# 1 Fractions

I have a pizza. I want to give $\frac{1}{4}$ of the pizza to each of my friends.

Raju, I have $\frac{1}{2}$ of a pie, I will share it equally with you.

How many friends can Raju give the pizza to?

SINGAPORE
**STUDENT LEARNING SPACE**

Do you know how to divide fractions?

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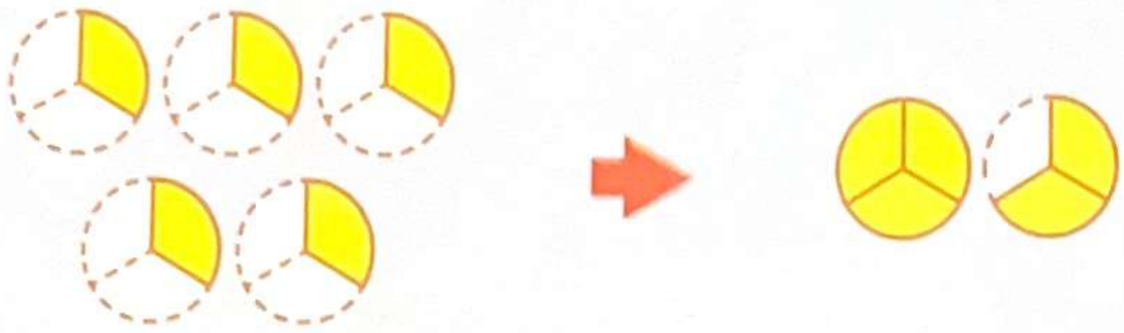
# Dividing a Fraction by a Whole Number

## Recall

**1** Find the value of $\frac{1}{3} \times 5$.



$$\frac{1}{3} \times 5 = \frac{1 \times 5}{3}$$

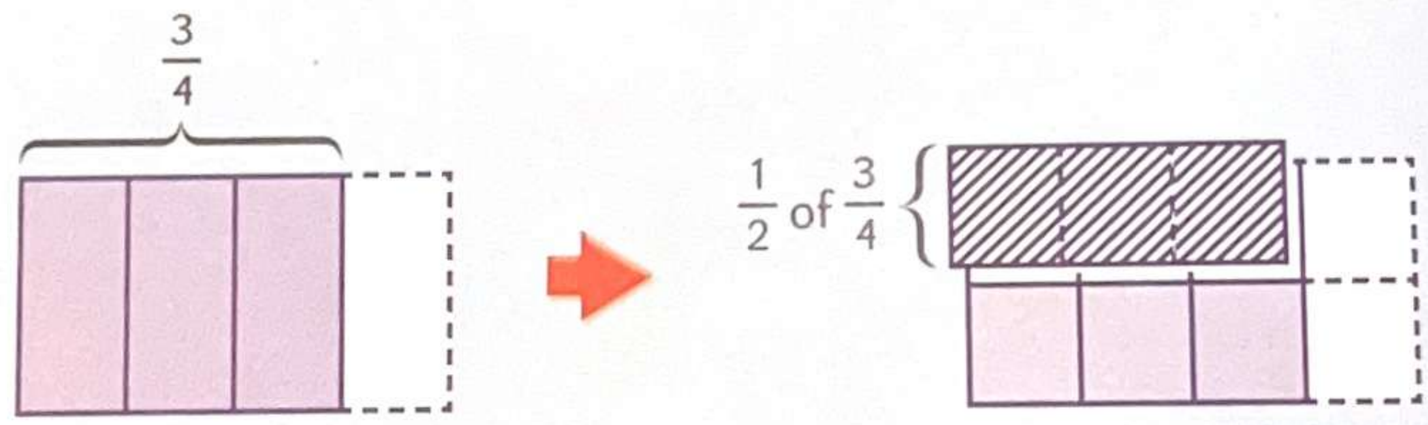
$$= \frac{\square}{\square} \quad \text{or} \quad \square$$

**2** What is $\frac{1}{2}$ of $\frac{3}{4}$?

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

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

$$= \frac{\square}{\square}$$




**3** Find the product of $\frac{1}{4}$ and $\frac{8}{3}$.

Express your answer in its simplest form.

**Method 1**

$$\frac{1}{4} \times \frac{8}{3} = \frac{1 \times 8}{4 \times 3}$$

$$= \frac{\square}{\square}$$

$$= \frac{\square}{\square}$$

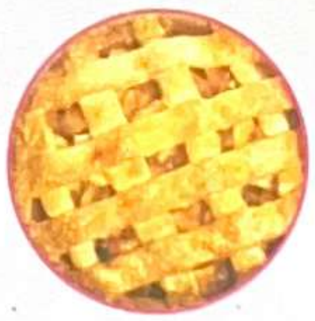
**Method 2**

$$\frac{1}{4} \times \frac{8}{3} = \frac{1 \times 8^{2}}{{}_{1}4 \times 3}$$

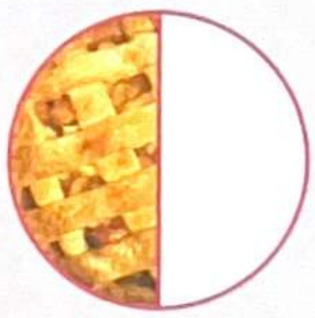
$$= \frac{1 \times 2}{1 \times 3}$$

$$= \frac{\square}{\square}$$

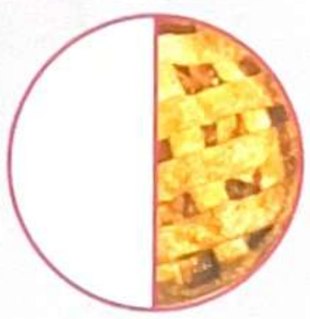
**4** Share 1 pie equally between 2 children.
How much pie does each child get?



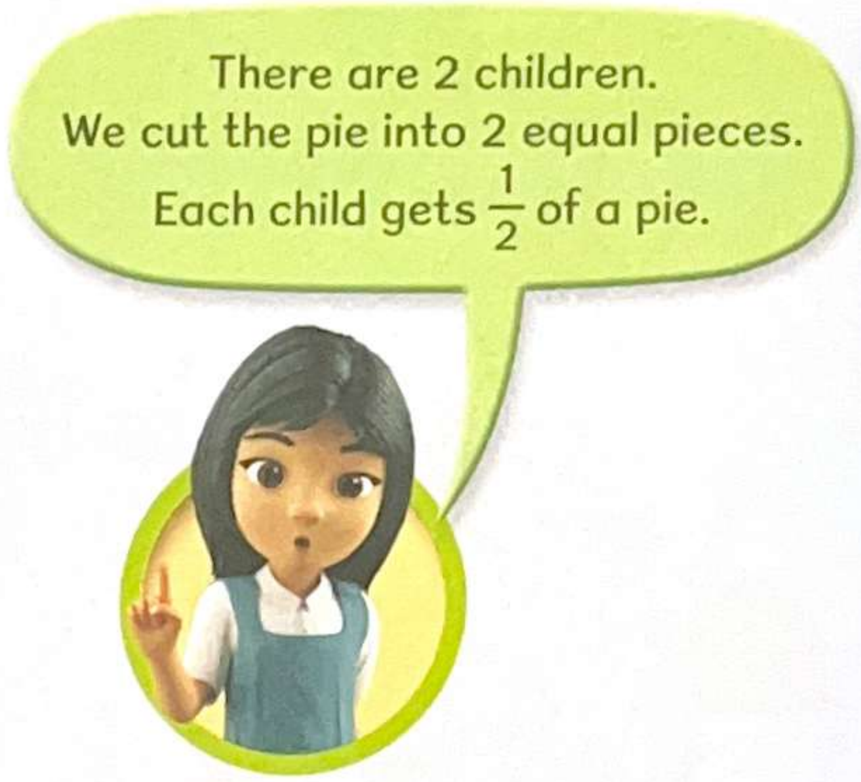
1 whole



$\frac{1}{2}$



$\frac{1}{2}$




**Method 1**

Fraction of pie each child gets

$= 1 \div 2$

$= \frac{\square}{\square}$

**Method 2**

Fraction of pie each child gets

$= 1 \div 2$

$= \frac{1}{\square}$ of $\square$

$= \frac{1}{\square} \times \square$

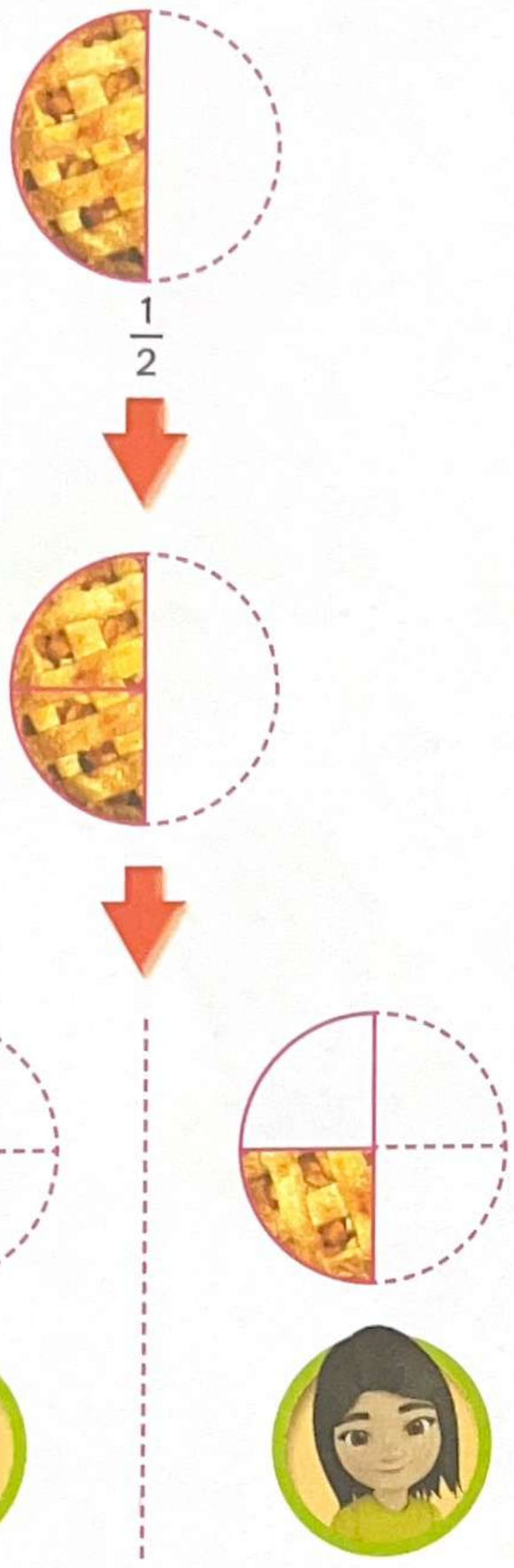
$= \frac{\square}{\square}$

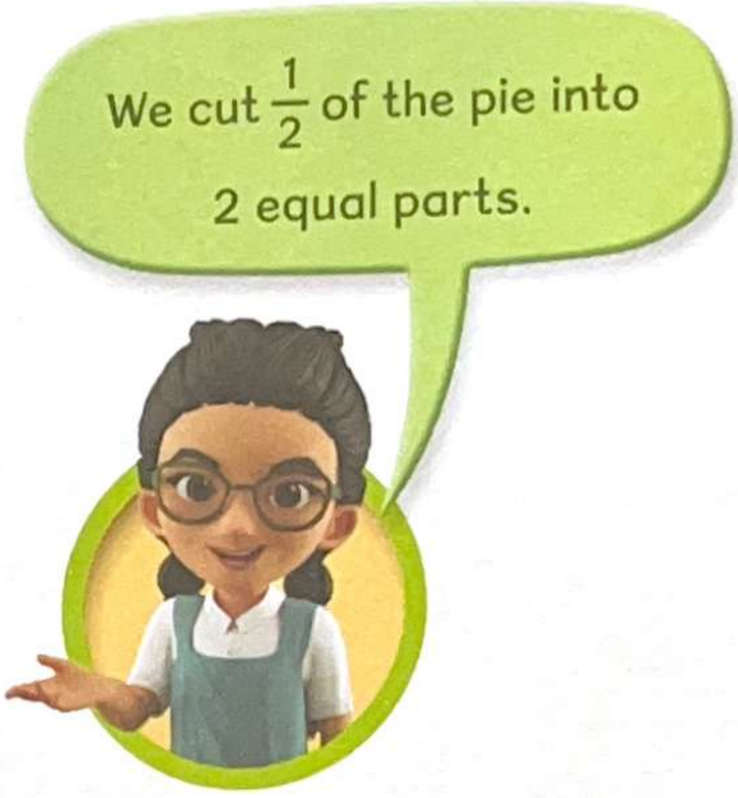
Each child gets $\frac{\square}{\square}$ of a pie.

There is a pie on the table.

$\frac{1}{2}$ of the pie is shared equally between 2 children.

What fraction of the pie does each child get?




Amount of pie each child gets $= \frac{1}{2} \div 2$

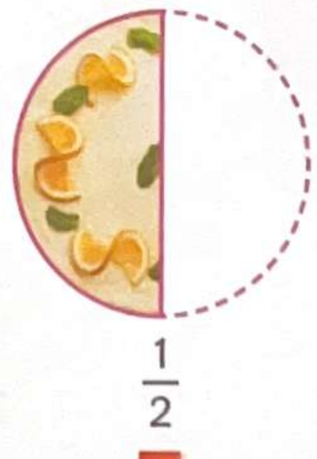
$= \frac{1}{4}$

Each child gets $\frac{1}{4}$ of the pie.

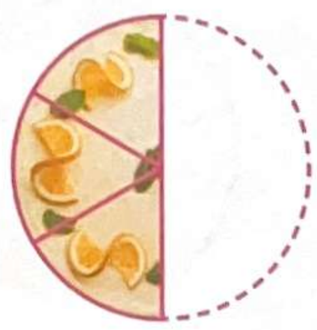
Mrs Tan bakes a cake.

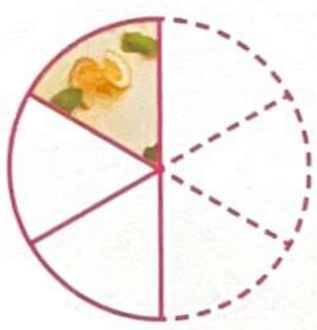
$\frac{1}{2}$ of the cake is shared equally among 3 children.

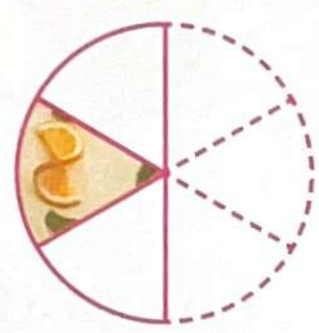
What fraction of the cake does each child get?

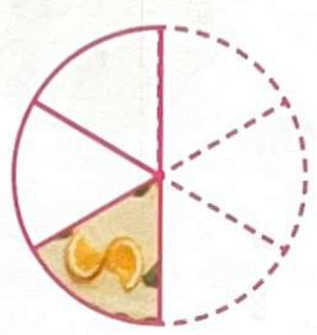


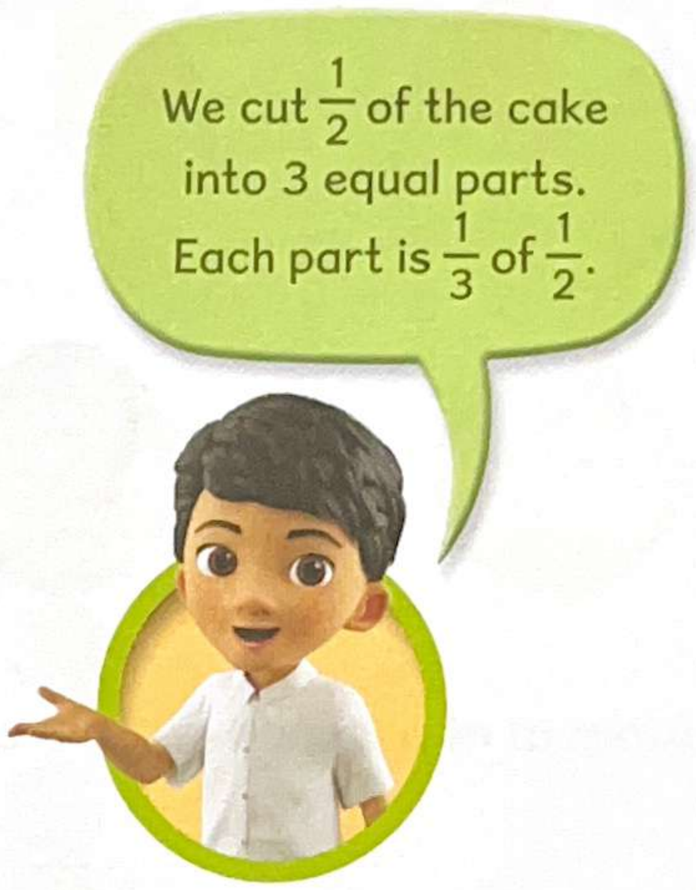
$\frac{1}{2}$












## Method 1

Each child gets $\frac{1}{3}$ of half of the cake.

$\frac{1}{2} \div 3 = \frac{1}{3}$ of $\frac{1}{2}$

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

$= \frac{1}{6}$

Each child gets $\frac{1}{6}$ of the cake.

## Method 2

Dividing by 3 is the same as multiplying by $\frac{1}{3}$.

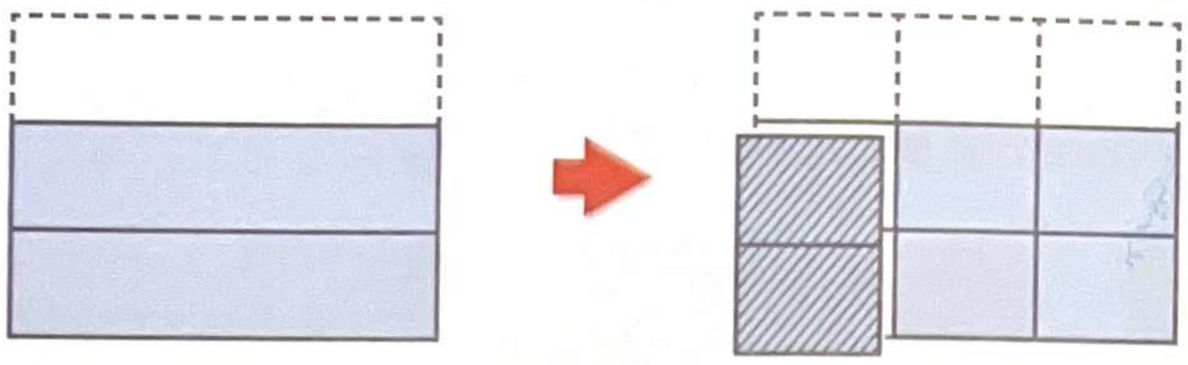
$\frac{1}{2} \div 3 = \frac{1}{2} \times \frac{1}{3}$

$= \frac{1}{6}$

Since $\frac{1}{3} \times \frac{1}{2} = \frac{1}{2} \times \frac{1}{3}$,

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

Divide $\frac{2}{3}$ by 3.



$\frac{2}{3} \div 3 = \frac{2}{3} \bigcirc \square$

$= \square$

## Let's Try! 1

**(a)** Divide. Give each answer in its simplest form where possible.

**(i)** $\frac{1}{3} \div 4 = \frac{\square}{\square}$

**(ii)** $\frac{3}{5} \div 6 = \frac{\square}{\square}$

**(iii)** $\frac{5}{9} \div 5 = \frac{\square}{\square}$

**(iv)** $\frac{7}{8} \div 3 = \frac{\square}{\square}$

**(b)** $\frac{1}{6}$ of a cake is shared equally between 2 people.
How much cake does each person get?

**(c)** $\frac{9}{10}$ m of ribbon is cut equally into 6 pieces.
What is the length of each piece of ribbon?

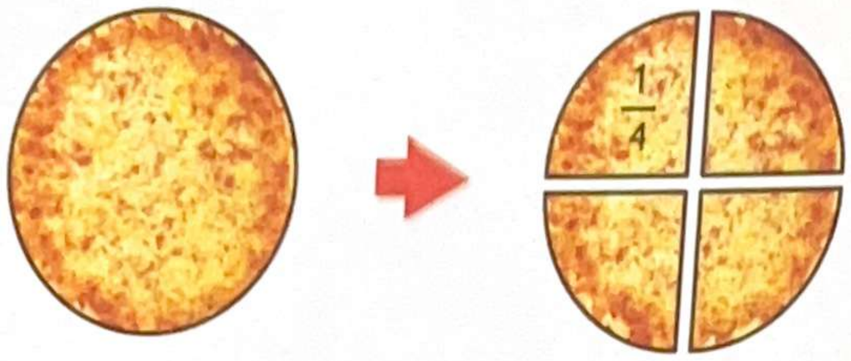
**(d)** $\frac{3}{4}$ kg of sugar is packed equally into 3 packets.
What is the mass of each packet of sugar?

Go to PB 6

# Dividing a Whole Number by a Fraction

Raju has 1 pizza. He is going to give $\frac{1}{4}$ of the pizza to each of his friends.

How many friends can he give the pizza to?





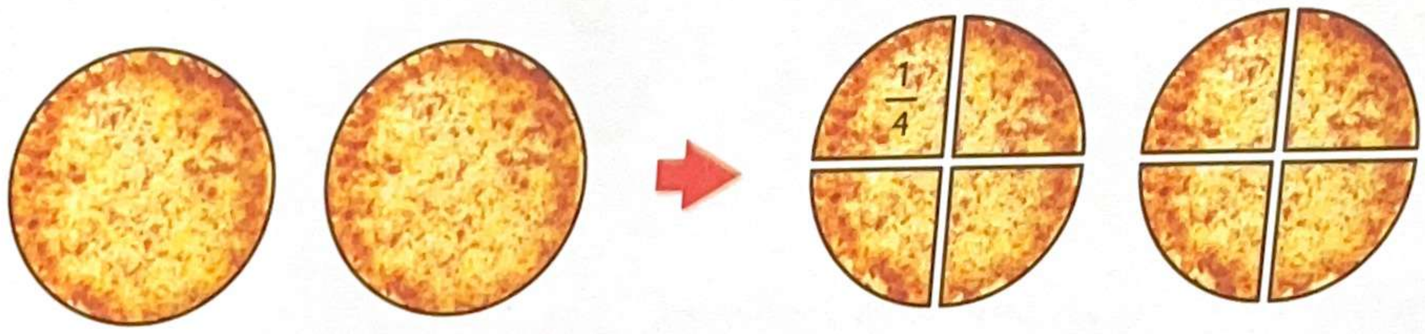
Number of friends he can give the pizza to $= 1 \div \frac{1}{4}$

$= 4$

He can give the pizza to **4** friends.

Anna has 2 pizzas. She is going to give $\frac{1}{4}$ of a pizza to each of her friends.

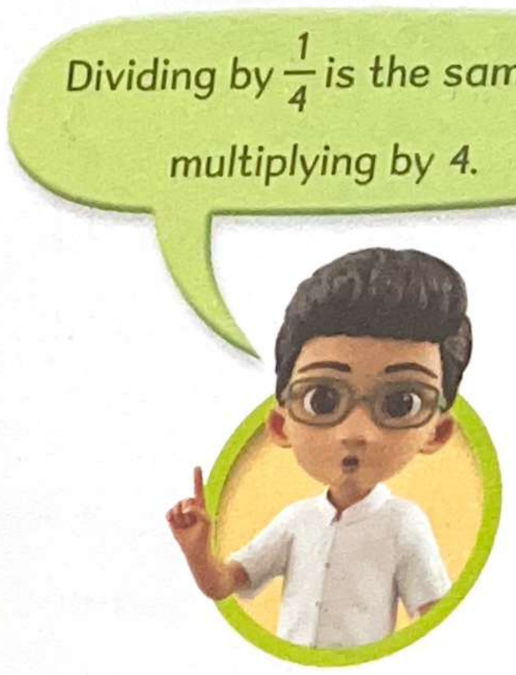
How many friends can she give the pizzas to?




Number of friends she can give the pizzas to $= 2 \div \frac{1}{4}$

$= 2 \times 4$

$= 8$

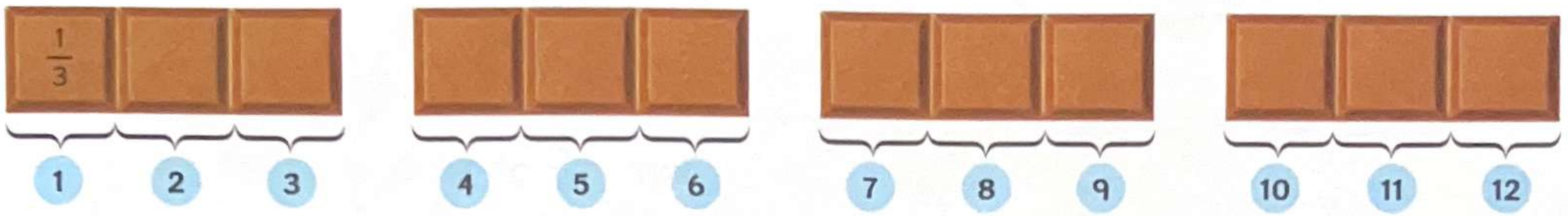



She can give the pizzas to **8** friends.

A group of children share 4 bars of chocolate equally.

Each child gets $\frac{1}{3}$ of a chocolate bar.

How many children are there?




Number of children $= 4 \div \frac{1}{3}$

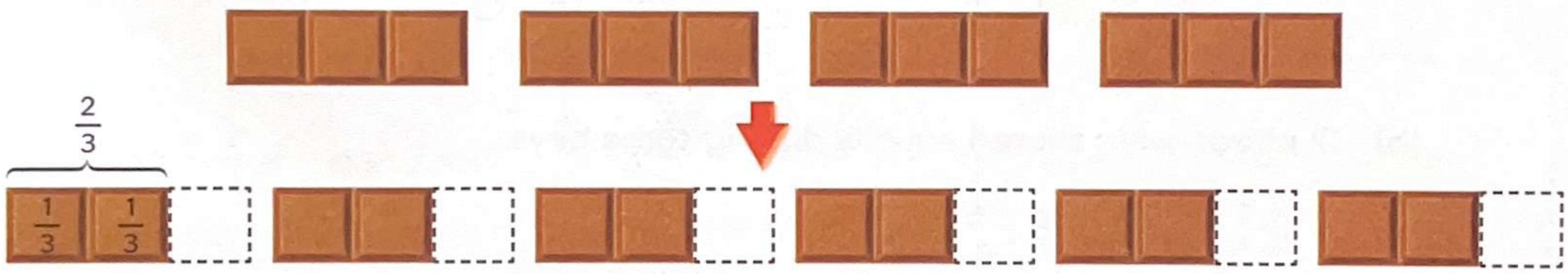
$= 12$

There are **12** children.

A group of children share 4 bars of chocolate equally.

Each child gets $\frac{2}{3}$ of a chocolate bar.

How many children are there?

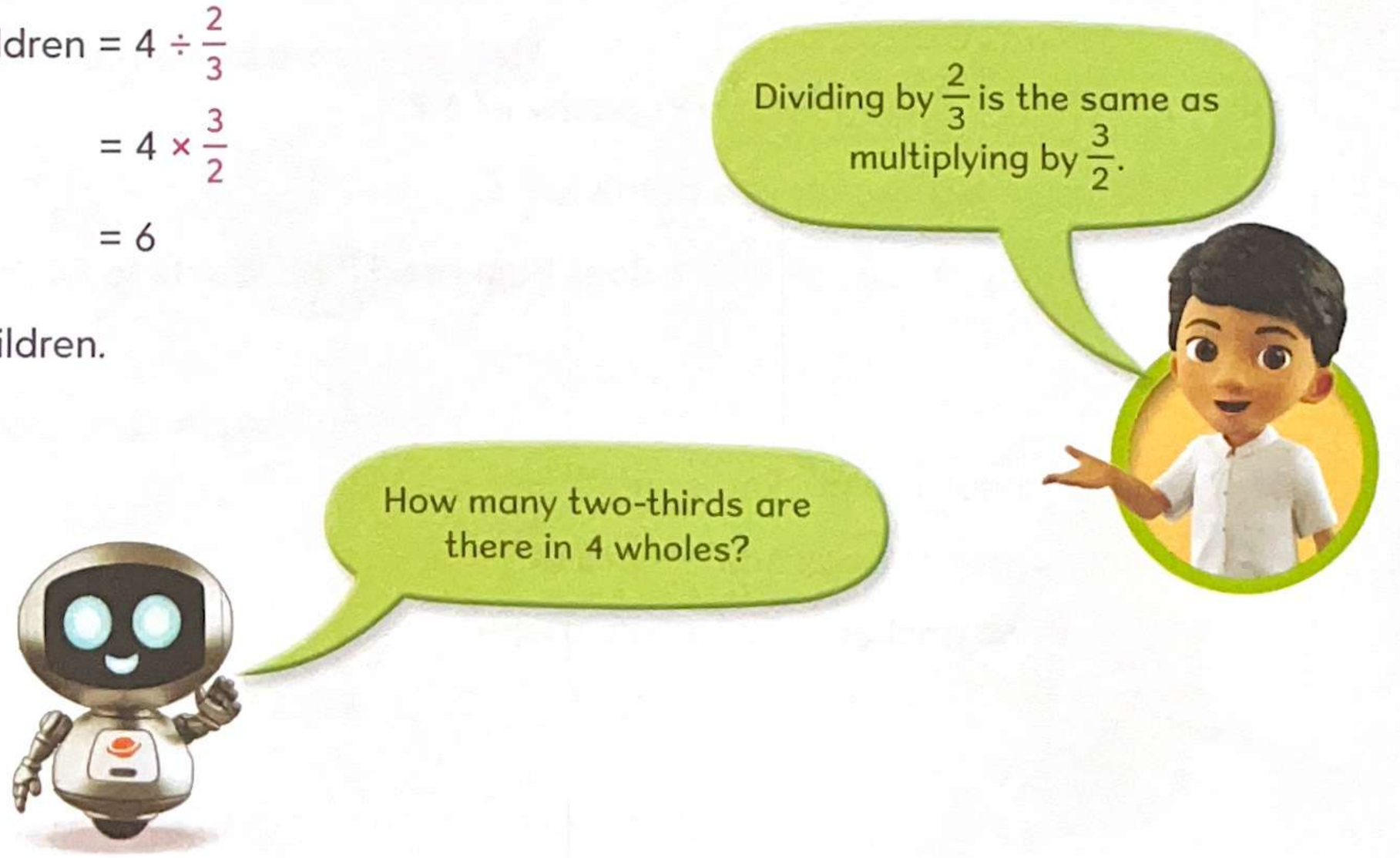



Number of children $= 4 \div \frac{2}{3}$

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

$= 6$

There are **6** children.



# Dividing a Fraction by a Fraction

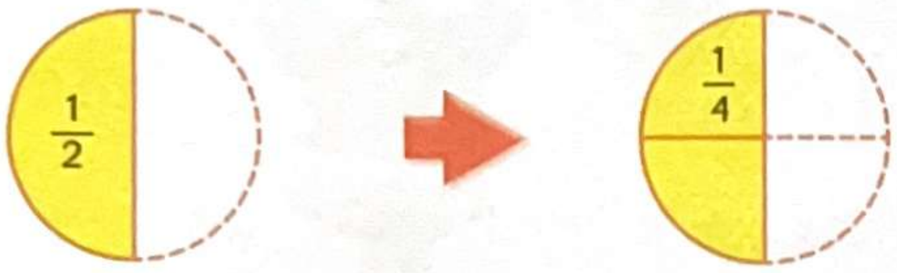
Raju has $\frac{1}{2}$ of a cake.

He cuts it into equal pieces.

Each piece is $\frac{1}{4}$ of the cake.

How many pieces of cake does he get?

Dividing by $\frac{1}{4}$ is the same as multiplying by 4.




Number of pieces of cake $= \frac{1}{2} \div \frac{1}{4}$

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

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

$= 2$

He gets **2** pieces of cake.

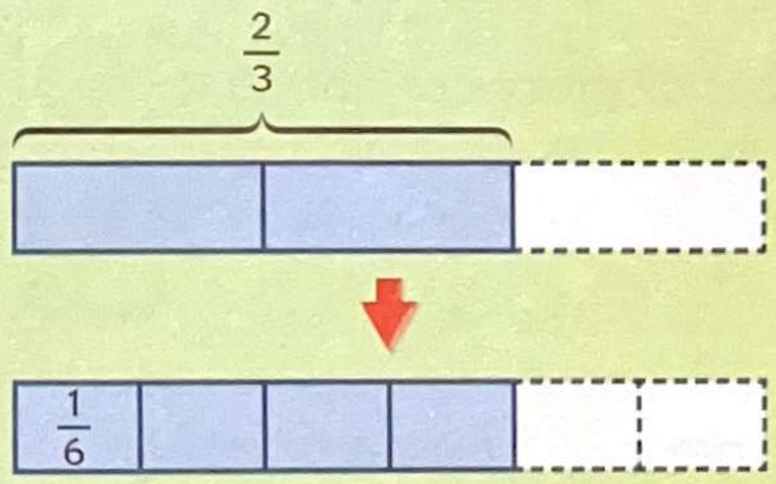
Hassan has $\frac{2}{3}$ of a pancake.

He cuts it into equal pieces.

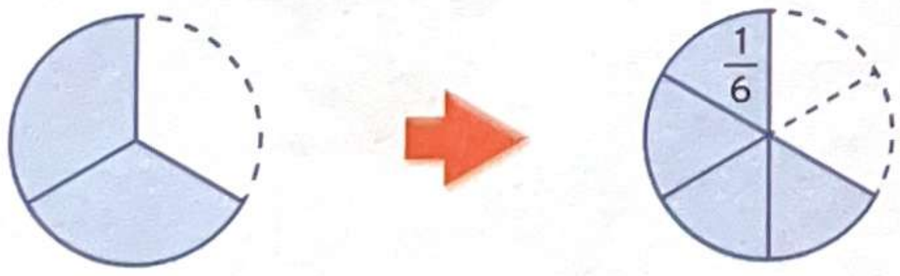
Each piece is $\frac{1}{6}$ of a pancake.

How many pieces of pancake does he get?

We can also use a bar model to show the division.




There are 4 sixths in $\frac{2}{3}$.




Number of pieces of pancake $= \frac{2}{3} \div \frac{1}{6}$

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

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

$= 4$

He gets **4** pieces of pancake.

## Let's Try! 3

**(a)** Divide.

**(i)** $\frac{1}{3} \div \frac{1}{6} =$ ☐

**(ii)** $\frac{2}{3} \div \frac{2}{9} =$ ☐

**(iii)** $\frac{4}{10} \div \frac{2}{5} =$ ☐

**(iv)** $\frac{3}{4} \div \frac{1}{8} =$ ☐

**(v)** $\frac{2}{9} \div \frac{1}{4} =$ ☐

**(vi)** $\frac{3}{4} \div \frac{1}{3} =$ ☐

**(b)** Jiahao had $\frac{2}{3}$ of a pizza.

He gave each friend $\frac{1}{3}$ of the whole pizza.

How many friends did he give the pieces of pizza to?

**(c)** Salleh has $\frac{5}{9}$ kg of popcorn.

He packs them into packets.

Each packet of popcorn has a mass of $\frac{1}{9}$ kg.

How many packets of popcorn does Salleh pack?

**(d)** A jug contains $\frac{2}{5}\ \ell$ of orange juice.

Audrey pours the juice equally into some glasses such that each glass contains $\frac{1}{10}\ \ell$ of juice.

How many glasses does she use?

Go to PB 6

# Word Problems

Julie, Tom and Ben had a pizza.

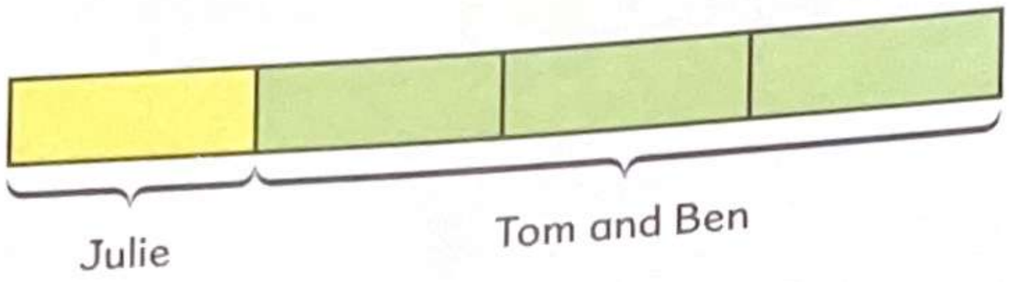
Julie ate $\frac{1}{4}$ of the pizza.

Tom and Ben shared the rest of the pizza equally.

**(a)** What fraction of the pizza did Tom and Ben share?

**(b)** What fraction of the pizza did Tom have?

**(a)**

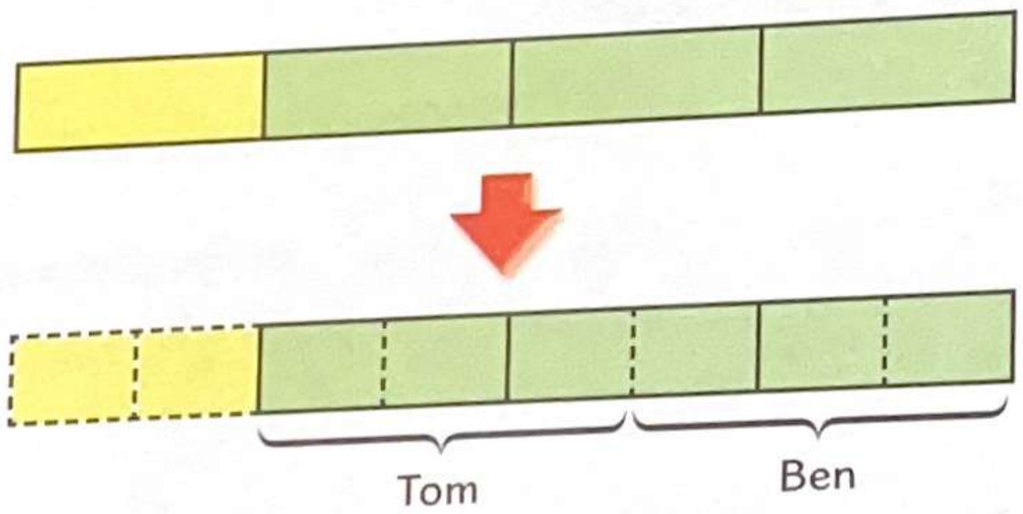



Fraction of pizza that Tom and Ben shared $= 1 - \frac{1}{4}$

$= \frac{3}{4}$

Tom and Ben shared $\frac{3}{4}$ of the pizza.

**(b)**




Fraction of pizza that Tom had $= \frac{3}{4} \div 2$

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

$= \frac{3}{8}$

Tom had $\frac{3}{8}$ of the pizza.

There are $1\frac{3}{4}\,\ell$ of juice in Jug A and $2\frac{1}{4}\,\ell$ of juice in Jug B.


Jug A Jug B

**(a)** How many litres of juice are there in both jugs altogether?

Total volume of juice $= 1\frac{3}{4}\,\ell + 2\frac{1}{4}\,\ell$

$= 4\,\ell$

There are **4** $\ell$ of juice in both jugs altogether.

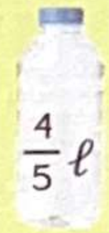
**(b)** John has some empty bottles. The capacity of each bottle is $\frac{4}{5}\,\ell$.
He fills all the bottles completely with juice from both jugs.
How many bottles can he fill?

Number of bottles filled $= 4 \div \frac{4}{5}$

$= 4 \times \frac{5}{4}$

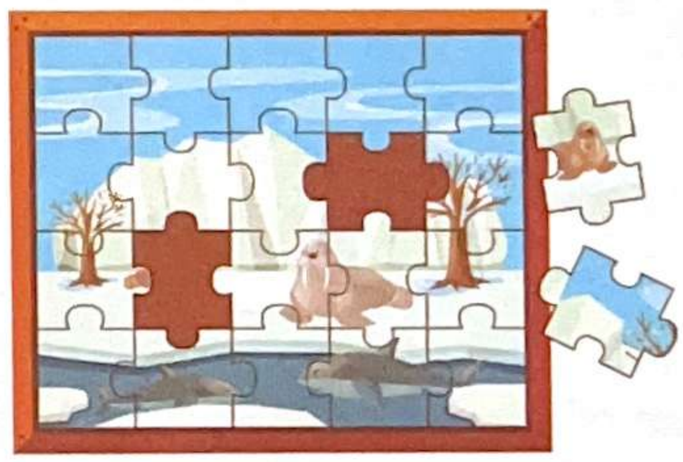
$= 5$

John can fill **5** bottles.




How many such bottles can John fill completely with juice?

Ramli took $\frac{1}{12}$ h to complete a puzzle.
How many such puzzles did he complete in $\frac{3}{4}$ h?



Number of puzzles completed $= \frac{3}{4} \div \frac{1}{12}$

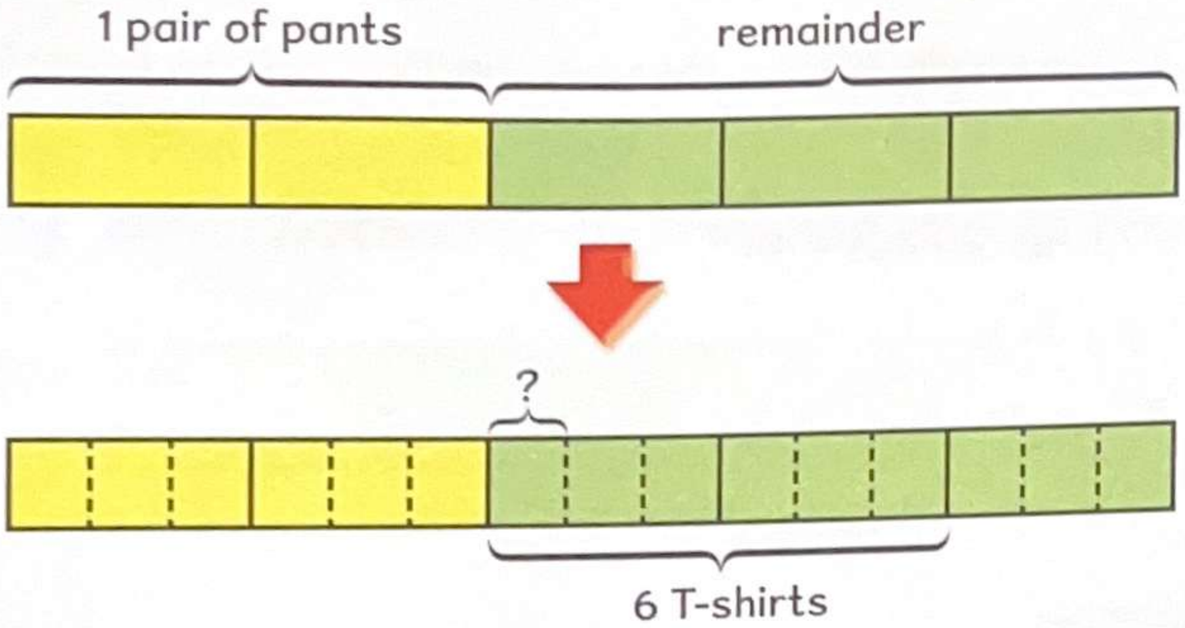
$= \frac{3}{4} \times 12$

$= 9$

Ramli completed **9** puzzles.

Peter spent $\frac{2}{5}$ of his money on a pair of pants and $\frac{2}{3}$ of the remainder on 6 T-shirts. What fraction of the money did Peter spend on each T-shirt?

**Method 1**




Peter spent $\frac{1}{15}$ of his money on each T-shirt.

**Method 2**

Remainder $= 1 - \frac{2}{5}$

$= \frac{3}{5}$

Fraction of money spent on 6 T-shirts $= \frac{2}{3}$ of the remainder

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

$= \frac{2 \times \cancel{3}^{1}}{\cancel{3}_{1} \times 5}$

$= \frac{2 \times 1}{1 \times 5}$

$= \frac{2}{5}$

Fraction of money spent on each T-shirt $= \frac{2}{5} \div 6$

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

$= \frac{\overset{1}{\cancel{2}} \times 1}{5 \times \cancel{6}_{3}}$

$= \frac{1 \times 1}{5 \times 3}$

$= \frac{1}{15}$

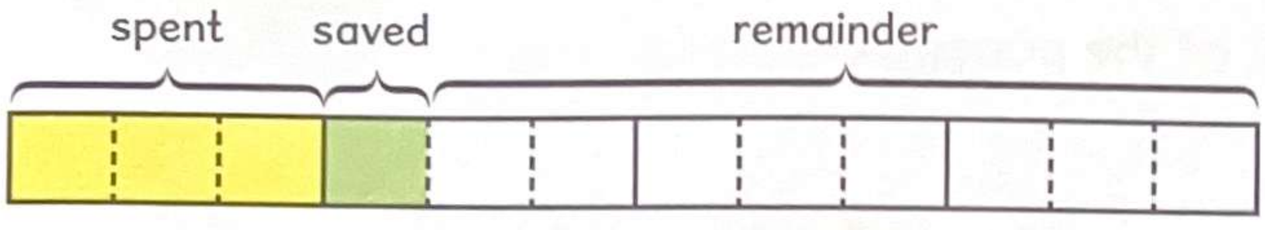
Peter spent $\frac{1}{15}$ of his money on each T-shirt.

Mr Lee spends $\frac{1}{4}$ of his salary and saves $\frac{1}{12}$ of his salary.

He divides the rest of his salary among all his children.

Each child receives $\frac{1}{6}$ of his salary.

How many children does he have?





Fraction of salary Mr Lee spends and saves $= \frac{1}{4} + \frac{1}{12}$

$= \frac{3}{12} + \frac{1}{12}$

$= \frac{4}{12}$

Fraction of salary Mr Lee has left $= \frac{12}{12} - \frac{4}{12}$

$= \frac{8}{12}$

$= \frac{2}{3}$

Number of children Mr Lee has $= \frac{2}{3} \div \frac{1}{6}$

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

$= \frac{2 \times \cancel{6}^{2}}{\cancel{3}_{1} \times 1}$

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

$= 4$

Mr Lee has **4** children.

There are some blue paper clips and green paper clips in a container.

$\frac{2}{3}$ of the paper clips are blue and the rest are green.

The blue and green paper clips are packed separately into boxes.

Sam packs $\frac{1}{12}$ of the blue paper clips into each box and Mei packs $\frac{1}{9}$ of the green paper clips into each box.

How many boxes do they need to pack all the paper clips?

Number of boxes used to put all the blue paper clips $= \frac{2}{3} \div \frac{1}{12}$

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

$= \frac{2 \times 12^{4}}{\cancel{3}_{1} \times 1}$

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

$= 8$


Fraction of paper clips that are green $= 1 - \frac{2}{3}$

$= \frac{1}{3}$

Number of boxes used to put all the green paper clips $= \frac{1}{3} \div \frac{1}{9}$

$= \frac{1}{3} \times \frac{9}{1}$

$= \frac{1 \times \cancel{9}^{3}}{\cancel{3}_{1} \times 1}$

$= \frac{1 \times 3}{1 \times 1}$

$= 3$

Total number of boxes used to put all the paper clips $= 8 + 3$

$= 11$

**11** boxes are used to put all the paper clips.

## Let's Try! 4

Solve the word problems.

**(a)** John ate $\frac{1}{3}$ of a bar of chocolate that he had.

**(i)** What fraction of the bar of chocolate did John have left?

**(ii)** He then gave the remaining chocolate bar equally to 4 friends.
What fraction of the bar of chocolate did each friend get?

**(b)** A ribbon was $\frac{7}{8}$ m long at first.
$\frac{1}{2}$ m of the ribbon was used to tie a present.
The remaining length of ribbon was cut equally to make 6 bows.

**(i)** What was the length of the ribbon left after tying the present?

**(ii)** What was the length of each bow?

**(c)** Ravi's mother bought a pizza. She gave $\frac{1}{4}$ of it to a neighbour.
She cut the remainder equally and each slice was $\frac{3}{20}$ of the whole pizza.
How many slices of pizza did she get?

**(d)** $\frac{3}{4}$ of the marbles in a tin are big and the rest are small.
The big marbles are packed equally into red plastic bags.
The small marbles are packed equally into blue plastic bags.
Each red plastic bag has $\frac{1}{12}$ of the total marbles in the tin.
Each blue plastic bag has $\frac{1}{8}$ of the total marbles in the tin.
How many plastic bags are used altogether?

**(e)** Peter mixed $1\frac{1}{5}\ \ell$ of blue paint and $2\frac{4}{5}\ \ell$ of yellow paint to make green paint.
He poured all the green paint equally into some cups.
Each cup had $\frac{1}{4}\ \ell$ of green paint.

**(i)** How many litres of green paint did Peter make?

**(ii)** How many cups did he use to hold the green paint?



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