Lesson 13 – Multiply Fractions by Integers

NC Objective: Multiply simple pairs of proper fractions, writing the answer in its simplest form.	Resources needed: Differentiated Sheets Teaching Slides	Vocabulary: Fractions, multiply, mixed numbers, integers, repeated addition, numerator, denominator, partition, improper, convert

Children multiply fractions and mixed numbers by integers. They use diagrams to highlight the link between multiplication and repeated addition. This supports the children in understanding why the denominator stays the same and we multiply the numerator.

When multiplying mixed numbers, children partition into wholes and parts to multiply more efficiently. They compare this method with multiplying improper fractions.

Key Questions:

How is multiplying fractions similar to adding fractions?

How does partitioning the mixed number into wholes and fractions support us to multiply?

Do you prefer partitioning the mixed number or converting it to an improper fraction to multiply? Why?

Does it matter if the integer is first or second in the multiplication sentence? Why?

★ Working Towards	★★ Working Within	★★★ Greater Depth
Children will have completed fraction diagrams to help them solve the calculations.	Children will use two methods of multiplying fractions by integers with diagrams to shade in.	Children will use two methods of multiplying fractions with empty shapes in which they split equally to make the given fraction.

Reasoning & Problem Solving

|		
Children will solve reasoning questions involving multiplying fractions. They use simple fractions.	Children will solve reasoning questions involving multiplying fractions. They use a range of fractions.	Children will solve reasoning questions involving multiplying fractions. They have more steps and fractions that are harder to calculate.

Complete:

$3 \times \dfrac{5}{8}$

$4 \times \dfrac{3}{4}$
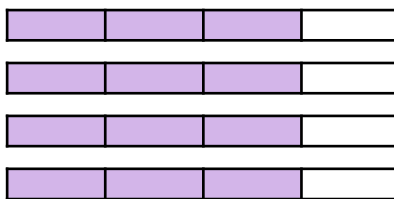
$\dfrac{2}{5} \times 6$
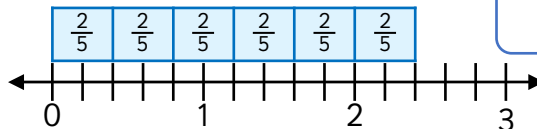
Tia partitions $3\dfrac{5}{6}$ to help her to calculate $3\dfrac{5}{6} \times 2$.

$3 \times 2 = 6$

$\dfrac{5}{6} \times 2 = \dfrac{10}{6} = \dfrac{5}{3} = 1\dfrac{2}{3}$

$6 + 1\dfrac{2}{3} = 7\dfrac{2}{3}$

Use Tia's method to calculate:

$2\dfrac{3}{7} \times 3 =$

$4\dfrac{1}{4} \times 5 =$

$5\dfrac{2}{3} \times 2 =$

$4 \times 3\dfrac{1}{6} =$

$5 \times 2\dfrac{3}{8} =$

$2 \times 4\dfrac{3}{5} =$

Convert the mixed number to an improper fraction to multiply.

$$3\dfrac{5}{6} \times 2 = \dfrac{23}{6} \times 2 = \dfrac{46}{6} = 7\dfrac{4}{6} = 7\dfrac{2}{3}$$

Use this method to calculate:

$1\dfrac{2}{3} \times 4 =$

$2\dfrac{7}{8} \times 6 =$

$7\dfrac{1}{4} \times 3 =$

$4 \times 2\dfrac{3}{5} =$

$3 \times 4\dfrac{5}{6} =$

$8 \times 3\dfrac{4}{9} =$

Complete:
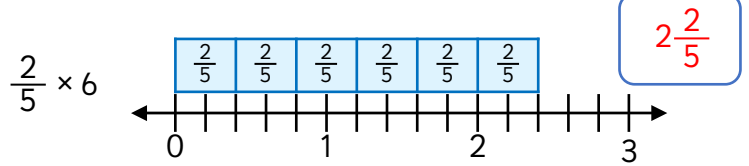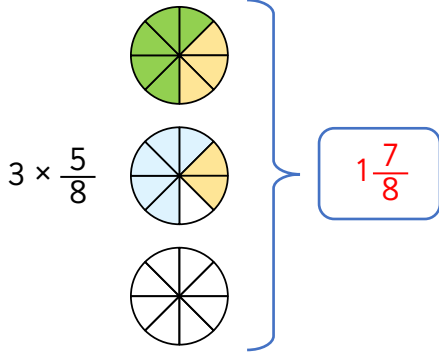
$3 \times \frac{5}{8}$ $1\frac{7}{8}$

$4 \times \frac{3}{4}$ 3

$\frac{2}{5} \times 6$ $2\frac{2}{5}$

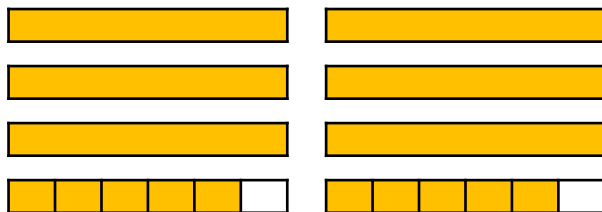| $\frac{2}{5}$ | $\frac{2}{5}$ | $\frac{2}{5}$ | $\frac{2}{5}$ | $\frac{2}{5}$ | $\frac{2}{5}$ |

0   1   2   3

Tia partitions $3\frac{5}{6}$ to help her to calculate $3\frac{5}{6} \times 2$.

$3 \times 2 = 6$

$\frac{5}{6} \times 2 = \frac{10}{6} = \frac{5}{3} = 1\frac{2}{3}$

$6 + 1\frac{2}{3} = 7\frac{2}{3}$

Use Tia's method to calculate:

$2\frac{3}{7} \times 3 =$ $7\frac{2}{7}$ $4\frac{1}{4} \times 5 =$ $21\frac{1}{4}$ $5\frac{2}{3} \times 2 =$ $11\frac{1}{3}$

$4 \times 3\frac{1}{6} =$ $12\frac{2}{3}$ $5 \times 2\frac{3}{8} =$ $11\frac{7}{8}$ $2 \times 4\frac{3}{5} =$ $9\frac{1}{5}$

Convert the mixed number to an improper fraction to multiply.

$$3\frac{5}{6} \times 2 = \frac{23}{6} \times 2 = \frac{46}{6} = 7\frac{4}{6} = 7\frac{2}{3}$$

Use this method to calculate:

$1\frac{2}{3} \times 4 =$ $6\frac{2}{3}$ $2\frac{7}{8} \times 6 =$ $17\frac{1}{4}$ $7\frac{1}{4} \times 3 =$ $21\frac{3}{4}$
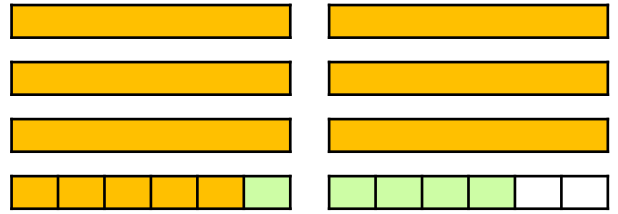
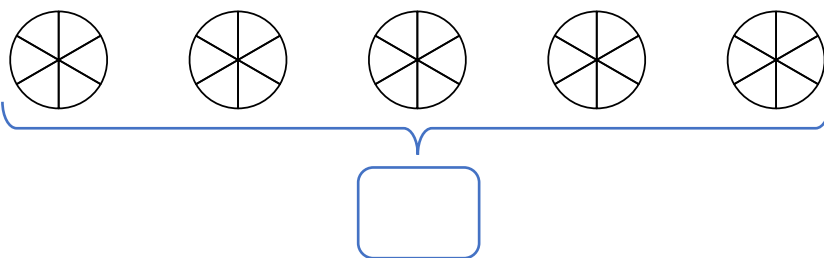$4 \times 2\frac{3}{5} =$ $10\frac{2}{5}$ $3 \times 4\frac{5}{6} =$ $14\frac{1}{2}$ $8 \times 3\frac{4}{9} =$ $27\frac{5}{9}$
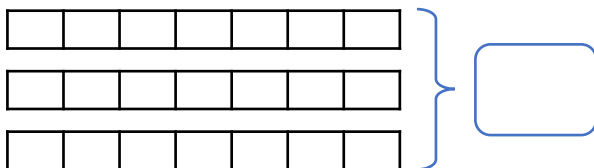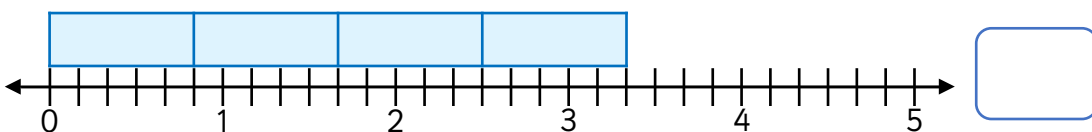
Complete:

$5 \times \dfrac{5}{6}$

$3 \times \dfrac{4}{7}$

$\dfrac{5}{6} \times 4$

Partition the fractions to help you calculate.

$3\dfrac{4}{5} \times 4 =$

$2\dfrac{7}{9} \times 8 =$

$3\dfrac{6}{7} \times 3 =$

$5 \times 5\dfrac{8}{9} =$

$6 \times 4\dfrac{3}{8} =$

$8 \times 3\dfrac{4}{5} =$

Convert the mixed number to an improper fraction to multiply.

$1\dfrac{4}{9} \times 2 =$

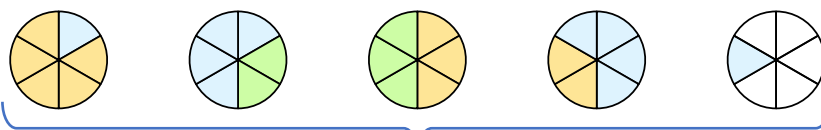$2\dfrac{2}{5} \times 4 =$

$4\dfrac{3}{8} \times 5 =$

$8 \times 4\dfrac{5}{8} =$

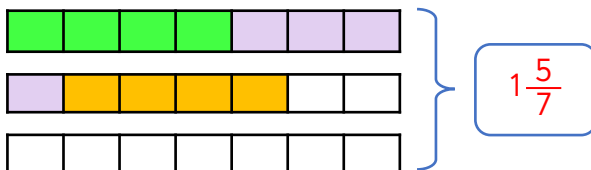$6 \times 2\dfrac{4}{7} =$

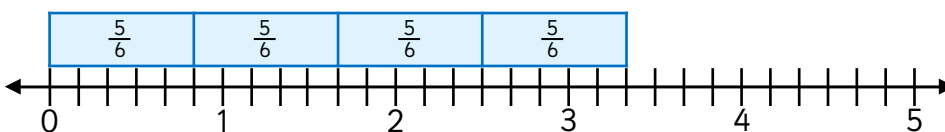$5 \times 8\dfrac{3}{4} =$

Complete:

$5 \times \dfrac{5}{6}$

$4\dfrac{1}{6}$

$3 \times \dfrac{4}{7}$

$1\dfrac{5}{7}$

$\dfrac{5}{6} \times 4$

$3\dfrac{1}{3}$

Partition the fractions to help you calculate.

$3\dfrac{4}{5} \times 4 = \boxed{15\dfrac{1}{5}}$

$2\dfrac{7}{9} \times 8 = \boxed{22\dfrac{2}{9}}$

$3\dfrac{6}{7} \times 3 = \boxed{11\dfrac{4}{7}}$

$5 \times 5\dfrac{8}{9} = \boxed{29\dfrac{4}{9}}$

$6 \times 4\dfrac{3}{8} = \boxed{26\dfrac{1}{4}}$

$8 \times 3\dfrac{4}{5} = \boxed{30\dfrac{2}{5}}$

Convert the mixed number to an improper fraction to multiply.

$1\dfrac{4}{9} \times 2 = \boxed{2\dfrac{8}{9}}$

$2\dfrac{2}{5} \times 4 = \boxed{9\dfrac{3}{5}}$

$4\dfrac{3}{8} \times 5 = \boxed{21\dfrac{7}{8}}$

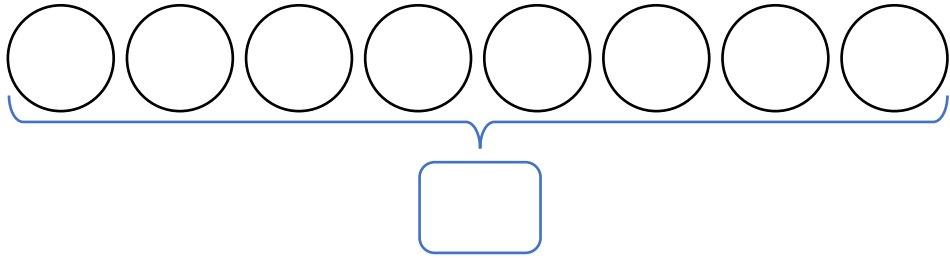$8 \times 4\dfrac{5}{8} = \boxed{37}$

$6 \times 2\dfrac{4}{7} = \boxed{15\dfrac{3}{7}}$

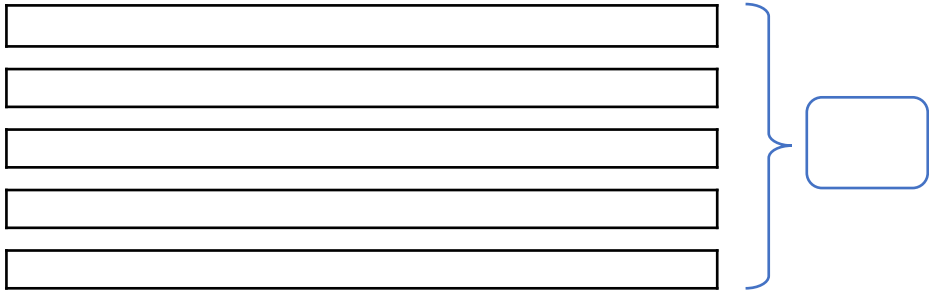$5 \times 8\dfrac{3}{4} = \boxed{43\dfrac{3}{4}}$
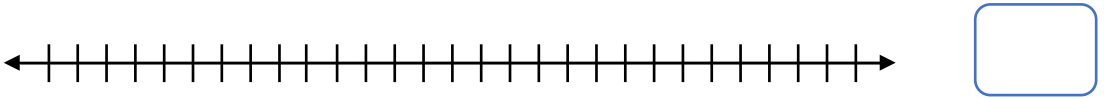
Complete:

$8 \times \frac{7}{10}$

$5 \times \frac{7}{9}$

$\frac{4}{7} \times 6$

Complete the calculations and compare the results.
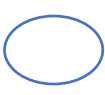
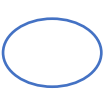| $2\frac{4}{9} \times 3$ | $4 \times 2\frac{2}{8}$ | $3\frac{4}{7} \times 5$ | $4 \times 4\frac{3}{8}$ | $7\frac{8}{9} \times 3$ | $4 \times 6\frac{9}{10}$ |

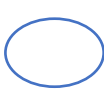| $3\frac{5}{6} \times 4$ | $6 \times 3\frac{6}{7}$ | $2\frac{3}{11} \times 7$ | $2 \times 7\frac{3}{11}$ | $4\frac{7}{8} \times 4$ | $3 \times 5\frac{4}{7}$ |

Convert the mixed numbers to improper fractions to multiply and compare the results.
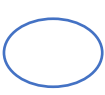
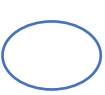| $6\frac{5}{7} \times 7$ | $8 \times 5\frac{4}{6}$ | $2\frac{1}{8} \times 9$ | $2 \times 9\frac{1}{8}$ | $6\frac{7}{9} \times 3$ | $5 \times 7\frac{3}{8}$ |

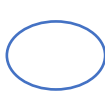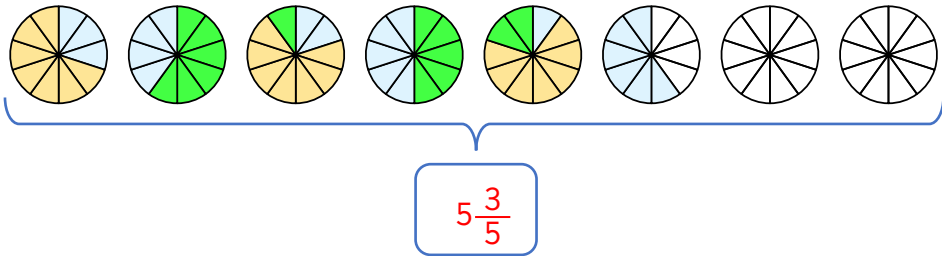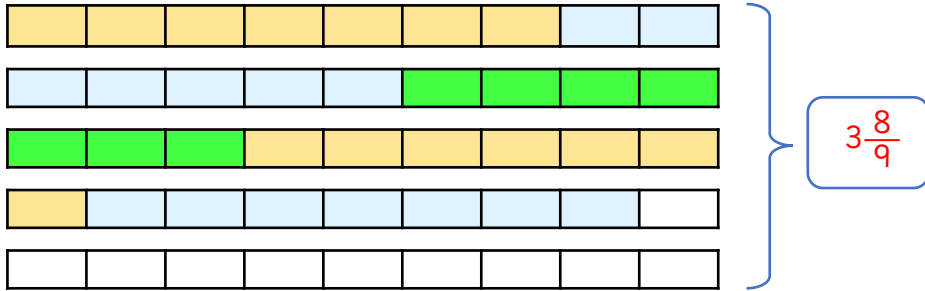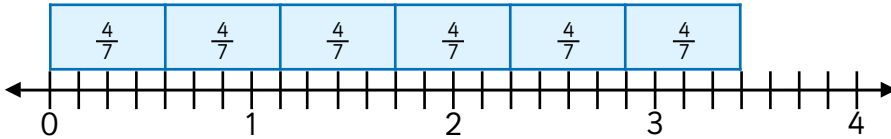| $4\frac{2}{5} \times 3$ | $3 \times 4\frac{2}{5}$ | $6\frac{4}{5} \times 7$ | $8 \times 5\frac{7}{10}$ | $3\frac{3}{5} \times 7$ | $8 \times 2\frac{7}{9}$ |

Complete:

$8 \times \frac{7}{10}$

$5\frac{3}{5}$

$5 \times \frac{7}{9}$

$3\frac{8}{9}$

$\frac{4}{7} \times 6$

$$\frac{4}{7} \quad \frac{4}{7} \quad \frac{4}{7} \quad \frac{4}{7} \quad \frac{4}{7} \quad \frac{4}{7}$$

0   1   2   3   4

$3\frac{3}{7}$

Complete the calculations and compare the results.

$2\frac{4}{9} \times 3$	$4 \times 2\frac{2}{8}$	$3\frac{4}{7} \times 5$	$4 \times 4\frac{3}{8}$	$7\frac{8}{9} \times 3$	$4 \times 6\frac{9}{10}$
$7\frac{1}{3}$ < 9		$17\frac{6}{7}$ > $17\frac{1}{2}$		$23\frac{2}{3}$ < $27\frac{3}{5}$	

$3\frac{5}{6} \times 4$	$6 \times 3\frac{6}{7}$	$2\frac{3}{11} \times 7$	$2 \times 7\frac{3}{11}$	$4\frac{7}{8} \times 4$	$3 \times 5\frac{4}{7}$
$15\frac{1}{3}$ < $23\frac{1}{7}$		$15\frac{10}{11}$ > $14\frac{6}{11}$		$19\frac{1}{2}$ > $16\frac{5}{7}$	

Convert the mixed numbers to improper fractions to multiply and compare the results.

$6\frac{5}{7} \times 7$	$8 \times 5\frac{4}{6}$	$2\frac{1}{8} \times 9$	$2 \times 9\frac{1}{8}$	$6\frac{7}{9} \times 3$	$5 \times 7\frac{3}{8}$
47 > $45\frac{1}{3}$		$19\frac{1}{8}$ > $18\frac{1}{4}$		$20\frac{1}{3}$ < $36\frac{7}{8}$	

$4\frac{2}{5} \times 3$	$3 \times 4\frac{2}{5}$	$6\frac{4}{5} \times 7$	$8 \times 5\frac{7}{10}$	$3\frac{3}{5} \times 7$	$8 \times 2\frac{7}{9}$
$13\frac{1}{5}$ = $13\frac{1}{5}$		$47\frac{3}{5}$ > $45\frac{3}{5}$		$25\frac{1}{5}$ > $22\frac{2}{9}$	

There are 9 lamp posts on a road.
There is $1\frac{1}{2}$ of a metre between each lamp post.

What is the distance between the first and last lamp post?

Use pattern blocks, if ⬛ is equal to 1 whole, work out what fraction the other shapes represent.
Use this to calculate the multiplications.
Give your answers in their simplest form.

◣ × 3 =

▲ × 3 =

▯ × 3 =

Rosie and Zach both work on a homework project.

Rosie

I spent $3\frac{2}{3}$ hours a week for 3 weeks doing my project.

I spent $4\frac{1}{4}$ hours a week for 2 weeks doing my project.

Zach

Who spent the most time on their project?
Explain your reasoning.

There are 9 lamp posts on a road.
There is $1\frac{1}{2}$ of a metre between each lamp post.

What is the distance between the first and last lamp post?

$8 \times 1\frac{1}{2} = 8 \times \frac{3}{2} = \frac{24}{2} = 12$

The distance between the first and last lamp post is 12 metres.

Use pattern blocks, if ▮ is equal to 1 whole, work out what fraction the other shapes represent.
Use this to calculate the multiplications.
Give your answers in their simplest form.

◣ × 3 = $\frac{3}{2}$

◢ × 3 = $\frac{3}{4}$

▮ × 3 = $\frac{3}{2}$

Rosie and Zach both work on a homework project.

I spent $3\frac{2}{3}$ hours a week for 3 weeks doing my project.

Rosie

I spent $4\frac{1}{4}$ hours a week for 2 weeks doing my project.

Zach

Who spent the most time on their project? Explain your reasoning.

$3 \times 3\frac{2}{3} = \frac{33}{3} = 11$ hours
$2 \times 4\frac{1}{4} = \frac{34}{4} = 8.5$ hours

Zach spent 2.5 hours less on his project than Rosie did.

There are 12 bus stops.
The distance between each two stops is $3\frac{4}{5}$ km.

What is the distance between the first and last bus stops?

Use pattern blocks, if ▰ is equal to 1 whole, work out what fraction the other shapes represent.
Use this to calculate the multiplications.
Give your answers in their simplest form.

▲ × 4 =

▲ × 4 =

▱ × 4 =

Rosie and Zach both work on a homework project.

Rosie

I spent $7\frac{4}{11}$ hours a week for 5 weeks doing my project.

I spent $9\frac{3}{8}$ hours a week for 4 weeks doing my project.

Zach

Who spent the most time on their project?
Explain your reasoning.

There are 12 bus stops.
The distance between each two stops is $3\frac{4}{5}$ km.

What is the distance between the first and last bus stops?

$11 \times 3\frac{4}{5} = 11 \times \frac{19}{5} = \frac{209}{5} = 41\frac{4}{5}$

The distance between the first and last lamp post is $41\frac{4}{5}$ metres.

Use pattern blocks, if ⬛ is equal to 1 whole, work out what fraction the other shapes represent.
Use this to calculate the multiplications.
Give your answers in their simplest form.

🔺 × 4 = $\frac{4}{3}$

◢ × 4 = 1

◣ × 4 = 2

Rosie and Zach both work on a homework project.

I spent $7\frac{4}{11}$ hours a week for 5 weeks doing my project.

Rosie

I spent $9\frac{3}{8}$ hours a week for 4 weeks doing my project.

Zach

Who spent the most time on their project? Explain your reasoning.

$5 \times 7\frac{4}{11} = \frac{405}{11} = 36\frac{9}{11}$ hours

$4 \times 9\frac{3}{8} = \frac{75}{2} = 37.5$ hours

Zach spent more time on his project than Rosie did.

There are 22 lamp posts on a road. There is $11\frac{1}{4}$ of a metre between each lamppost.

What is the distance between the first and last lamp post?

Use pattern blocks, if ⬡ is equal to 1 whole, work out what fraction the other shapes represent.
Use this to calculate the multiplications.
Give your answers in their simplest form.

⬢ × 5 =

△ × 5 =

▱ × 5 =

Rosie and Zach both work on a homework project.

Rosie: I spent $4\frac{2}{5}$ hours a week for 4 weeks doing my project.

Zach: I spent $5\frac{1}{4}$ hours a week for 3 weeks doing my project.

Tia: I spent $8\frac{2}{3}$ hours a week for 2 weeks doing my project.

Who spent the most time on their project?

There are 22 lamp posts on a road.
There is $11\frac{1}{4}$ of a metre between each lamp post

What is the distance between the first and last lamp post?

$21 \times 11\frac{1}{4} = 21 \times \frac{45}{4} = \frac{945}{4} = 236\frac{1}{4}$

The distance between the first and last lamp post is $236\frac{1}{4}$ metres.

Use pattern blocks, if ⬡ is equal to 1 whole, work out what fraction the other shapes represent.
Use this to calculate the multiplications.
Give your answers in their simplest form.

▱ $\times 5 = 2\frac{1}{2}$

△ $\times 5 = \frac{5}{6}$

▱ $\times 5 = 1\frac{2}{3}$

Rosie and Zach both work on a homework project.

Rosie: I spent $4\frac{2}{5}$ hours a week for 4 weeks doing my project.

Zach: I spent $5\frac{1}{4}$ hours a week for 3 weeks doing my project.

Tia: I spent $8\frac{2}{3}$ hours a week for 2 weeks doing my project.

Rosie spent the most time.

$4 \times 4\frac{2}{5} = \frac{88}{5} = 17\frac{3}{5}$ hours

$3 \times 5\frac{1}{4} = \frac{63}{4} = 15\frac{3}{4}$ hours

$2 \times 8\frac{2}{3} = \frac{52}{3} = 17\frac{1}{3}$ hours

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