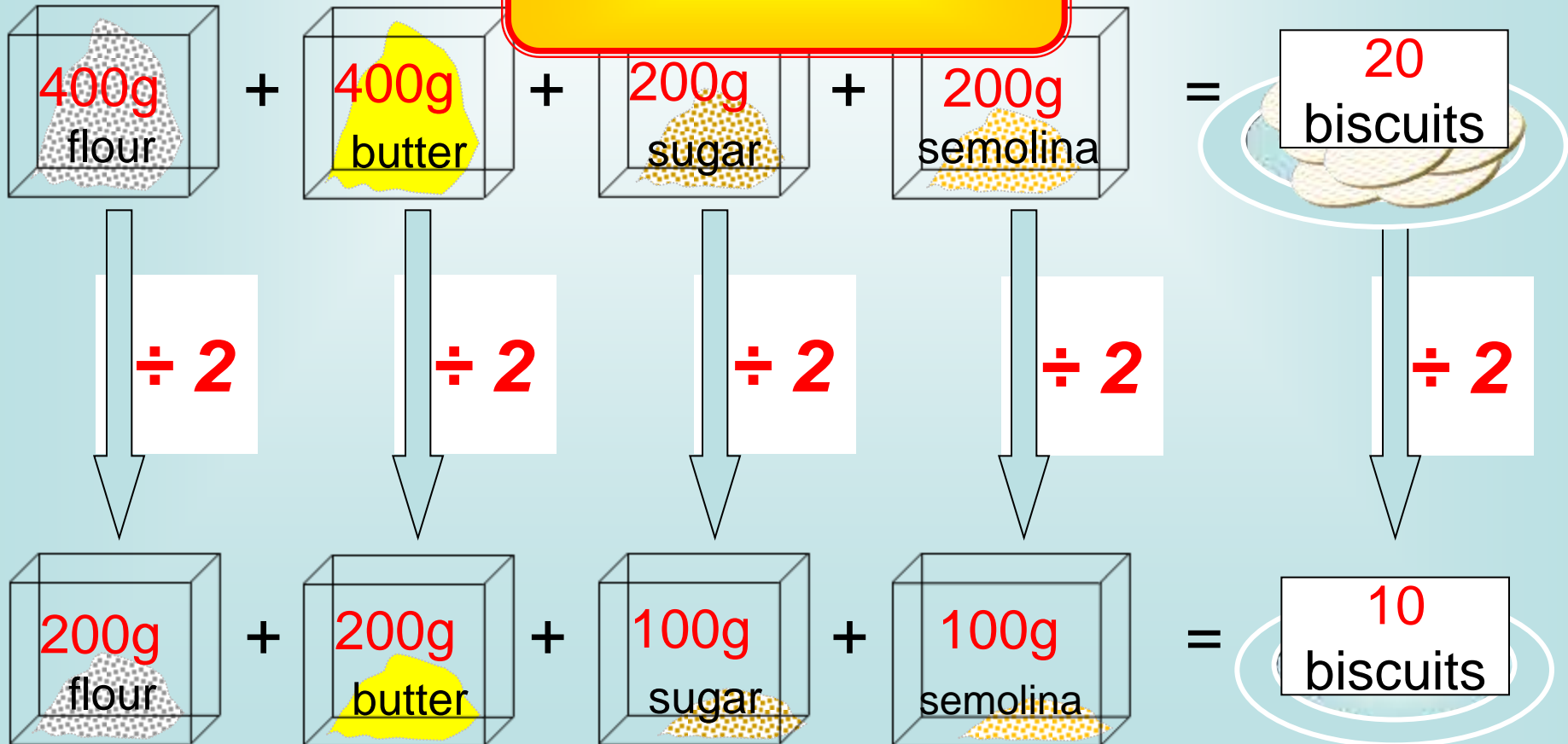
STEP 3: CHECK the maths!

- using ratio.

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

STEP 2: Do the maths!

DO THE SAME X or ÷ to ALL ingredients



STEP 1: CHOOSE the maths!

CHOOSE FROM \times or \div

... BIGGER means \times

... SMALLER means \div

STEP 2: DO the maths!

DO THE SAME \times or \div 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!

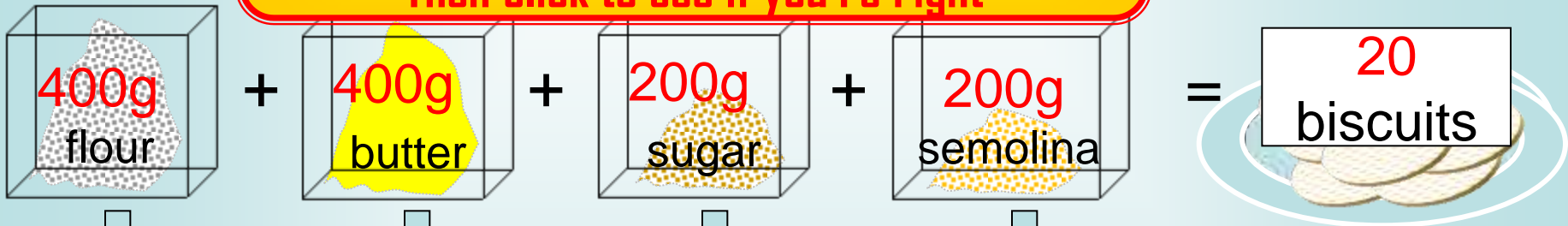
Check his working out

Why don't taste right!

Then click to see if you're right

Did he

in proportion?



$\div 10$

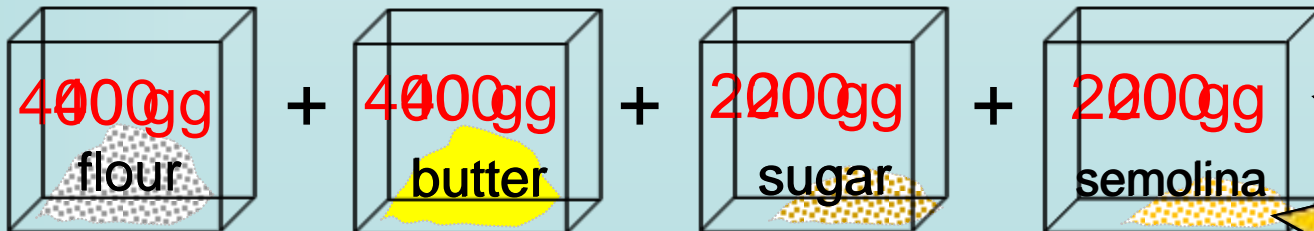
$\div 10$

$\div 10$

$\div 10$

$\div 10$

~~$\times 10$~~



200 BISCUITS INSTEAD OF 2!

STEP 1: CHOOSE the maths!

CHOOSE FROM \times or \div

... BIGGER means \times

... SMALLER means \div

STEP 2: DO the maths!

DO THE SAME \times or \div 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!

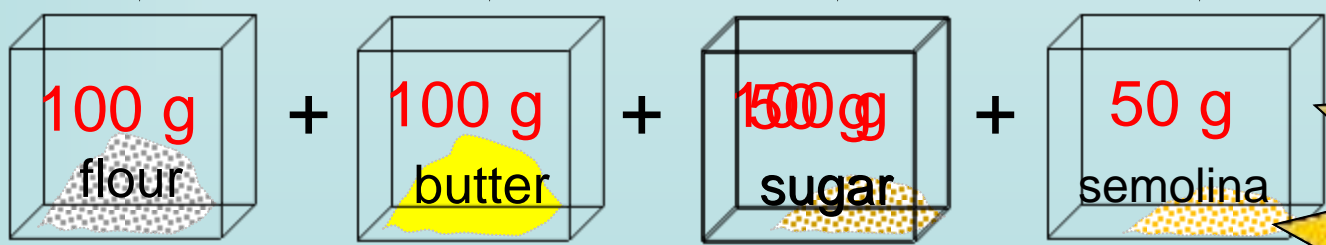
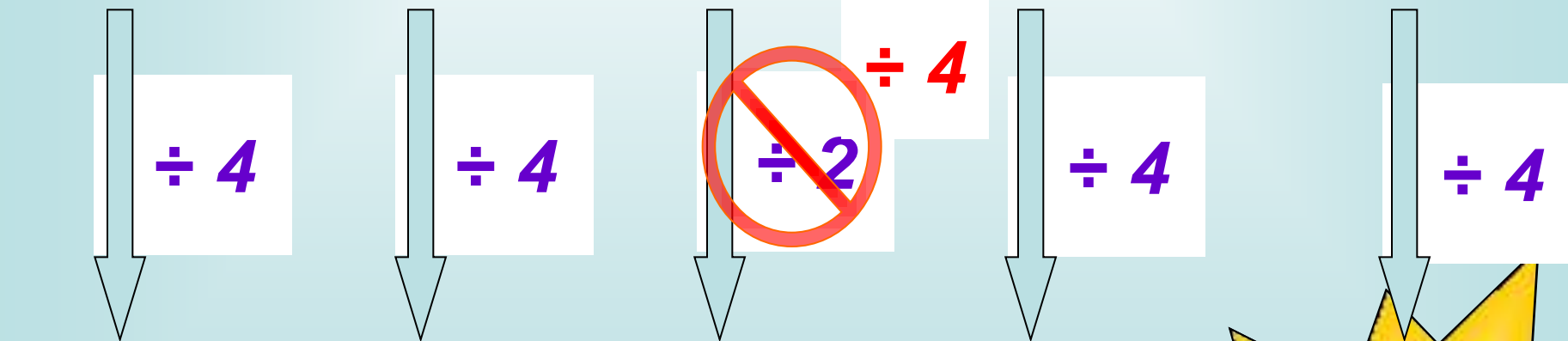
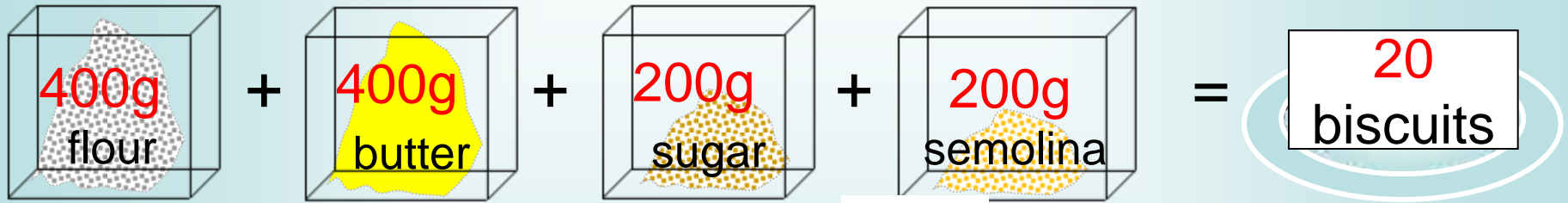
... Liana makes 5 shortbread biscuits

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

... don't taste right!

Did s

in proportion?



THE BISCUITS WERE TOO SWEET!

STEP 1: CHOOSE the maths!

CHOOSE FROM \times or \div

... BIGGER means \times

... SMALLER means \div

STEP 2: DO the maths!

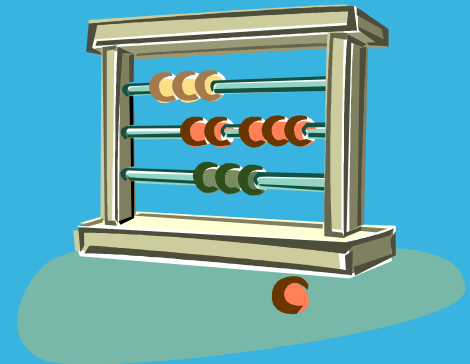
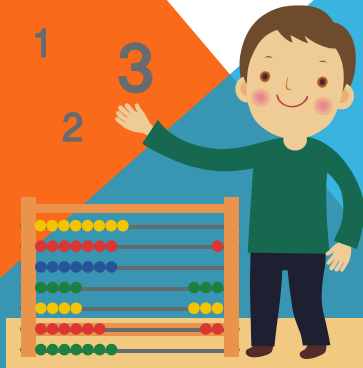
DO THE SAME \times or \div to ALL ingredients

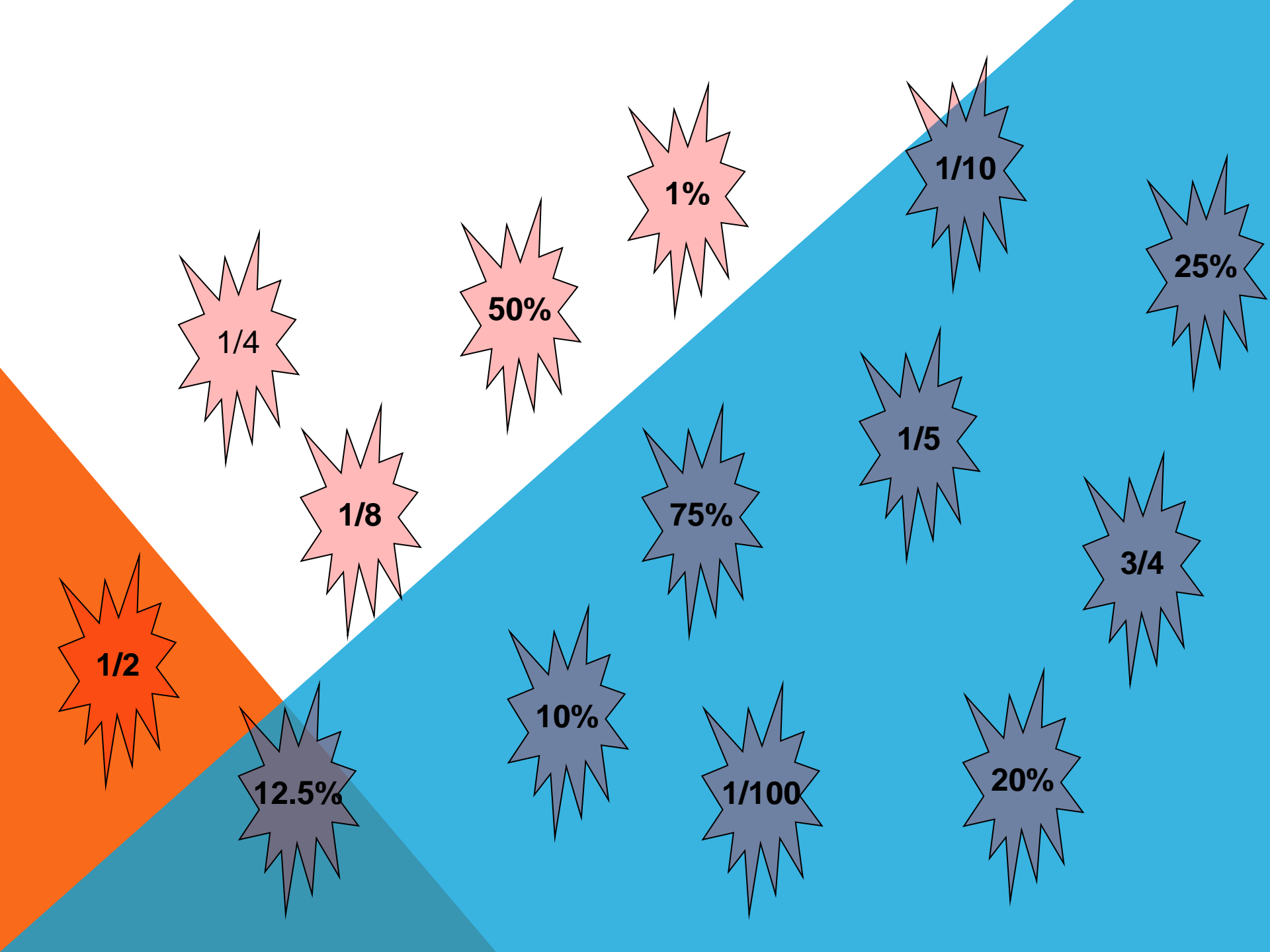
STEP 3: CHECK the maths!

- using ratio.

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

Find equivalent fractions and percentages.





1/2

1/4

1/8

50%

1%

12.5%

10%

1/100

20%

75%

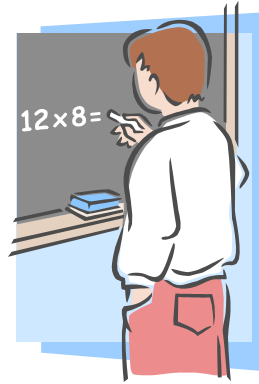
1/5

3/4

25%

1/10

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

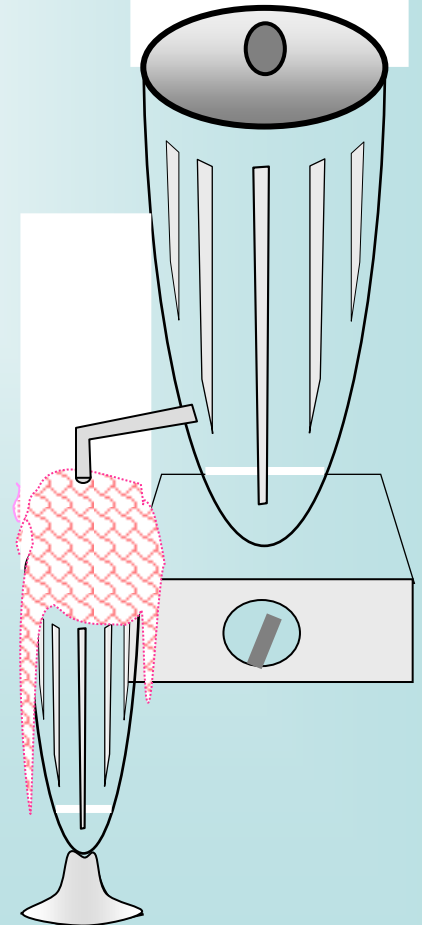
100 g melon



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.


$$600 \text{ g} + 400 \text{ g} + 200 \text{ g} =$$


Melon Merenga for 8


$$300 \text{ g} + 200 \text{ g} + 100 \text{ g} =$$





Melon Merenga for 4


$$150 \text{ g} + 100 \text{ g} + 50 \text{ g} =$$


Melon Merenga for 2


$$75 \text{ g} + 50 \text{ g} + 25 \text{ g} =$$


Melon Merenga for 1


$$450 \text{ g} + 300 \text{ g} + 150 \text{ g} =$$


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)

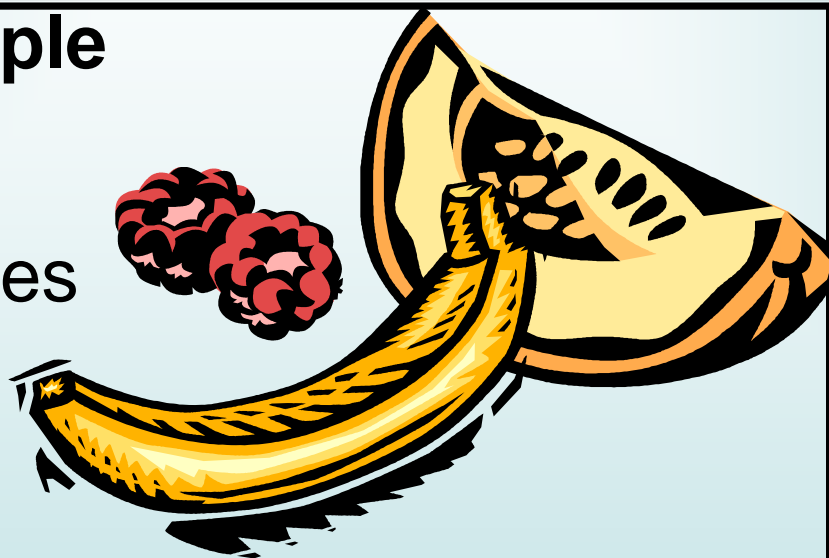
Serves 10 people

Ingredients

500 g raspberries

250 g bananas

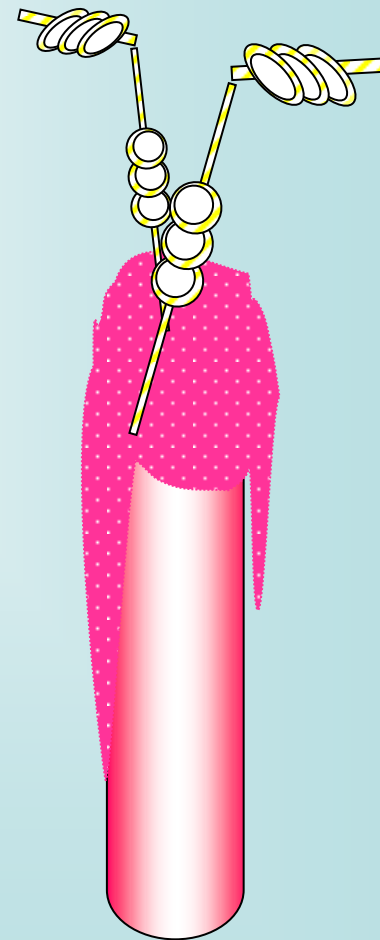
150 g melon



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


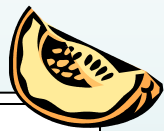

STEP 3: CHECK the maths!

- using ratio.




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


$$500 \text{ g} + 250 \text{ g} + 150 \text{ g} =$$





Raspberry Fruitloop for 10


$$250 \text{ g} + 125 \text{ g} + 75 \text{ g} =$$





Raspberry Fruitloop for 5


$$50 \text{ g} + 25 \text{ g} + 15 \text{ g} =$$


Raspberry Fruitloop for 1


$$200 \text{ g} + 100 \text{ g} + 60 \text{ g} =$$


Raspberry Fruitloop for 4


$$400 \text{ g} + 200 \text{ g} + 120 \text{ g} =$$


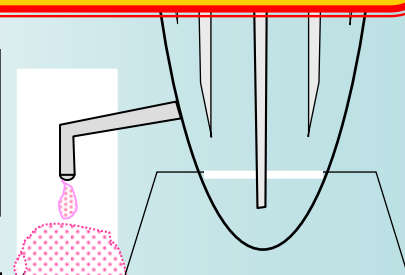
Raspberry Fruitloop for 8

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

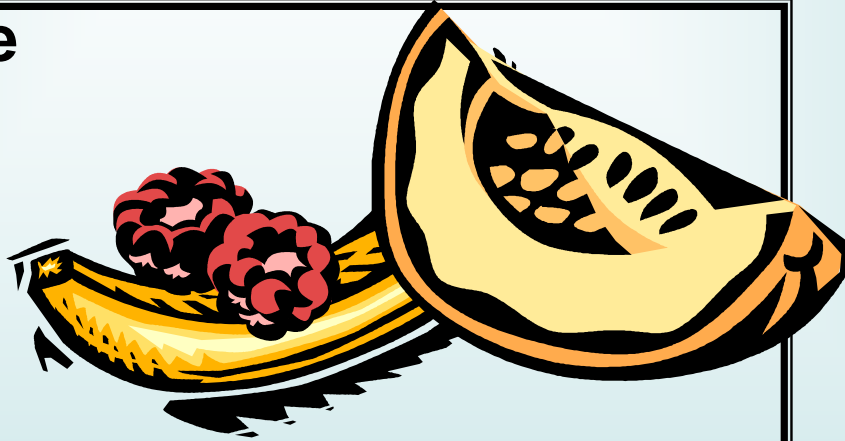
Recipe No.3 Bombastic Banana Boat

(Same ingredients. Different amounts)

Serves 12 people

Ingredients

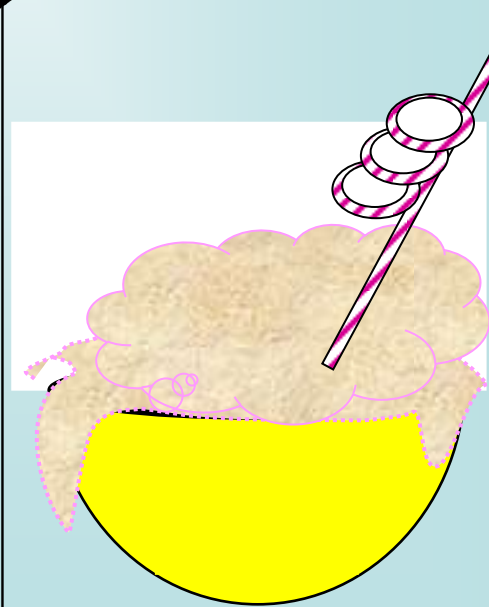
120 g raspberries
600 g bananas
120 g melon



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.



$$120 \text{ g} +$$


$$600 \text{ g} +$$


$$120 \text{ g} =$$

Banana Boat
for 12



$$60 \text{ g} +$$


$$300 \text{ g} +$$


$$60 \text{ g} =$$


Banana Boat
for 6



$$40 \text{ g} +$$


$$200 \text{ g} +$$


$$40 \text{ g} =$$


Banana Boat
for 4



$$10 \text{ g} +$$


$$50 \text{ g} +$$


$$10 \text{ g} =$$

Banana Boat
for 1


$$80 \text{ g} +$$


$$400 \text{ g} +$$


$$80 \text{ g} =$$

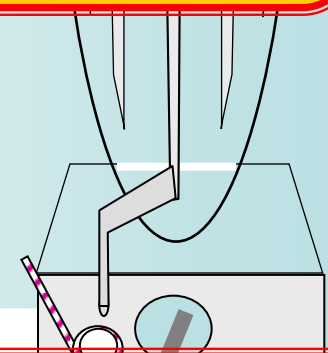
Banana Boat
for 8

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

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

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.

raspberry ice cream
for 8 people

$\frac{1}{2}$ litre of cream

1kg raspberries

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 $2\frac{1}{2}$ kg of raspberries. How much sugar does he use?

Long Division

The space saver method

Let's try $489 \div 7$

$$\begin{array}{r} 069 \\ 7 \overline{) 489} \end{array} \text{ r } 6$$

The diagram illustrates the space-saving method for long division. The divisor 7 is on the left, and the dividend 489 is on the right. A horizontal line is drawn above the dividend. The quotient digits 0, 6, and 9 are written above the line, aligned with the hundreds, tens, and ones places respectively. The remainder 6 is written to the right of the line. Small red numbers 4, 8, and 6 are placed below the dividend digits to indicate the current step in the division process.

Long Division

The space saver method

Let's try $4729 \div 28$

$$\begin{array}{r} 0168 \text{ r } 25 \\ 28 \overline{) 4729} \\ \underline{4} \\ 7 \\ \underline{56} \\ 19 \\ \underline{168} \\ 24 \\ \underline{252} \\ 9 \end{array}$$

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

Long Division

The space saver method

Let's try $46283 \div 36$

$$\begin{array}{r} 01285 \\ 36 \overline{) 46283} \end{array} \quad r 23$$

The diagram illustrates the space-saving long division method for $46283 \div 36$. The divisor 36 is on the left, and the dividend 46283 is on the right. A horizontal line is drawn above the dividend. The quotient digits 0, 1, 2, 8, and 5 are written above the line. The remainder 23 is written to the right of the line. The dividend digits are color-coded: 4 is black, 6 is red, 2 is black, 8 is red, and 3 is black. The partial products are written below the dividend: 4 (black), 4 (red), 10 (red), 2 (black), 30 (red), 8 (black), and 20 (red).

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

Definitions

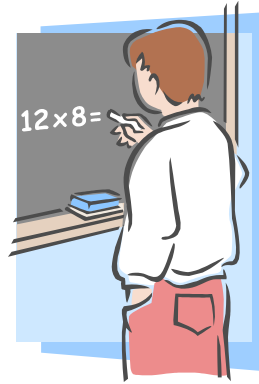
Short Division

Long Division

Practice

Main Menu

Learning Objective



To find the ratio or proportions of amounts

Ratio & Proportion

Ratio Calculations

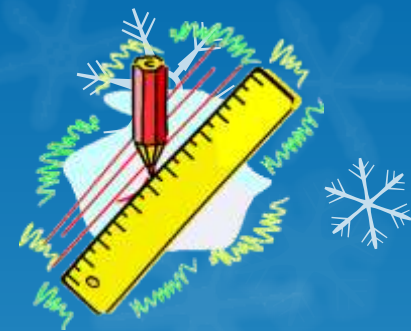


Example : The ratio of boys to girls is 4:5.
If there are 16 boys, how many girls
are there?

boys	girls
4	5
$\times 4$ 16	20 $\times 4$

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
$\times 7$ 3	7
21	49 $\times 7$

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 :

$$3+5 = 8 \text{ shares}$$

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

Step 3 : Bill gets $3 \times 50 = \text{£}150$

Ben gets $5 \times 50 = \text{£}250$

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 :

$$3+1 = 4 \text{ shares } 6$$

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

Step 3 : Ryan gets $3 \times 6 = 18$

Ross gets $1 \times 6 = 6$

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 $\frac{3}{10}$.

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

