Problem of the Week: Week 3 (Summer 2): Year 8: Ratio and proportion: Part: Whole and percentage change

- Understand that a multiplicative relationship between two quantities can be expressed as a fraction or a ratio
- Divide a given quantity into a ratio with more than two parts.
- Express the division of a quantity into two or more part as a ratio using appropriate notation
- Solve problems involving percentage change, including: percentage increase, decrease and original value problems and simple interest in financial mathematics
- Work with percentages greater than 100%

Problem 1:

Some students have decided to make cakes for their class. They have a recipe for a tray bake that makes 12 portions. They need to make sure it is not too expensive to make and find out how much the ingredients are.

On the next page there are a set of cards, use these to

- Find a mauve card for 12 cakes, find a turquoise card with the recipe for 12 cakes and a green card with the cost of ingredients of 12 cakes, write down the letters for each of these cards.
- Now sort the rest of the cards into groups - in each group you should have one turquoise recipe card, one mauve card for the number of cakes and one green card for the cost of ingredients. Write down the letters for each of these cards.
- Work out the relationship between the recipes for the different numbers of cakes.
  For example:
  How do you work out the quantities for 6 cakes if you know them for 12 cakes, how do you work out the quantities for 12 cakes if you know the quantities for 6 cakes?
- Assume there are 30 students in your class find the cost and the quantities of each ingredient for making the cakes.
- What would you do if you need to make cakes for 50 people?

Solution

12 cakes: cards G, C and X
6 cakes: cards E, A and Z
24 cakes: cards H, B and W
36 cakes: cards F, D and Y

If you know the quantities and price for 12 cakes you half them to find the corresponding information for 6 cakes. If you have the information for 6 cakes you would double the information for 12 cakes.

If you know the quantities and price for 12 cakes you multiply them by 3 to find the corresponding information for 36 cakes. If you have the information for 36 cakes you would third (divide by 3) to find the information for 12 cakes.

30 students:
To find the quantities for 30 cakes, you can use the information for 24 cakes and 6 cakes or multiply the information for 6 cakes by 5
This would give:

325g caster sugar 325g margarine 325g self raising flour 5 eggs $2\frac{1}{2}$ x 5ml spoon baking powder	£1.65

50 students:
For 50 students you could make 54 cakes, as this is a multiple of 6. You would need 9 times the amount required for 6 cakes.
If you need no waste, you will need to find the quantities for 1 cake and multiply this by 50.
This would give the following

542g caster sugar 542g margarine 542g self raising flour 8 eggs 4 x 5ml spoon baking powder	£2.75

Adapted from: Tray bake https://nrich.maths.org/7781

12 Cakes **G**	24 Cakes **H**	6 Cakes **E**	36 Cakes **F**

A

65g caster sugar

___g margarine

___g self raising flour

1 egg

$\frac{1}{2}$ x 5ml spoon baking powder

B

___g caster sugar

260g margarine

___g self raising flour

___ eggs

2 x 5ml spoon baking powder

C

130g caster sugar

130g margarine

130g self raising flour

2 eggs

1 x 5ml spoon baking powder

D

___g caster sugar

___g margarine

390g self raising flour

6 eggs

___ x 5ml spoon baking powder

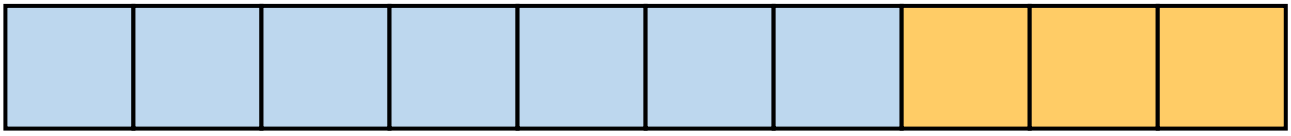
£1.30 **W**	65p **X**	£1.95 **Y**	33p **Z**

Problem 2:

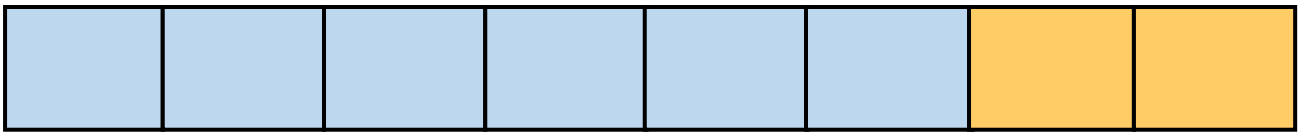
A. Craig makes orange squash using 7 parts of water for every 3 parts of squash, Jess makes orange squash using 6 parts of water for every 2 parts of squash. Does Craig or Jess make the most orangery squash? Explain how you know.

Solution

Craig's drink



Jess' drink



We can see that Craig's drink has a greater fraction that is squash than Jess'. Craig's drink is $\frac{3}{10}$ squash, whereas Jess's drink is $\frac{2}{8}$ *or* $\left(\frac{1}{4}\right)$ squash, this is equivalent to 30% and 25% of the drink respectively.

B. If the ratio of boys to girls in a class is 7:2, could there be exactly 27 children in the class? Why? Could there be 25 boys? Why?

Solution

B	B	B	B	B	B	B	G	G

3 groups of this makes 27 children, 27÷ 9 = 3. This means there can be 27 children

If there were 25 boys, you would need to multiply the number of girls by $\frac{25}{7}$. This would give 2 x $\frac{25}{7}$ = $\frac{50}{7}$, as this is not a whole number of girls you can not have 25 boys.

Alternatively, 25 is not a multiple of 7, so this is not possible.

https://www.ncetm.org.uk/resources/47230 (secondary assessment materials)