Year 7

Understand and use equivalent fractions

Within this **two week unit**, students will learn to:

- Represent fractions using area diagrams, bar models and number lines
- Recognise and name equivalent fractions
- Convert fractions to decimals
- Convert terminating decimals to fractions in their simplest form
- Convert between mixed numbers and improper fractions
- Compare and order numbers (including like and unlike fractions)
- Convert simple fractions and decimals to percentages

Mathematics Mastery

Resources available for this unit:
Ideas for representations
Further depth tasks 1, Further depth tasks 2
Coaching
Workbook
Departmental Workshop 1, Departmental Workshop 2
TBC

Question prompts L1-5

L1: How do you know if the parts are / aren't equal?
Can equal parts look different? What is the same about them?
What is the most useful representation? Why?
What additional information do you need to identify the fraction?
If one cube is a quarter, how many make the whole? How do you know?
How can you compare thirds to quarters?

L2: How many equal parts are there in this shape? How many quarters / sixths are in each half?
How do the number of quarters / sixths in one whole compare with the number in one half?
How could you use a number line / fraction wall to check for equivalence?
What do you notice about the numerator and denominator for equivalent fractions?

L3: Are these fractions equivalent? How do you know?
What equivalent fractions can you write?
What is the fewest number of equal parts you need to represent this fraction?
What is a common factor / multiple? How is this useful when simplifying?
What's the limitation of halving multiple times to simplify?
How can you check if the fraction is fully simplified?

L4: Which pairs of bars can you use to show a half? What do you notice about the pairs?
How many unit fractions is it possible to show with any pair of bars?
How can equivalent fractions help you find pairs of bars?
How many of each bar do you need to show matching lengths? What do you notice about the number of bars?
How can you show an improper fraction?
How can you show a whole number relationship between bars?

L5: How can you compare them?
[When comparing e.g. quarters and fifths]
Which parts are greater? How do you know?
What does the denominator tell us?
Why might having a common denominator help?
Does it matter if the bars for 'one whole' are equal in length when comparing fractions?
Can you compare these fractions without using equivalent fractions? How?
What could you compare these fractions to in order to help?

Question prompts L6-10

L6: What does the denominator / numerator tell us?
[Given an improper fraction] How many equal parts are in one whole?
How can we represent a fraction greater than 1?
How do we know which integers to place this [improper fraction] between on a number line?
What is the difference between an improper fraction and a mixed number?
How can we convert the improper fraction to a mixed number?

L7: How can you tell if a fraction is improper?
How can you convert from a mixed number to an improper fraction?
Which representations show improper fractions / mixed numbers most clearly?
How can you compare these numbers?
What number are they close to? How do you know?
How does this method work? What diagram can help you explain?

L8: What number does this image represent? How many ways can you write that?
How do you know what decimal / fraction it represents?
Why is a denominator of 10 / 100 useful?
What is a tenth / hundredth? How many ways can you write that?
How many tenths / hundredths are there? How many hundredths are there in 2 tenths? How can you convince me?
What decimal would go between these decimals? How can you write that as a vulgar fraction?

L9: How can you write one half as a decimal?
How many tenths are equal to one half?
How do you know?
How what denominators are helpful to convert fractions into decimals?
How can equivalent fractions help us?
What are the factor pairs of 100 / 1000?
How can you compare fractions and decimals? Is it better to compare them as fractions or decimals? Why?
What mistakes might people make when converting?

L10: What does 'percentage' mean?
When have you seen 'cent' before?
Which representations are most helpful to show percentage? Why?
How could you write these percentages as fractions / decimals? How do you know?
How could you write 1% as a fraction or decimal? What about 10% / 100%?
What denominators will be useful to convert fractions to percentages?
How could you compare fractions decimals and percentages?

Thursday, 04 June 2020

Lesson 1

Representing fractions

Key learning

Understand a fraction is a division
Understand fractions as parts of shapes
Understand fractions as parts of sets
Understand fractions as numbers
Represent a fraction numerically and in words

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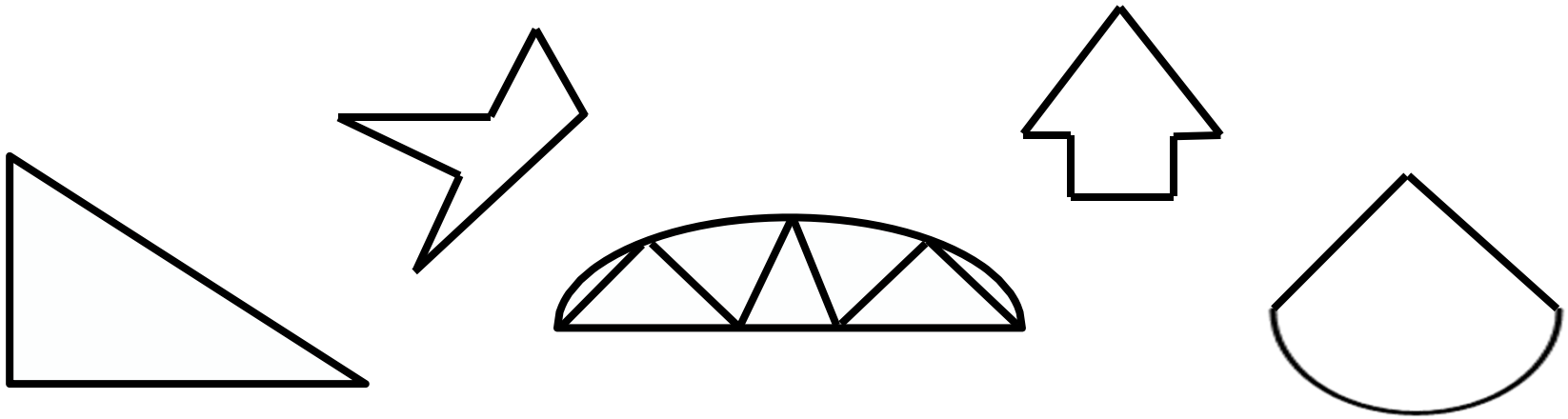
Do Now

Below are some half-shapes.
What could the whole shapes look like?

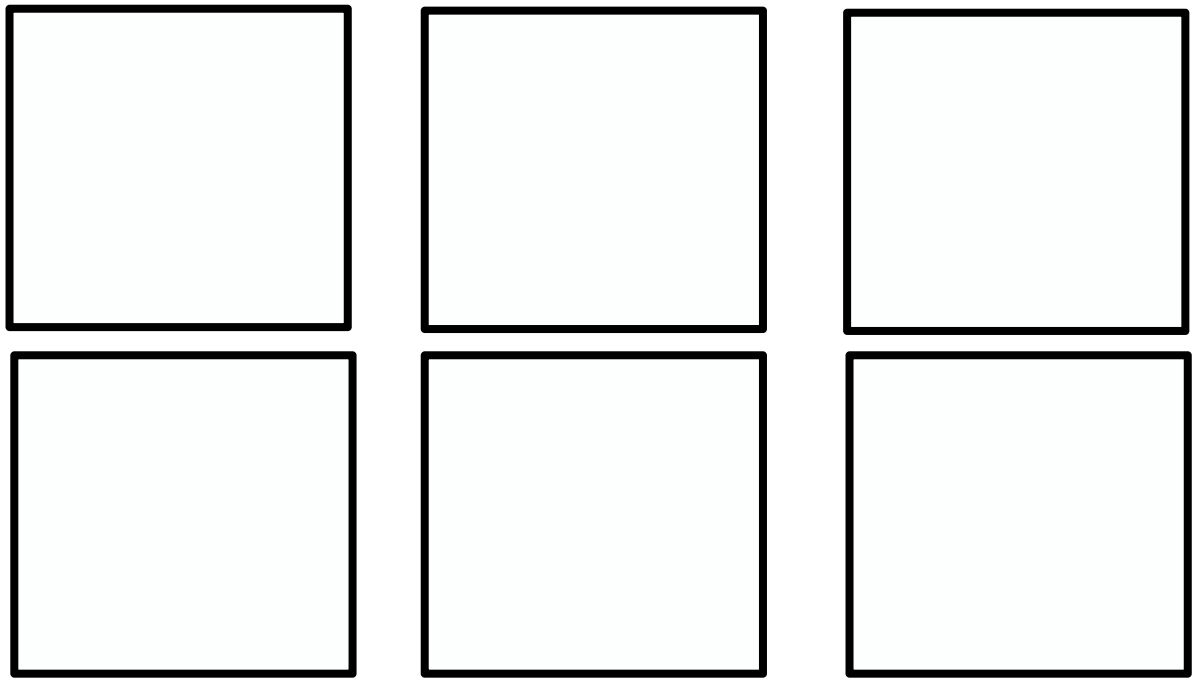


Is there more than one answer?

If these were one third of a shape.
What could the whole shape look like?

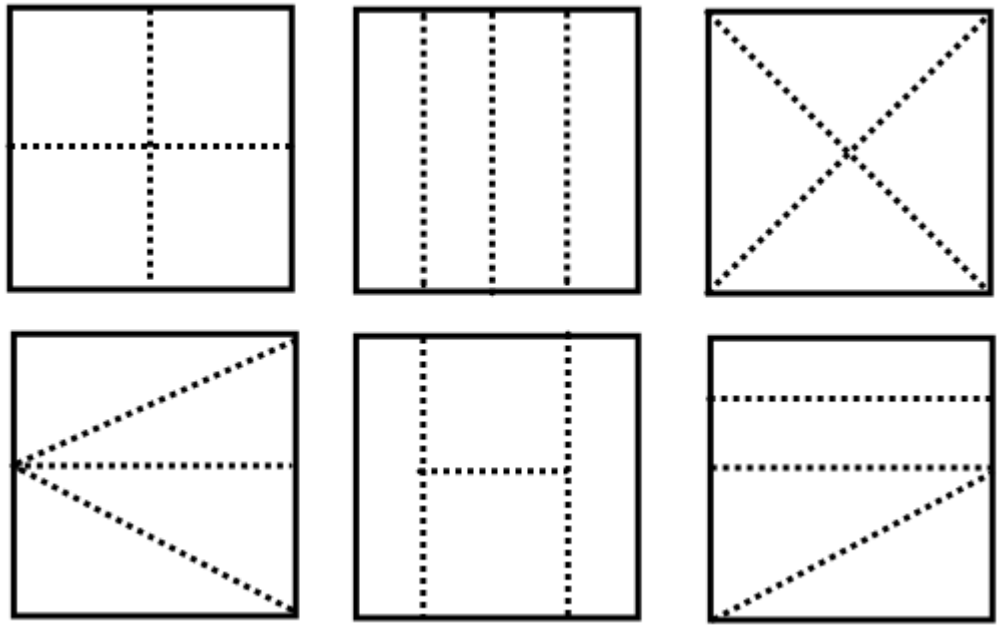
Showing one quarter

Find at least six ways to cut a square into quarters.



How does this question change if the shape is a rectangle?

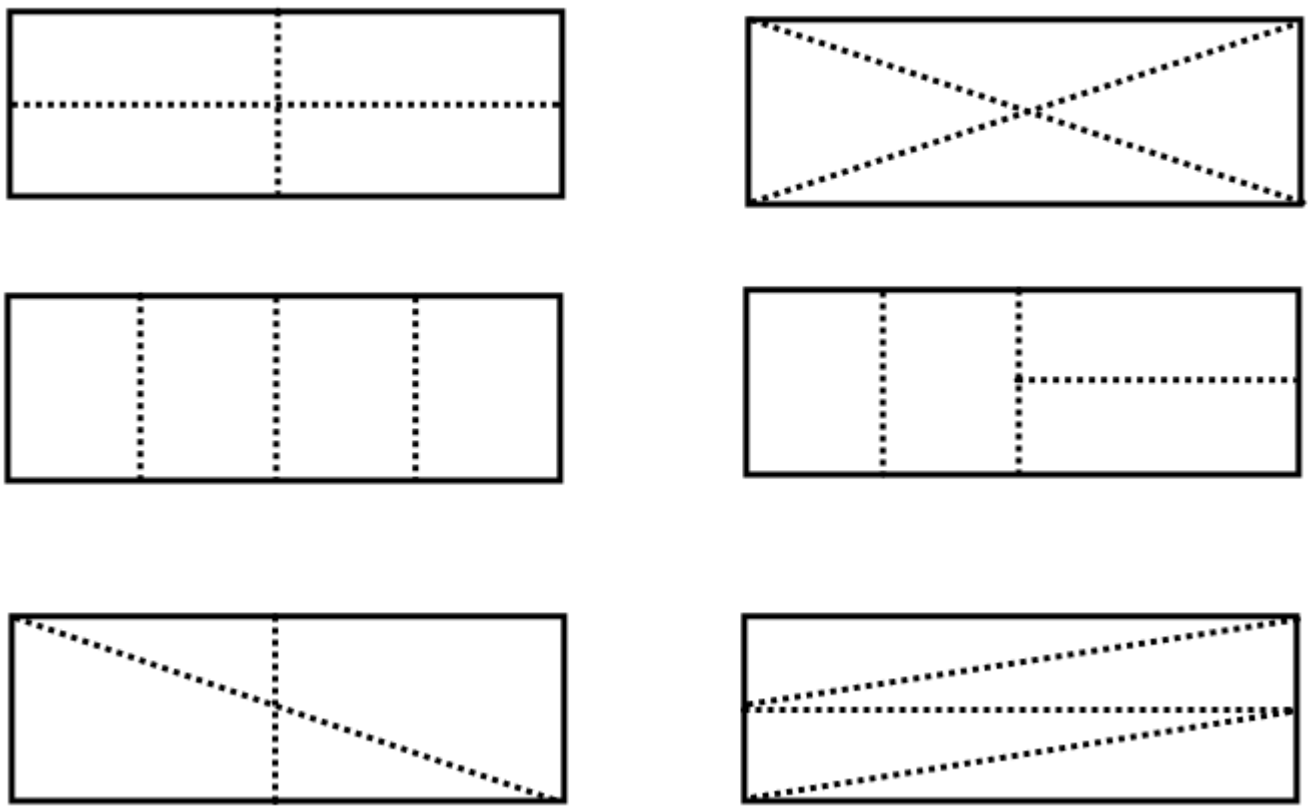
Quarters



Are all these divisions quarters?
Why?

Quarters

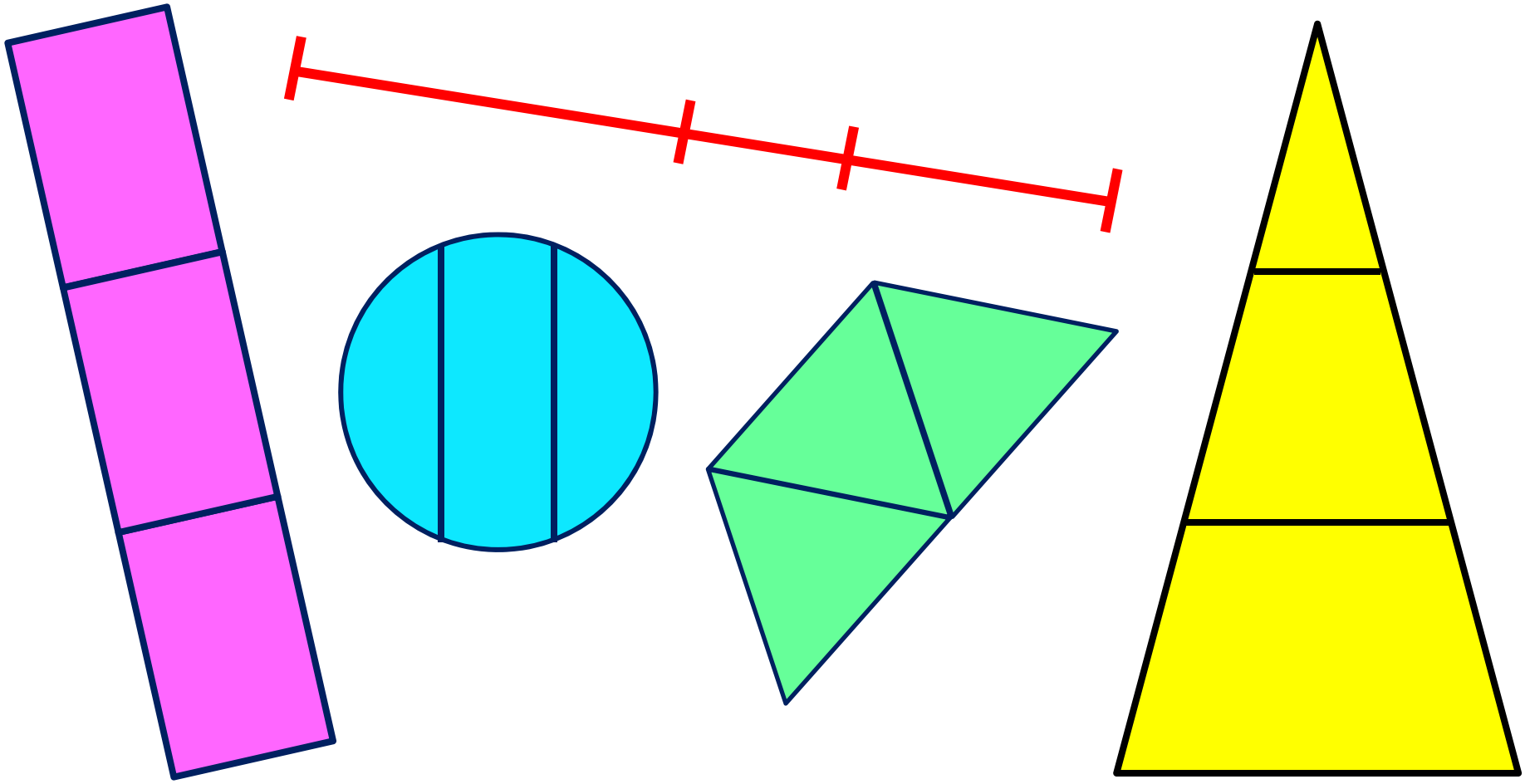
Which of these rectangles are correctly divided into quarters?
How do you know?



Thirds

Which of these representations accurately show thirds? Why? Why not?

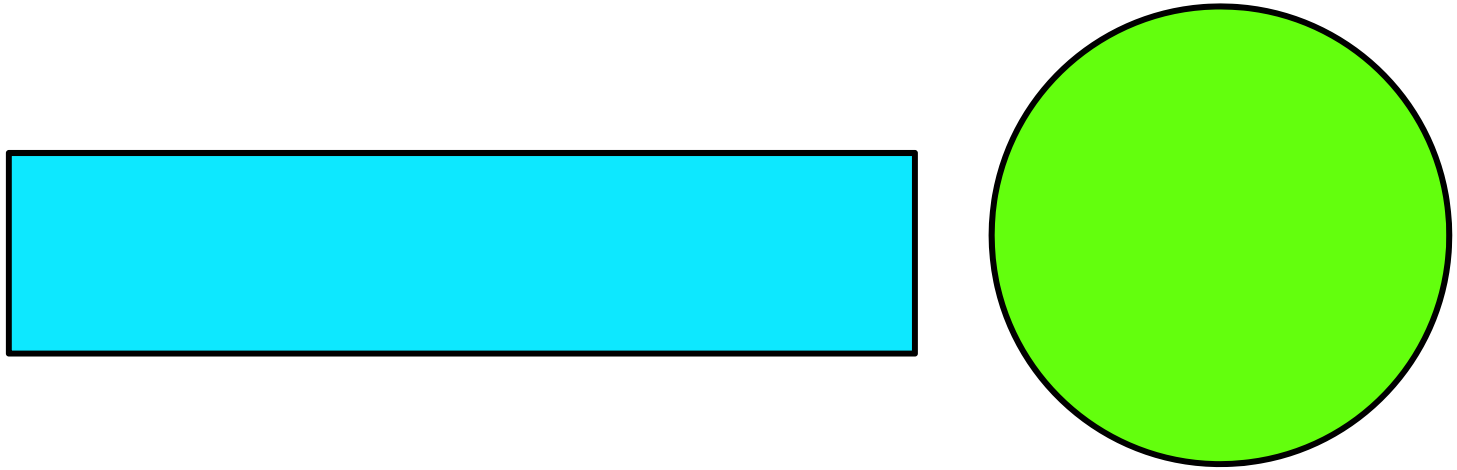
What key words are useful for justifying your answer?



How could you change the divisions so they all represent thirds?

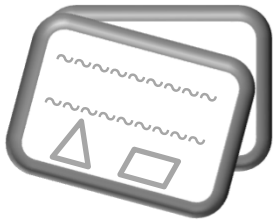
Finding fractions of a shape

What fractions can you represent on these shapes?



Which is the easiest to represent one fifth on?
Why?

What is a fraction?



Which of these definitions do you agree with? Why?

A fraction is….

a division

a part of a whole

a small part

not an integer

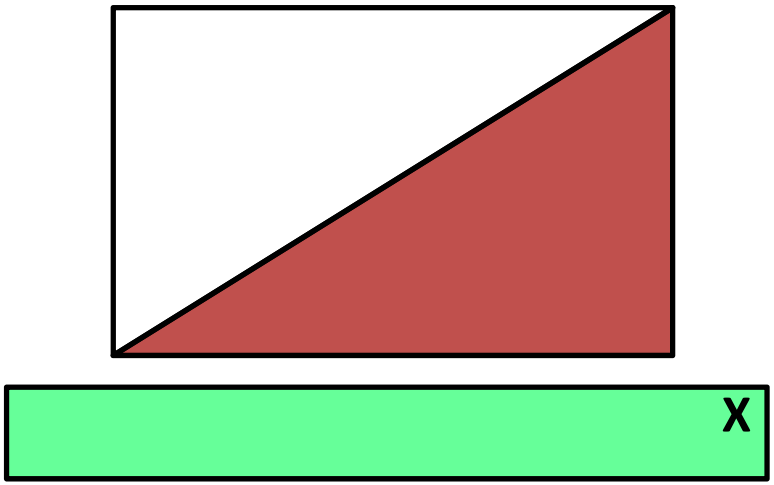
less than one

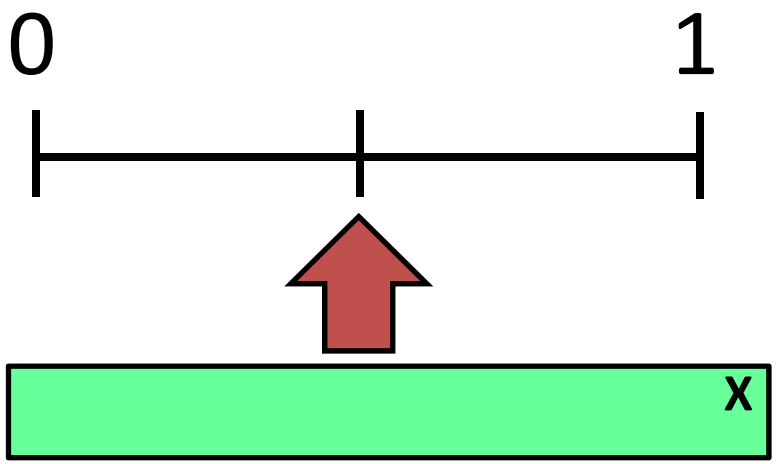
Think of examples to disprove the definitions you don’t agree with.

Can you think of another definition?

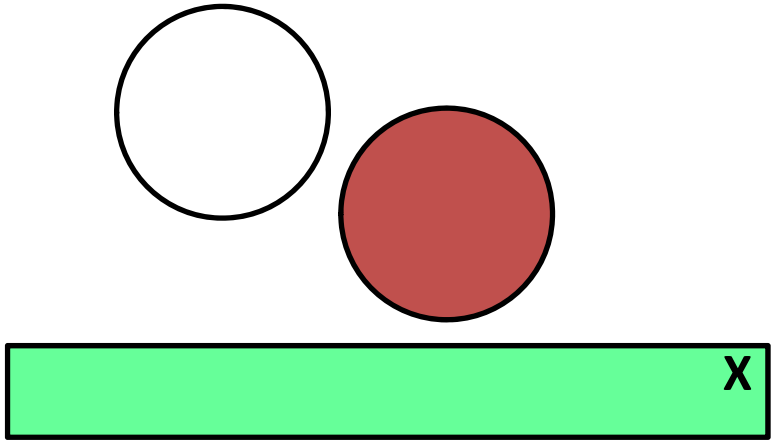
What is a fraction?

How would you describe the following representations of fractions?





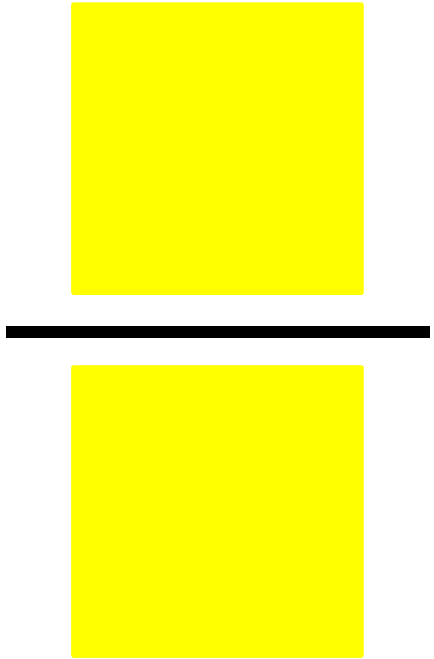
$$1 \div 2 = \frac{1}{2}$$



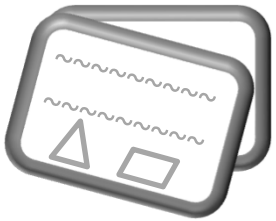
Representing fractions

What is this line called?

Think of a sentence to explain what it tells us



Representing fractions



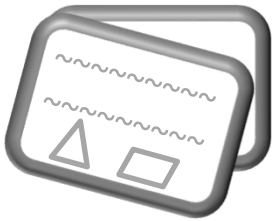
Vinculum

$$\frac{\square}{3}$$

What is this digit called?

Think of a sentence to explain what it tells us.

Representing fractions



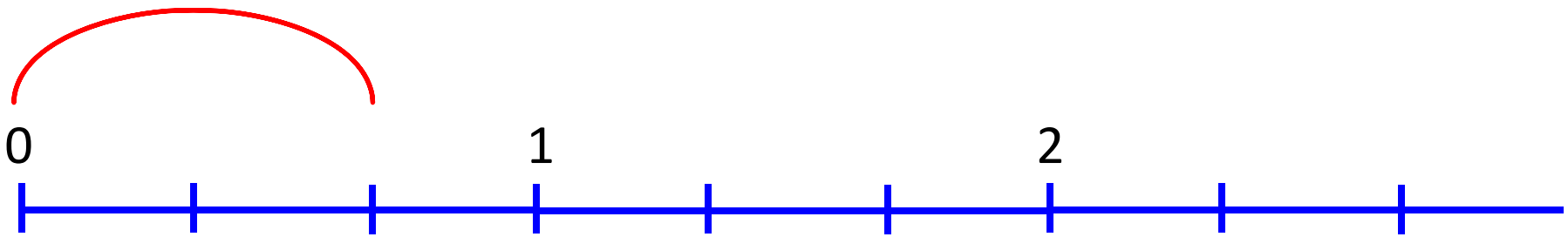
Vinculum

$$\frac{2}{3}$$

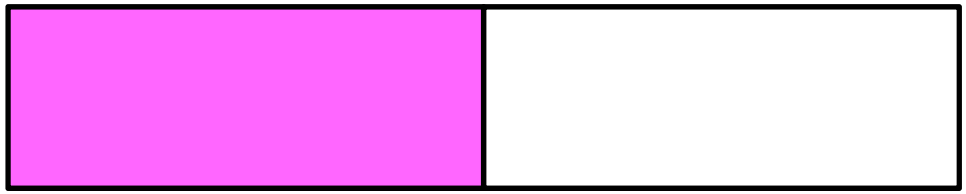
What is this digit called?

Think of a sentence to explain what it tells us.

Denominator



True or false?



This shows that $\frac{1}{3}$ is greater than $\frac{1}{2}$

Use concrete manipulatives or bar models to demonstrate how you know.

Representing fractions

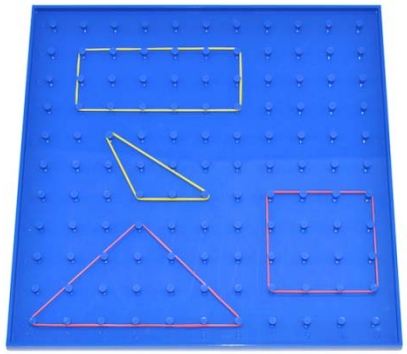
Use different concrete and pictorial objects to represent the following fractions:

$\frac{1}{5}$

$\frac{1}{4}$

$\frac{1}{3}$

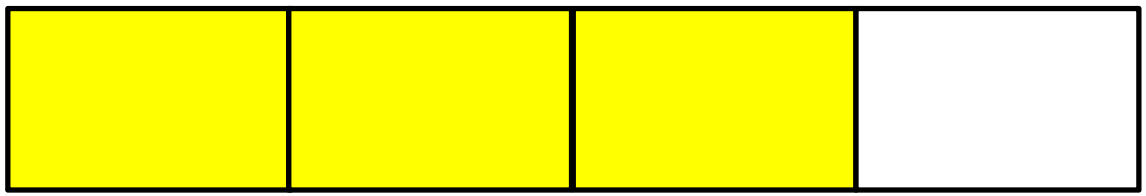
$\frac{1}{2}$

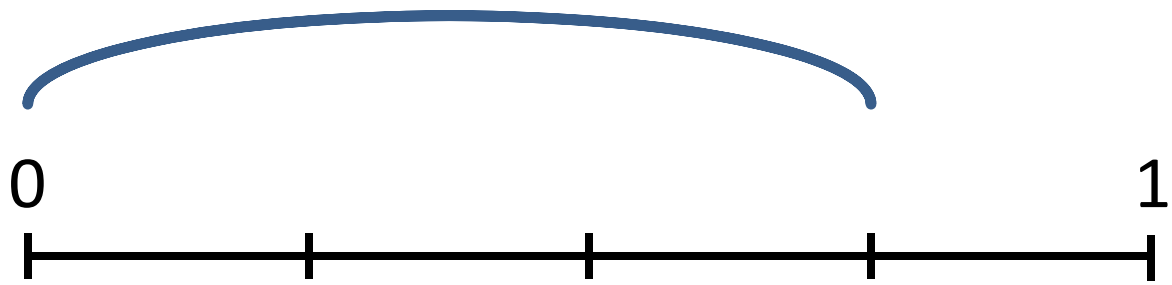


Think of a fraction you can't represent with one of your manipulatives. Explain why you can't.

Same or different?

What fraction do these diagrams represent?





What assumptions have you made?
How could they represent different fractions?

Fraction match

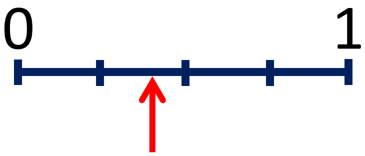
Match each fraction to its pictorial and number line representation.
Explain how you decided remembering your key words.

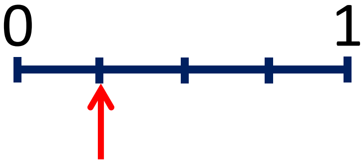
$\frac{3}{4}$

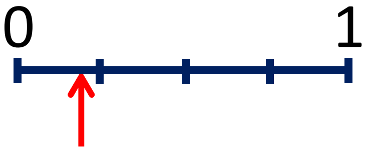
$\frac{2}{5}$

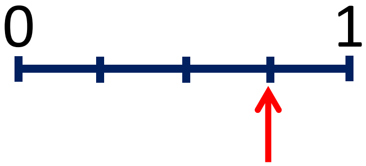
$\frac{1}{4}$

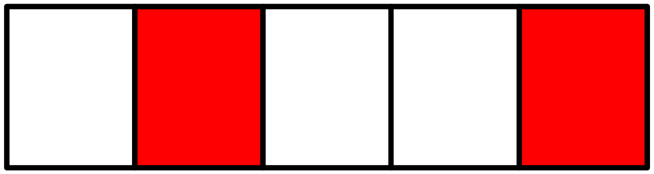
$\frac{1}{5}$

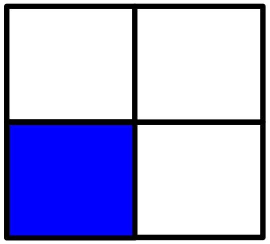


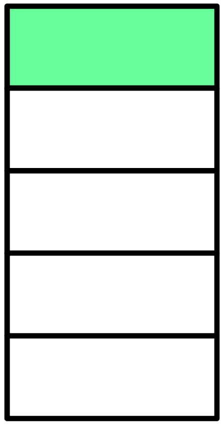




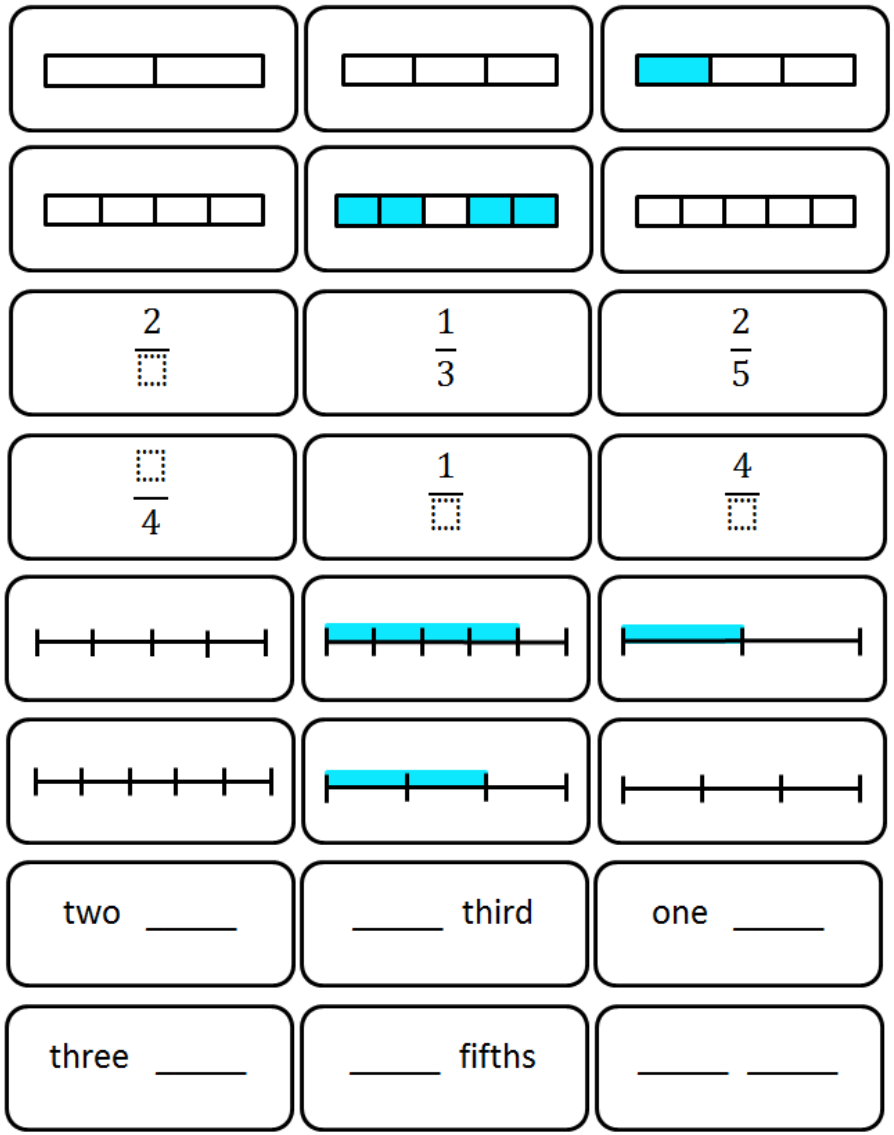








Fraction match



Each fraction has four cards that can represent it.

Match them together to make six groups.

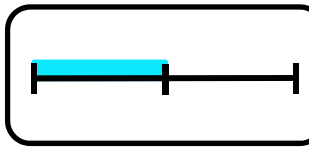
You will need to fill in the blanks and diagrams on most of the cards. You might want to start in pencil!

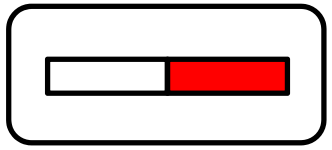
Create extra cards to match to each group showing the fraction in a different way.

Fraction match

$\frac{1}{2}$

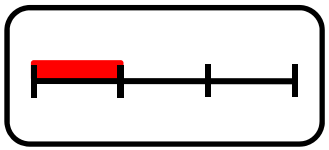
one half

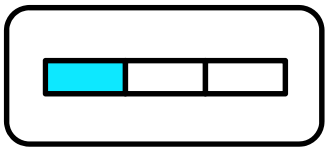




$\frac{1}{3}$

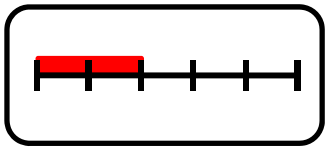
one third

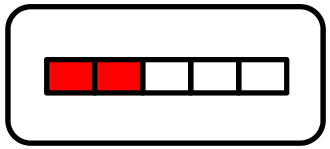




$\frac{2}{5}$

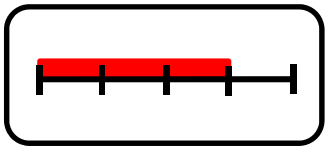
two-fifths

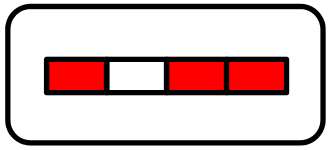




$\frac{3}{4}$

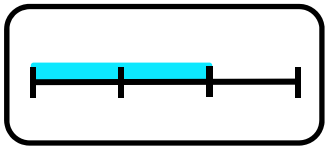
three-quarters

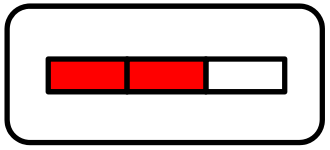




$\frac{2}{3}$

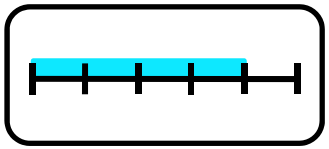
two-thirds

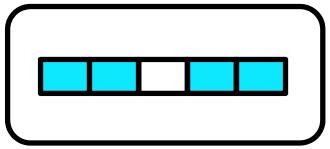




$\frac{4}{5}$

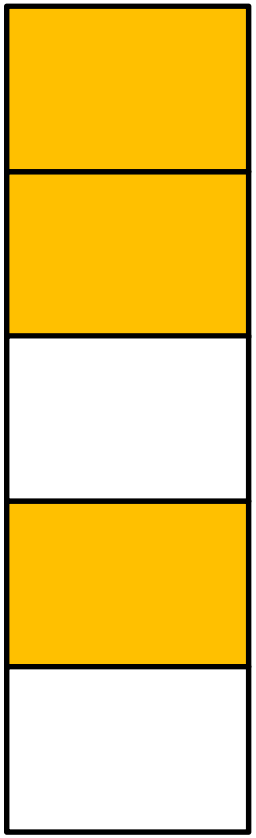
four-fifths

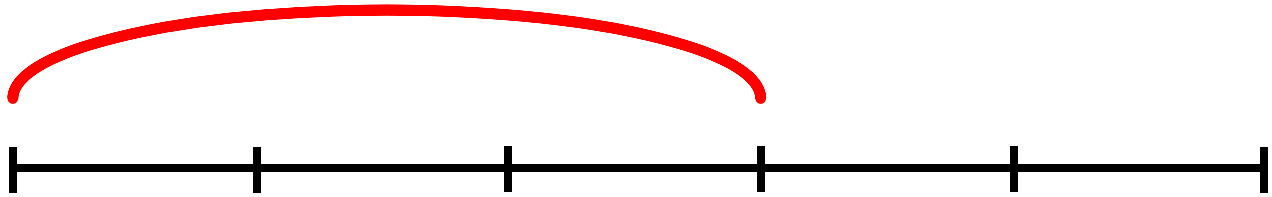


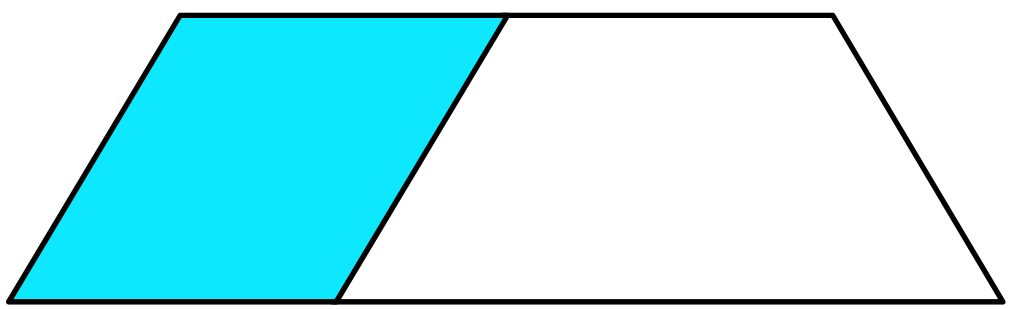


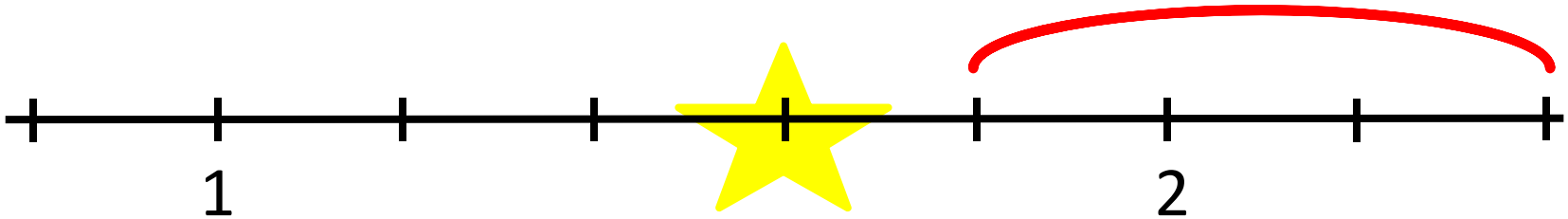
Same or different?

Explain how each of these could represent $\frac{3}{5}$.



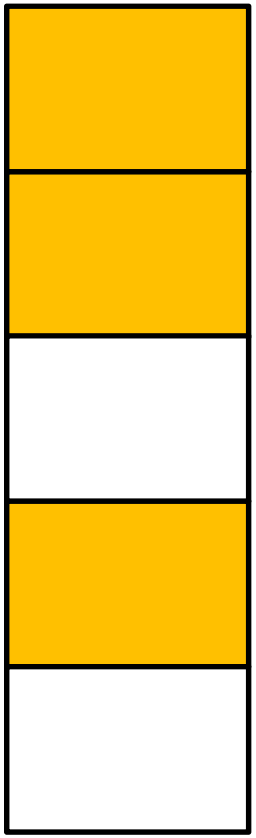


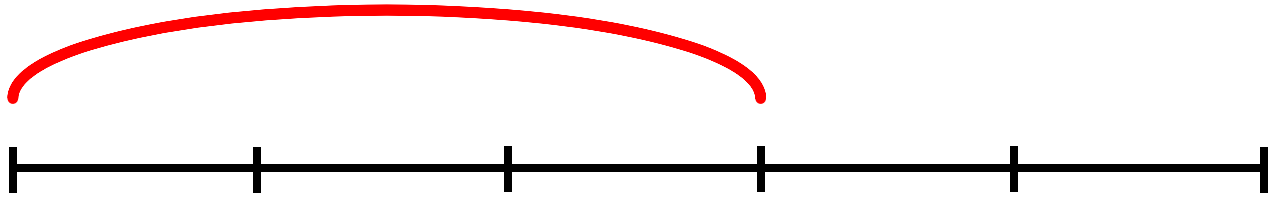


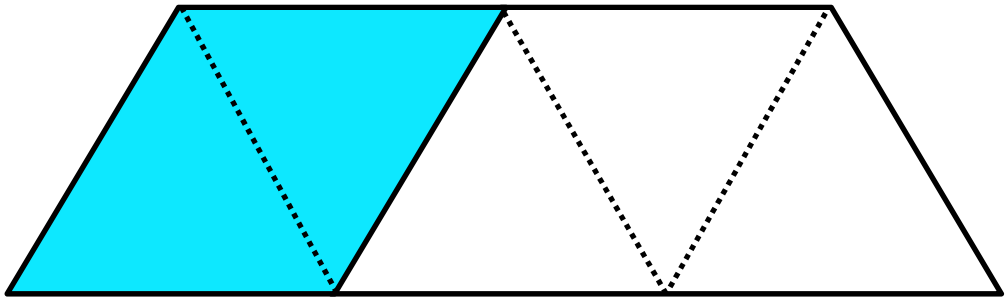


Same or different?

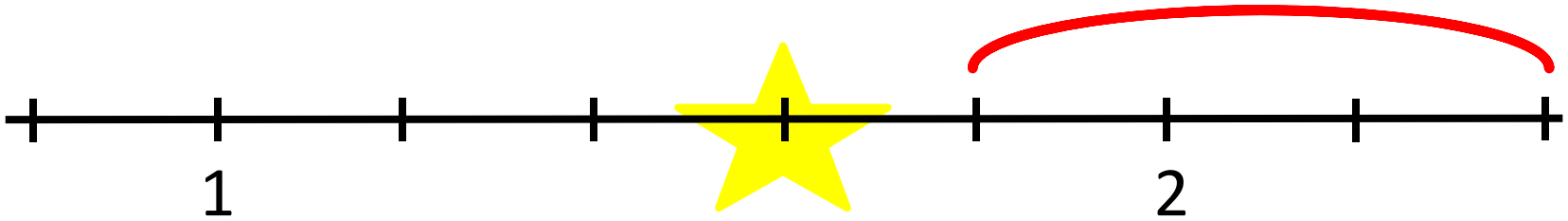
Explain how each of these could represent $\frac{3}{5}$.







What special quadrilaterals must the blue and white shapes be?



Thursday, 04 June 2020

Lesson 2

Determining equivalent fractions

Key learning

Represent fractions with different numbers of equal parts
Identify equivalent fractions
Write different equivalent fractions
Represent equivalent fractions on a number line and fraction wall

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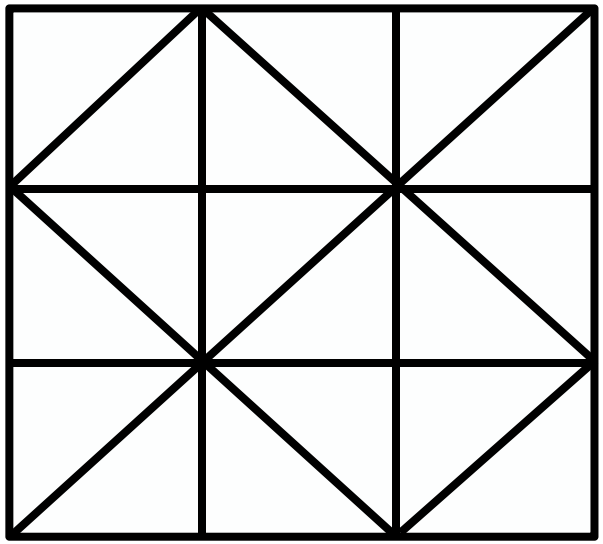
Do Now

How many ways can you shade half of this shape using just the lines given?



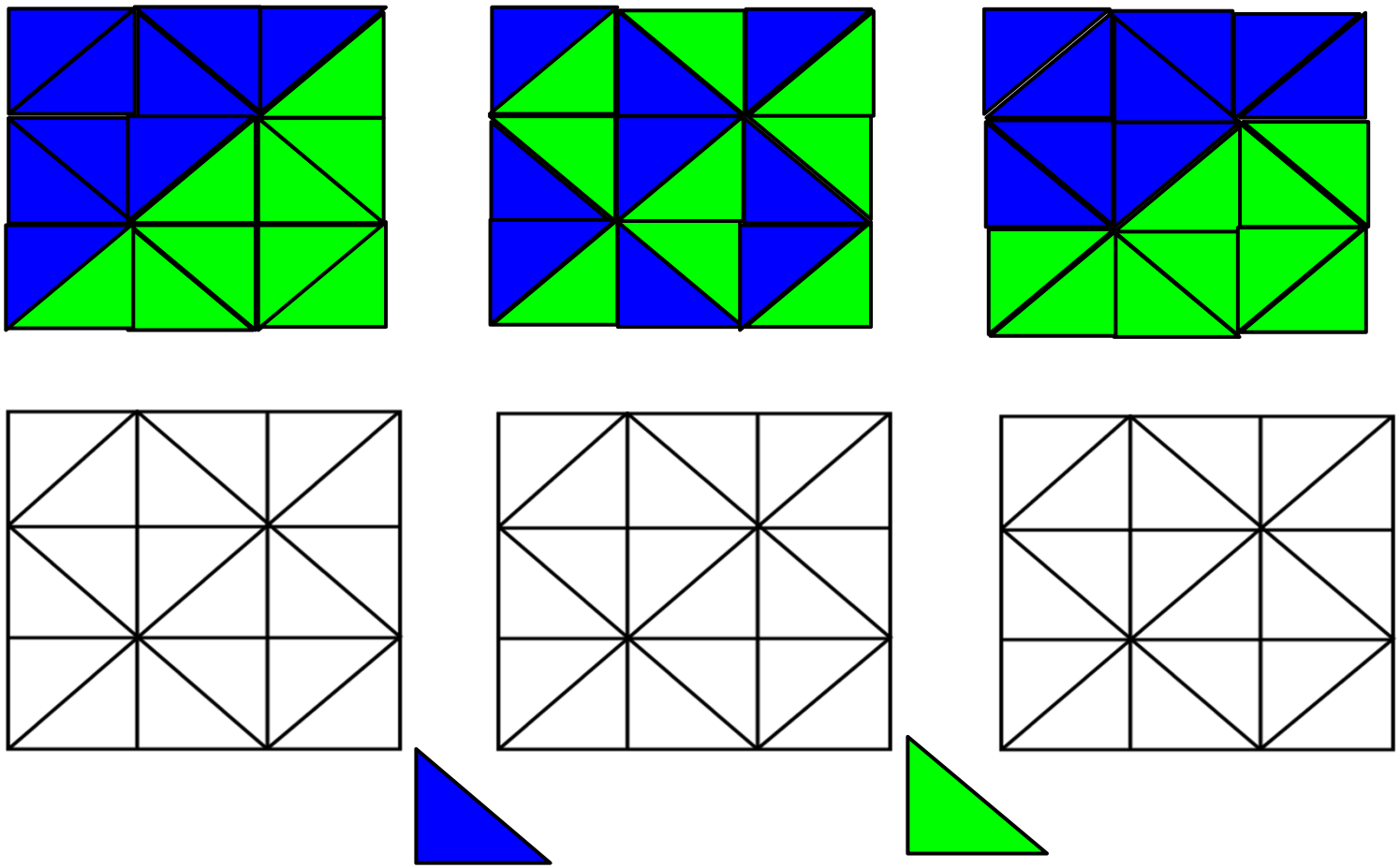
By shading with different colours, explore the ways in which you can divide the shape into three-thirds, six-sixths or nine-ninths.

What line(s) would you need to add to divide the shape into four-quarters or five-fifths?

http://nrich.maths.org/2124

Halves

How do you know these have been divided into halves?



Can you find more ways to divide these into halves?

Fraction shapes

Use your pattern blocks to find as many ways as possible to show $\frac{1}{4}$.

Be ready to explain how your representations show $\frac{1}{4}$.

Teacher note: interactive pattern blocks available at http://www.mathplayground.com/patternblocks.html

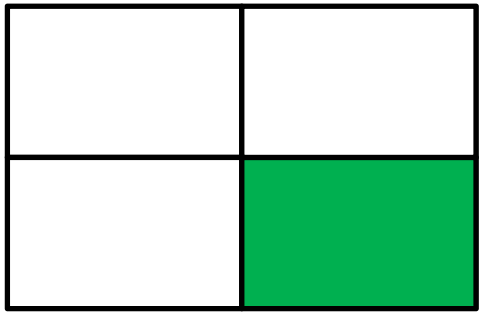
Explain your representations using the shape properties of triangles and special quadrilaterals.

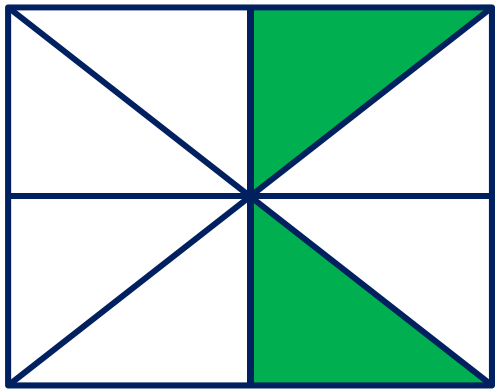
What other fractions could your representations be showing?

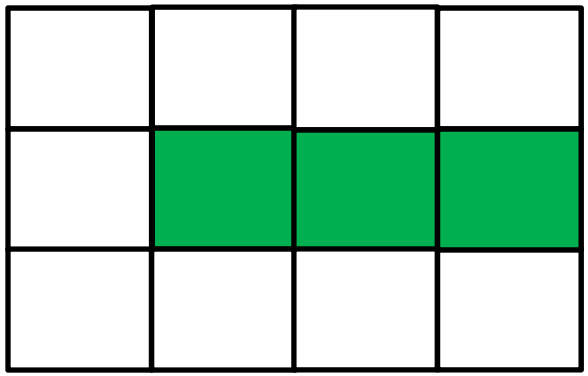
Showing one quarter

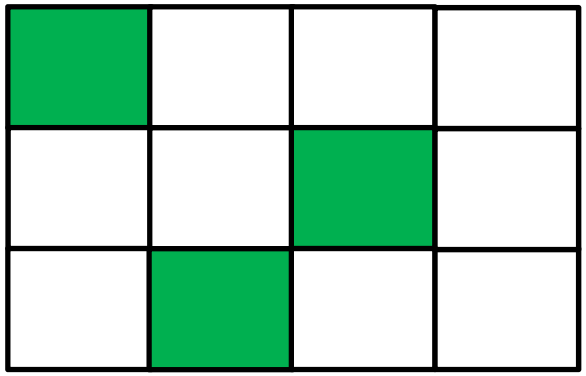
How many different ways can you explain that the following diagrams show $\frac{1}{4}$?

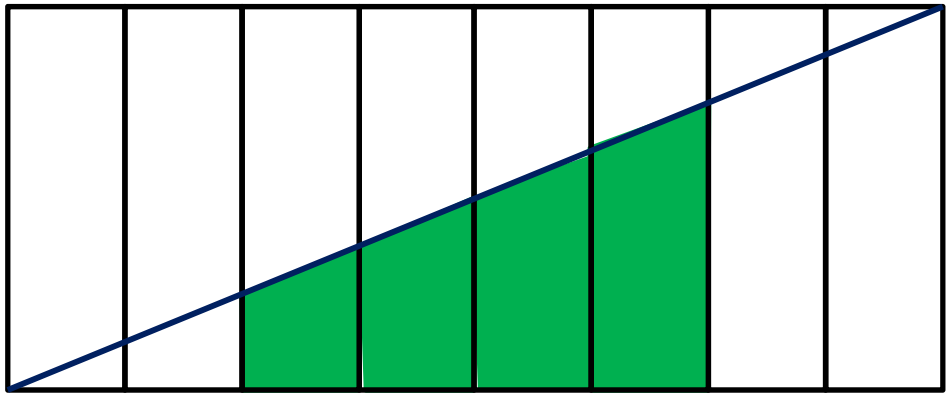
Are the parts equal? Explain how you know.









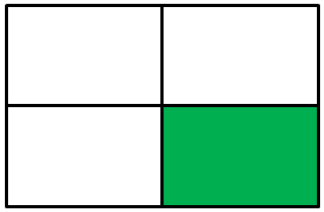


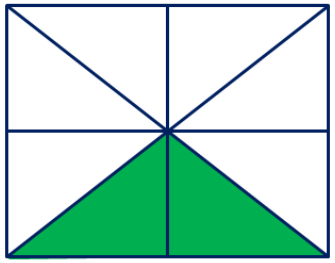
Showing one quarter

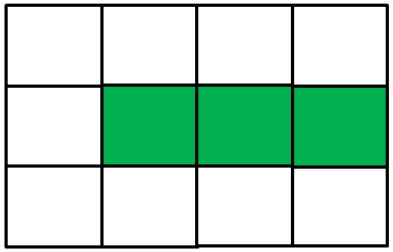
One out of every four parts is shaded so that must be a quarter of the whole shape

The shape is in **four equal parts** and only one of them is shaded

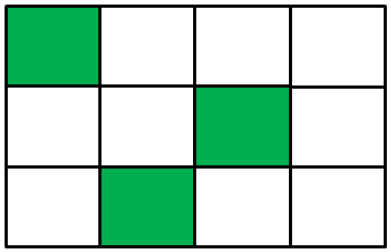
It doesn't matter if the parts are equal. All that matters is **how many** are shaded.

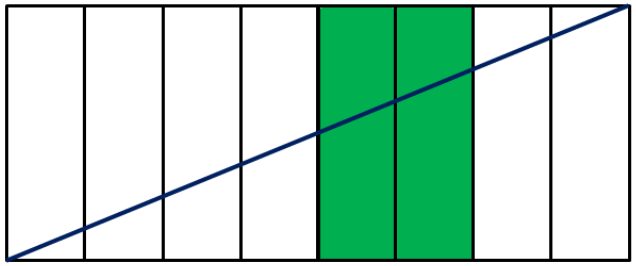






If I re-arrange the shaded parts I can see that **one quarter** is shaded



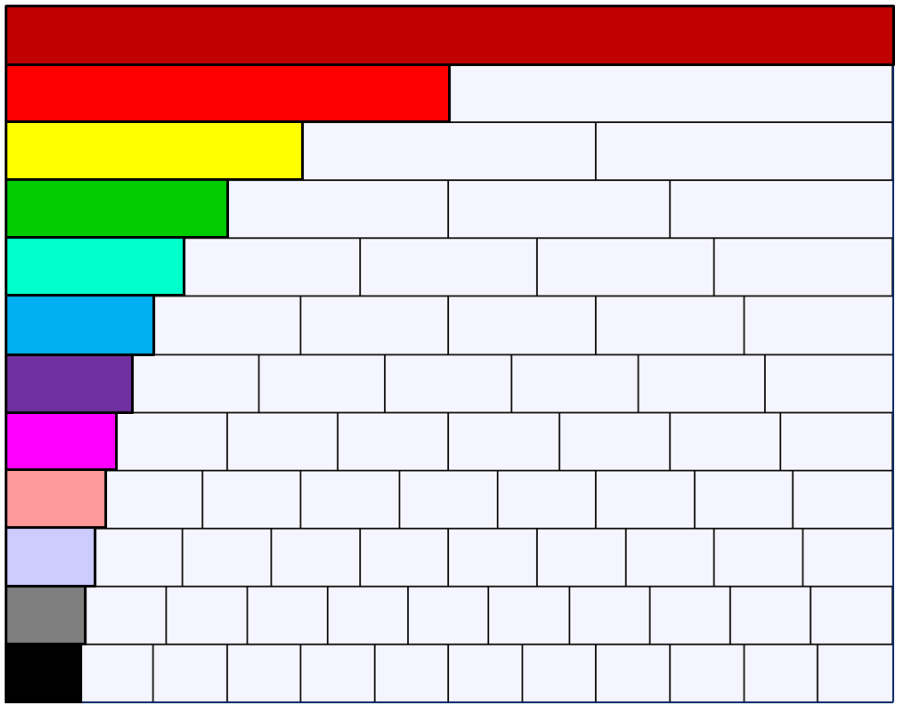


If you count how many parts are shaded it's **equivalent** to $\frac{1}{4}$

Which of these explanations do you agree with? Why?
Which of the diagrams could they be talking about?
They could be describing more than one!

Fraction wall

What fractions of the whole do these bars represent?



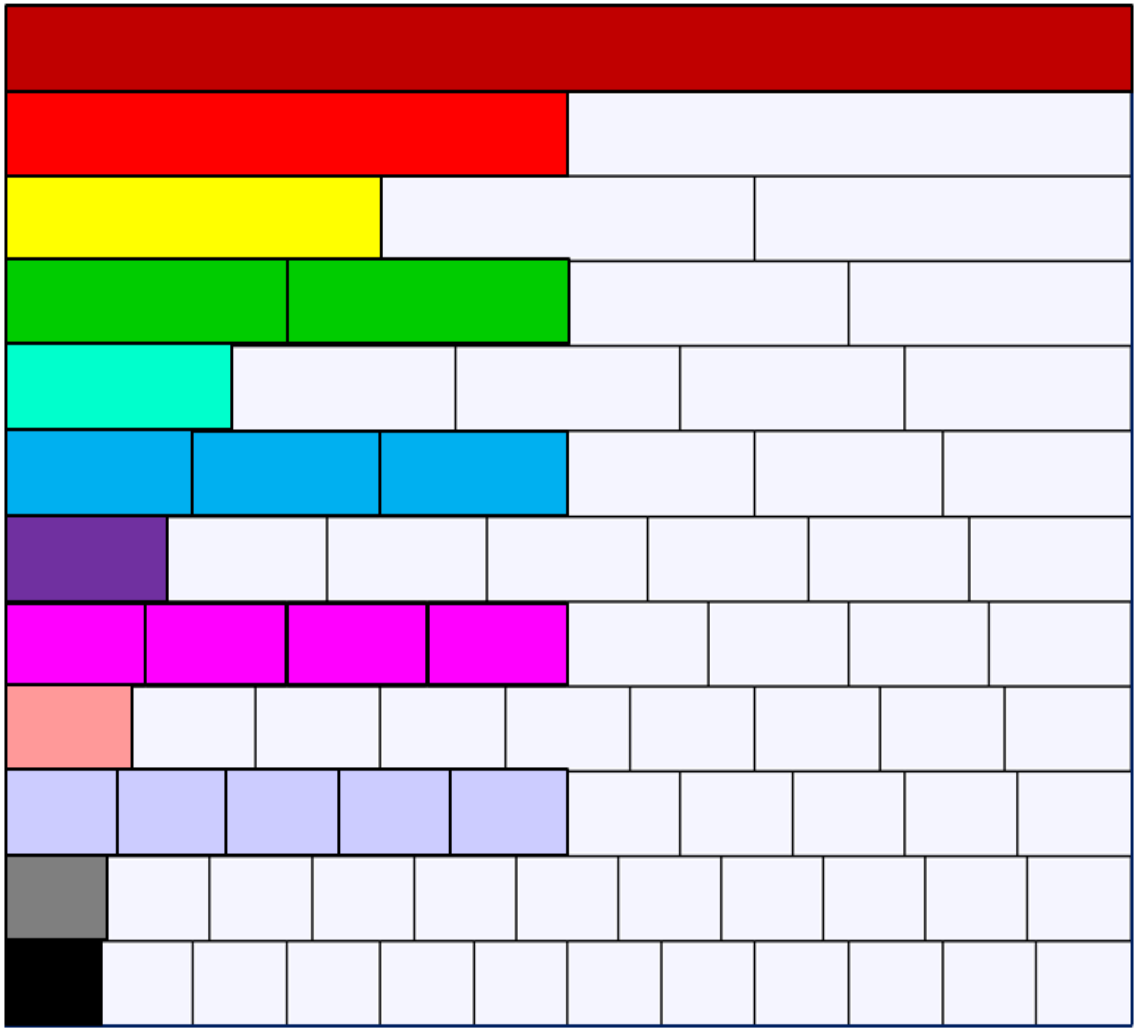
Why might ‘multiples’ be a key word when explaining the pattern in equivalent fractions?

Teacher note: Interactive fraction wall available at http://www.visnos.com/demos/fraction-wall

By colouring in your fraction wall, find as many fractions that are equivalent to $\frac{1}{2}$ as you can.

Is there a pattern in their numerators and denominators?
What other equivalent fractions can you find that aren’t on the fraction wall?

Equivalent to a half



$$\frac{1}{2}$$

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

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

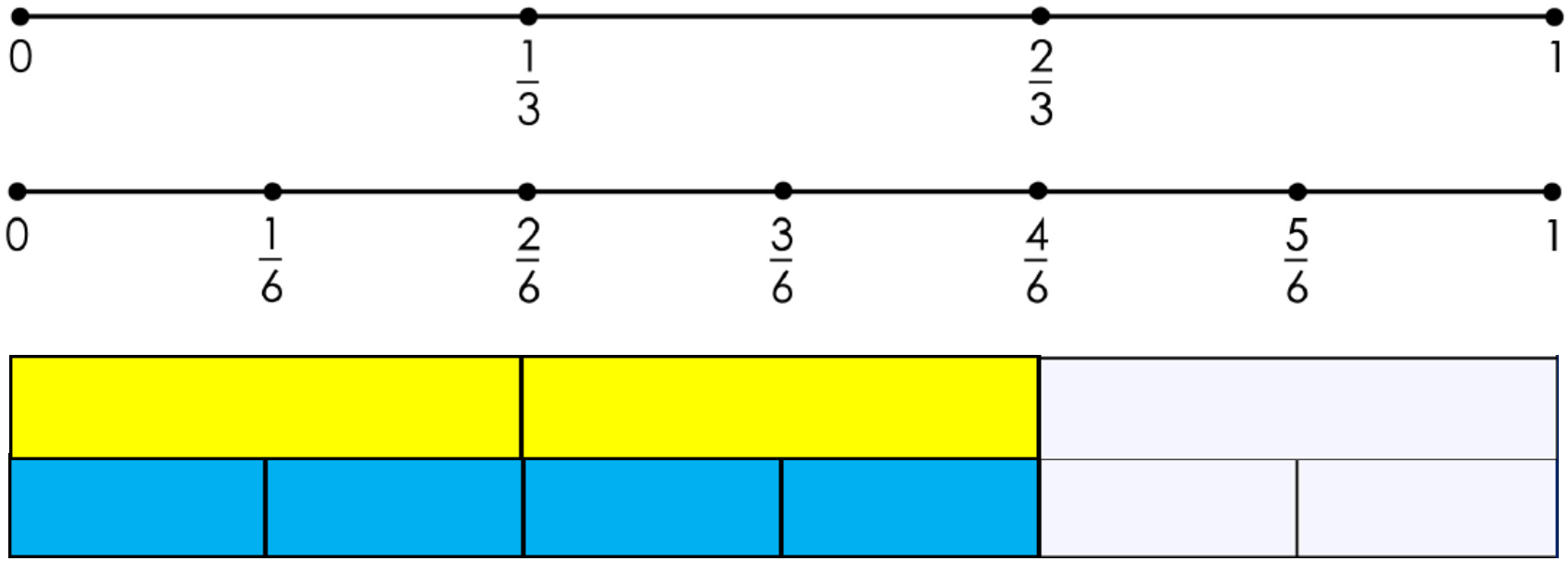
$$\frac{1}{2} = \frac{4}{8}$$

$$\frac{1}{2} = \frac{5}{10}$$

$$\frac{1}{2} = \frac{\quad}{12}$$

I know $\frac{3}{5}$ is not equivalent to a half because.....

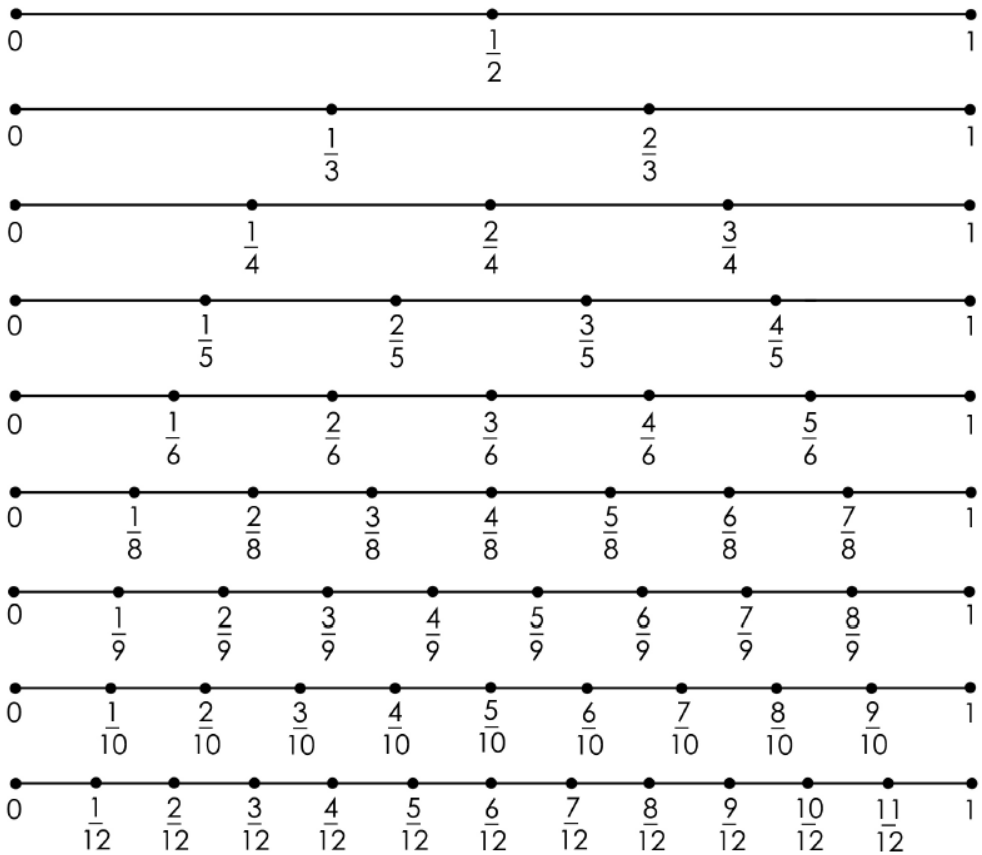
Equivalent to two thirds



There are twice as many sixths in one whole than there are thirds. So to find an equivalent number of sixths, I will need to double the number of thirds that I had.

$$\frac{2}{3} \overset{\times 2}{\underset{\times 2}{=}} \frac{4}{6}$$

Equivalent fractions number lines



$$\frac{1}{3} = \frac{4}{12}$$

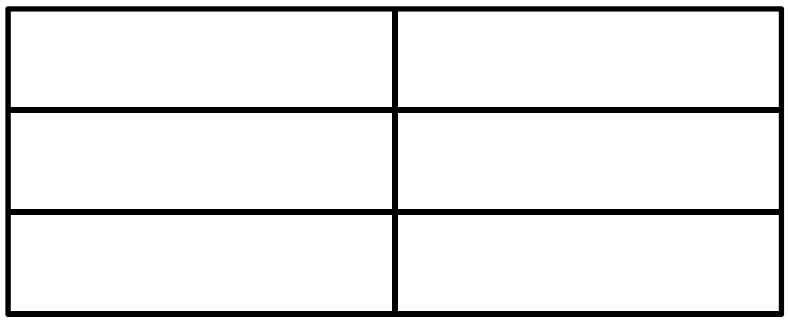
I know this because there are four times as many twelfths in one whole than…….

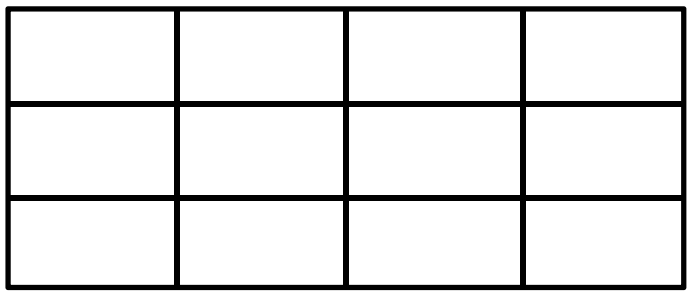
Use your number lines to find as many pairs of equivalent fractions as possible. Write a sentence to explain how you know they are equivalent.

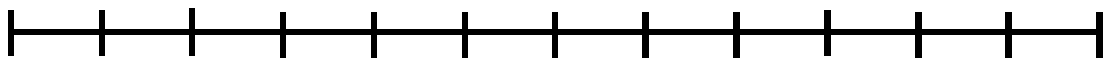
How many pairs of equivalent fractions can you find that do not include the digit ‘1’. How can you explain that these are equivalent?

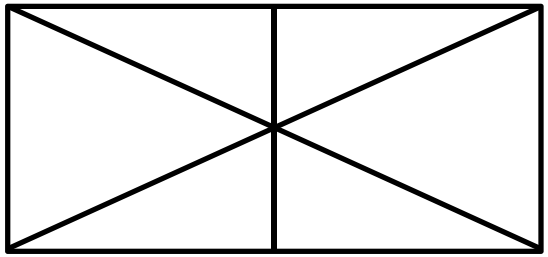
Showing $\frac{2}{3}$

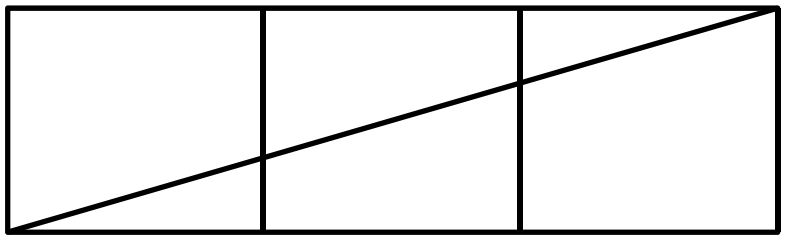
Which of the following diagrams can you use to accurately show $\frac{2}{3}$?











For any diagrams you cannot use to show $\frac{2}{3}$ explain why that is the case.

How else can you write the fractions you have shown?

Complete the patterns

$$\frac{3}{4} \overset{\times 2}{=} \frac{6}{} \overset{\times \square}{=} \frac{}{24}$$

$$\frac{2}{5} \overset{\times \square}{=} \frac{}{15} \overset{\times 4}{=} \frac{}{}$$

$$\frac{2}{} \overset{\times \square}{=} \frac{}{18} \overset{\times 5}{=} \frac{}{}$$

How many ways can you fill in the spaces? How do you know that you've found them all?

Fill in the blanks

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

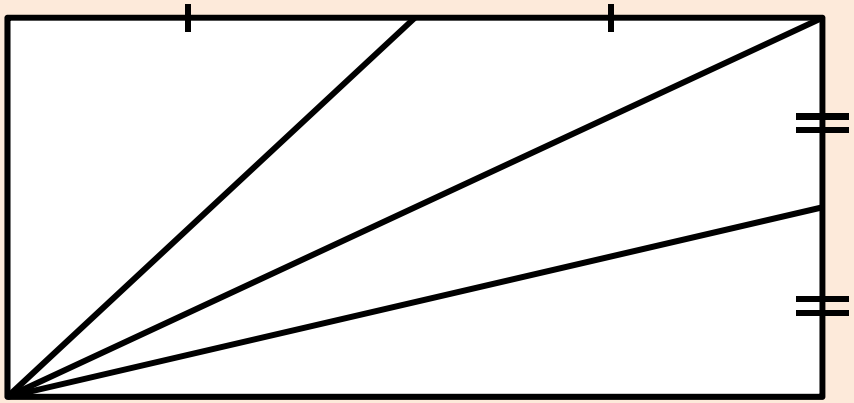
Use just the numbers 1-10 to fill the blanks in the equation above.
You may use each number only once.

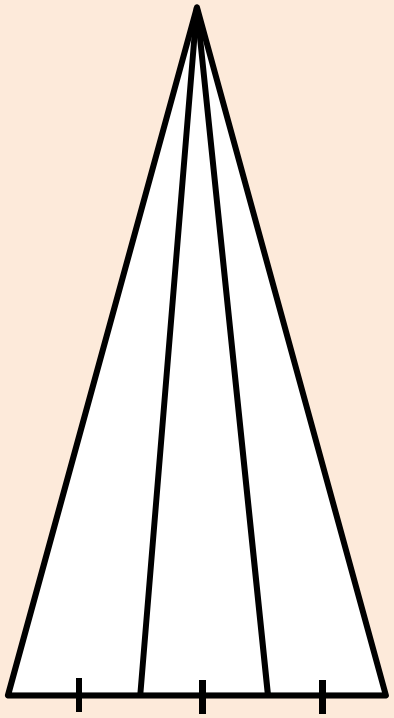
Can you do this for another fraction?
Why?

Challenge Extra

Stuart says he has divided the shapes below into quarters and thirds

Is he correct?
Can you prove it?





Hint

x

Thursday, 04 June 2020

Lesson 3

Simplify fractional expressions

Key learning

Simplify fractions

Identify fractions in their simplest form

Identify equivalent fractions

Identify common factors in numerators and denominators

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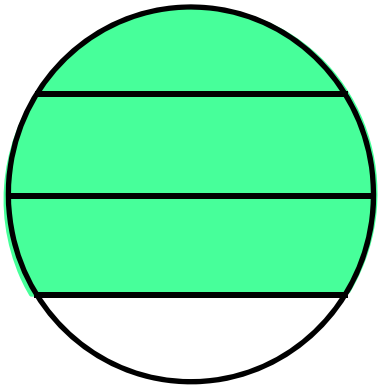
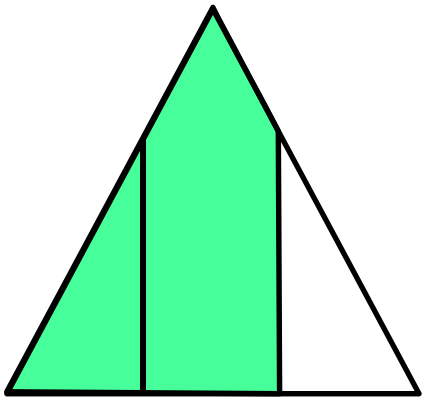
Do Now

What's gone wrong?

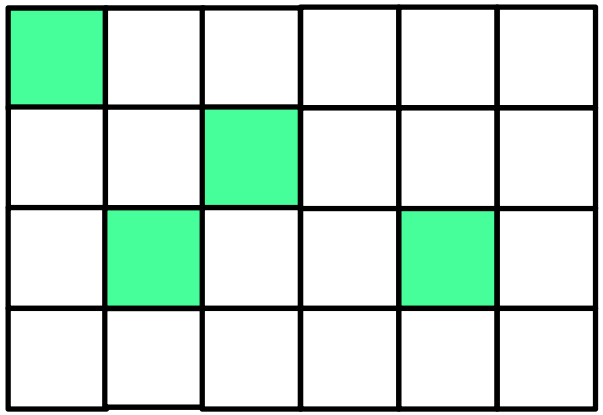
None of these diagrams represent the fractions written below.
Explain why they are incorrect.



$\frac{3}{4}$



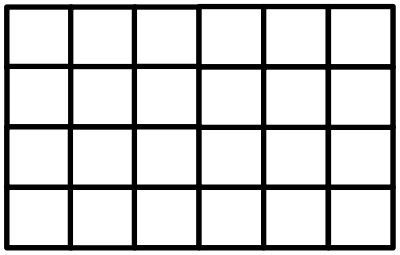
$\frac{2}{3}$

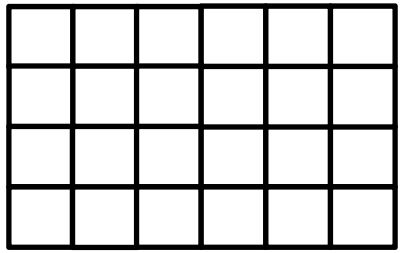


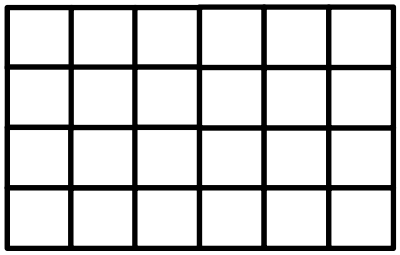
$\frac{1}{4}$

Grouping fractions

$\frac{1}{6}$ $\frac{1}{4}$ $\frac{1}{3}$ $\frac{1}{2}$ $\frac{2}{8}$ $\frac{4}{12}$ $\frac{3}{12}$ $\frac{6}{12}$ $\frac{12}{24}$ $\frac{4}{24}$





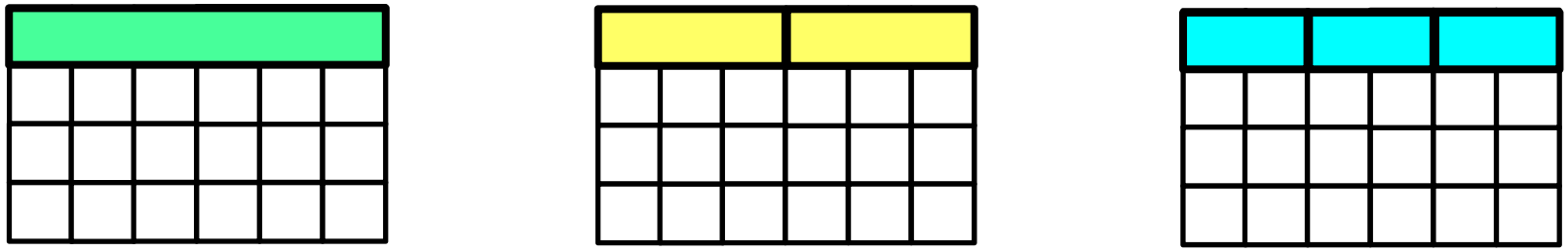


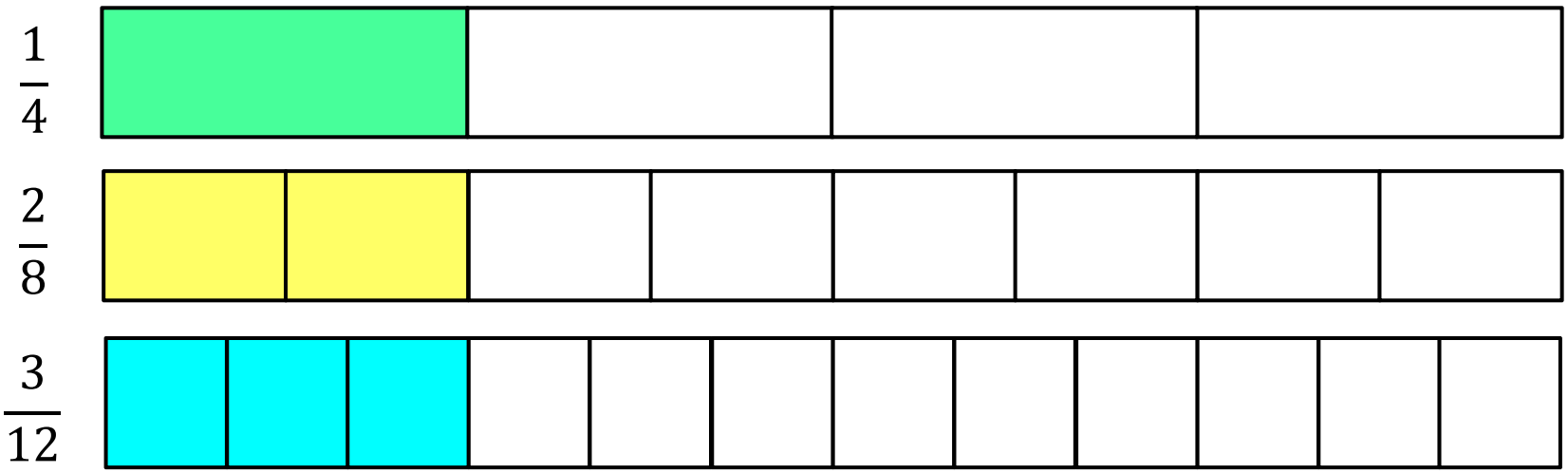
Find a way to put the fractions above into groups. You may find it helpful to shade them in on grids like these first.

Find other fractions that would go into the groups.
Can you explain how this is possible?

Grouping fractions

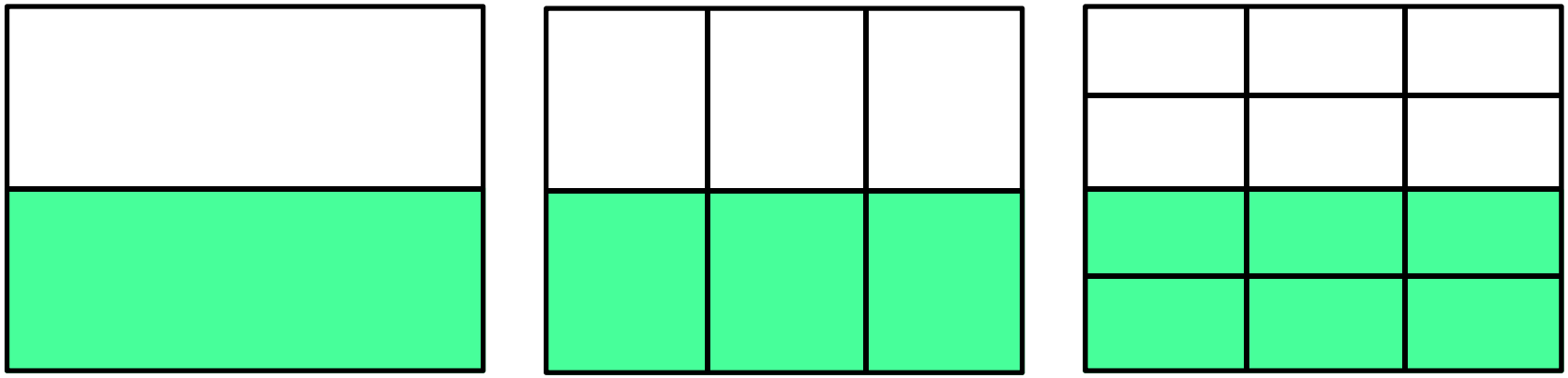
$\frac{1}{6}$ $\frac{1}{4}$ $\frac{1}{3}$ $\frac{1}{2}$ $\frac{2}{8}$ $\frac{4}{12}$ $\frac{3}{12}$ $\frac{6}{12}$ $\frac{12}{24}$ $\frac{4}{24}$





What other groups did you find?

Simplifying fractions

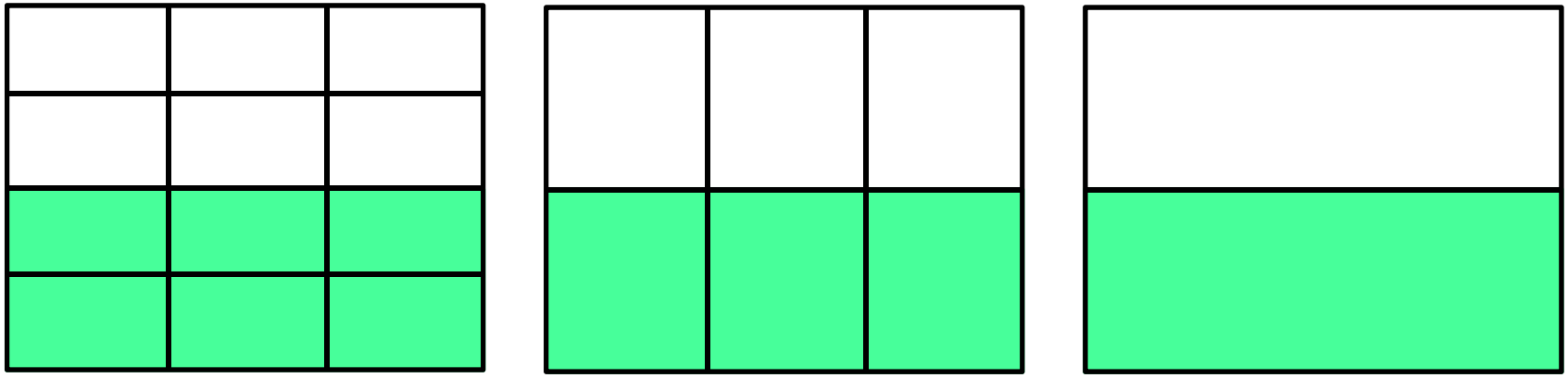


$$\frac{1}{2} \overset{\times 3}{=} \frac{3}{} \overset{\times \square}{=} \frac{}{12}$$

$$\times 3 \qquad \times \square$$

How could we describe going the opposite way?

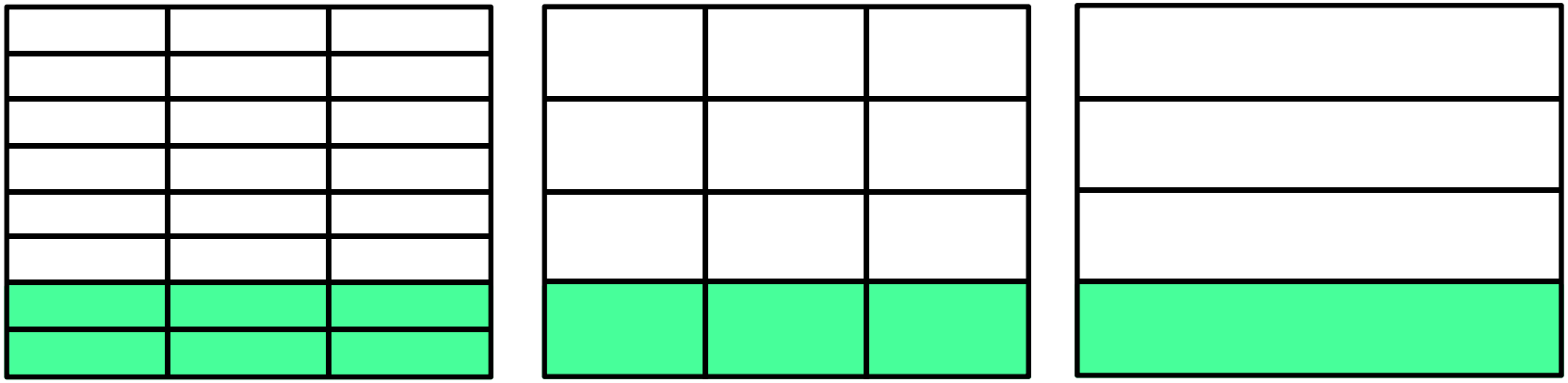
Simplifying fractions



$$\frac{6}{12} \overset{\div 2}{\underset{\div 2}{=}} \frac{3}{6} \overset{\div 3}{\underset{\div 3}{=}} \frac{1}{2}$$

How can you decide what to divide by?
Could this have been simplified in one step?

Simplifying fractions



$$\frac{6}{24} \overset{\div 2}{=} \frac{3}{} \overset{\div \square}{=} \frac{}{4}$$

Why did we divide both the numerator and denominator by 2 in the first step?

x

Simplifying fractions

Explain how you can simplify these fractions.

$$\frac{4}{12} \qquad \frac{6}{18}$$

$$\frac{8}{20} \qquad \frac{28}{84}$$

Is it possible to simplify them in one step? How do you know what to divide the numerator and denominator by?

Simplified?

$$\frac{24}{36} \rightarrow \frac{12}{18} \rightarrow \frac{6}{9}$$

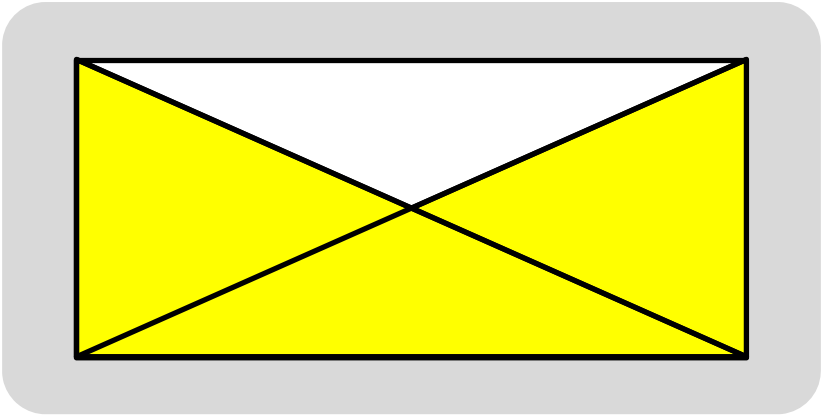
Sandy: ‘This fraction is fully simplified because if I half the numerator and denominator again they won’t be integer digits.’

Ivan: ‘I think you can simplify the fraction further. The numerator and denominator are both multiples of 3.’

Who is correct?
How do you know?

Fraction match

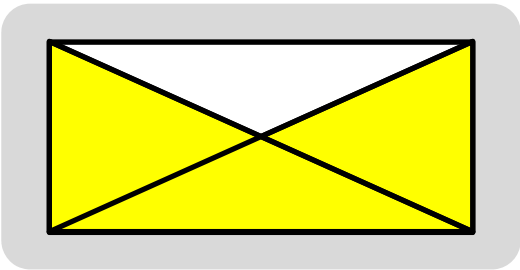
Use each diagram to show a fraction that matches one of the fraction cards. Write a sentence to explain how the diagram matches the fraction. An example has been done for you.

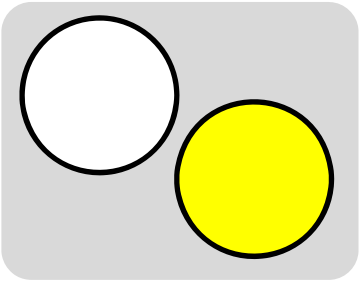


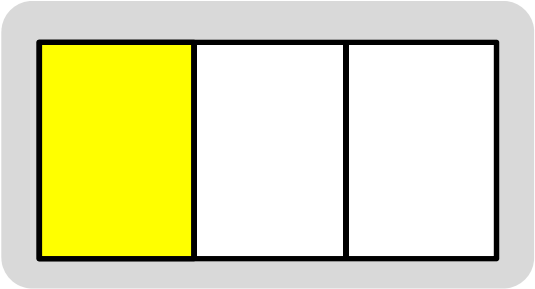
$$\frac{6}{8}$$

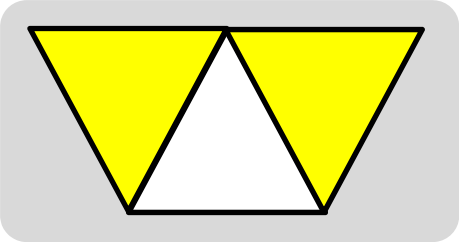
This diagram has $\frac{3}{4}$ shaded, and I can simplify $\frac{6}{8}$ to $\frac{3}{4}$ so these two cards can go together.

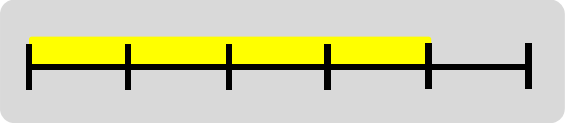
Fraction match

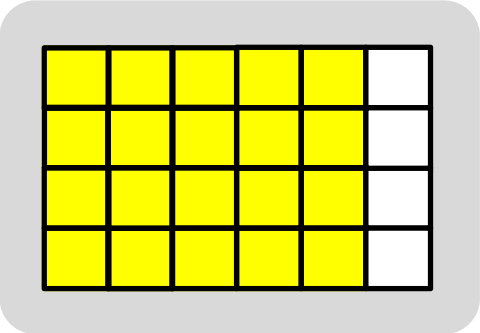


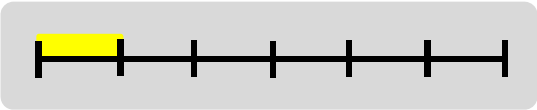


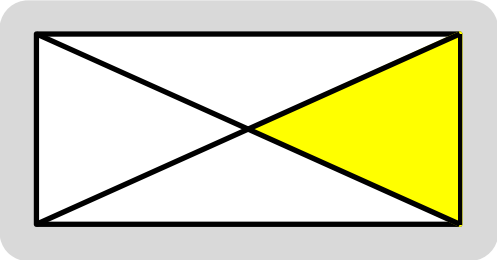












$\frac{6}{36}$ $\frac{15}{60}$ $\frac{16}{20}$ $\frac{9}{18}$ $\frac{8}{12}$ $\frac{10}{12}$ $\frac{10}{30}$ $\frac{6}{8}$

Simplifying strategies

Discuss the different strategies you could use to simplify these fractions

$$\frac{36}{48} \qquad \frac{96}{132}$$

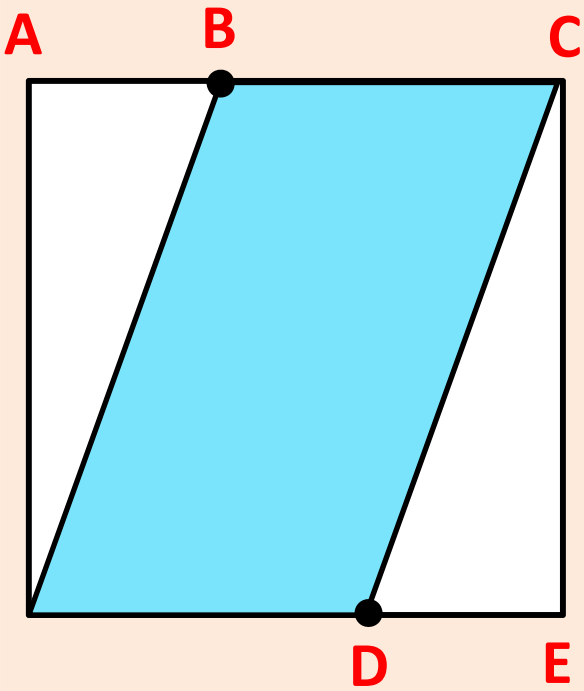
$$\frac{44}{104} \qquad \frac{87}{93}$$

Which strategy do you prefer? Why?

Explain why looking for 'common factors' is helpful when simplifying fractions

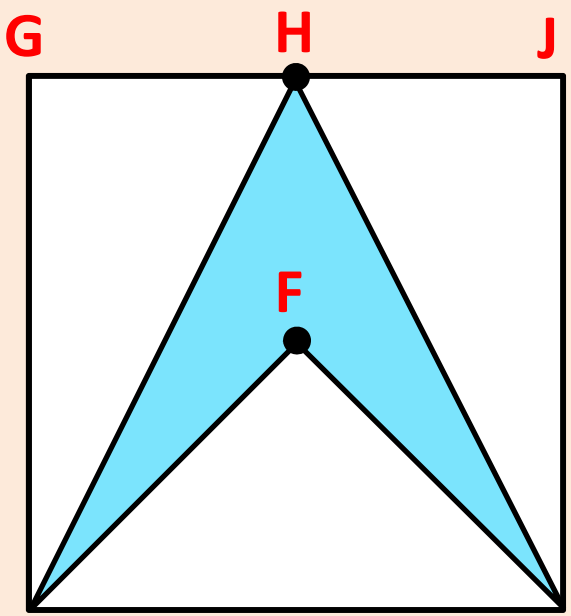
Challenge Extra

Without calculating the area, work out what fraction of each of the squares has been shaded blue.



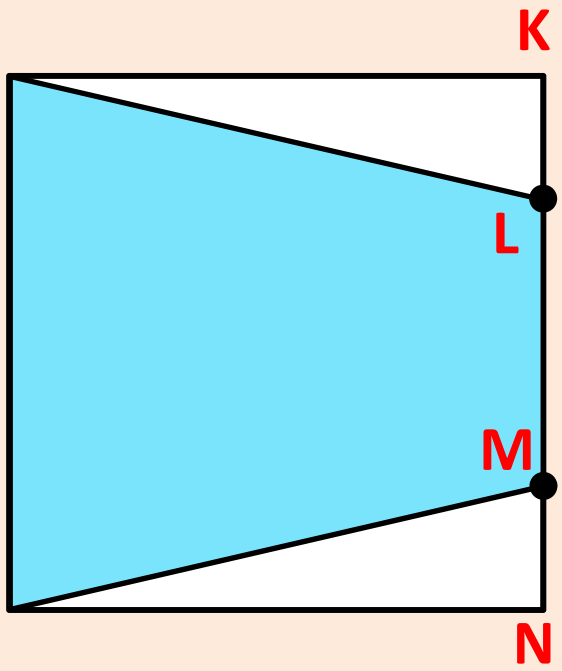
Length AB is one third of length AC

Length AB = Length DE



F is the centre of the square

H is the midpoint of length GJ



Length KL is one fifth of length KN

Length KL = Length MN

Hint

X

Thursday, 04 June 2020

Lesson 4

One quantity as a fraction of another

Key learning

Write one quantity as a fraction of another

Reason proportionally

Understand and use equivalent fractions

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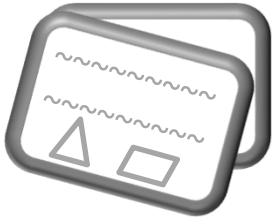
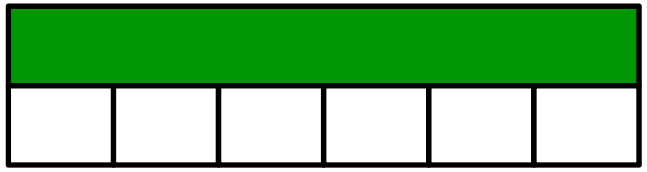
Do Now

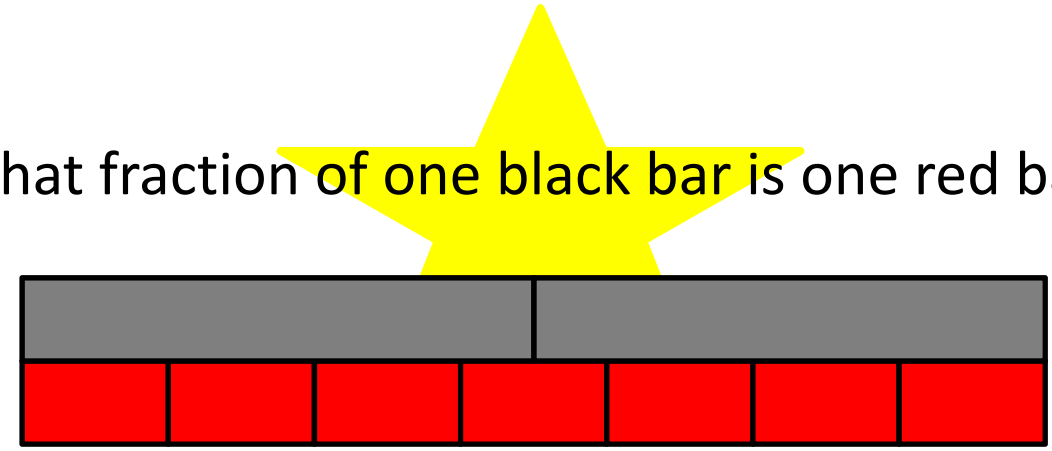


What fraction of the green bar is one white bar?



How many ways can you explain your answer?

What fraction of one black bar is one red bar?



Rod fractions

Complete this task **without measuring** the length of the rods!

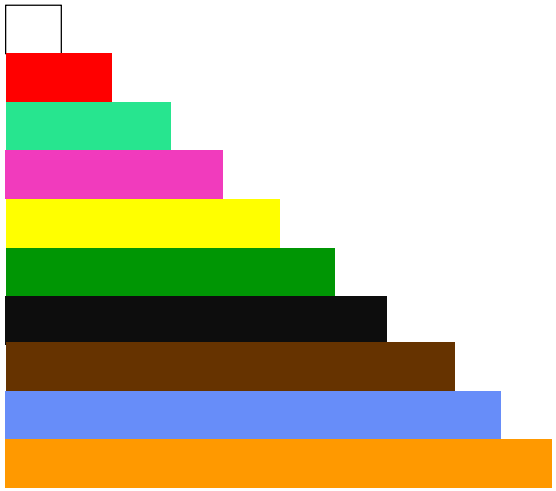
What fraction of the orange rod is the yellow rod?

How can you tell?

What fraction of the blue rod is the red rod?

How can you tell?

Hint: You may need to use lots of blue and red rods!

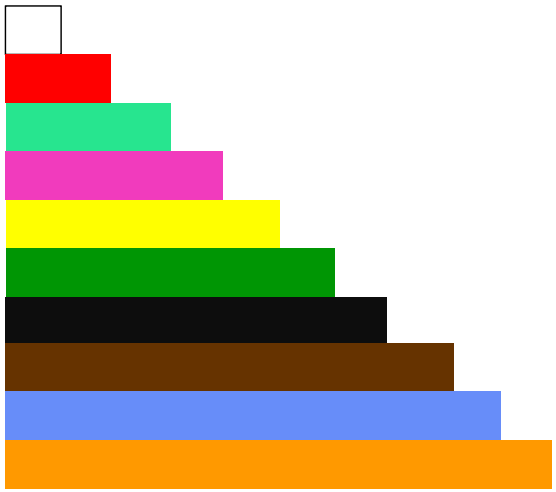


http://nrich.maths.org/4345

Rod fractions

By selecting two different coloured rods each time, work out what fraction of the longer rod the shorter rod represents. Tabulate your results.

What are the largest and smallest fractions you can make?



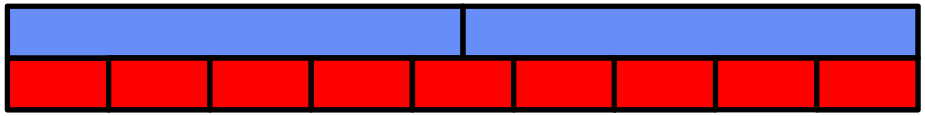
Given an unlimited supply of differently coloured rods, can you find a general rule to work out what fraction of the longer rod, the shorter rod is? Why does this work?

http://nrich.maths.org/4345

Expressing one quantity as a fraction of another

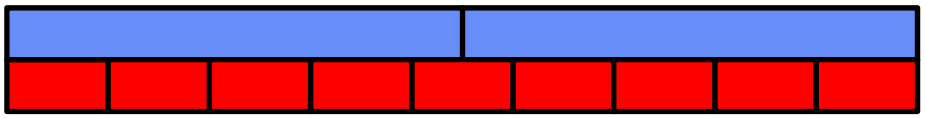
The yellow bar is $\frac{1}{2}$ of the orange bar because it is half the length.

How can the diagram below help us find out what fraction the red bar is of the blue bar? How many ways can you explain?



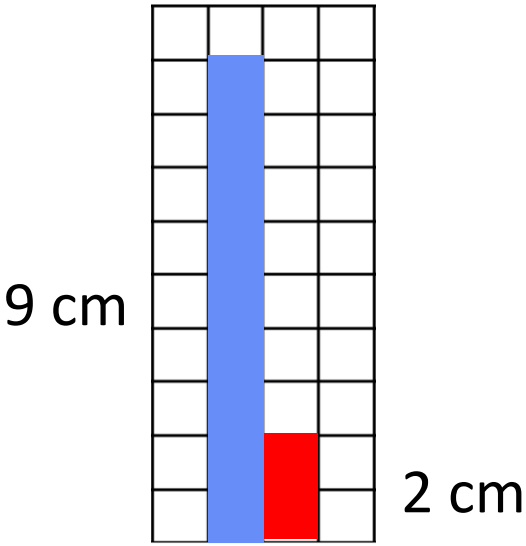
Hint: Remember representing **fractions as a division!**

Expressing one quantity as a fraction of another



Each red bar is equal to 2 blue bars divided into 9 equal parts.

$$2 \div 9 = \frac{2}{9}$$

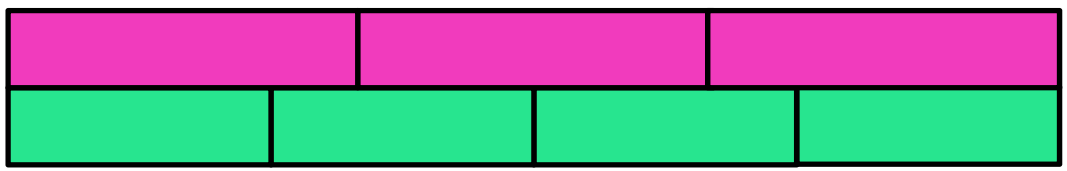


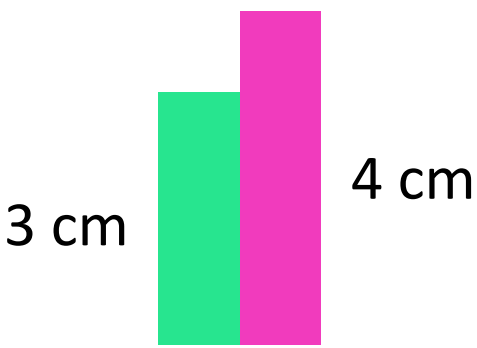
The red bar is $\frac{2}{9}$ of the blue bar because it is 2 cm out of 9 cm.

Expressing one quantity as a fraction of another

Each green bar is equal to 3 purple bars divided into 4 equal parts.

$$3 \div 4 = \frac{3}{4}$$





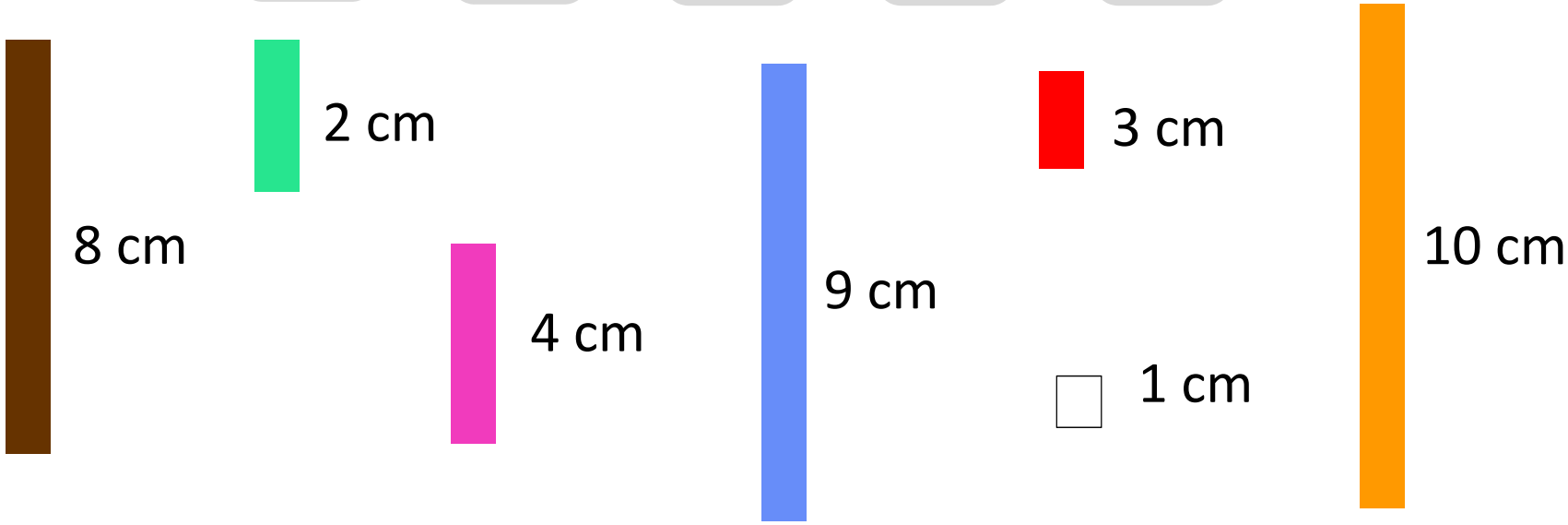
The green bar is $\frac{3}{4}$ of the purple bar because it is 3 cm out of 4 cm.

How many different ways?

Using these bar lengths, how many different ways can you find of showing the following fractions?

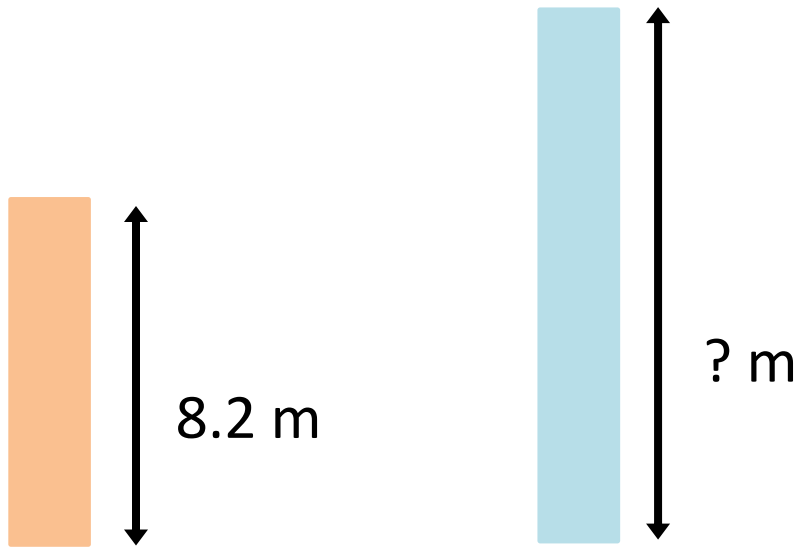
(You may use bars more than once.)

$\frac{1}{2}$ $\frac{2}{3}$ $\frac{3}{4}$ $\frac{4}{5}$ $\frac{5}{4}$



Explain how your understanding of equivalent fractions can help you find solutions. Include some examples in your explanation.

Fractional lengths



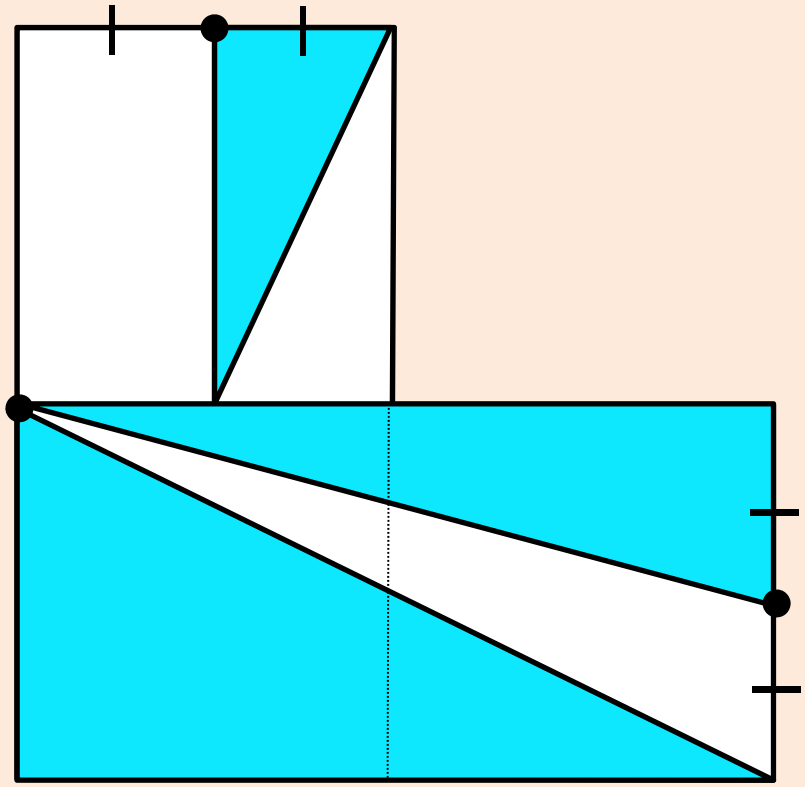
What would the length of the blue bar need to be for the orange bar to represent:

a) $\frac{1}{2}$ b) $\frac{1}{5}$ c) $\frac{2}{3}$ d) $\frac{5}{12}$ of the blue bar?

What fraction of 0.98 m is 5600 mm?
Write your answer in it's simplest form.

Challenge Extra

This compound shape is formed of three congruent squares.



Work out what fraction of the whole shape each of the three blue regions represents.

Thursday, 04 June 2020

Lesson 5

Compare and order fractions

Key learning

Compare fractions with different denominators

Use different comparison strategies

Understand and use equivalent fractions

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True or false?

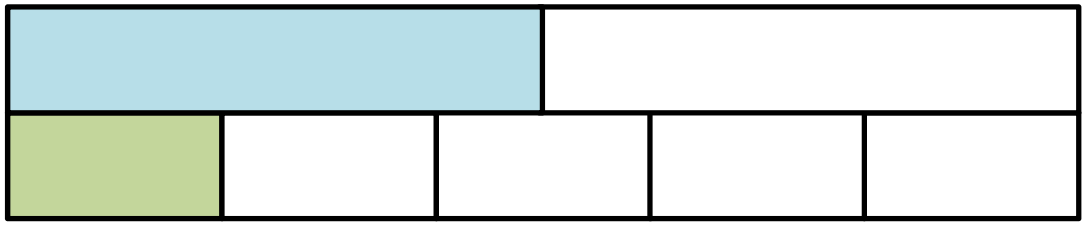
Since $5 > 2$, this means that $\frac{1}{5} > \frac{1}{2}$

Use manipulatives or bar models to demonstrate how you know.

What fraction is half way between $\frac{1}{5}$ and $\frac{1}{2}$?
Show this using a bar model.

True or false?

Since $5 > 2$, this means that $\frac{1}{5} > \frac{1}{2}$



False, $\frac{1}{2} > \frac{1}{5}$. I know this because if I divide one whole into 5 equal parts, each part is smaller than half of the same whole.

Estimating

Estimate where on the number line the following fractions go.

$\frac{1}{2}$ $\frac{1}{3}$ $\frac{1}{4}$ $\frac{1}{5}$ $\frac{1}{10}$

Explain how you know how to compare the fractions.

Estimating

Estimate where on the number line the following fractions go.

$\frac{2}{5}$ $\frac{1}{2}$ $\frac{9}{10}$ $\frac{3}{5}$ $\frac{1}{5}$ $\frac{3}{10}$

What strategies did you use here? How was it the same or different to ordering the previous set of fractions?

Which is greater?

In your groups, find as many ways as possible to show which fraction in each of these pairs is greater. You may use any representation you like. Clear mathematical language and full sentences are key!

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

$\frac{2}{3}$ $\frac{5}{6}$

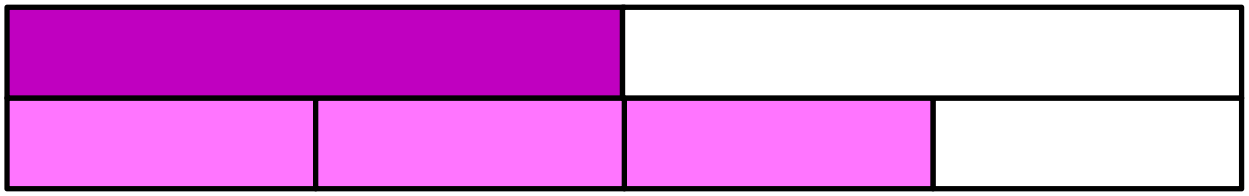
$\frac{5}{12}$ $\frac{2}{5}$

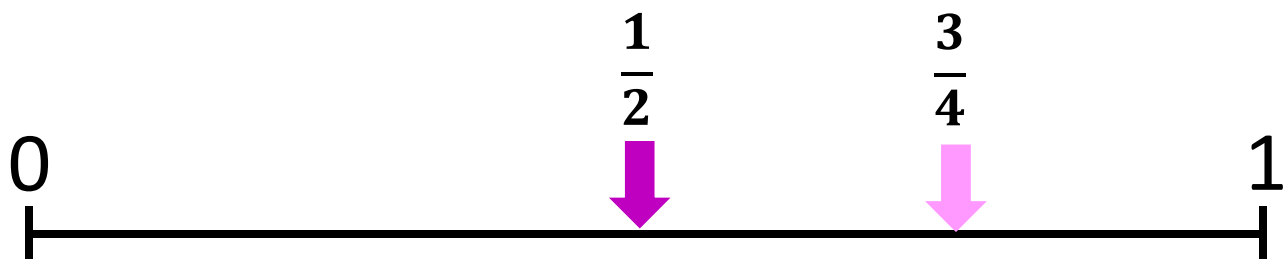
Use three different representations to show each comparison.

Which is larger?

$$\frac{3}{4} > \frac{1}{2}$$

$$\frac{1}{2} = \frac{2}{4} \qquad \frac{3}{4} > \frac{2}{4} \qquad \text{so } \frac{3}{4} > \frac{1}{2}$$



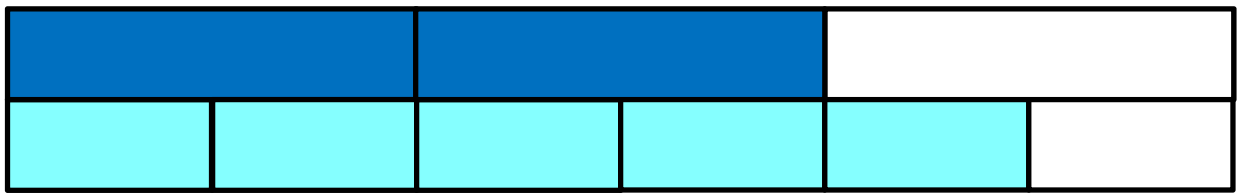


Which representation is clearest to you?

Which is larger?

$$\frac{2}{3} < \frac{5}{6}$$

$$\frac{2}{3} = \frac{4}{6} \qquad \frac{4}{6} < \frac{5}{6} \qquad \text{so } \frac{2}{3} < \frac{5}{6}$$



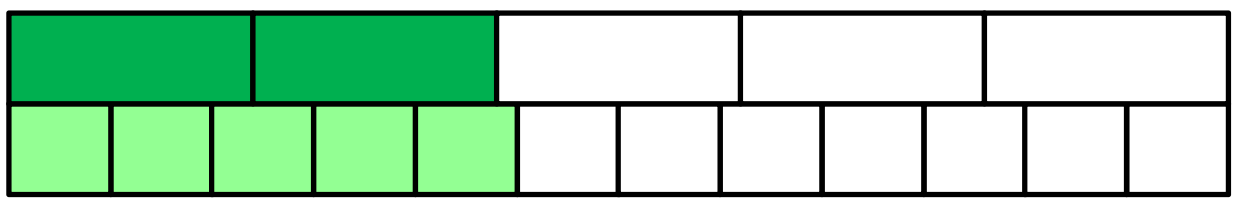
Which representation is clearest to you?

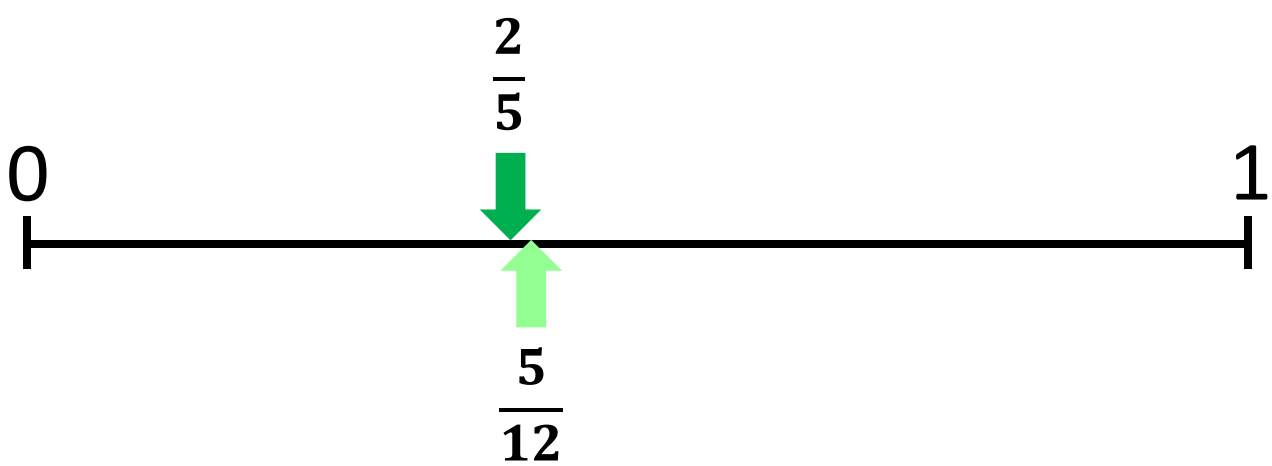
Which is larger?

$$\frac{5}{12} > \frac{2}{5}$$

$$\frac{5}{12} = \frac{25}{60} \qquad \frac{2}{5} = \frac{24}{60}$$

$$\frac{25}{60} > \frac{24}{60} \qquad \text{so } \frac{5}{12} > \frac{2}{5}$$

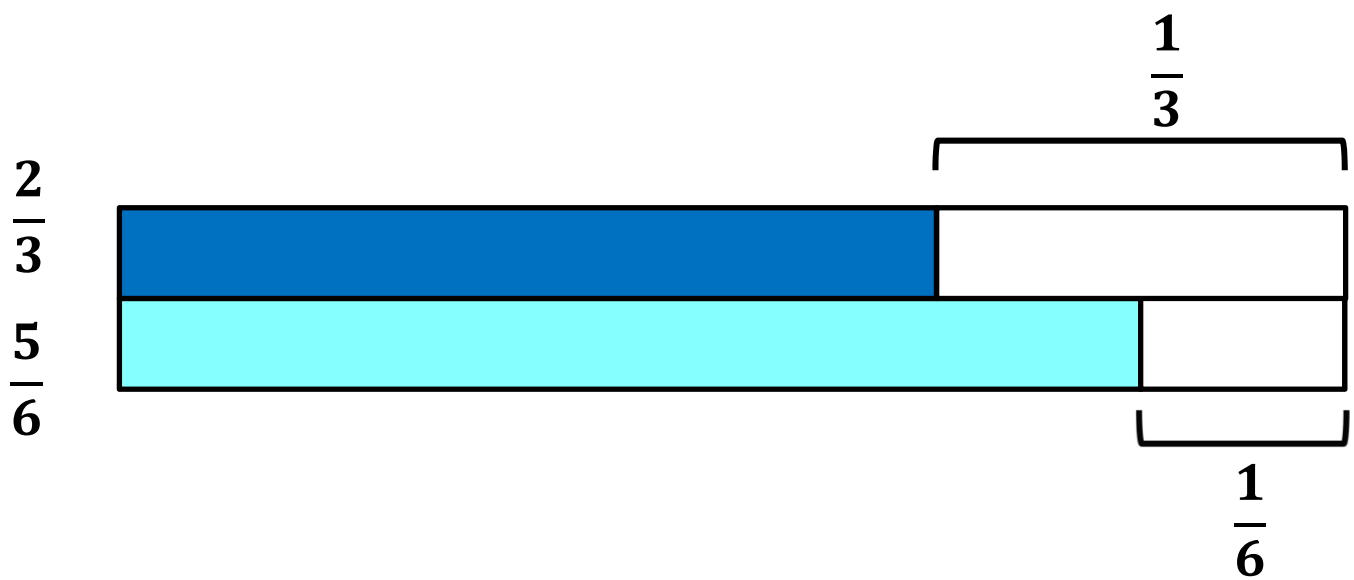




Which representation is clearest to you?

A different comparison strategy

Think about the comparison strategy below. Think of a pair of fractions to compare where this would be useful and explain why.



$\frac{2}{3}$ is $\frac{1}{3}$ less than one whole and $\frac{5}{6}$ is $\frac{1}{6}$ less than one whole.

Since $\frac{1}{6}$ is smaller than $\frac{1}{3}$, I know that $\frac{5}{6}$ must be larger because it is closer to one whole

Higher? Lower?

Choosing pairs from these fractions, make at least 10 comparisons. Use the > and < symbols to write your answers.

$\frac{1}{3}$ $\frac{1}{4}$ $\frac{1}{2}$ $\frac{7}{9}$ $\frac{3}{10}$ $\frac{6}{6}$

$\frac{3}{10}$ $\frac{5}{8}$ $\frac{7}{12}$ $\frac{3}{5}$ $\frac{21}{25}$

Use a range of written and pictorial methods to show your comparisons. Which representations compare each pair most clearly?

Which of these could you show using Cuisennaire rods?

Find three fractions less than 1, which are greater than $\frac{24}{25}$.

Three different ways

$$\frac{3}{4} \qquad \frac{5}{6}$$

Show three ways to compare $\frac{3}{4}$ and $\frac{5}{6}$.

Write a sentence to compare them using key words and symbols.

Thursday, 04 June 2020

Lesson 6

Improper fractions and mixed numbers (1)

Key learning

Understand and represent improper fractions

Convert improper fractions to mixed numbers

Place improper fractions on a number line

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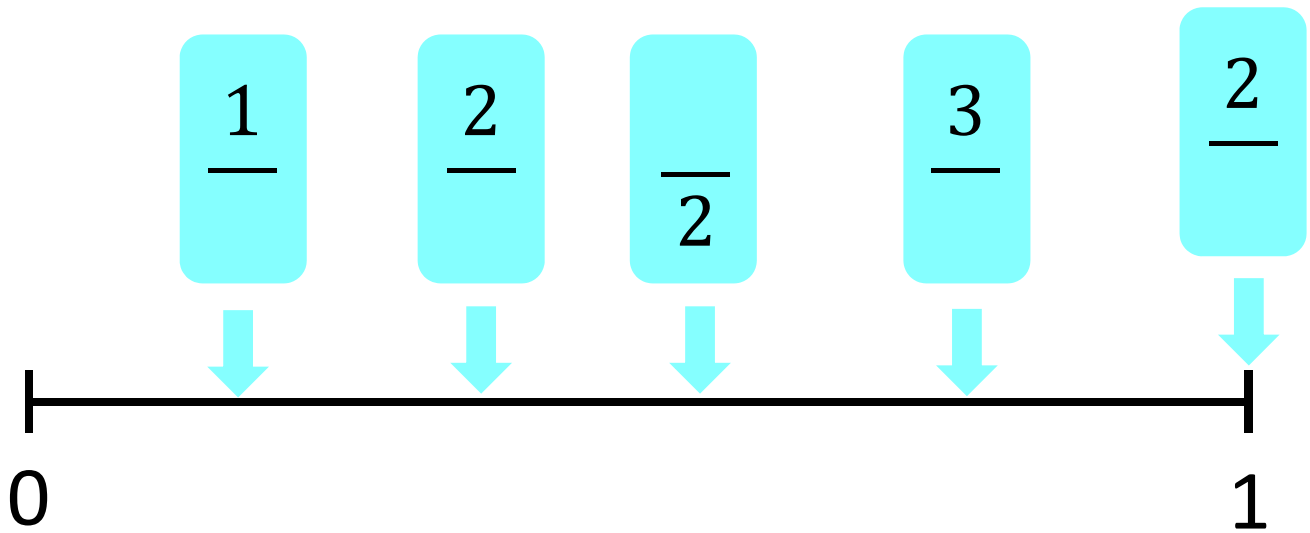
Fill in the blanks

Fill in the blanks on the number line so that the fractions are in the correct order.

Note: The arrows aren't all placed accurately on the line, but they are in ascending order.



How many different ways can you fill the blanks?

Odd one out

In each group, which is the odd one out? Why?

$\frac{1}{4}$ $\frac{2}{3}$ $\frac{5}{20}$

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

$\frac{10}{8}$ $\frac{3}{10}$ $\frac{5}{4}$

Find reasons to pick a different ‘odd one out’ in each group?

Odd one out

This one is the odd one out because.....

This is the only fraction that is a number of quarters

$\frac{4}{3}$

$\frac{3}{4}$

$\frac{2}{3}$

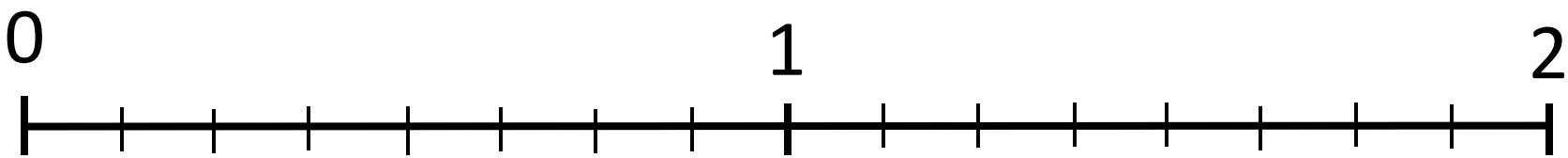
This is the only fraction that is greater than one whole

This is the only fraction that has the digit ‘2’ when in its simplest form

Between 0 and 2

$\frac{5}{4}$ $\frac{1}{4}$ $\frac{5}{8}$ $\frac{7}{4}$ $\frac{15}{8}$ $\frac{9}{8}$ $\frac{3}{8}$ $\frac{3}{2}$ $\frac{3}{4}$ $\frac{1}{2}$

Where would you place the fractions on this number line?



A student says '$\frac{1}{2}$ should go here because it's in the middle of the line'.
What mistake have they made?

Show me thirds

Let one cube represent one third.

Show me two thirds.

Show me one whole.

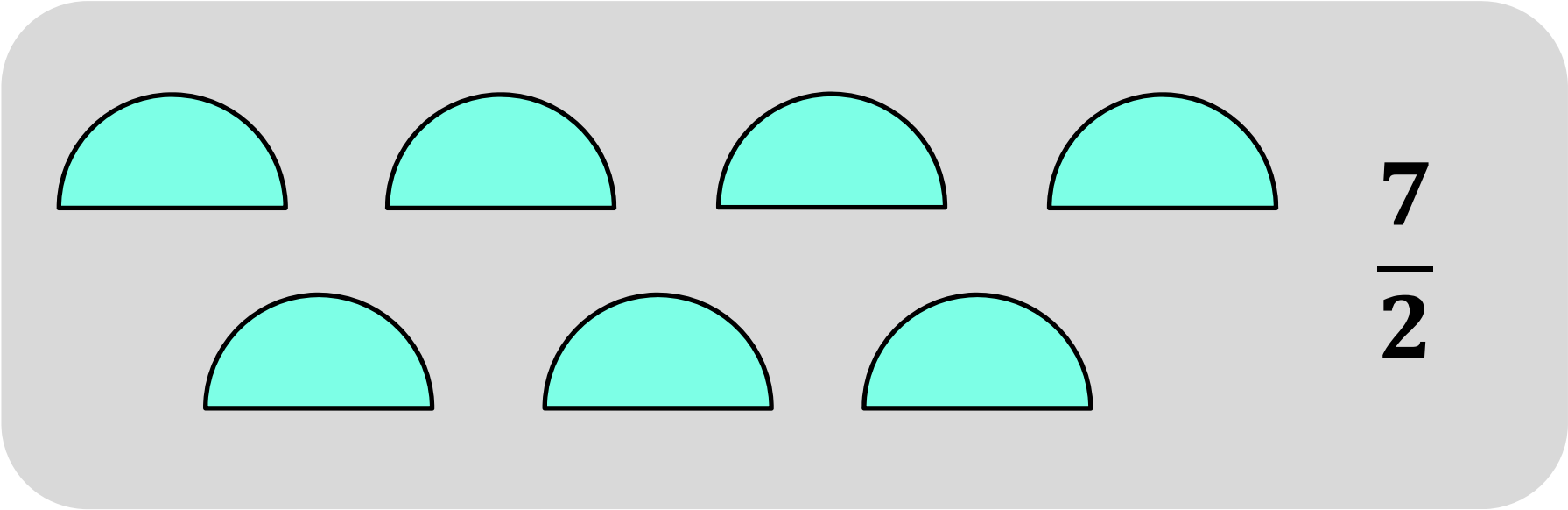
Show me five thirds.

Come up with one sentence to compare one whole with five thirds.

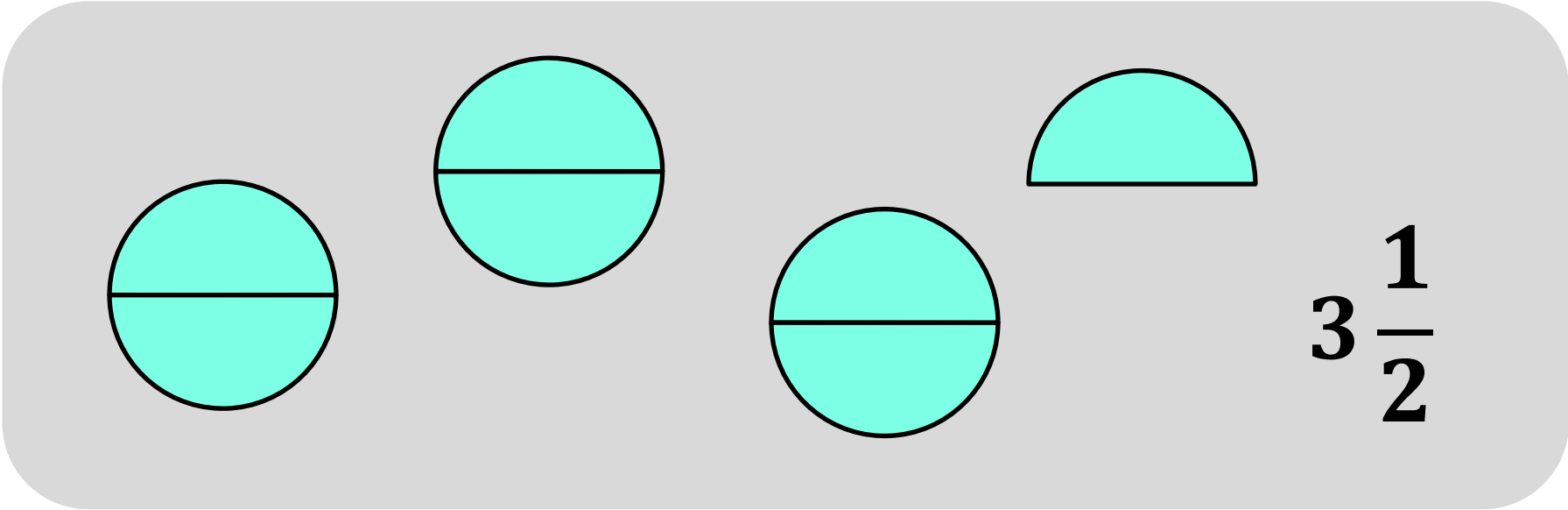
How else could you describe five thirds?

Come up with three different ways of
comparing five thirds with eight thirds

What's the same and what's different?



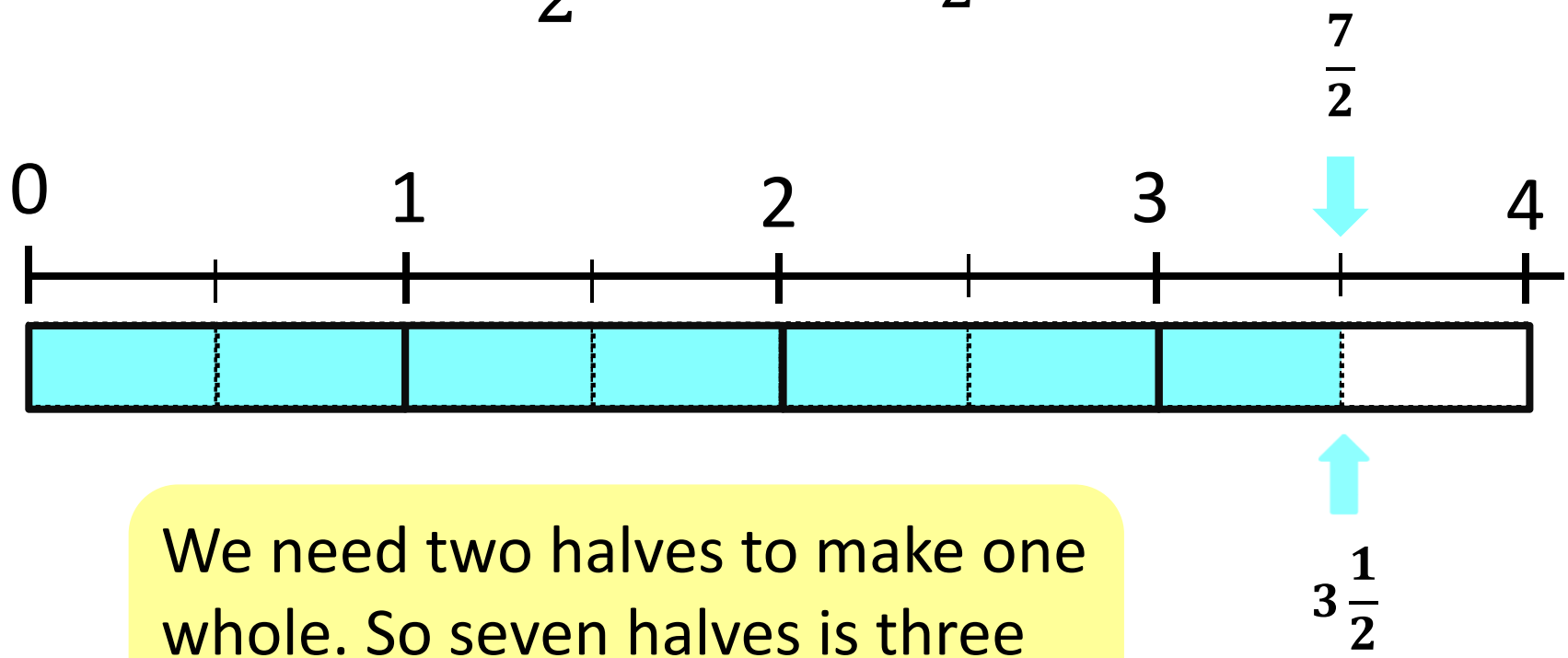
$$\frac{7}{2}$$



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

What is an improper fraction?

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



We need two halves to make one whole. So seven halves is three and a half.

Multilink fractions

If **one cube** represents **one half** how would you show the following numbers?

1

1.5

$\frac{3}{2}$

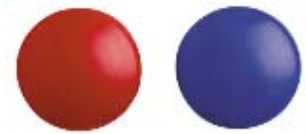
2

$\frac{7}{2}$

$\frac{5}{4}$

Counter fractions

If **two counters** represent **one third** how would you show the following numbers?



3

$\frac{4}{3}$

$\frac{1}{6}$

1

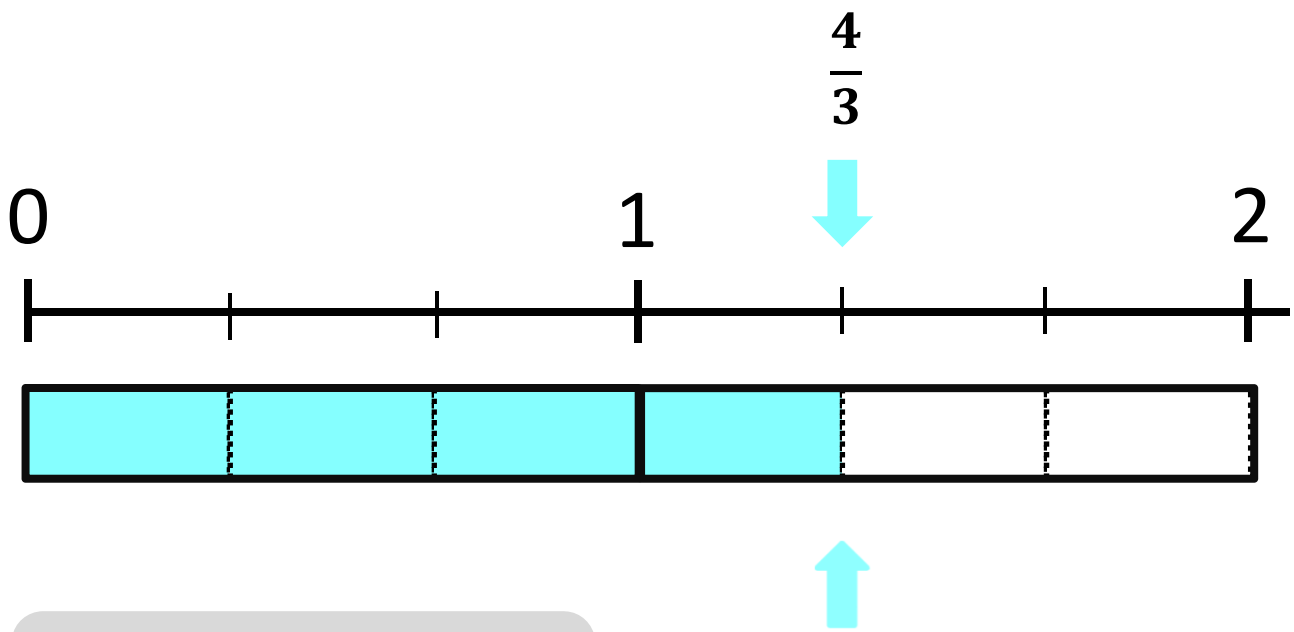
$\frac{1}{12}$

$\frac{2}{3}$

$1\frac{2}{3}$

Converting into mixed numbers

$\frac{4}{3}$



Why do we call this a mixed number?

$1\frac{1}{3}$

$\frac{4}{3}$ is equal to **one whole and one third**

Convert into mixed numbers

Convert these improper fractions into mixed numbers.
Draw bar models to show how you converted them.

$\frac{5}{2}$ $\frac{5}{3}$ $\frac{9}{4}$ $\frac{11}{5}$ $\frac{13}{3}$

$\frac{21}{12}$ $\frac{36}{8}$ $\frac{19}{6}$

Make sure your mixed numbers are written in their simplest form.

Draw a number line and order all the mixed numbers on it.

Always, sometimes, never true?

Are these statements always, sometimes or never true?

Improper fractions are fractions that are between 1 and 2 on a number line

Improper fractions can always be simplified

Improper fractions can also be shown as mixed numbers

Improper fractions aren't real fractions because you can't have 'five out of three'

Mixed numbers are always in their simplest form

You can convert an improper fraction into a mixed number by subtracting the denominator from the numerator

Think of examples to explain for the explanations that are sometimes or never true.

Pizza sharing

At John's birthday party everyone was given $\frac{1}{4}$ of a pizza.

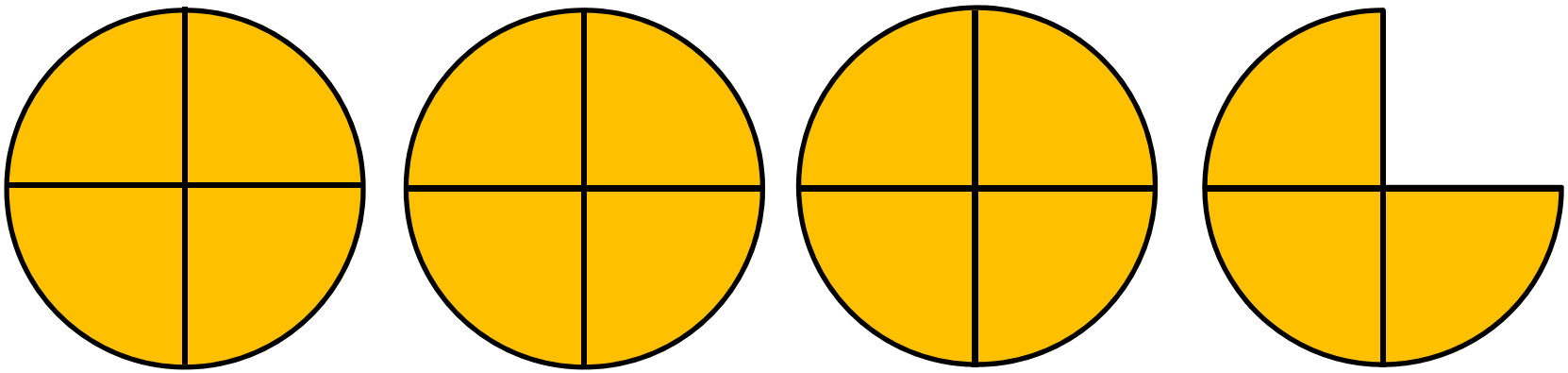
There were 15 people at the party. How much pizza did he give out?

How can John work out how much pizza was given out?

How could you represent this with multilink cubes?

Pizza sharing

What does 15 quarters look like? $\frac{15}{4}$



You need 4 quarters to make each whole pizza.

15 quarters is the same as 3 whole pizzas and $\frac{3}{4}$ of a pizza.

$$\frac{15}{4} = 3\frac{3}{4}$$

Challenge Extra

Use the numbers 1 – 10 once only to fill in the inequality.

$$\frac{\square}{\square} > \frac{\square}{\square} > \frac{\square}{\square} > \frac{\square}{\square} > \frac{\square}{\square}$$

Can you use your solution to find a different solution?

Hint X

Will this pattern work for any set of ten consecutive numbers?
Explain why or why not.

Thursday, 04 June 2020

Lesson 7

Improper fractions and mixed numbers (2)

Key learning

Converting improper fractions to mixed numbers
Converting mixed numbers to improper fractions
Comparing mixed numbers and improper fractions

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Do Now

In each group of three fractions, identify the odd one out.

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

$\frac{4}{3}$ $\frac{8}{6}$ $\frac{8}{9}$

$\frac{6}{15}$ $\frac{10}{25}$ $\frac{12}{30}$

$\frac{14}{16}$ $\frac{35}{40}$ $\frac{20}{55}$

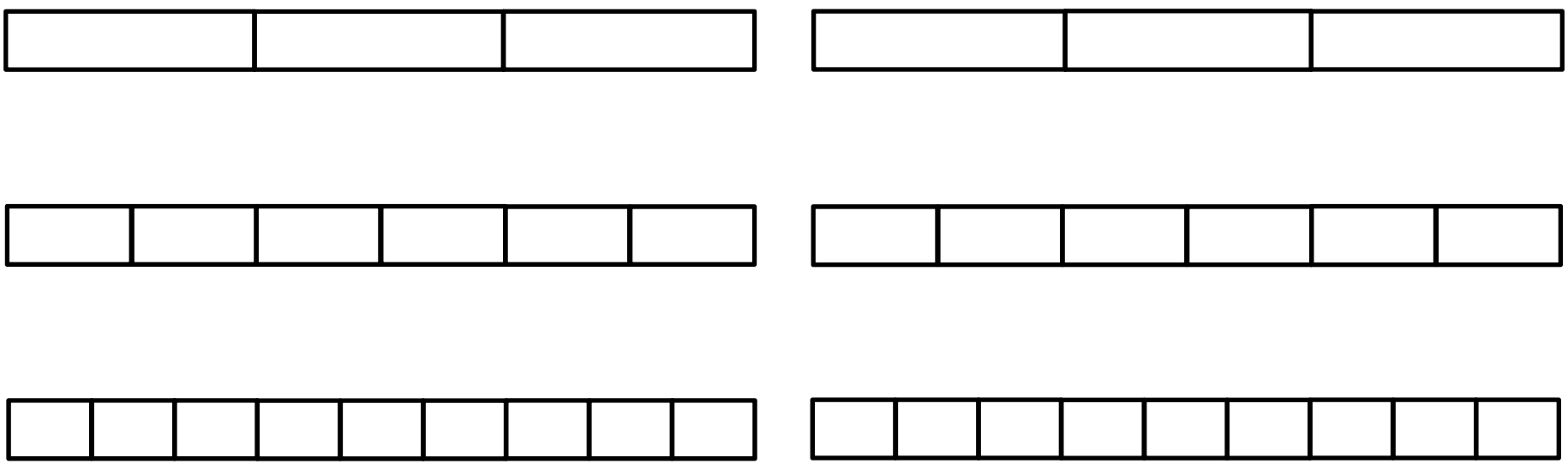
$\frac{21}{18}$ $\frac{18}{21}$ $\frac{77}{66}$

Can you find a reason for each of the other fractions being the odd one out?

Bar models

$$\frac{4}{3} \qquad \frac{8}{6} \qquad \frac{8}{9}$$

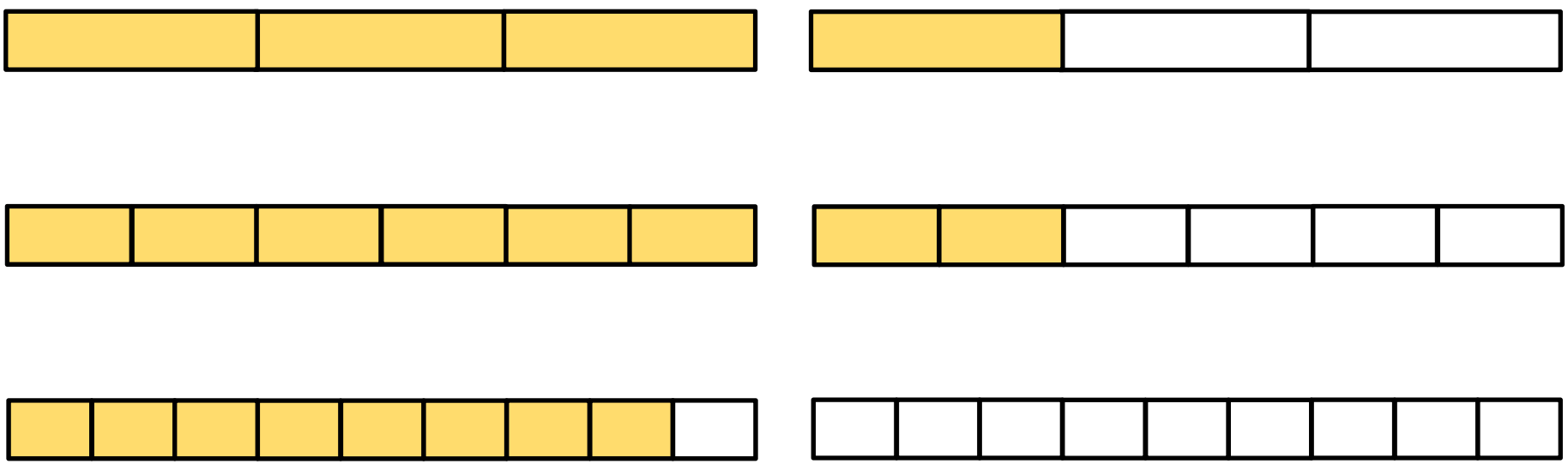
Which is the greatest?
How do you know?



Bar models

$$\frac{4}{3} \qquad \frac{8}{6} \qquad \frac{8}{9}$$

Which is the greatest?
How do you know?



Fraction match

Match each improper fraction to a mixed number.
Fill in the blanks to complete the pairs.

$\frac{15}{4}$		$1\frac{8}{9}$	$4\frac{2}{3}$
	$\frac{17}{9}$		
$\frac{32}{5}$	$\frac{19}{4}$	$6\frac{1}{2}$	$3\frac{3}{4}$

Write an equivalent mixed number or improper fraction to go with each pair.

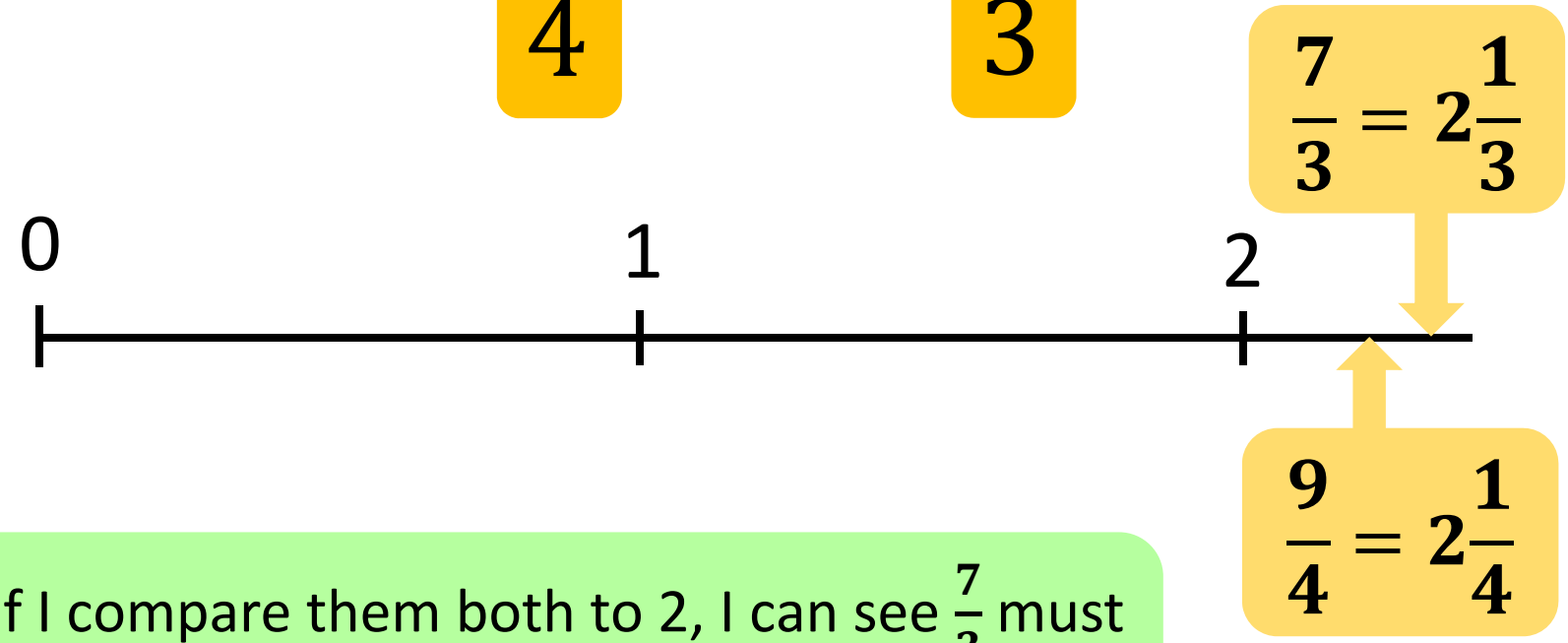
True or false?

$$\frac{9}{4} > \frac{7}{3}$$

Explain, using diagrams or otherwise, how you know.

Comparing

$$\frac{9}{4} > \frac{7}{3}$$



If I compare them both to 2, I can see $\frac{7}{3}$ must be greater. I know this because $\frac{1}{3} > \frac{1}{4}$.

Comparing fractions

$\frac{11}{9}$ $\frac{2}{5}$ $\frac{7}{2}$ $\frac{7}{6}$ $\frac{4}{9}$ $\frac{19}{6}$ $\frac{9}{8}$ $\frac{3}{7}$ $\frac{5}{6}$

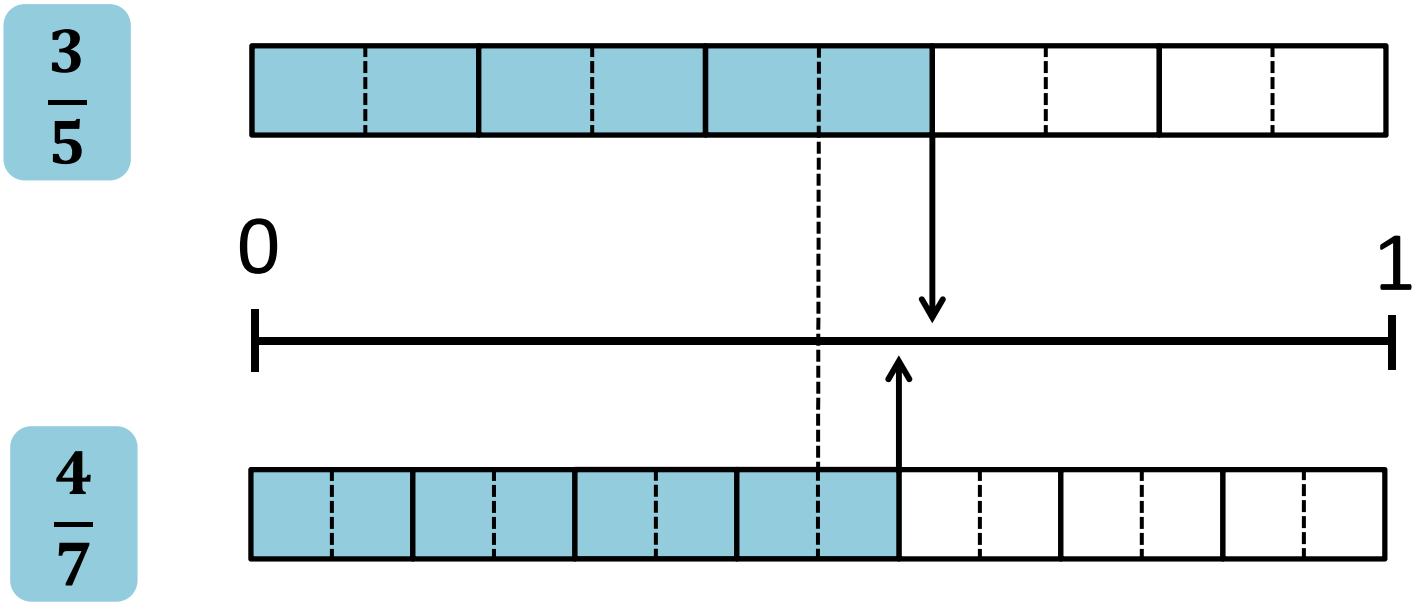
$\frac{25}{8}$ $\frac{5}{9}$ $\frac{10}{9}$ $\frac{26}{9}$ $\frac{3}{5}$ $\frac{10}{3}$ $\frac{7}{8}$ $\frac{4}{7}$ $\frac{29}{10}$

Pick two fractions from the cloud to compare.
Write an inequality using the < or > symbols.
Draw a diagram or write a sentence to show how you know which is greater / smaller.

X

What number would it be useful to compare the yellow fractions to? Why?

Comparing to one half



$\frac{3}{5} > \frac{4}{7}$. I know this because $\frac{3}{5}$ is $\frac{1}{10}$ greater than one half, and $\frac{4}{7}$ is $\frac{1}{14}$ greater than one half.

How do you know?

Ewan says: ‘To convert a mixed number into an improper fraction, first multiply the whole number by the denominator, then add the numerator. This gives you the numerator of the improper fraction.’

Is Ewan’s method correct? Use multi link or bar models to explain why it does or doesn’t work.

Improper fractions

Which of these mixed numbers would have the same numerator once converted to an improper fraction?

$2\frac{1}{4}$	$8\frac{2}{3}$	$9\frac{5}{6}$	$2\frac{2}{15}$
$4\frac{4}{7}$	$4\frac{1}{2}$	$2\frac{4}{11}$	$7\frac{3}{8}$
$4\frac{11}{12}$	$6\frac{2}{5}$	$5\frac{1}{5}$	$10\frac{2}{3}$

Use concrete and pictorial representations to help you.

Is there a quicker way of converting $4\frac{11}{12}$ into an improper fraction?
How might a 'close to a whole number' strategy work?
When would you use it?

Challenge Extra

1 2 3

Find as many improper fractions as you can using only the digits 1, 2 and 3
(You do not need to use all the digits).

E.g.:

$\frac{3}{2}$ $\frac{21}{3}$

Which of these represent an integer?

Which of these lie between 1 and 2?

Which of these lie between 3 and 10?

Can you make an improper fraction that lies between 3 and 4 using the digits 1, 2, and 3? Why?

What range(s) of values is or isn't possible if you use the digits 2, 3 and 4?

Thursday, 04 June 2020

Lesson 8

Converting decimals to fractions

Key learning

Represent decimal place value

Convert fractions to decimals

Use equivalent fractions with denominators 10 and 100

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Do Now

How many different ways can you represent these numbers?

$$\frac{1}{10}$$

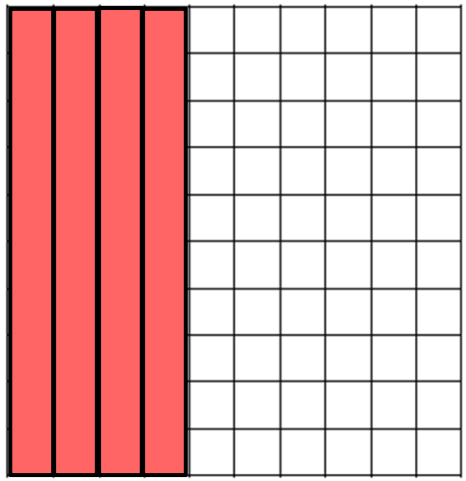
$$\frac{3}{10}$$

$$0.5$$

$$\frac{4}{10}$$

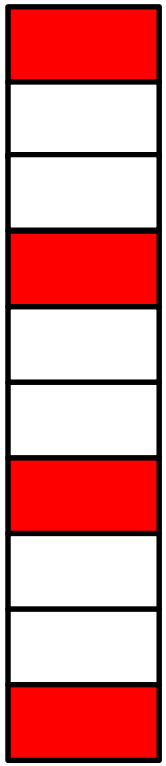
Representing $\frac{4}{10}$

Explain how each of these can represent $\frac{4}{10}$.

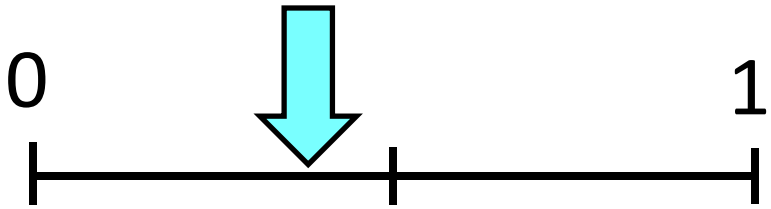


$$\boxed{\frac{4}{10}}$$

$$0.4$$



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

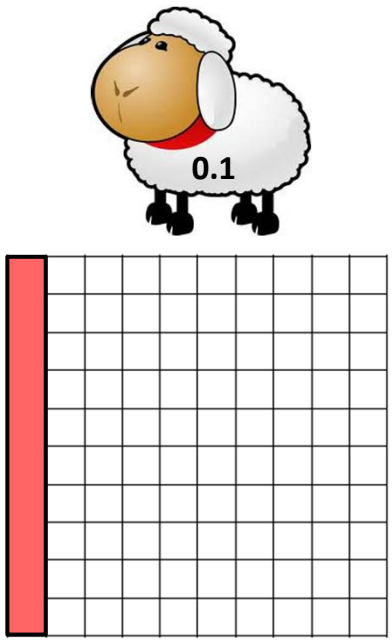


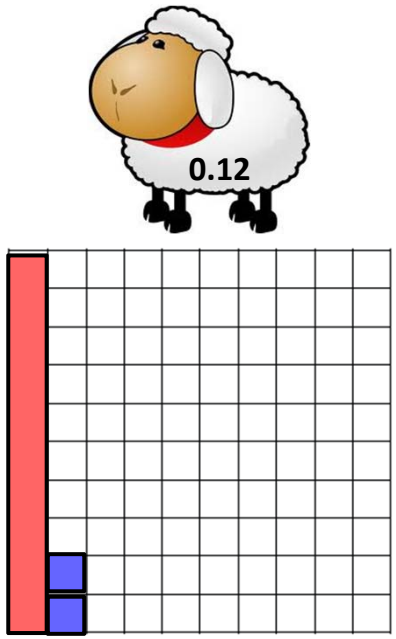
Tenths and hundredths

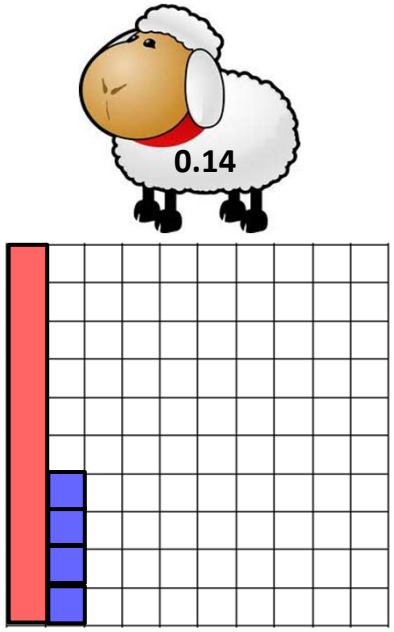
Write each of the following decimals as a fraction.

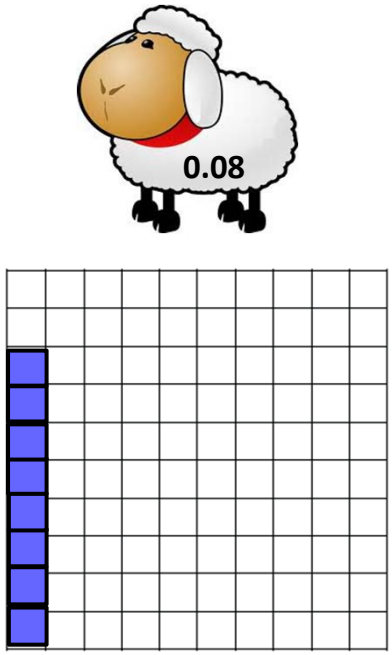
Remember how many hundredths there are in one tenth.

How could I show eleven hundredths?







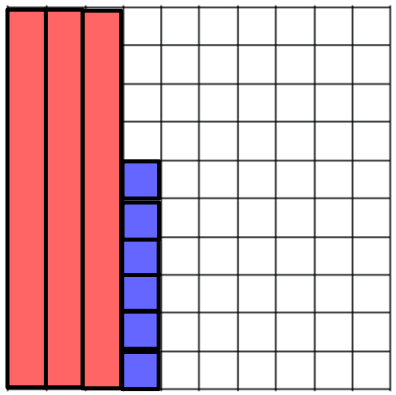


Same or different?

Are the representations in representations below the same or different?

0.36

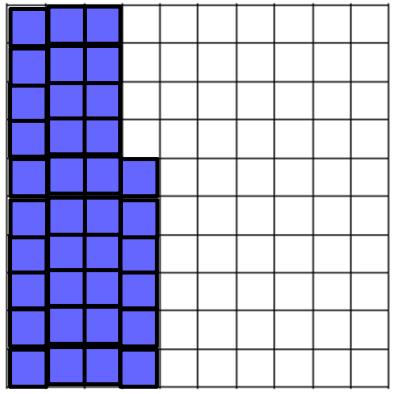
'Three tenths and six hundredths'



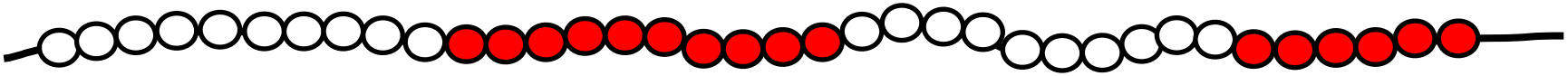
'Thirty six hundredths'

$\frac{36}{100}$

$\frac{9}{25}$



		$\frac{1}{10}$	$\frac{1}{100}$
One		Tenths	Hundredths
0		3	6

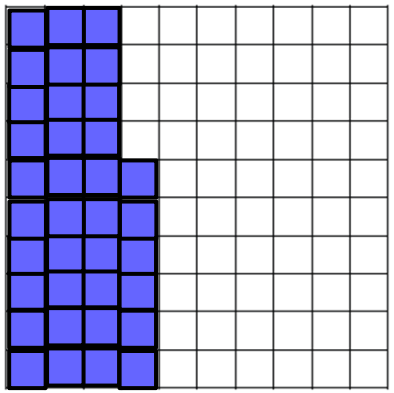


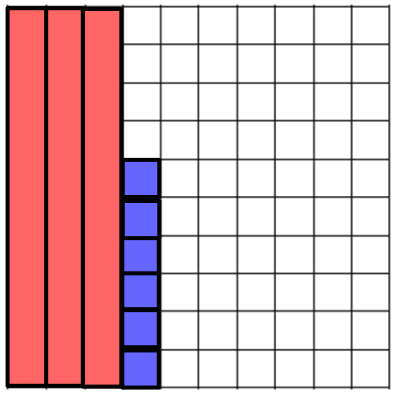
Tenths and hundredths

Ten hundredths is equal to one tenth.

$$0.36 = \frac{36}{100}$$

Thirty-six hundredths is equal to three tenths and six hundredths





'Thirty six hundredths'

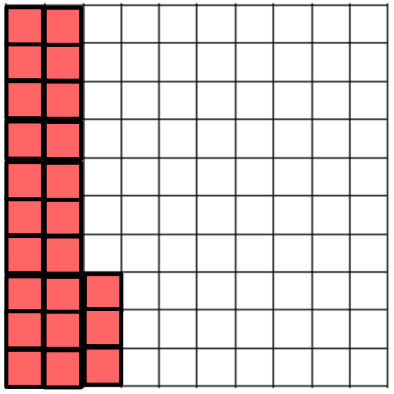
'Three tenths and six hundredths'

Decimal fractions to vulgar fractions

Convert the following decimals to vulgar fractions by drawing them on the hundred squares. One had been done for you.

0.23 0.4 0.06 0.16 0.9 0.09 0.99 2.1 6.08

$$0.23 = \frac{23}{100}$$



'I know this because two tenths and three hundredths is equal to twenty-three hundredths.'

How could you represent 9.4 on a bead string? What is the value of each bead now?

Is it possible to represent 3.45 on a bead string? Why? Why not?

Vulgar fractions in the gaps

0.91 0.36 0.55
0.27 0.145 0.73
0.59 0.75
0.655
0.2 0.45
0.08 0.962 0.88
0.76 0.6

Put these decimals in order on a number line.
Write a vulgar fraction that lies in each of the gaps between the numbers.

E.g. $\mathbf{0.27} < \frac{\mathbf{3}}{\mathbf{10}} < \mathbf{0.36}$

Find the mean of each pair of decimals that are next to each other on the number line. Is the fraction you found between the two decimals bigger or smaller than the mean?

Classic mistakes

$$0.7 = \frac{7}{100}$$

$$0.28 = \frac{28}{10}$$

What mistake has been made?

Use a diagram and full sentence to explain what the correct fractions would be for these decimals.

Think of a different classic mistake and show how you could explain the error.

Thursday, 04 June 2020

Lesson 9

Converting between decimals and vulgar fractions

Key learning

Understand the value of each digit in a decimal
Convert between decimals and fractions
Represent fractions and decimals on number lines
Compare and order fractions and decimals

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Do Now

Complete these equations with as many different decimals as you can.

$$0.\square + 0.\square = \frac{7}{10}$$

$$0.\square - 0.\square = \frac{37}{100}$$

$$\square.\square + \square.\square = \frac{42}{10}$$

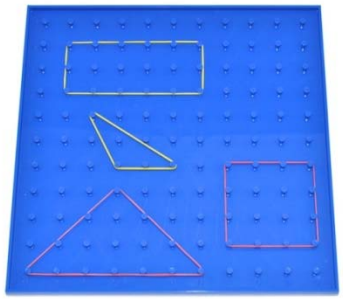
$$\square.\square - \square.\square = 3\,\frac{29}{1000}$$

Fractions to decimals

Represent each vulgar fraction with concrete manipulatives.
Which manipulatives help most when converting them into decimals?

$\frac{1}{2}$ $\frac{1}{5}$ $\frac{3}{10}$ $\frac{3}{4}$ $\frac{1}{8}$

How can equivalent fractions help?



Ewan’s mistake

Ewan is trying to compare two fractions.

$$\frac{1}{5} = 0.5$$

$$\frac{1}{7} = 0.7$$

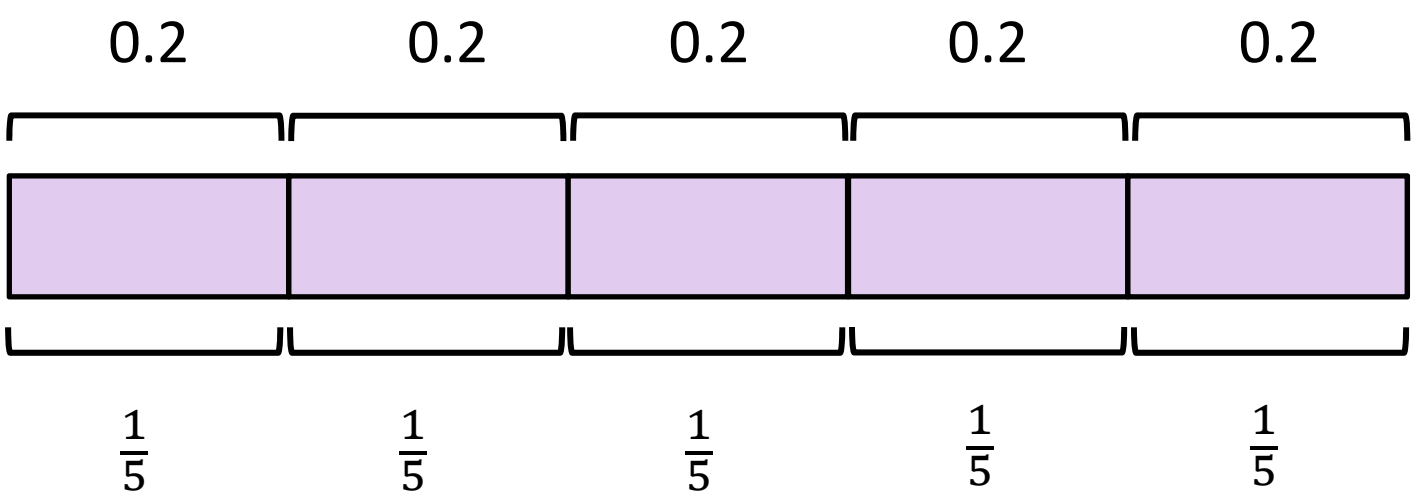
‘ $\frac{1}{5}$ must be less than $\frac{1}{7}$

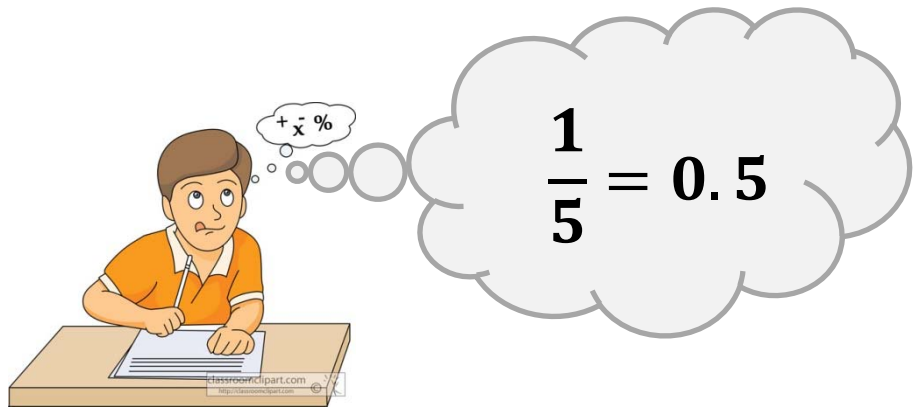
because 0.5 < 0.7 ’

What has gone wrong in Ewan’s working?

Ewan’s mistake

How could this bar model help show Ewan his mistake?

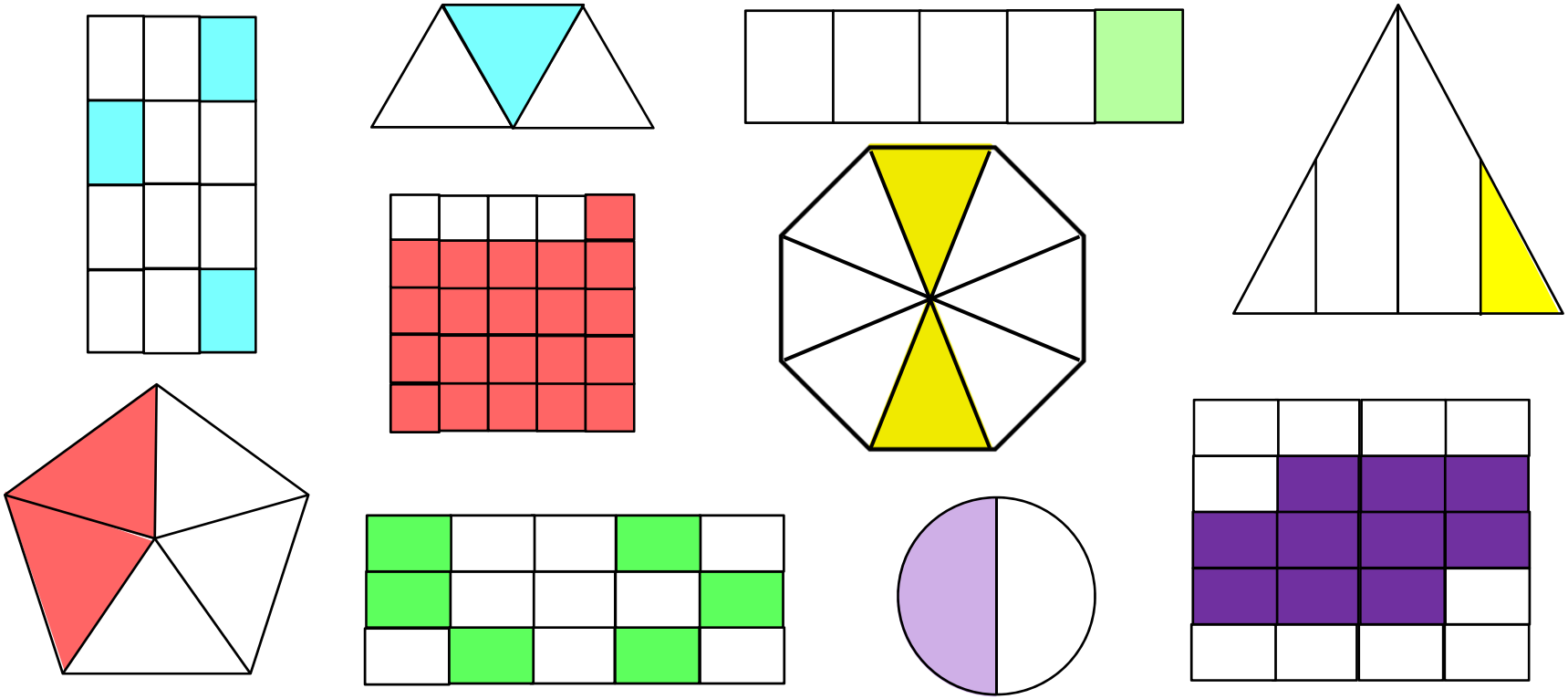




Fractions to decimals

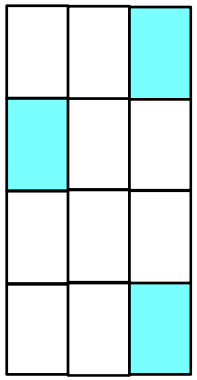
Which of the pictures represent the given decimal?
There may be more than one picture for each decimal.

0.25 0.4 0.5 0.84



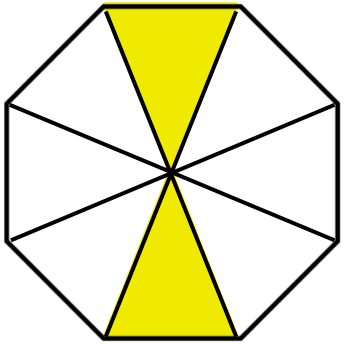
What fractions do each of the shapes represent?
Put the decimals and unmatched fractions into ascending order.

0.25



How do we know?

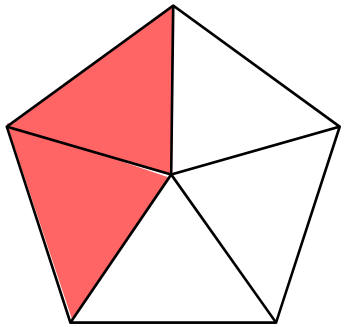
x



How do we know?

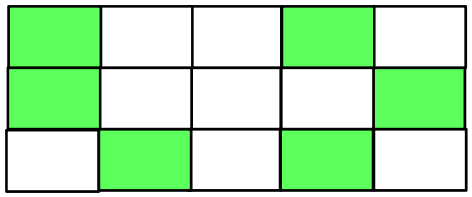
x

0.4



How do we know?

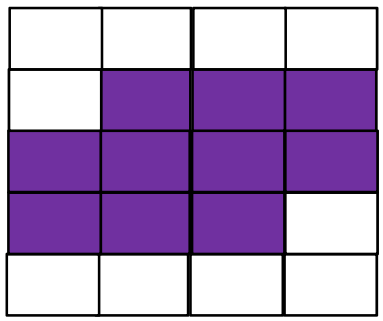
x



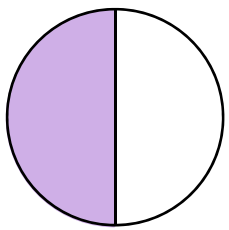
How do we know?

x

0.5



How do we know?



How do we know?

Explain why: $\frac{5}{10} = \frac{50}{100} = 0.5$

More classic mistakes

For each of the following, decide where the mistake has been made and find the correct answer.

Rashid shared 4 cakes between three people.
He could not share this evenly.

$$\frac{1}{4} = 1.4$$

$$\frac{7}{3} = 2.1$$

Laura shared 2 chocolate bars between 3 people.
Each person received half a bar.

$$12 \div 5 = 2 \text{ remainder } 2 \text{ so:}$$

$$\frac{12}{5} = 2.2$$

I shared 3 pizzas between 5 people.
Each person got 3.5 pizzas.

Create a classic mistake problem of your own.
Come up with an explanation of the mistake using diagrams or manipulatives

Ordering

$\frac{2}{5}$ 2.5 $\frac{9}{4}$ 0.3 $\frac{9}{25}$ 0.86 $\frac{13}{5}$

0.361 $\frac{3}{8}$ 1.5 $\frac{13}{20}$ 2.2 $\frac{24}{20}$ 0.64

Put these fractions and decimals into ascending order.

How accurately can you place them on a number line?

Thursday, 04 June 2020

Lesson 10

Fractions, decimals and percentages

Key learning

Understand percentage as a fraction

Between fraction and percentage

Order fractions and percentage

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Do Now

Which of these numbers can you write as a fraction with a denominator of 100? Why?

$\frac{3}{10}$ $\frac{1}{8}$ 0.6 $\frac{67}{50}$

0.11

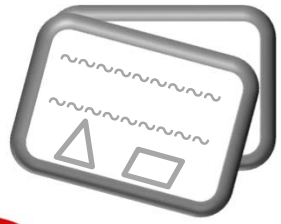
$\frac{13}{25}$ $\frac{17}{20}$ $\frac{3}{12}$ $\frac{3}{4}$ 0.851

$\frac{\quad}{100}$

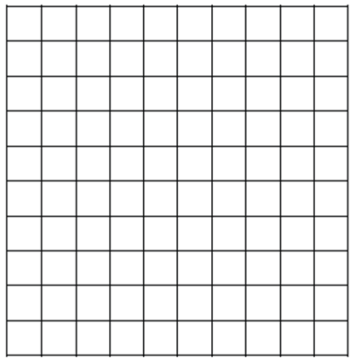
2.45 0.35 $\frac{6}{15}$ 1.3

My fraction has a denominator of 24. It can be written with a denominator of 100. What can you tell me about the possible numerators of my fraction?

What is percentage?



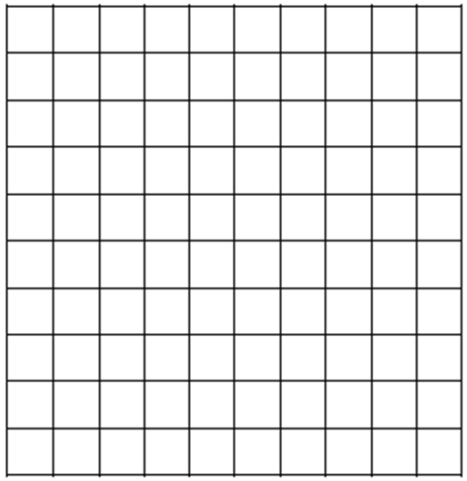
%



Percentages

50 %

What does this mean?
How would you represent it using a bead string or a hundred grid?



What does each bead or square represent as a fraction or decimal?

Percentages

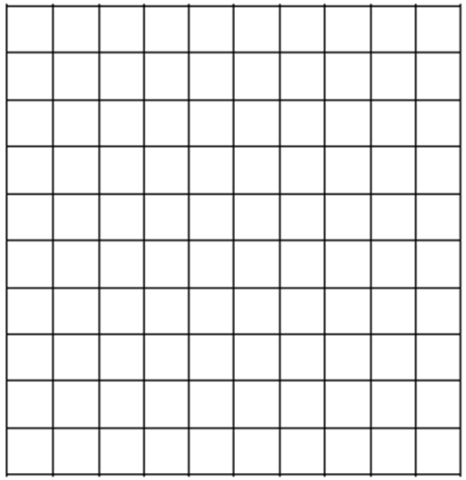
35 %

6 %

99 %

120 %

How could you show these percentages?



How many equivalent fractions or decimals can you write for each?

Percentages

0.6

$\frac{3}{10}$

$\frac{3}{4}$

$\frac{1}{8}$

0.851

$\frac{67}{50}$

$\frac{17}{20}$

$\frac{\quad}{100}$

2.45

How can you explain how to convert these numbers into percentages?

$$\frac{\square}{\square} = \frac{\square}{100} = \square\ \%$$

Star questions hint

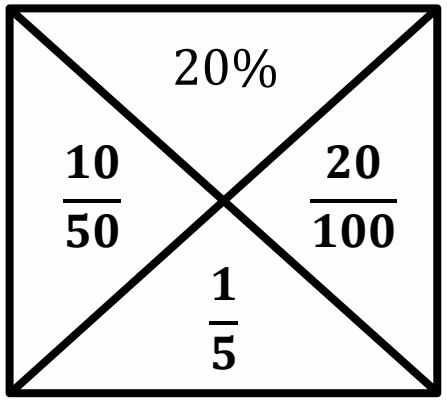
x

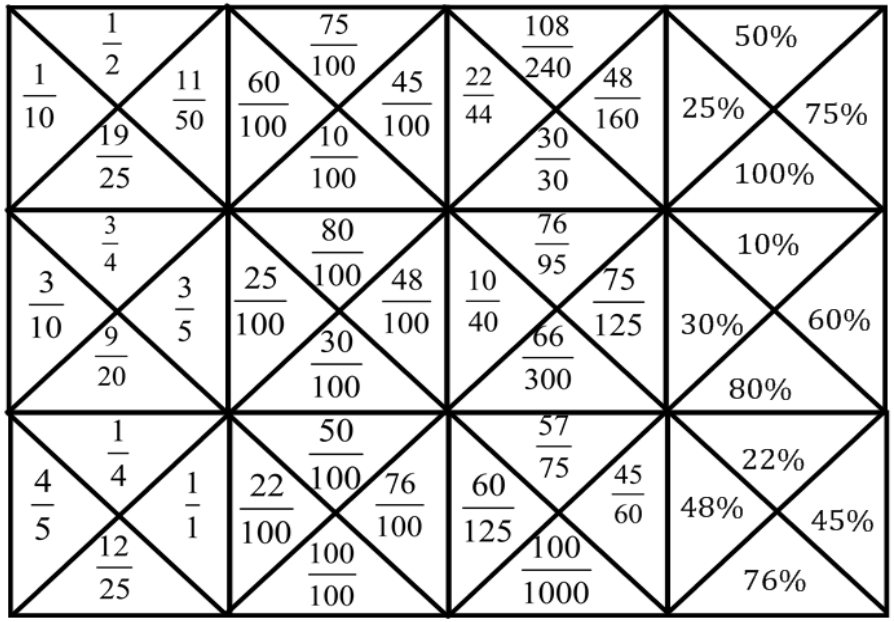
Match them up!

Cut out the triangles and match up into groups of four.

Each group should contain one percentage and three equivalent fractions.

For example:

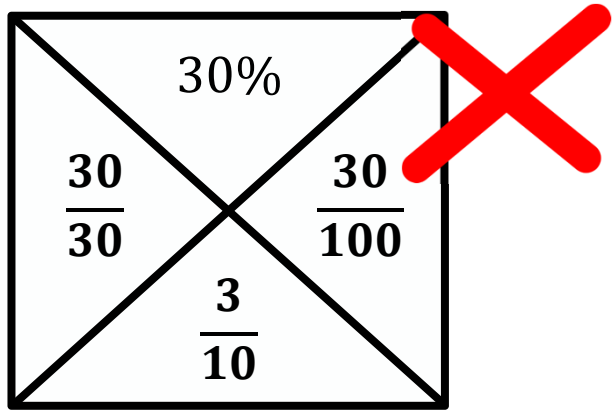




What would the following fractions be as percentages?

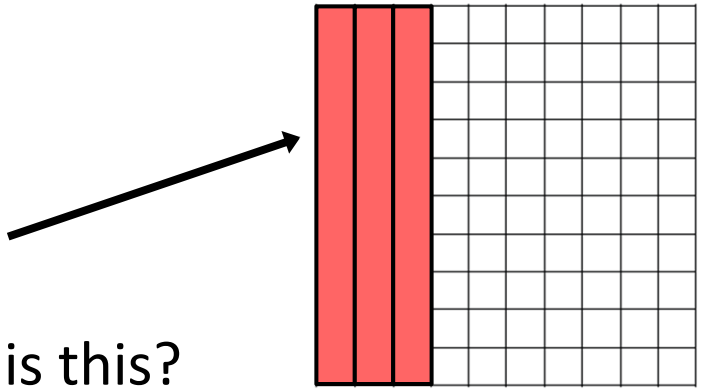
$\frac{6}{5}$ $\frac{3}{1}$ $\frac{1}{3}$ $\frac{1}{8}$

Percentage mistakes

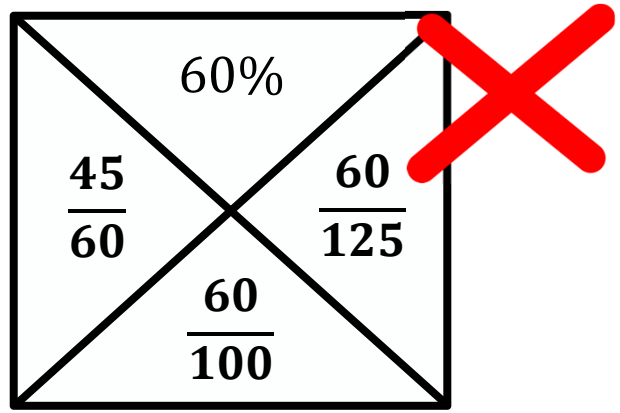


What mistake has this student made?
How do you know this?

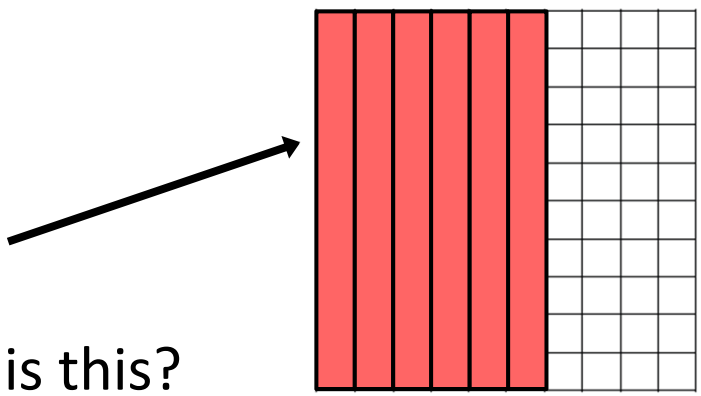
30 %
What fraction is this?



Percentage mistakes



What mistake has this student made?
How do you know this?



60 %
What fraction is this?

Classic mistakes

$\frac{1}{1}$ is equivalent to 1%

50% is equal to $\frac{1}{5}$

Can you explain what error these students have made?

True or false?

Paige scored 18 out of her 20 penalty shots.
That's over 90 %.

42% of students failed the maths test.
Over half the students passed the maths test.

There were 32 chocolates in the jar.
15 were dark, 13 were white and 2 were wrapped in foil.
Less than 38% were milk chocolate.

Saul ate 38% of the cake.
More than $\frac{16}{25}$ of the cake was still left.

Jair bought 3 bananas, Shea bought 9.
There were 15 left on the stall.
More than 60% of the bananas were left.

Shop A reduced shoes by 20% in the sale.
Shop B reduced them by $\frac{3}{20}$.

Shop B made the greater reduction.

65% is the answer. What is the question?

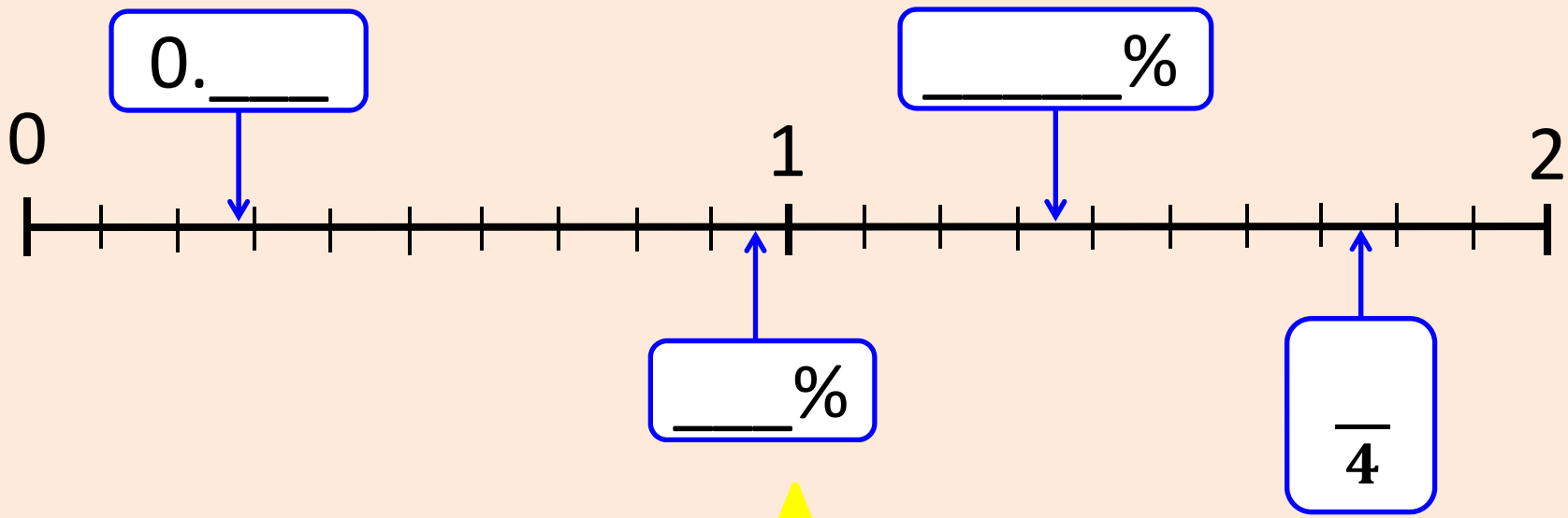
165% is part of the question. What is the answer?

Challenge Extra

Completing the number line

~~0~~ 1 2 3 ~~4~~ 5 6 7 8 9

Filling in gaps on a number line with only digits 1-9. Some of the digits have been entered for you.



Create a different set of numbers that fit on the number line using only the digits 0-9.

Additional slides

These slides can be adapted and used to provide:

- Depth
- Scaffolding
- Further practice

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