

Reasoning and Problem Solving

Step 20: Using Fractions as Operators

National Curriculum Objectives:

Mathematics Year 5: (5C8c) [Solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple rates](#)

Differentiation:

Questions 1, 4 and 7 (Problem Solving)

Developing Find the missing unit fraction to complete the statements.

Expected Find the missing non-unit fraction to complete the statements.

Greater Depth Find the missing improper fraction to complete the statements.

Questions 2, 5 and 8 (Reasoning)

Developing Explain which statement is the odd one out. Includes unit fractions only.

Expected Explain which statement is the odd one out. Includes non-unit fractions in their simplest form.

Greater Depth Explain which statement is the odd one out. Questions include non-unit fractions and improper fractions.

Questions 3, 6 and 9 (Reasoning)

Developing Identify the correct statement about fractions as operators and explain why. Includes unit fractions only.

Expected Identify the correct statement about fractions as operators and explain why. Includes non-unit fractions in their simplest form.

Greater Depth Identify the correct statement about fractions as operators and explain why. Questions include non-unit fractions and improper fractions.

More [Year 5 Fractions](#) resources.

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Using Fractions as Operators

Using Fractions as Operators

1a. The statements can be completed by using the same unit fraction. Find the missing fraction.

$$12 \times \frac{\boxed{}}{\boxed{}} = \frac{\boxed{}}{\boxed{}} \text{ of } 12 = 3$$

$$8 \times \frac{\boxed{}}{\boxed{}} = \frac{\boxed{}}{\boxed{}} \text{ of } 8 = 2$$



PS

1b. The statements can be completed by using the same unit fraction. Find the missing fraction.

$$15 \times \frac{\boxed{}}{\boxed{}} = \frac{\boxed{}}{\boxed{}} \text{ of } 15 = 5$$

$$9 \times \frac{\boxed{}}{\boxed{}} = \frac{\boxed{}}{\boxed{}} \text{ of } 9 = 3$$



PS

2a. Circle the odd one out.

A. $\frac{1}{2}$ of 16

B. 8

C. $16 \times \frac{1}{2}$

D. 4

Explain your reasoning.



R

2b. Circle the odd one out.

A. $\frac{1}{4}$ of 20

B. 4

C. $20 \times \frac{1}{4}$

D. 5

Explain your reasoning.



R

3a. Danny and Sarah are using fractions as operators.

Danny says,

$$12 \text{ lots of } \frac{1}{3} = \frac{1}{3} \text{ of } 12$$



Sarah says,

$$\frac{1}{3} \text{ of } 12 = 12 \times 3$$



Who is correct? Convince me.



R

3b. Jake and Kiran are using fractions as operators.

Jake says,

$$\frac{1}{2} \text{ of } 14 = 2 \text{ lots of } 14$$



Kiran says,

$$\frac{1}{2} \text{ of } 14 = 14 \times \frac{1}{2}$$



Who is correct? Convince me.



R

Using Fractions as Operators

Using Fractions as Operators

4a. The statements can be completed by using the same non-unit fraction. Find the missing fraction.

$$20 \times \frac{\square}{\square} = \frac{\square}{\square} \text{ of } 20 = 15$$

$$16 \times \frac{\square}{\square} = \frac{\square}{\square} \text{ of } 16 = 12$$



PS

4b. The statements can be completed by using the same non-unit fraction. Find the missing fraction.

$$24 \times \frac{\square}{\square} = \frac{\square}{\square} \text{ of } 24 = 16$$

$$18 \times \frac{\square}{\square} = \frac{\square}{\square} \text{ of } 18 = 12$$



PS

5a. Circle the odd one out.

A. 10

B. $14 \times \frac{5}{7}$

C. 7

D. $\frac{5}{7}$ of 14

Explain your reasoning.



R

5b. Circle the odd one out.

A. $\frac{4}{9}$ of 27

B. 3

C. $27 \times \frac{4}{9}$

D. 12

Explain your reasoning.



R

6a. Scott and Anya are using fractions as operators.

Scott says,

$$10 \text{ lots of } \frac{3}{5} = \frac{3}{5} \text{ of } 10$$



Anya says,

$$\frac{3}{5} \text{ of } 10 = 10 \text{ lots of } 3 \times 5$$



Who is correct? Convince me.



R

6b. Mo and Lily are using fractions as operators.

Mo says,

$$\frac{3}{4} \text{ of } 12 = 12 \text{ lots of } 3$$



Lily says,

$$\frac{3}{4} \text{ of } 12 = 12 \times \frac{3}{4}$$



Who is correct? Convince me.



R

Using Fractions as Operators

7a. The statements can be completed by using the same improper fraction. Find the missing improper fraction.

$$15 \times \frac{\boxed{}}{\boxed{}} = \frac{\boxed{}}{\boxed{}} \text{ of } 15 = \frac{60}{3} = 20$$

$$24 \times \frac{\boxed{}}{\boxed{}} = \frac{\boxed{}}{\boxed{}} \text{ of } 24 = \frac{96}{3} = 32$$



PS

Using Fractions as Operators

7b. The statements can be completed by using the same improper fraction. Find the missing improper fraction.

$$20 \times \frac{\boxed{}}{\boxed{}} = \frac{\boxed{}}{\boxed{}} \text{ of } 20 = \frac{100}{4} = 25$$

$$8 \times \frac{\boxed{}}{\boxed{}} = \frac{\boxed{}}{\boxed{}} \text{ of } 8 = \frac{40}{4} = 10$$



PS

8a. Circle the odd one out.

A. $\frac{7}{5}$ of 15

B. 28

C. $15 \times \frac{7}{5}$

D. 21

Explain your reasoning.



R

8b. Circle the odd one out.

A. 44

B. $\frac{5}{2}$ of 22

C. $22 \times \frac{5}{2}$

D. 55

Explain your reasoning.



R

9a. Alfie and Tasmin are using fractions as operators.

Alfie says,

$$\frac{6}{4} \text{ of } 16 = 16 \text{ lots of } 6 \times 4.$$



Tasmin says,

$$16 \times \frac{6}{4} = \frac{6}{4} \text{ of } 16$$



Who is correct? Convince me.



R

9b. Luke and Freya are using fractions as operators.

Luke says,

$$24 \text{ lots of } \frac{5}{3} = \frac{5}{3} \text{ of } 24$$



Freya says,

$$\frac{5}{3} \text{ of } 24 = 24 \times \frac{5}{3}$$



Who is correct? Convince me.



R

Reasoning and Problem Solving Using Fractions as Operators

Developing

1a. $\frac{1}{4}$

2a. D is the odd one out because A and C = B.

3a. Various answers, for example: Danny is correct because he has used commutativity. Sarah is incorrect because 12 needs to be divided by 3 rather than multiplied.

Expected

4a. $\frac{3}{4}$

5a. C is the odd one out because B and D = A.

6a. Various answers, for example: Scott is correct because he has used commutativity. Anya is incorrect because 10 lots of $3 \times 5 = 150$ where as $\frac{3}{5}$ of $10 = 6$.

Greater Depth

7a. $\frac{4}{3}$

8a. B is the odd one out because A and C = D.

9a. Various answers, for example: Tasmin is correct because she has used commutativity. Alfie is incorrect because he should have done 16 lots of $\frac{6}{4}$ instead of 16 lots of 6×4 .

Reasoning and Problem Solving Using Fractions as Operators

Developing

1b. $\frac{1}{3}$

2b. B is the odd one out because A and C = D.

3b. Various answers, for example: Kiran is correct because she has used commutativity. Jake is incorrect because 14 needs to be divided by 2 rather than multiplied.

Expected

4b. $\frac{2}{3}$

5b. B is the odd one out because A and C = D.

6b. Various answers, for example: Lily is correct because she has used commutativity. Mo is incorrect because he should do 12 lots of three quarters instead of 12 lots of three.

Greater Depth

7b. $\frac{5}{4}$

8b. A is the odd one out because B and C = D.

9b. Various answers, for example: Luke and Freya are correct. They have both used commutativity. 'Lots of' means the same as multiplying.