

Reasoning and Problem Solving

Step 10: Calculate Quantities

National Curriculum Objectives:

Mathematics Year 4: (4F10a) [Solve problems involving increasingly harder fractions to calculate quantities, and fractions to divide quantities, including non-unit fractions where the answer is a whole number](#)

Differentiation:

Questions 1, 4 and 7 (Reasoning)

Developing Find and explain a mistake in a calculation. Draw a bar model to support the answer. Involves unit fractions only.

Expected Find and explain a mistake in a calculation. Draw a bar model to support the answer. Involves non-unit fractions.

Greater Depth Find and explain a mistake in a calculation. Draw a bar model to support the answer. Involves non-unit fractions and the use of related facts.

Questions 2, 5 and 8 (Reasoning)

Developing Identify and explain an error when finding the whole number. Involves unit fractions only.

Expected Identify and explain an error when finding the whole number. Involves non-unit fractions.

Greater Depth Identify and explain an error when finding a fraction of the whole number as part of a two-step problem. Involves non-unit fractions and the use of related facts.

Questions 3, 6 and 9 (Problem Solving)

Developing Solve a word problem involving calculating quantities. Involves unit fractions only.

Expected Solve a word problem involving calculating quantities. Involves non-unit fractions in their simplest form.

Greater Depth Solve a two-step problem involving calculating quantities. Involves non-unit fractions and the use of related facts.

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Calculate Quantities

1a. Mia completes the following calculation in her book but she has made a mistake.

If $\frac{1}{2}$ is 12, then the whole is 6.

Find the mistake that she has made.

Draw a bar model to prove your answer.



R

Calculate Quantities

1b. Freddy completes the following calculation in his book but he has made a mistake.

If $\frac{1}{3}$ is 9, then the whole is 18.

Find the mistake that he has made.

Draw a bar model to prove your answer.



R

2a. Danny is calculating a whole number from a fraction.

He says,



I know $\frac{1}{4}$ of a number is 5. To find the whole I can divide by 4.

Is he correct? Explain how you know.



R

2b. Ellie is calculating a whole number from a fraction.

She says,



I know $\frac{1}{5}$ of a number is 10. To find the whole I can calculate $10 + 10 + 10 + 10 + 10$.

Is she correct? Explain how you know.



R

3a. Alfie and Sally are counting their birthday presents.

$\frac{1}{5}$ of Alfie's pile is 3 presents.

$\frac{1}{3}$ of Sally's pile is 4 presents.

Who has the most presents?



PS

3b. David and Elsa are each putting pegs on a washing line.

$\frac{1}{7}$ of David's washing line is 5 pegs.

$\frac{1}{8}$ of Elsa's washing line is 4 pegs.

Who has the longest line of pegs?



PS

Calculate Quantities

4a. Margot completes the following calculation in her book but she has made a mistake.

If $\frac{2}{9}$ is 18, then the whole is 36.

Find the mistake that she has made.

Draw a bar model to prove your answer.



R

Calculate Quantities

4b. Taryn completes the following calculation in her book but she has made a mistake.

If $\frac{3}{5}$ is 15, then the whole is 9.

Find the mistake that she has made.

Draw a bar model to prove your answer.



R

5a. Fiona is calculating a whole number from a fraction.

She says,



I know $\frac{6}{10}$ of a number is 12. To find the whole I can divide by 10 and multiply by 6.

Is she correct? Explain how you know.



R

5b. Malakai is calculating a whole number from a fraction.

He says,



I know $\frac{4}{12}$ of a number is 12. To find the whole I can multiply by 4 because $\frac{4}{12} = \frac{1}{4}$.

Is he correct? Explain how you know.



R

6a. Sam and Brad are each building a tower of blocks.

$\frac{2}{9}$ of Sam's tower is 6 blocks.

$\frac{2}{5}$ of Brad's tower is 8 blocks.

Who has the tallest tower?



PS

6b. Sia and Hugo are each building a domino trail.

$\frac{4}{7}$ of Sia's trail is 12 dominoes.

$\frac{2}{9}$ of Hugo's trail is 4 dominoes.

Who has the longest trail?



PS

Calculate Quantities

7a. David completes the following calculation in his book but he has made a mistake.

If $\frac{3}{9}$ is 12, then $\frac{8}{18}$ is 16 and the whole is 32.

Find the mistake that he has made.

Draw a bar model to prove your answer.



R

Calculate Quantities

7b. Lilli completes the following calculation in her book but she has made a mistake.

If $\frac{9}{15}$ is 18, then $\frac{2}{5}$ is 8 and the whole is 30.

Find the mistake that she has made.

Draw a bar model to prove your answer.



R

8a. Nathaniel is calculating a whole number from a fraction.

He says,



I know $\frac{6}{9}$ of a number is 12. To find the whole I can divide by 2 and multiply by 3.

Is he correct? Explain how you know.



R

8b. Erin is calculating a whole number from a fraction.

She says,



I know $\frac{8}{18}$ of a number is 24. To find the whole I can multiply 24 by 9.

Is she correct? Explain how you know.



R

9a. Ava, Louis and Ivy are each making a bunch of flowers.

$\frac{2}{7}$ of Ava's bunch is 8 flowers.

Ivy's bunch is $\frac{1}{4}$ larger than Ava's.

Louis bunch is $\frac{1}{7}$ smaller than Ivy's

Who has the largest bunch of flowers?



PS

9b. Wilf, Dominic and Ben are each making a balloon display.

$\frac{2}{8}$ of Dominic's display is 12 balloons.

Wilf's display is $\frac{3}{16}$ smaller than Dominic's.

Ben's display is $\frac{2}{13}$ larger than Wilf's.

Who has the largest balloon display?



PS

Reasoning and Problem Solving Calculate Quantities

Developing

- 1a. Mia has divided by 2 instead of multiplying by 2. The whole should be 24.
- 2a. Danny is incorrect because he needs to multiply by 4. The correct answer is 20.
- 3a. Alfie has the most presents because he has 15 and Sally has 12.

Expected

- 4a. Margot has multiplied 18 by 2 instead of dividing by 2 and multiplying by 9. The whole should be 81.
- 5a. Fiona is incorrect because she has mixed up the operations for the numerator and denominator. She should have divided by 6 and multiplied by 10.
- 6a. Sam's tower is the tallest because he has used 27 bricks and Brad only used 20.

Greater Depth

- 7a. David has correctly calculated the two fractions of the amount. His mistake is with finding the whole as he doubled 16 to find the whole but this only gives you $\frac{16}{18}$. The whole should be 36.
- 8a. Nathaniel is correct because $\frac{6}{9}$ is equivalent to $\frac{2}{3}$.
- 9a. Ava – 28 flowers; Ivy – 35 flowers; Louis – 30 flowers. Ivy's bunch is the largest.

Reasoning and Problem Solving Calculate Quantities

Developing

- 1b. Freddy has multiplied by 2 instead of 3. The whole should be 27.
- 2b. Ellie is correct because $10 + 10 + 10 + 10 + 10$ is the same as 5×10 to find $\frac{1}{5}$.
- 3b. David's washing line is the longest because he has used 35 pegs and Elsa has only used 32.

Expected

- 4b. Taryn has divided by 5 and multiplied by 3 instead of dividing by 3 and multiplying by 5. The whole should be 25.
- 5b. Malakai is incorrect because $\frac{4}{12} = \frac{1}{3}$ so he should have multiplied by 3.
- 6b. Sia's trail is the longest because she has used 21 dominoes and Hugo has only used 18 dominoes.

Greater Depth

- 7b. Lilli has correctly found the whole because $18 \div 9 \times 15 = 30$. $\frac{2}{5}$ is incorrect as this would be 12 because $\frac{1}{5} = 6$ ($18 \div 3$).
- 8b. Erin is incorrect. She could find the whole by multiplying 6 by 9 because $\frac{8}{18}$ is equivalent to $\frac{4}{9}$ and $24 \div 4 = 6$.
- 9b. Dominic – 48 balloons; Wilf – 39 balloons; Ben – 45 balloons. Dominic's display is the largest.