

Fractions: Of Amounts & Multiplying

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Starter 1

1. Fully simplify: $\frac{18}{24}$

2. Calculate: $2\frac{1}{3} + 1\frac{1}{2}$

3. Using the bar models to the left:

$\frac{1}{2}$ of 20 = $\underline{\hspace{1cm}}$ $\frac{1}{4}$ of 20 = $\underline{\hspace{1cm}}$ $\frac{3}{4}$ of 20 = $\underline{\hspace{1cm}}$

4. Calculate:

$\frac{1}{3}$ of 24 $\frac{2}{3}$ of 24

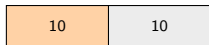
5. Fill in the blank: $\frac{3}{4}$ of $\underline{\hspace{1cm}}$ = 18

6. Find $\frac{2}{5}$ of 35.

7. Amy cuts a 60 cm ribbon and takes $\frac{3}{4}$ of it. How long is her piece?

8. True or false? " $\frac{1}{2}$ of 30 = $30 \div 2$." Explain your reasoning.

20



$\frac{1}{2}$ of 20 = ?



$\frac{1}{4}$ of 20 = ?



$\frac{3}{4}$ of 20 = ?

Starter 1

1. Fully simplify: $\frac{18}{24} \frac{3}{4}$ 2. Calculate: $2\frac{1}{3} + 1\frac{1}{2} = 3\frac{5}{6}$

3. Using the bar models to the left:

$$\frac{1}{2} \text{ of } 20 = 10 \quad \frac{1}{4} \text{ of } 20 = 5 \quad \frac{3}{4} \text{ of } 20 = 15$$

4. Calculate:

$$\frac{1}{3} \text{ of } 24 \quad \frac{2}{3} \text{ of } 24$$

8 and 16

5. Fill in the blank: $\frac{3}{4}$ of 24 = 18

6. Find $\frac{2}{5}$ of 35. 14

7. Amy cuts a 60 cm ribbon and takes $\frac{3}{4}$ of it. How long is her piece? 45 cm

8. True or false? " $\frac{1}{2}$ of 30 = $30 \div 2$." Explain your reasoning. True. $\frac{1}{2}$ of 30 = 15 and $30 \div 2 = 15$.

Worked Solution: Starter 1, Question 1

Question: Fully simplify $\frac{18}{24}$.

Worked Solution: Starter 1, Question 1

Question: Fully simplify $\frac{18}{24}$.

Solution: The highest common factor of 18 and 24 is 6, so divide numerator and denominator by 6:

$$\frac{18}{24} = \frac{18 \div 6}{24 \div 6} = \frac{3}{4}.$$

So $\frac{18}{24}$ simplifies to $\frac{3}{4}$.

Worked Solution: Starter 1, Question 2

Question: Calculate $2\frac{1}{3} + 1\frac{1}{2}$.

Worked Solution: Starter 1, Question 2

Question: Calculate $2\frac{1}{3} + 1\frac{1}{2}$.

Solution: Use a common denominator of 6:

$$2\frac{1}{3} = 2\frac{2}{6}, \quad 1\frac{1}{2} = 1\frac{3}{6}.$$

$$2\frac{2}{6} + 1\frac{3}{6} = 3\frac{5}{6}.$$

So the sum is $3\frac{5}{6}$.

Worked Solution: Starter 1, Question 3

Question: Using the bar models, find $\frac{1}{2}$ of 20, $\frac{1}{4}$ of 20, and $\frac{3}{4}$ of 20.

Worked Solution: Starter 1, Question 3

Question: Using the bar models, find $\frac{1}{2}$ of 20, $\frac{1}{4}$ of 20, and $\frac{3}{4}$ of 20.

Solution: The bar models split the whole 20 into equal parts.

$\frac{1}{2}$ of 20: split into 2 parts of 10, so 10.

$\frac{1}{4}$ of 20: split into 4 parts of 5, so 5.

$\frac{3}{4}$ of 20: take 3 of the 4 equal parts, so $3 \times 5 = 15$.

Therefore:

$$\frac{1}{2} \text{ of } 20 = 10, \quad \frac{1}{4} \text{ of } 20 = 5, \quad \frac{3}{4} \text{ of } 20 = 15.$$

Worked Solution: Starter 1, Question 4

Question: Calculate $\frac{1}{3}$ of 24 and $\frac{2}{3}$ of 24.

Worked Solution: Starter 1, Question 4

Question: Calculate $\frac{1}{3}$ of 24 and $\frac{2}{3}$ of 24.

Solution: First find one third:

$$24 \div 3 = 8.$$

So $\frac{1}{3}$ of 24 = 8.

Two thirds are two lots of one third:

$$\frac{2}{3} \text{ of } 24 = 2 \times 8 = 16.$$

Hence the answers are 8 and 16.

Worked Solution: Starter 1, Question 5

Question: Fill in the blank: $\frac{3}{4}$ of ___ = 18.

Worked Solution: Starter 1, Question 5

Question: Fill in the blank: $\frac{3}{4}$ of ___ = 18.

Solution: Let the missing number be x . We need

$$\frac{3}{4}x = 18.$$

Divide both sides by 3: one quarter of x is 6. Then multiply by 4: the whole of x is $4 \times 6 = 24$.

So the blank is 24.

Worked Solution: Starter 1, Question 6

Question: Find $\frac{2}{5}$ of 35.

Worked Solution: Starter 1, Question 6

Question: Find $\frac{2}{5}$ of 35.

Solution: Divide 35 into 5 equal parts:

$$35 \div 5 = 7.$$

Each fifth is 7, so two fifths are

$$2 \times 7 = 14.$$

Therefore $\frac{2}{5}$ of 35 = 14.

Worked Solution: Starter 1, Question 7

Question: Amy cuts a 60 cm ribbon and takes $\frac{3}{4}$ of it. How long is her piece?

Worked Solution: Starter 1, Question 7

Question: Amy cuts a 60 cm ribbon and takes $\frac{3}{4}$ of it. How long is her piece?

Solution: Divide the ribbon into 4 equal parts:

$$60 \div 4 = 15.$$

Each quarter is 15 cm. Amy takes 3 quarters, so her piece is

$$3 \times 15 = 45 \text{ cm.}$$

So Amy's piece is 45 cm long.

Worked Solution: Starter 1, Question 8

Question: True or false? “ $\frac{1}{2}$ of $30 = 30 \div 2$.” Explain your reasoning.

Worked Solution: Starter 1, Question 8

Question: True or false? “ $\frac{1}{2}$ of $30 = 30 \div 2$.” Explain your reasoning.

Solution: True. The word “of” means multiply, so

$$\frac{1}{2} \text{ of } 30 = \frac{1}{2} \times 30 = \frac{30}{2} = 15.$$

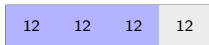
Also,

$$30 \div 2 = 15.$$

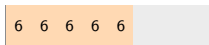
Since both give 15, the statement is true.

Starter 2

48



$\frac{3}{4}$ of 48 = ?

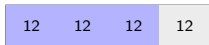


$\frac{5}{8}$ of 48 = ?

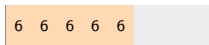
1. Order smallest to largest: $\frac{3}{8}$, $\frac{1}{2}$, $\frac{5}{12}$
2. Convert $\frac{17}{5}$ to a mixed number.
3. Use the bar model to find $\frac{3}{4}$ of 48 and $\frac{5}{8}$ of 48.
4. Calculate: $\frac{5}{8}$ of 72
5. $\frac{2}{3}$ of a class of 30 are girls. How many boys are there?
6. Rania says " $\frac{3}{5}$ of 40 = 24". Is she correct? Show your working.
7. Which is greater:
 $\frac{3}{4}$ of 60 or $\frac{4}{5}$ of 55?
8. Fill in the blank:
 $\frac{\quad}{8}$ of 64 = 40

Starter 2

48



$\frac{3}{4}$ of 48 = 36



$\frac{5}{8}$ of 48 = 30

1. Order smallest to largest: $\frac{3}{8}, \frac{1}{2}, \frac{5}{12}$ $\frac{3}{8} < \frac{5}{12} < \frac{1}{2}$
2. Convert $\frac{17}{5}$ to a mixed number. $3\frac{2}{5}$
3. Use the bar model to find $\frac{3}{4}$ of 48 and $\frac{5}{8}$ of 48. 36 and 30
4. Calculate: $\frac{5}{8}$ of 72 = 45
5. $\frac{2}{3}$ of a class of 30 are girls. How many boys are there?
10 boys
6. Rania says " $\frac{3}{5}$ of 40 = 24". Is she correct? Show your working. Yes; $\frac{3}{5} \times 40 = 24$.
7. Which is greater:
 $\frac{3}{4}$ of 60 or $\frac{4}{5}$ of 55? $\frac{3}{4}$ of 60 (= 45)
8. Fill in the blank:
 $\frac{5}{8}$ of 64 = 40

Worked Solution: Starter 2, Question 1

Question: Order smallest to largest: $\frac{3}{8}$, $\frac{1}{2}$, $\frac{5}{12}$.

Worked Solution: Starter 2, Question 1

Question: Order smallest to largest: $\frac{3}{8}$, $\frac{1}{2}$, $\frac{5}{12}$.

Solution: Use a common denominator of 24:

$$\frac{3}{8} = \frac{9}{24}, \quad \frac{1}{2} = \frac{12}{24}, \quad \frac{5}{12} = \frac{10}{24}.$$

The numerators are $9 < 10 < 12$, so

$$\frac{3}{8} < \frac{5}{12} < \frac{1}{2}.$$

Worked Solution: Starter 2, Question 2

Question: Convert $\frac{17}{5}$ to a mixed number.

Worked Solution: Starter 2, Question 2

Question: Convert $\frac{17}{5}$ to a mixed number.

Solution: Divide 17 by 5. Since $5 \times 3 = 15$, there are 3 whole fives with remainder 2:

$$\frac{17}{5} = 3\frac{2}{5}.$$

So the mixed number is $3\frac{2}{5}$.

Worked Solution: Starter 2, Question 3

Question: Use the bar model to find $\frac{3}{4}$ of 48 and $\frac{5}{8}$ of 48.

Worked Solution: Starter 2, Question 3

Question: Use the bar model to find $\frac{3}{4}$ of 48 and $\frac{5}{8}$ of 48.

Solution: For $\frac{3}{4}$ of 48: split 48 into 4 equal parts.

$$48 \div 4 = 12, \quad 3 \times 12 = 36.$$

For $\frac{5}{8}$ of 48: split 48 into 8 equal parts.

$$48 \div 8 = 6, \quad 5 \times 6 = 30.$$

So the answers are 36 and 30.

Worked Solution: Starter 2, Question 4

Question: Calculate $\frac{5}{8}$ of 72.

Worked Solution: Starter 2, Question 4

Question: Calculate $\frac{5}{8}$ of 72.

Solution: Divide 72 into 8 equal parts:

$$72 \div 8 = 9.$$

Each eighth is 9, so five eighths are

$$5 \times 9 = 45.$$

Therefore $\frac{5}{8}$ of 72 = 45.

Worked Solution: Starter 2, Question 5

Question: $\frac{2}{3}$ of a class of 30 are girls. How many boys are there?

Worked Solution: Starter 2, Question 5

Question: $\frac{2}{3}$ of a class of 30 are girls. How many boys are there?

Solution: If $\frac{2}{3}$ are girls, then $\frac{1}{3}$ are boys.

$$30 \div 3 = 10.$$

So there are 10 boys.

Alternatively, girls = $\frac{2}{3} \times 30 = 20$, so boys = $30 - 20 = 10$.

Worked Solution: Starter 2, Question 6

Question: Rania says “ $\frac{3}{5}$ of $40 = 24$ ”. Is she correct? Show your working.

Worked Solution: Starter 2, Question 6

Question: Rania says “ $\frac{3}{5}$ of $40 = 24$ ”. Is she correct? Show your working.

Solution: Split 40 into 5 equal parts:

$$40 \div 5 = 8.$$

Three fifths are

$$3 \times 8 = 24.$$

So Rania is correct: $\frac{3}{5}$ of $40 = 24$.

Worked Solution: Starter 2, Question 7

Question: Which is greater: $\frac{3}{4}$ of 60, or $\frac{4}{5}$ of 55?

Worked Solution: Starter 2, Question 7

Question: Which is greater: $\frac{3}{4}$ of 60, or $\frac{4}{5}$ of 55?

Solution: Compute each amount.

$$\frac{3}{4} \times 60 = 45.$$

$$\frac{4}{5} \times 55 = \frac{4 \times 55}{5} = \frac{220}{5} = 44.$$

Since $45 > 44$, $\frac{3}{4}$ of 60 is greater.

Worked Solution: Starter 2, Question 8

Question: Fill in the blank:

$$\frac{\quad}{8} \text{ of } 64 = 40.$$

Worked Solution: Starter 2, Question 8

Question: Fill in the blank:

$$\frac{\quad}{8} \text{ of } 64 = 40.$$

Solution: Let the missing numerator be x . Then

$$\frac{x}{8} \times 64 = 40.$$

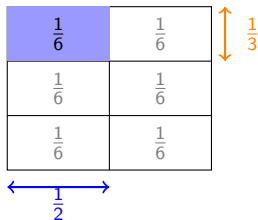
Since $64 \div 8 = 8$,

$$8x = 40.$$

$$x = 40 \div 8 = 5.$$

So the missing number is 5.

Starter 3



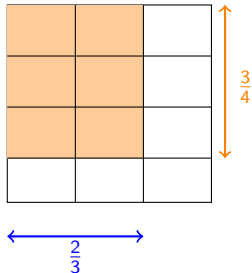
1. What is $\frac{1}{2}$ of $\frac{1}{2}$? Draw a picture to show your answer.

2. Use the area model on the left to calculate $\frac{1}{2} \times \frac{1}{3} = \underline{\hspace{1cm}}$

3. Use the second area model to calculate and simplify:
 $\frac{2}{3} \times \frac{3}{4} = \frac{\underline{\hspace{1cm}}}{\underline{\hspace{1cm}}} = \frac{\underline{\hspace{1cm}}}{\underline{\hspace{1cm}}}$

4. Calculate:

$$\frac{3}{5} \times \frac{5}{7}$$

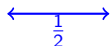
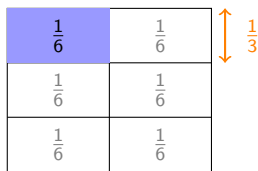


5. Simplify *then* multiply: $\frac{3}{9} \times \frac{4}{8}$

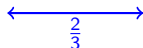
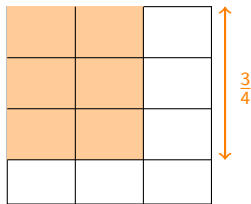
6. Find $\frac{3}{4}$ of $\frac{2}{5}$. What do you notice about “of” and “ $\times$ ”?

7. Calculate: $1\frac{1}{2} \times 1\frac{1}{2}$

Starter 3



Q1: $\frac{1}{2}$ of $\frac{1}{2} = \frac{1}{4}$



- What is $\frac{1}{2}$ of $\frac{1}{2}$? Draw a picture to show your answer.

$$\frac{1}{4}$$

- Use the area model on the left to calculate $\frac{1}{2} \times \frac{1}{3} = \frac{1}{6}$

- Use the second area model to calculate and simplify:

$$\frac{2}{3} \times \frac{3}{4} = \frac{6}{12} = \frac{1}{2}$$

- Calculate:

$$\frac{3}{5} \times \frac{5}{7}$$

$$= \frac{3}{7}$$

- Simplify *then* multiply: $\frac{3}{9} \times \frac{4}{8} = \frac{1}{6}$

- Find $\frac{3}{4}$ of $\frac{2}{5}$. What do you notice about “of” and “ $\times$ ”? $\frac{3}{10}$; “of” means multiply.

- Calculate: $1\frac{1}{2} \times \frac{1}{2}$

Worked Solution: Starter 3, Question 1

Question: What is $\frac{1}{2}$ of $\frac{1}{2}$? Draw a picture to show your answer.

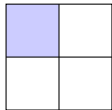
Worked Solution: Starter 3, Question 1

Question: What is $\frac{1}{2}$ of $\frac{1}{2}$? Draw a picture to show your answer.

Solution: " $\frac{1}{2}$ of $\frac{1}{2}$ " means

$$\frac{1}{2} \times \frac{1}{2} = \frac{1 \times 1}{2 \times 2} = \frac{1}{4}.$$

A diagram showing this is a square split into 2 equal rows and 2 equal columns. Shading one of the four equal parts shows one quarter.



So the answer is $\frac{1}{4}$.

Worked Solution: Starter 3, Question 2

Question: Use the area model to calculate

$$\frac{1}{2} \times \frac{1}{3} = \frac{\text{---}}{\text{---}}.$$

Worked Solution: Starter 3, Question 2

Question: Use the area model to calculate

$$\frac{1}{2} \times \frac{1}{3} = \frac{\text{---}}{\text{---}}.$$

Solution: The area model is divided into 2 equal columns and 3 equal rows, so it has

$$2 \times 3 = 6$$

equal parts. The overlap of $\frac{1}{2}$ and $\frac{1}{3}$ is exactly 1 of those 6 parts.

Therefore

$$\frac{1}{2} \times \frac{1}{3} = \frac{1}{6}.$$

The missing numbers are 1 and 6.

Worked Solution: Starter 3, Question 3

Question: Use the second area model to calculate and simplify:

$$\frac{2}{3} \times \frac{3}{4} = \frac{\text{---}}{\text{---}} = \frac{\text{---}}{\text{---}}.$$

Worked Solution: Starter 3, Question 3

Question: Use the second area model to calculate and simplify:

$$\frac{2}{3} \times \frac{3}{4} = \frac{\quad}{\quad} = \frac{\quad}{\quad}.$$

Solution: The second area model is divided into 3 equal columns and 4 equal rows, giving

$$3 \times 4 = 12$$

equal parts. The overlap is $2 \times 3 = 6$ parts, so

$$\frac{2}{3} \times \frac{3}{4} = \frac{6}{12}.$$

Now simplify by dividing numerator and denominator by 6:

$$\frac{6}{12} = \frac{1}{2}.$$

So the completed fraction is

$$\frac{2}{3} \times \frac{3}{4} = \frac{6}{12} = \frac{1}{2}.$$

Worked Solution: Starter 3, Question 4

Question: Calculate

$$\frac{3}{5} \times \frac{5}{7}.$$

Worked Solution: Starter 3, Question 4

Question: Calculate

$$\frac{3}{5} \times \frac{5}{7}.$$

Solution: Multiply numerators and denominators:

$$\frac{3}{5} \times \frac{5}{7} = \frac{3 \times 5}{5 \times 7} = \frac{15}{35}.$$

Simplify by dividing numerator and denominator by 5:

$$\frac{15}{35} = \frac{3}{7}.$$

So $\frac{3}{5} \times \frac{5}{7} = \frac{3}{7}.$

Worked Solution: Starter 3, Question 5

Question: Simplify *then* multiply:

$$\frac{3}{9} \times \frac{4}{8}.$$

Worked Solution: Starter 3, Question 5

Question: Simplify *then* multiply:

$$\frac{3}{9} \times \frac{4}{8}.$$

Solution: First simplify each fraction:

$$\frac{3}{9} = \frac{1}{3}, \quad \frac{4}{8} = \frac{1}{2}.$$

Then multiply:

$$\frac{1}{3} \times \frac{1}{2} = \frac{1 \times 1}{3 \times 2} = \frac{1}{6}.$$

$$\text{So } \frac{3}{9} \times \frac{4}{8} = \frac{1}{6}.$$

Worked Solution: Starter 3, Question 6

Question: Find $\frac{3}{4}$ of $\frac{2}{5}$. What do you notice about “of” and “ $\times$ ”?

Worked Solution: Starter 3, Question 6

Question: Find $\frac{3}{4}$ of $\frac{2}{5}$. What do you notice about “of” and “ $\times$ ”?

Solution: “ $\frac{3}{4}$ of $\frac{2}{5}$ ” means

$$\frac{3}{4} \times \frac{2}{5} = \frac{3 \times 2}{4 \times 5} = \frac{6}{20} = \frac{3}{10}.$$

So the answer is $\frac{3}{10}$.

Notice that “of” means the same as multiplication by a fraction.

Worked Solution: Starter 3, Question 7

Question: Calculate

$$1\frac{1}{2} \times \frac{1}{3}.$$

Worked Solution: Starter 3, Question 7

Question: Calculate

$$1\frac{1}{2} \times \frac{1}{3}.$$

Solution: First convert $1\frac{1}{2}$ to an improper fraction:

$$1\frac{1}{2} = \frac{3}{2}.$$

Then multiply:

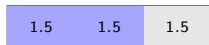
$$\frac{3}{2} \times \frac{1}{3} = \frac{3 \times 1}{2 \times 3} = \frac{3}{6} = \frac{1}{2}.$$

So $1\frac{1}{2} \times \frac{1}{3} = \frac{1}{2}.$

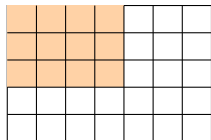
Starter 4

1. Simplify: $\frac{24}{36}$
2. $3\frac{1}{4} - 1\frac{2}{3}$
3. $\frac{5}{6}$ of 42

$4\frac{1}{2}$ m wall



$$\frac{3}{5} \times \frac{4}{7}$$



4. A wall is $4\frac{1}{2}$ m long. A mural covers $\frac{2}{3}$ of it. Use the bar model to find the length of the mural.

5. Use the area model to calculate: $\frac{3}{5} \times \frac{4}{7} = \frac{\quad}{\quad}$

6. Which is greater: $\frac{2}{3} \times \frac{3}{4}$, or $\frac{3}{4}$ of $\frac{2}{3}$? Explain.

7. Fill in the blank:

$$\frac{3}{5} \times \frac{\quad}{\quad} = \frac{6}{35}$$

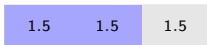
two proper fractions always gives a smaller result than either fraction." Explain or give a counterexample.

8. True or false? "Multiplying

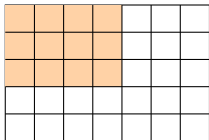
Starter 4

1. Simplify: $\frac{24}{36} \times \frac{2}{3}$ 2. $3\frac{1}{4} - 1\frac{2}{3} = 1\frac{7}{12}$ 3. $\frac{5}{6}$ of 42 = 35

$4\frac{1}{2}$ m wall



$$\frac{3}{5} \times \frac{4}{7}$$



4. A wall is $4\frac{1}{2}$ m long. A mural covers $\frac{2}{3}$ of it. Use the bar model to find the length of the mural. 3 m

5. Use the area model to calculate: $\frac{3}{5} \times \frac{4}{7} = \frac{12}{35}$

6. Which is greater: $\frac{2}{3} \times \frac{3}{4}$, or $\frac{3}{4}$ of $\frac{2}{3}$? Explain. They are equal ($\frac{1}{2}$).

7. Fill in the blank:

$$\frac{3}{5} \times \frac{2}{7} = \frac{6}{35}$$

two proper fractions always gives a smaller result than either fraction." Explain or give a counterexample.

True; e.g. $\frac{2}{3} \times \frac{3}{4} = \frac{1}{2}$, which is smaller than both.

8. True or false? "Multiplying

Worked Solution: Starter 4, Question 1

Question: Simplify $\frac{24}{36}$.

Worked Solution: Starter 4, Question 1

Question: Simplify $\frac{24}{36}$.

Solution: The highest common factor of 24 and 36 is 12. Divide numerator and denominator by 12:

$$\frac{24}{36} = \frac{24 \div 12}{36 \div 12} = \frac{2}{3}.$$

So $\frac{24}{36}$ simplifies to $\frac{2}{3}$.

Worked Solution: Starter 4, Question 2

Question: Calculate $3\frac{1}{4} - 1\frac{2}{3}$.

Worked Solution: Starter 4, Question 2

Question: Calculate $3\frac{1}{4} - 1\frac{2}{3}$.

Solution: Convert both mixed numbers to improper fractions:

$$3\frac{1}{4} = \frac{13}{4}, \quad 1\frac{2}{3} = \frac{5}{3}.$$

Use a common denominator of 12:

$$\frac{13}{4} = \frac{39}{12}, \quad \frac{5}{3} = \frac{20}{12}.$$

Subtract:

$$\frac{39}{12} - \frac{20}{12} = \frac{19}{12} = 1\frac{7}{12}.$$

So the answer is $1\frac{7}{12}$.

Worked Solution: Starter 4, Question 3

Question: Calculate $\frac{5}{6}$ of 42.

Worked Solution: Starter 4, Question 3

Question: Calculate $\frac{5}{6}$ of 42.

Solution: Divide 42 into 6 equal parts:

$$42 \div 6 = 7.$$

Each sixth is 7, so five sixths are

$$5 \times 7 = 35.$$

Therefore $\frac{5}{6}$ of 42 = 35.

Worked Solution: Starter 4, Question 4

Question: A wall is $4\frac{1}{2}$ m long. A mural covers $\frac{2}{3}$ of it. Use the bar model to find the length of the mural.

Worked Solution: Starter 4, Question 4

Question: A wall is $4\frac{1}{2}$ m long. A mural covers $\frac{2}{3}$ of it. Use the bar model to find the length of the mural.

Solution: Split the wall into 3 equal thirds:

$$4\frac{1}{2} \div 3 = \frac{9}{2} \div 3 = \frac{9}{2} \times \frac{1}{3} = \frac{3}{2} = 1.5 \text{ m.}$$

Each third is 1.5 m. The mural covers 2 thirds, so its length is

$$2 \times 1.5 = 3 \text{ m.}$$

Equivalently,

$$\frac{2}{3} \times 4\frac{1}{2} = \frac{2}{3} \times \frac{9}{2} = \frac{18}{6} = 3.$$

So the mural is 3 m long.

Worked Solution: Starter 4, Question 5

Question: Use the area model to calculate

$$\frac{3}{5} \times \frac{4}{7} = \frac{___}{___}.$$

Worked Solution: Starter 4, Question 5

Question: Use the area model to calculate

$$\frac{3}{5} \times \frac{4}{7} = \frac{___}{___}.$$

Solution: The area model is divided into 5 equal rows and 7 equal columns, so it has

$$5 \times 7 = 35$$

equal parts. The shaded overlap is $3 \times 4 = 12$ parts.

Therefore

$$\frac{3}{5} \times \frac{4}{7} = \frac{12}{35}.$$

The missing numbers are 12 and 35.

Worked Solution: Starter 4, Question 6

Question: Which is greater: $\frac{2}{3} \times \frac{3}{4}$, or $\frac{3}{4}$ of $\frac{2}{3}$? Explain.

Worked Solution: Starter 4, Question 6

Question: Which is greater: $\frac{2}{3} \times \frac{3}{4}$, or $\frac{3}{4}$ of $\frac{2}{3}$? Explain.

Solution: Since “of” means multiply, both are products of the same two fractions:

$$\frac{2}{3} \times \frac{3}{4} = \frac{2 \times 3}{3 \times 4} = \frac{6}{12} = \frac{1}{2},$$

and

$$\frac{3}{4} \text{ of } \frac{2}{3} = \frac{3}{4} \times \frac{2}{3} = \frac{3 \times 2}{4 \times 3} = \frac{6}{12} = \frac{1}{2}.$$

They are equal. Multiplication of fractions is commutative, so neither is greater.

Worked Solution: Starter 4, Question 7

Question: Fill in the blank:

$$\frac{3}{5} \times \text{---} = \frac{6}{35}.$$

Worked Solution: Starter 4, Question 7

Question: Fill in the blank:

$$\frac{3}{5} \times \text{---} = \frac{6}{35}.$$

Solution: Let the missing fraction be x . To find x , divide $\frac{6}{35}$ by $\frac{3}{5}$:

$$x = \frac{6}{35} \div \frac{3}{5} = \frac{6}{35} \times \frac{5}{3} = \frac{6 \times 5}{35 \times 3} = \frac{30}{105} = \frac{2}{7}.$$

So the missing fraction is $\frac{2}{7}$.

Worked Solution: Starter 4, Question 8

Question: True or false? “Multiplying two proper fractions always gives a smaller result than either fraction.” Explain or give a counterexample.

Worked Solution: Starter 4, Question 8

Question: True or false? “Multiplying two proper fractions always gives a smaller result than either fraction.” Explain or give a counterexample.

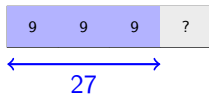
Solution: True for positive proper fractions. A proper fraction lies between 0 and 1, and multiplying a positive number by a number less than 1 makes it smaller.

For example,

$$\frac{2}{3} \times \frac{3}{4} = \frac{6}{12} = \frac{1}{2}.$$

Here $\frac{1}{2} < \frac{2}{3}$ and $\frac{1}{2} < \frac{3}{4}$, so the result is smaller than both fractions. Therefore the statement is true.

Starter 5

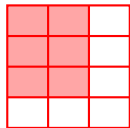


1. Simplify: $\frac{20}{30}$
2. Simplify: $\frac{84}{108}$
3. Convert $4\frac{3}{5}$ to an improper fraction.
4. Calculate: $2\frac{3}{4} + 1\frac{3}{5}$
5. $\frac{3}{4}$ of a number is 27. Use the bar model to find the whole number.
6. Jack spends $\frac{1}{3}$ of his pocket money on Monday and $\frac{1}{4}$ on Tuesday. What fraction remains?
7. A jug holds $1\frac{1}{2}$ litres. You fill $\frac{2}{3}$ of it. How many millilitres is that?
8. Show that $\frac{2}{3} \times \frac{3}{4} = \frac{3}{4} \times \frac{2}{3}$ using area diagrams.

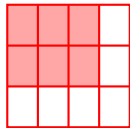
Starter 5



↔
27



Q7: $\frac{2}{3} \times \frac{3}{4} = \frac{6}{12}$



$\frac{3}{4} \times \frac{2}{3} = \frac{6}{12}$

1. Simplify: $\frac{20}{30} \frac{2}{3}$
2. Simplify: $\frac{84}{108} \frac{7}{9}$
3. Convert $4\frac{3}{5}$ to an improper fraction. $\frac{23}{5}$
4. Calculate: $2\frac{3}{4} + 1\frac{3}{5} = 4\frac{7}{20}$
5. $\frac{3}{4}$ of a number is 27. Use the bar model to find the whole number. 36
6. Jack spends $\frac{1}{3}$ of his pocket money on Monday and $\frac{1}{4}$ on Tuesday. What fraction remains? $\frac{5}{12}$
7. A jug holds $1\frac{1}{2}$ litres. You fill $\frac{2}{3}$ of it. How many millilitres is that? 1000 mL
8. Show that $\frac{2}{3} \times \frac{3}{4} = \frac{3}{4} \times \frac{2}{3}$ using area diagrams.

Worked Solution: Starter 5, Question 1

Question: Simplify $\frac{20}{30}$.

Worked Solution: Starter 5, Question 1

Question: Simplify $\frac{20}{30}$.

Solution: The highest common factor of 20 and 30 is 10. Divide numerator and denominator by 10:

$$\frac{20}{30} = \frac{20 \div 10}{30 \div 10} = \frac{2}{3}.$$

So $\frac{20}{30}$ simplifies to $\frac{2}{3}$.

Worked Solution: Starter 5, Question 2

Question: Simplify $\frac{84}{108}$.

Worked Solution: Starter 5, Question 2

Question: Simplify $\frac{84}{108}$.

Solution: Divide numerator and denominator by their highest common factor, 12:

$$\frac{84}{108} = \frac{84 \div 12}{108 \div 12} = \frac{7}{9}.$$

So $\frac{84}{108}$ simplifies to $\frac{7}{9}$.

Worked Solution: Starter 5, Question 3

Question: Convert $4\frac{3}{5}$ to an improper fraction.

Worked Solution: Starter 5, Question 3

Question: Convert $4\frac{3}{5}$ to an improper fraction.

Solution: The whole number 4 is $4 \times 5 = 20$ fifths. Add the extra 3 fifths:

$$4\frac{3}{5} = \frac{4 \times 5 + 3}{5} = \frac{20 + 3}{5} = \frac{23}{5}.$$

So the improper fraction is $\frac{23}{5}$.

Worked Solution: Starter 5, Question 4

Question: Calculate $2\frac{3}{4} + 1\frac{3}{5}$.

Worked Solution: Starter 5, Question 4

Question: Calculate $2\frac{3}{4} + 1\frac{3}{5}$.

Solution: Add the whole numbers and the fractions separately.

$$2 + 1 = 3.$$

$$\frac{3}{4} + \frac{3}{5} = \frac{15}{20} + \frac{12}{20} = \frac{27}{20} = 1\frac{7}{20}.$$

So the total is

$$3 + 1\frac{7}{20} = 4\frac{7}{20}.$$

$$\text{Thus } 2\frac{3}{4} + 1\frac{3}{5} = 4\frac{7}{20}.$$

Worked Solution: Starter 5, Question 5

Question: $\frac{3}{4}$ of a number is 27. Use the bar model to find the whole number.

Worked Solution: Starter 5, Question 5

Question: $\frac{3}{4}$ of a number is 27. Use the bar model to find the whole number.

Solution: The bar model shows the whole split into 4 equal quarters. Three quarters are worth 27, so one quarter is

$$27 \div 3 = 9.$$

The whole number is four quarters:

$$4 \times 9 = 36.$$

So the whole number is 36.

Worked Solution: Starter 5, Question 6

Question: Jack spends $\frac{1}{3}$ of his pocket money on Monday and $\frac{1}{4}$ on Tuesday. What fraction remains?

Worked Solution: Starter 5, Question 6

Question: Jack spends $\frac{1}{3}$ of his pocket money on Monday and $\frac{1}{4}$ on Tuesday. What fraction remains?

Solution: First find the total fraction spent.

$$\frac{1}{3} + \frac{1}{4} = \frac{4}{12} + \frac{3}{12} = \frac{7}{12}.$$

The whole amount is $1 = \frac{12}{12}$, so the fraction remaining is

$$\frac{12}{12} - \frac{7}{12} = \frac{5}{12}.$$

So $\frac{5}{12}$ of the pocket money remains.

Worked Solution: Starter 5, Question 7

Question: A jug holds $1\frac{1}{2}$ litres. You fill $\frac{2}{3}$ of it. How many millilitres is that?

Worked Solution: Starter 5, Question 7

Question: A jug holds $1\frac{1}{2}$ litres. You fill $\frac{2}{3}$ of it. How many millilitres is that?

Solution: First convert $1\frac{1}{2}$ litres to millilitres:

$$1\frac{1}{2} \text{ L} = 1500 \text{ mL.}$$

Now find $\frac{2}{3}$ of 1500 mL. Divide by 3:

$$1500 \div 3 = 500.$$

Two thirds are

$$2 \times 500 = 1000 \text{ mL.}$$

So the jug contains 1000 mL.

Worked Solution: Starter 5, Question 8

Question: Show that

$$\frac{2}{3} \times \frac{3}{4} = \frac{3}{4} \times \frac{2}{3}$$

using area diagrams.

Worked Solution: Starter 5, Question 8

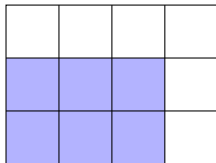
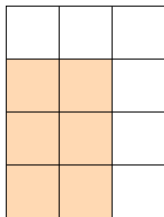
Question: Show that

$$\frac{2}{3} \times \frac{3}{4} = \frac{3}{4} \times \frac{2}{3}$$

using area diagrams.

Solution: In the left diagram, take a 3×4 grid. Shade 2 columns and 3 rows, giving $2 \times 3 = 6$ shaded cells out of $3 \times 4 = 12$.

In the right diagram, take a 4×3 grid. Shade 3 columns and 2 rows, giving $3 \times 2 = 6$ shaded cells out of $4 \times 3 = 12$.



Both diagrams give

$$\frac{6}{12} = \frac{1}{2}.$$