PAINT WITH NUMBERS
Lesson 2: Adding Parts

Australian Curriculum: Mathematics (Year 7)

ACMNA173: Recognise and solve problems involving simple ratios.

Lesson abstract

Students are posed with the scenario of painting a wall using a mixture of blue and white paint in the ratio of 1:3. They determine if adding an extra tin of each colour changes the ratio.

Mathematical purpose (for students)

We will determine strategies to keep the ratio constant when increasing quantities.

Mathematical purpose (for teachers)

Students learn that a ratio is a multiplicative comparison between two quantities. They recognise that equality between ratios is maintained through the use of multiplication and division. They determine that additive strategies change the ratio.

Suggested presentation: One lesson of one hour

Vocabulary encountered
- additive
- multiplicative
- ratio

Lesson materials
- Syringes
- Paint
- Student Sheet – Adding Parts

We value your feedback after this lesson via our website.

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Introduction

Introduce the following scenario:

- *When you buy paint, you choose a colour and the paint shop assistant mixes the colour for you. The assistant has a formula for each colour that they have to follow to make sure they get the colour exactly right.*
- *Katie was painting a wall in her house a pale blue colour. The assistant mixed the paint in the ratio 1:3 — one part blue to three parts white. Katie bought four litres of paint mixed in this ratio.*
- *When she got home, Katie realised that she would need six litres of paint to cover the entire wall. She decided to add some more paint into the paint that she bought.*
- *Katie took her 4 litres of paint and added a 1 litre tin of blue paint and a 1 litre tin of white paint to make six litres of paint.*

Pose the question: *Will Katie's new batch of paint be the same colour as the original mix she brought home from the shop? Why or why not?*

Exploration

Provide students with Student Sheet – Adding Parts. Have them predict whether the colour will be the same and to justify their prediction.

Assessment

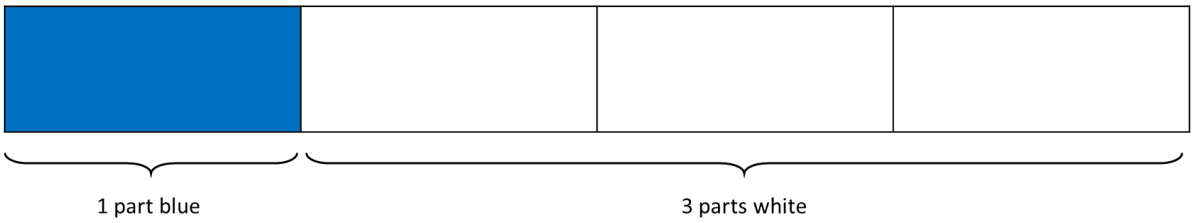
- Students' answers to this question reveal whether they are reasoning additively or multiplicatively about ratios. Students who think the colour will be the same are not thinking multiplicatively.

Have students mix blue and white paint in the ratio 1:3 — one part blue to three parts white. Syringes can be used to ensure precision in measurement (see Lesson 1). Students record the measurements of paint, ratios used, and the colour made on their Student Sheet.

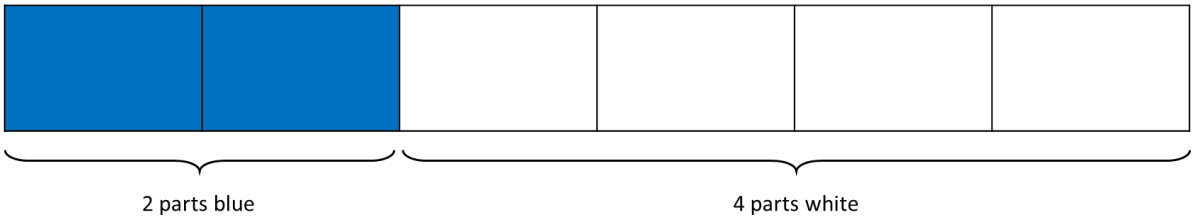
Ask students to modify their paint mix by adding one additional part white and one additional part blue. Record on Student Sheet.

Pose the challenge: *Use ratios to explain why the two colours are different.*

Representing the problem using the bar model



Adding an additional part blue and an additional part white makes the ratio 2:4, which is equivalent to 1:2



Questions to promote deeper thinking

- *If Katie adds two litres of paint in the ratio 1:3 (one part blue to three parts white) to four litres of paint mixed in the same ratio, what happens to the colour of the paint?*
    - The colour remains the same.
- *How much blue paint and how much white paint should Katie have added to her four litres of paint to make six litres of paint the exact same colour?*
    - To make an extra two litres of paint in the same colour, Katie should have added 500 mL of blue paint and 1.5 L of white paint.
- *When Katie added one litre of blue paint and one litre of white paint to her four litres of paint, she realised the colour of her paint had changed. How much blue and white paint should she add to get back to the original colour?*
    - By adding one litre of each colour, Katie's 1:3 paint is now in a ratio of 2:4. Katie will need to add two litres of white paint to take her to a ratio of 2:6, which is the same as 1:3.

Class discussion

Select and sequence student responses

Identify students who have used the following strategies and have them present to the class:

- Additive instead of multiplicative reasoning, i.e. students who claimed that adding one litre of each paint would keep the colour the same.
    - *What did you notice?*
- Using repeated addition strategies and/or multiplication
- Using bar model

Connecting strategies and exploring the mathematics

- *Can you see a connection between the bar model and the use of repeated addition strategies and multiplication strategies?*
- *Why is it that the colour of the paint changes?*
    - Because the paint mix has a new ratio.
- *If Katie adds two litres of paint in the ratio 1:3 (one part blue to three parts white) to four litres of paint mixed in the same ratio, what happens to the colour of the paint? Why?*
    - The colour does not change, because the ratio has been kept the same.

Adding Parts

Name: _____

Katie was painting a wall in her house a pale blue colour. The assistant at the paint shop mixed the paint in the ratio 1:3 — one part blue to three parts white. Katie bought four litres of paint mixed in this ratio.

When she got home, Katie realised that she needed six litres of paint to cover the entire wall. She decided to mix in some more paint. She added in a 1 litre tin of blue paint and a 1 litre tin of white paint to make six litres of paint.

Will Katie's new batch of paint be the same colour as the original mix she brought home from the shop? Why or why not?

My prediction:

My reasoning:

The results:

Paint mixed in the ratio 1:3 with 1 part blue and 3 parts white

1 additional part blue and 1 additional part white added.

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