

Student Name

Mathematics Stage 4

FRACTIONS DECIMALS
PERCENTAGES

Book 1 Compare fractions using equivalence

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CONTENTS

Overview2

Highest Common Factor5

Lowest Common Multiple8

Relating HCF and LCM 11

Equivalent Fractions Using Diagrams 18

Equivalent Fractions using the Rule 23

Simplifying Fractions 29

Comparing Fractions: Same Numerator / Denominator 34

Comparing Fractions: Related Denominators 37

Comparing Fractions: Unrelated Denominators 41

Check Your Understanding 46

OVERVIEW

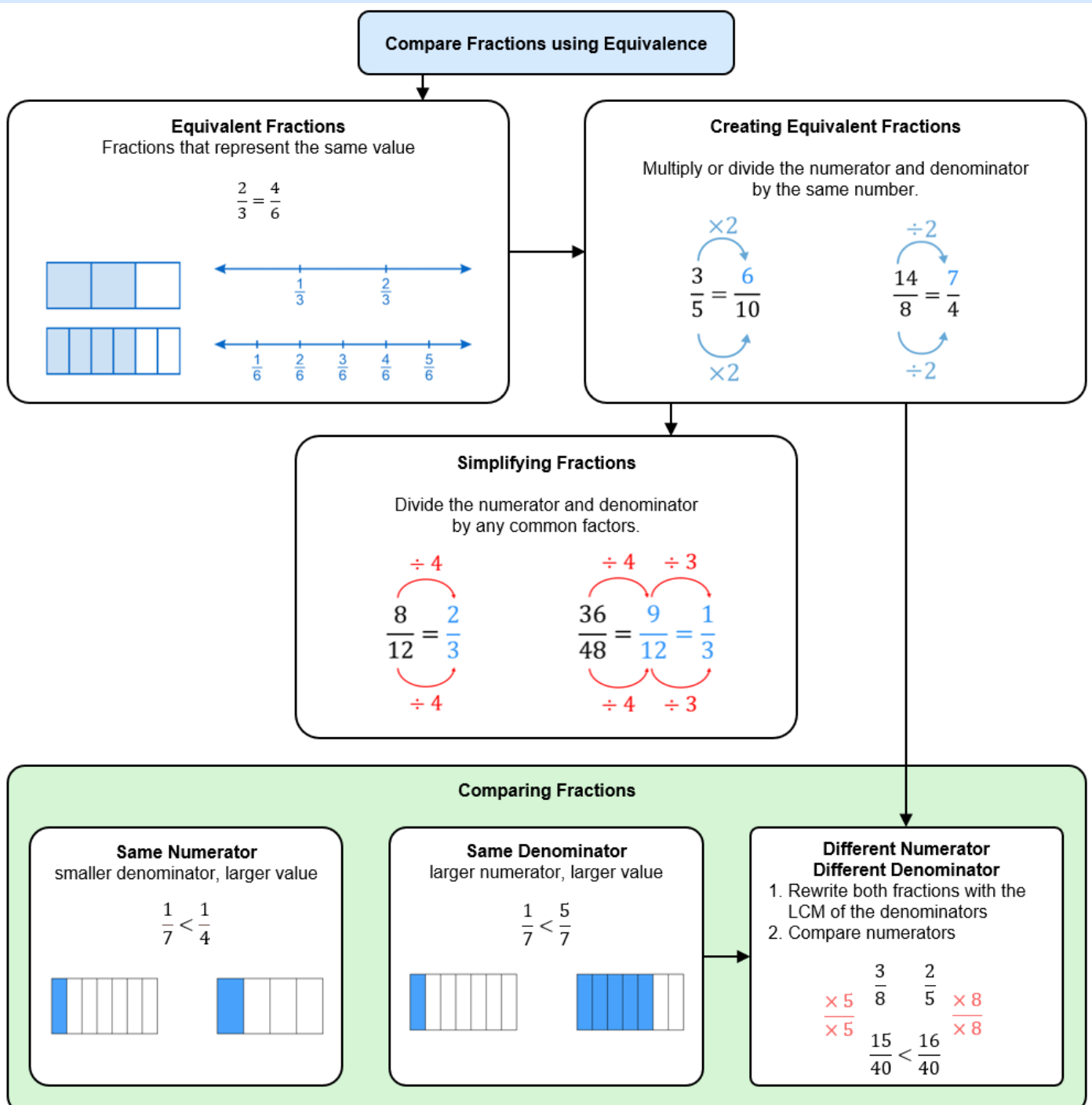
SYLLABUS CONTENT

MA4-FRC-C-01 represents and operates with fractions, decimals and percentages to solve problems

Compare fractions using equivalence

- Determine the highest common factor (HCF) of 2 whole numbers
- Examine methods of generating equivalent fractions
- Simplify fractions by using methods, including determining the HCF of the numerator and denominator or repeated simplification using common factors
- Create fractions with the same denominator to compare their sizes
- Compare and order fractions with different denominators

SUMMARY



REVIEW OF PRIOR KNOWLEDGE

1 Identify the factor pairs of 42:

1 and 42 2 and and 14 6 and

2 Identify the factor pairs of 30:

.....

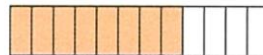
3 List the factors of each number:

a 27	b 16	c 18
d 28	e 49	f 19

4 List the first 5 multiples of each number:

a 7	b 10	c 12
d 15	e 40	f 14

5 Write the fractions shown by each diagram.



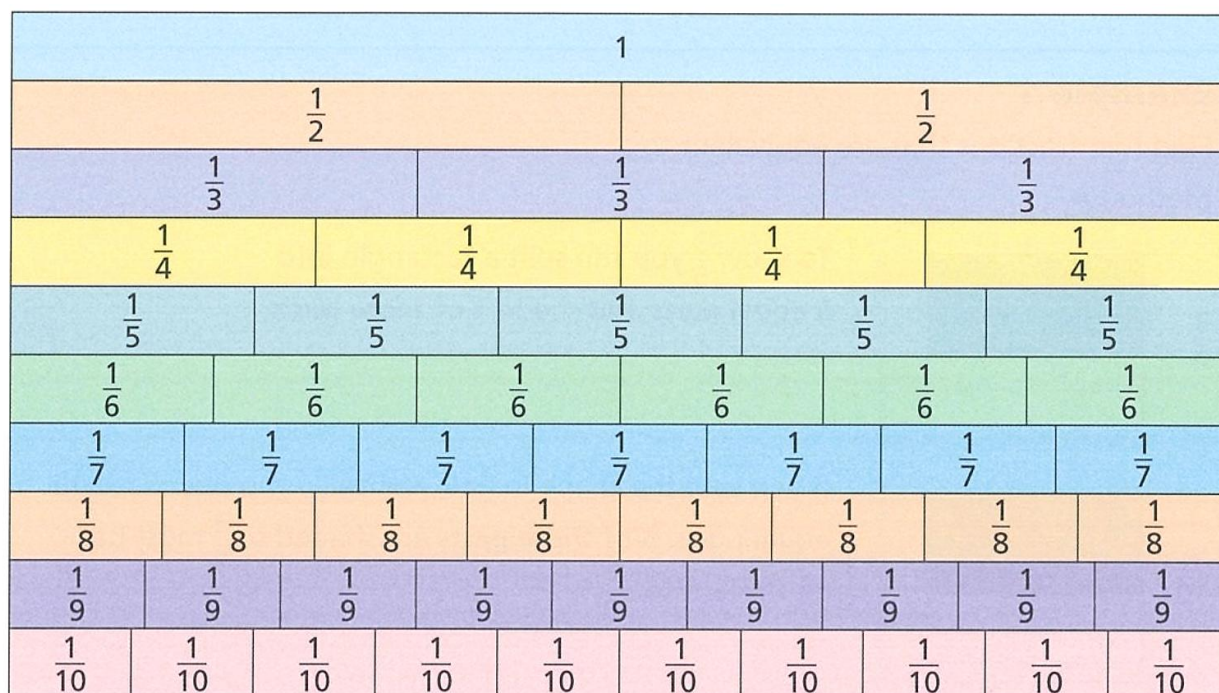
What do you notice about the lengths of the bars in parts **a** and **b**?

.....

6 Write some fractions that are equivalent to 1 whole.

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

- 7 Use the fraction wall to find fractions that have the same value.



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

b $\frac{2}{3} = \frac{\square}{6}$

c $\frac{1}{2} = \frac{5}{\square}$

d $\frac{6}{9} = \frac{\square}{3}$

e $\frac{6}{\square} = \frac{\square}{4}$

f $1 = \frac{\square}{7}$

HIGHEST COMMON FACTOR

🌟 Highest Common Factor: <https://www.geogebra.org/m/hjvhxr2p>

- The **highest common factor** (HCF) is the largest factor shared by two or more numbers.
 - List all factors of both numbers.
 - Identify the largest shared factor.

Example Determine the highest common factor.

Determine the HCF of 36 and 48 1. Factors of 36: 1, 2, 3, 4, 6, 9, 12, 18, 36 Factors of 48: 1, 2, 3, 4, 6, 8, 12, 16, 24, 48 2. The highest common factor is 12.	What does “common” mean? <i>In mathematics, “common” means something two or more quantities</i> How is your knowledge of division important for noticing the HCF? <i>The HCF is the largest number that you can two numbers by.</i>
--	---

Find the HCF of:

a 6 and 15 Factors of 6: 1, 2, 3, 6 Factors of 15: 1, 3, 5, 15 The HCF is	b 15 and 12 Factors of 15: Factors of 12: The HCF is
c 16 and 20	d 16 and 32

Key ideas

- A factor is a number that can be into another number with no
- The HCF is the largest that two numbers share.

1 Fill in the gaps to complete the set of factors for each of the following numbers.

a 18 1, 2, __, 6, 9, __

b 25 1, __, 25

c 72 __, 2, 3, __, __, 8, __, __, 18, __, 36, 72

d 120 1, 2, __, __, __, 6, __, 10, __, __, 20, __, 30, __, 60, __

2 List all the factors of these numbers.

a 10

b 15

c 12

d 20

e 40

f 24

3 Fill in the missing numbers to find the HCF of 18 and 30:

Factors of 18 are 1, __, 3, __, __ and 18.

Factors of 30 are 1, __, __, 5, __, 10, __ and 30.

Therefore, the HCF of 18 and 30 is ____.

4 Find the Highest Common Factor of the following pairs of numbers.

a 8 and 14

b 10 and 15

Factors of 8:

Factors of 10:

Factors of 14:

Factors of 15:

c 16 and 20

d 15 and 60

.....

.....

.....

.....

e 12 and 42

f 48 and 72

.....

.....

.....

.....

e 50 and 150

f 28 and 36

.....

.....

.....

.....

5

- a List the factors of 18
- b List the factors of 27
- c List the common factors of 18 and 27
- d What is the highest common factor of 18 and 27?

6

- a List the factors of 16
- b List the factors of 32
- c List the common factors of 16 and 32
- d What is the highest common factor of 16 and 32?
- e What do you notice? Why does this happen?

7

- a List the factors of 7
- b List the factors of 9
- c List the common factors of 7 and 9
- d What is the highest common factor of 7 and 9?
- e What do you notice? Why does this happen?

8 Find the Highest Common Factor of the following pairs of numbers.

a 12 and 1	i 12 and 9	q 12 and 17
b 12 and 2	j 12 and 10	r 12 and 18
c 12 and 3	k 12 and 11	s 12 and 19
d 12 and 4	l 12 and 12	t 12 and 20
e 12 and 5	m 12 and 13	u 12 and 30
f 12 and 6	n 12 and 14	v 12 and 40
g 12 and 7	o 12 and 15	w 12 and 50
h 12 and 8	p 12 and 16	x 12 and 60

LOWEST COMMON MULTIPLE

- The **lowest common multiple** (LCM) is the smallest shared multiple of two or more numbers.
 - List some multiples of both numbers.
 - Find the smallest shared multiple.

Example Determine the lowest common multiple.

Determine the LCM of 6 and 8 1. Multiples of 6: 6, 12, 18, 24, 30, ... Multiples of 8: 8, 16, 24, 32, 40, ... 2. The lowest common multiple is 24	Why did we only write a few multiples of each number? <i>There are an number of multiples. We only need to write a few to find the LCM.</i>
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a Determine the LCM of 6 and 9.



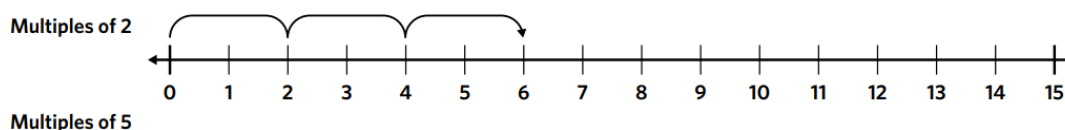
Multiples of 6: 6, 12, 18

Multiples of 9: 9, 18

The LCM is

18

b Determine the LCM of 2 and 5.



Multiples of 2:

Multiples of 5: The LCM is

10

c Determine the LCM of 8 and 12.

Multiples of 8:

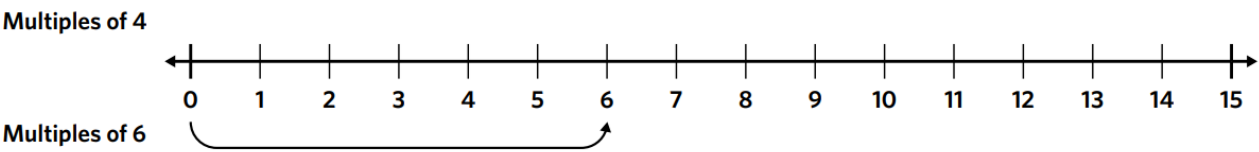
Multiples of 12: The LCM is

24

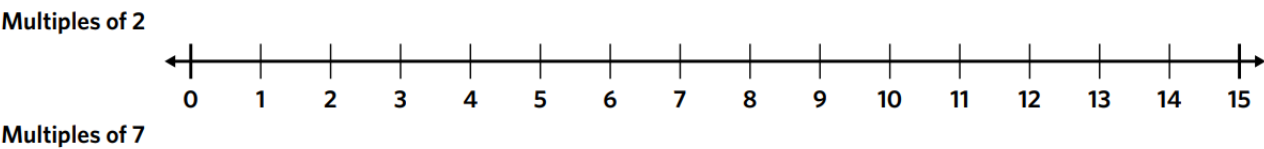
Key ideas

- A multiple is the of a number and another whole number.
- The is the smallest that two numbers share.

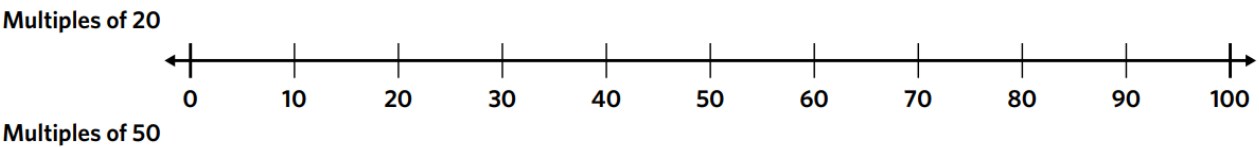
- 1 Use the number lines to find the
- a LCM of 4 and 6



- b LCM of 2 and 7



- c LCM of 20 and 50



- 2 Fill in the missing numbers to find the LCM of 9 and 15:

Multiples of 9 are _____, _____, _____, _____, _____,

Multiples of 15 are _____, _____, _____,

Therefore, the LCM of 9 and 15 is _____.

- 3 Find the Lowest Common Multiple of these pairs of numbers:

- | | |
|-----------------------|-----------------------|
| a 4 and 9 | b 3 and 7 |
| Multiples of 4: | Multiples of 3: |
| Multiples of 9: | Multiples of 7: |
| c 12 and 5 | d 10 and 11 |
| | |
| | |
| e 4 and 9 | f 5 and 10 |
| | |
| | |
| e 15 and 20 | f 9 and 16 |
| | |
| | |

4

- a List the first ten multiples of 8
- b List the first ten multiples of 10
- c Identify the common multiples of 8 and 10 from your lists.
- d What is the lowest common multiple of 8 and 10?

5

- a List the first ten multiples of 12
- b List the first ten multiples of 6
- c Identify the common multiples of 12 and 6 from your lists.
- d What is the lowest common multiple of 12 and 6?
- e What do you notice? Why does this happen?

6

- a List the first ten multiples of 7
- b List the first ten multiples of 9
- c Identify the common multiples of 7 and 9 from your lists.
- d What is the lowest common multiple of 7 and 9?
- e What do you notice? Why does this happen?

7 Find the Lowest Common Multiple of the following pairs of numbers.

a 12 and 1	i 12 and 9	q 12 and 17
b 12 and 2	j 12 and 10	r 12 and 18
c 12 and 3	k 12 and 11	s 12 and 19
d 12 and 4	l 12 and 12	t 12 and 20
e 12 and 5	m 12 and 13	u 12 and 30
f 12 and 6	n 12 and 14	v 12 and 40
g 12 and 7	o 12 and 15	w 12 and 50
h 12 and 8	p 12 and 16	x 12 and 60

1 Given $7 \times 8 = 56$

Which of these statements are true? Circle 2 answers.

a 7 is a multiple of 56

b 8 is a factor of 56

c 7 is a factor of 56

2 Given $5 \times 4 = 20$

Which of these statements are true? Circle 2 answers.

a 20 is a multiple of 4

b 5 is a multiple of 20

c 5 is a factor of 20

3 Given $6 \times 7 = 42$

Which of these statements are true? Circle 2 answers.

a 42 is a multiple of 7

b 6 is a factor of 42

c 42 is a factor of 7

4 Given $9 \times 2 = 18$

Which of these statements are true? Circle 2 answers.

a 9 is a factor of 18

b 18 is a multiple of 2

c 18 is a factor of 9

5 Given $8 \times 5 = 40$

Which of these statements are true? Circle 2 answers.

a 8 is a factor of 40

b 5 is a factor of 40

c 5 is a multiple of 8

6 For each of the following numbers, circle whether they are factors (F), multiples (M) or neither (N) of the number 60.

a 120 F M N

b 14 F M N

c 15 F M N

d 40 F M N

e 6 F M N

f 5 F M N

g 240 F M N

h 2 F M N

i 22 F M N

j 600 F M N

k 70 F M N

l 1 F M N

7 Determine the lowest common multiple of each set of numbers.

a 5 and 8	b 6 and 7	c 4 and 3
d 2 and 11	e 13 and 4	f 9 and 14

What do you notice about your answers? Why does this happen?

.....

.....

8 Work out the lowest common multiple for each set of numbers.

a 6 and 12	b 27 and 3	c 15 and 5
d 10 and 30	e 24 and 8	f 51 and 17

What do you notice about your answers? Why does this happen?

.....

.....

9 Identify the highest common factor of each pair of numbers.

a 15 and 18	b 15 and 25	c 15 and 29	d 15 and 45
e 15 and 12	f 18 and 25	g 18 and 29	h 18 and 45
i 18 and 12	j 25 and 29	k 25 and 45	l 25 and 12
m 29 and 45	n 29 and 12	o 45 and 12	

- 10** A shortcut for finding the LCM is to find the product of the two numbers, then divide the product by the HCF.

Example: Find the lowest common multiple of 6 and 10:

Find product: $6 \times 10 = 60$

Find HCF: HCF of 6 and 10 is 2.

Divide by HCF: $60 \div 2 = 30$

Therefore, the LCM of 6 and 10 is 30.

Find the HCF of each of these numbers, then use it to calculate the LCM.

a 14 and 8

b 12 and 9

c 15 and 20

d 14 and 21

e 25 and 15

f 18 and 24

g 24 and 36

h 30 and 45

i 42 and 56

j 48 and 64

k 36 and 120

l 45 and 75

11 Identify the highest common factor of each pair of numbers.

a 3 and 6	b 3 and 8	c 3 and 12	d 3 and 15
e 3 and 7	f 6 and 8	g 6 and 12	h 6 and 15
i 6 and 7	j 8 and 12	k 8 and 15	l 8 and 7
m 12 and 15	n 12 and 7	o 15 and 7	

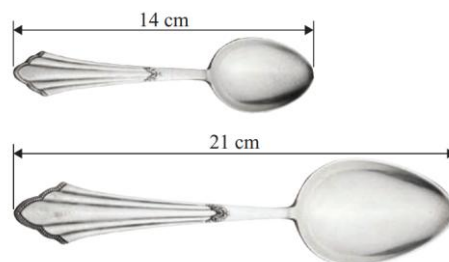
12 Find the HCF and LCM of these pairs of numbers.

a 5 and 10	HCF:	LCM:
b 10 and 5	HCF:	LCM:
c 20 and 5	HCF:	LCM:
d 20 and 10	HCF:	LCM:
e 20 and 30	HCF:	LCM:
f 10 and 30	HCF:	LCM:
g 5 and 30	HCF:	LCM:
h 6 and 30	HCF:	LCM:
i 4 and 30	HCF:	LCM:
j 3 and 30	HCF:	LCM:
k 7 and 30	HCF:	LCM:
l 12 and 15	HCF:	LCM:
m 20 and 25	HCF:	LCM:
n 18 and 24	HCF:	LCM:
o 11 and 21	HCF:	LCM:
p 8 and 40	HCF:	LCM:
q 36 and 48	HCF:	LCM:

- 13** Two numbers are even. What must be one of their common factors?

.....

- 14** A line of spoons is next to a line of teaspoons.



- a** What is the smallest number of each spoon that would make the lines equal in length?

.....

- b** How long would that line be?

.....

The answer to part **b** is called the of 14 and 21

- 15** Wendy is a florist who is making up small bunches of roses for sale.

She has 36 red roses, 42 pink roses and 30 cream roses.

Each bunch contains only one colour.

Each bunch must contain the same number of roses. Wendy wants to use all the roses.

- a** What is the largest number of roses Wendy can put in each bunch?

.....

- b** The answer to part **a** is called the of 36, 42 and 30.

- c** How many bunches of each colour can she make?

.....

- 16** The highest common factor of two numbers is 5. The lowest common multiple is 150.

What could the two numbers be? Is there more than one answer?

.....

In each of the following questions, determine whether to use the HCF or LCM to solve the question.

- 17** Trains leave Central to Parramatta every 15 minutes and to Chatswood every 21 minutes.
A train to Parramatta and a train to Chatswood both leave Central at 11 am.
What is the next time a train to Parramatta and a train to Chatswood will leave at the same time?

.....

.....
- 18** A dentist advises a patient to have a scale every 4 months and a polish every 6 months.
If they have a scale and polish today, how long will they wait before they can have both during the same appointment?

.....

.....
- 19** Sophie checks her bike for repairs every 9 days and Susan check hers every 12 days.
If they both check their bikes today, after how many days do they next both check their bike again?

.....

.....
- 20** A carpenter got given some free wooden planks. Some are 12m long and some are 18m long.
She wants to cut them up so that she has equal size planks to make using them easier.
What size planks should she cut them into to avoid wasting any wood?

.....

.....
- 21** A bus company has 21-seater and 35-seater buses.
What is the smallest group which will fit exactly onto a whole number of buses of either type?

.....

.....
- 22** Year 7 has 48 students. Year 8 has 90 students.
Each year group must be separately divided into football teams so that all teams are the same size, and there are no people left over. What's the largest team size?

.....

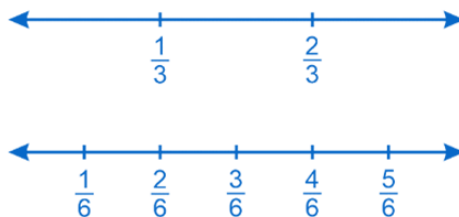
.....

- 23** Tom and Claire both like to do short exercise that involve small breaks.
Tom does a short burst of exercise every 2 minutes, and Claire does hers every 3 minutes.
If they start doing their exercise at 9:00am, when do they both do their exercises again?
.....
.....
- 24** The 90A bus and the 95B bus both stop at the bus station at 12:00.
90A stops there every 20 minutes and 95B stops there every 8 minutes.
When do they both stop there again?
.....
.....
- 25** Train A and Train B stop at Swindon at 10:30.
Train A stops every 12 minutes and Train B stops every 14 minutes.
When do they both stop at Swindon again?
.....
.....
- 26** There are two loaf cakes. One is 35cm long and one is 27cm long.
They want to cut the cake up and sell the slices, but all the slices must be equal.
What is the largest slices that they can cut them into?
.....
.....
- 27** Umar and Aiden are both keen runners.
Umar takes 5 minutes to jog around a running track and Aiden takes 4 minutes.
They start at the same time and run until they both cross the finish line at the same time.
- a** How long do they run for?
- b** How many laps did Aiden run?
- c** How many laps did Umar run?
- 28** James and Harry had the same amount of money.
James spent all his money on books that cost \$6 and Harry spent all his on books costing \$8.
If they both had more than \$50 but less than \$90, how many books did they each buy?
.....
.....
.....

EQUIVALENT FRACTIONS USING DIAGRAMS

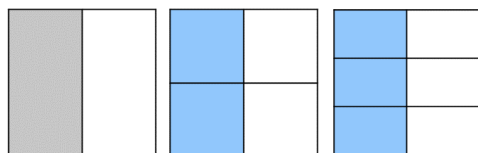
- **Equivalent fractions** represent the same value.
- In area models, they represent the same shaded amount.
- On number lines, they mark the same distance from zero.

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



Example Produce equivalent fractions.

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

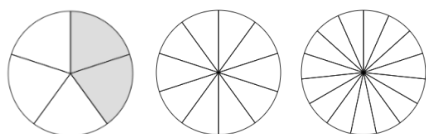


How do we produce equivalent fractions using an area model?

We create equivalent fractions by an area into more

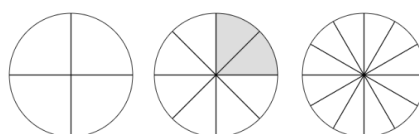
Produce equivalent fractions using the models.

a $\frac{2}{5} = \frac{\quad}{10} = \frac{\quad}{15}$



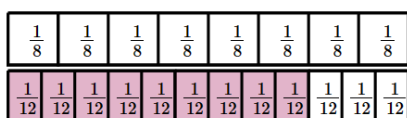
$$\frac{4}{10}, \frac{6}{15}$$

b $\frac{\quad}{\quad} = \frac{2}{8} = \frac{\quad}{\quad}$



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

c $\frac{\quad}{8} = \frac{9}{12}$



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

d $\frac{1}{4} = \frac{\quad}{\quad}$



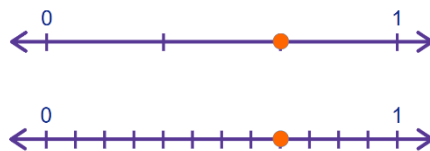
$$\frac{2}{8}$$

e $\frac{2}{5} = \frac{\quad}{\quad}$



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

f $\frac{2}{3} = \frac{\quad}{\quad}$

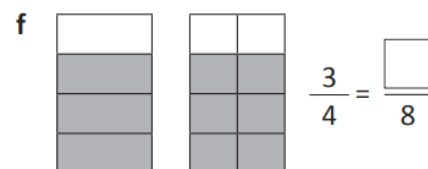
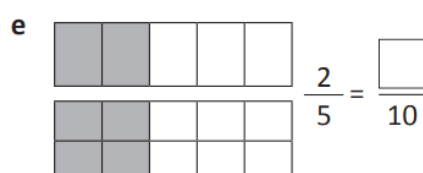
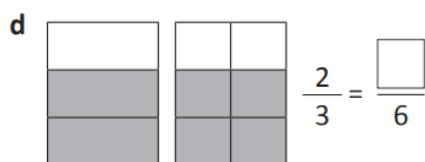
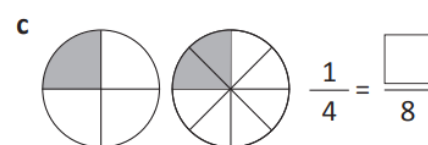
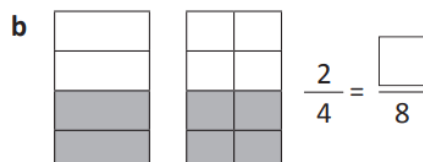
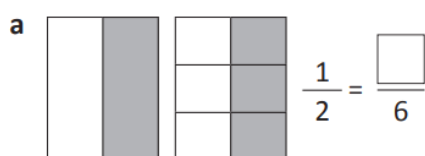


$$\frac{8}{12}$$

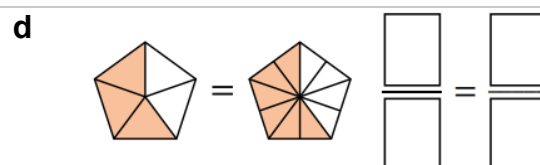
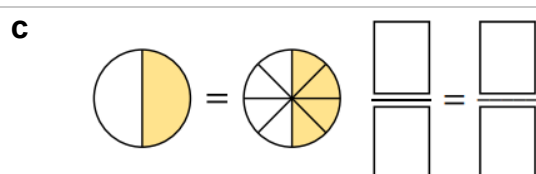
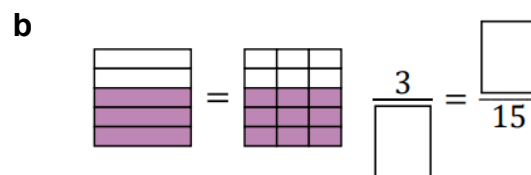
Key ideas

1. Equivalent fractions have the same
2. Equivalent fractions are made when we split the whole into more parts.

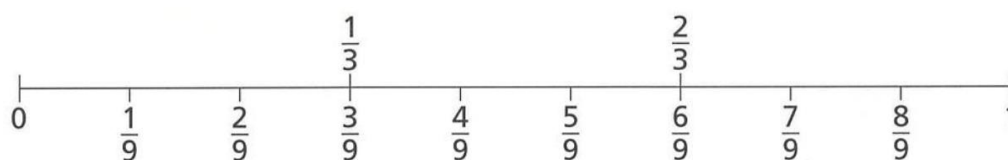
1 Fill in the missing numbers.



2 Fill in the missing numbers.



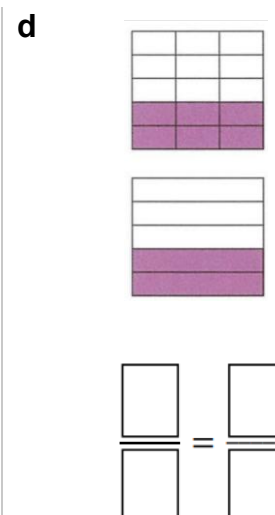
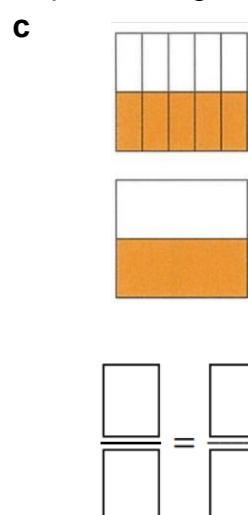
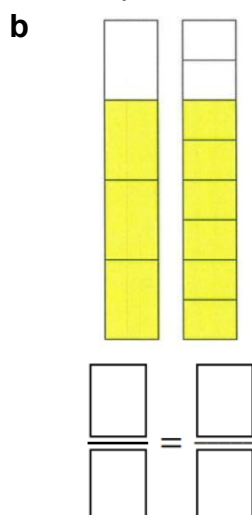
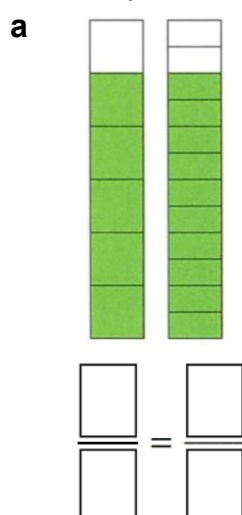
3 What equivalent fractions can be seen on the number line?



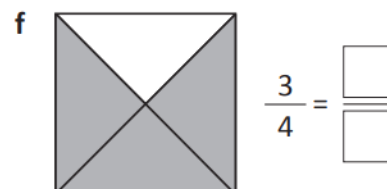
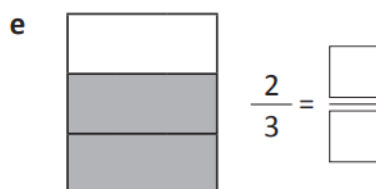
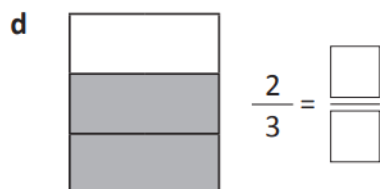
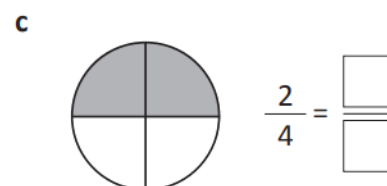
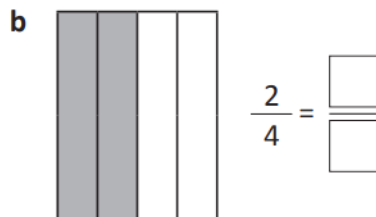
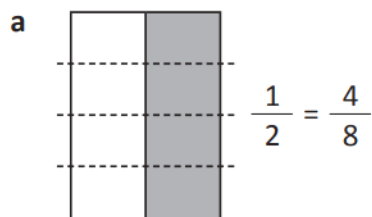
$$\frac{\boxed{}}{\boxed{}} = \frac{\boxed{}}{\boxed{}}$$

$$\frac{\boxed{}}{\boxed{}} = \frac{\boxed{}}{\boxed{}}$$

4 What equivalent fractions are represented by each pair of diagrams?



5 Create equivalent fractions by splitting the shape up into more equal parts.



6 Read the examples carefully and answer the questions.

Name: Mark

Partition the model to prove that the following number sentence is true.

$$\frac{2}{5} = \frac{4}{10}$$

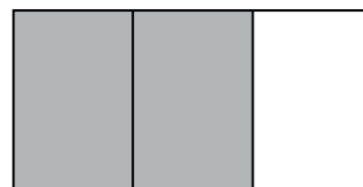
After Mark partitioned the model, what happened to the size of each part?

What happened to the number of parts?

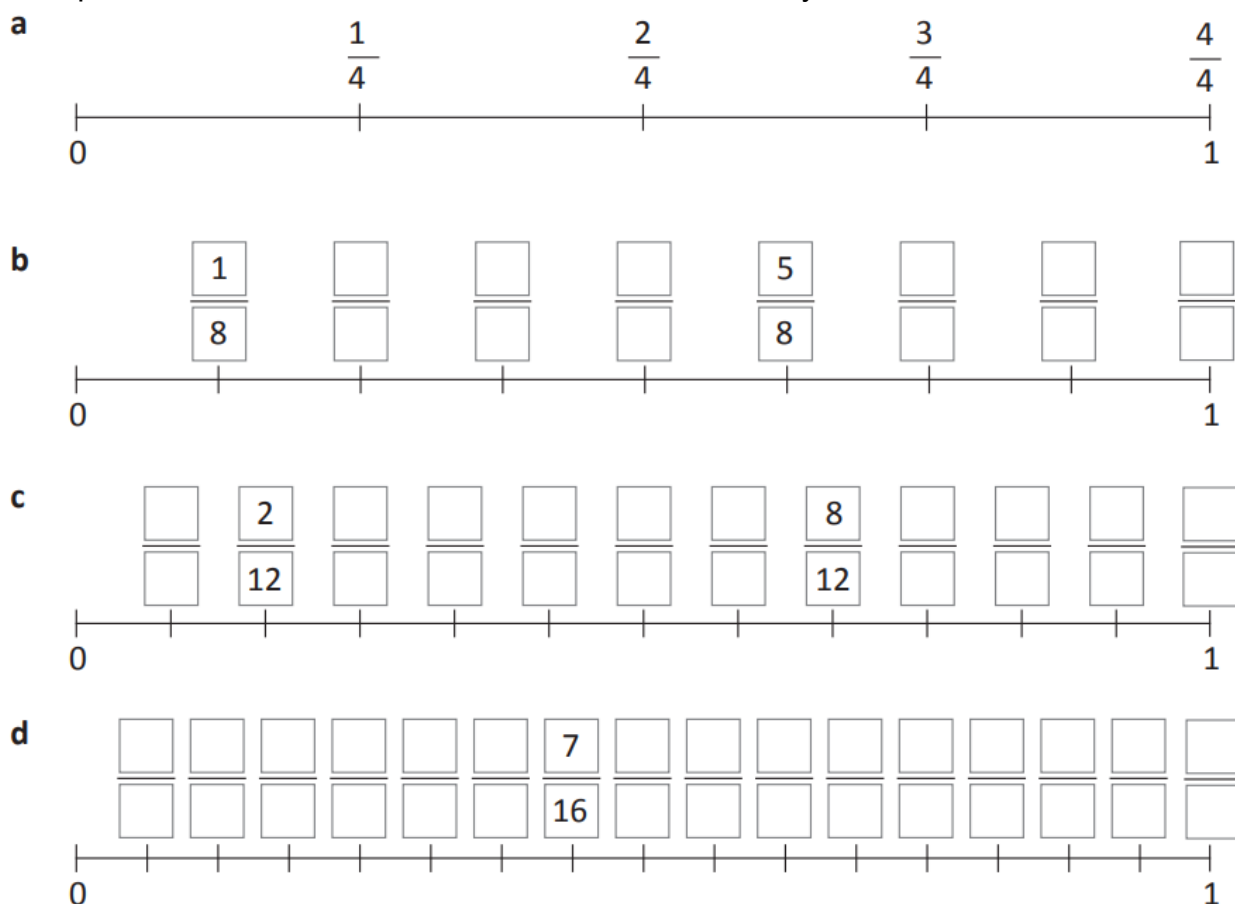
Even though the size and number of parts changed, why is $\frac{2}{5}$ equal to $\frac{4}{10}$?

Partition the model to prove that the following number sentence is true.

$$\frac{2}{3} = \frac{6}{9}$$



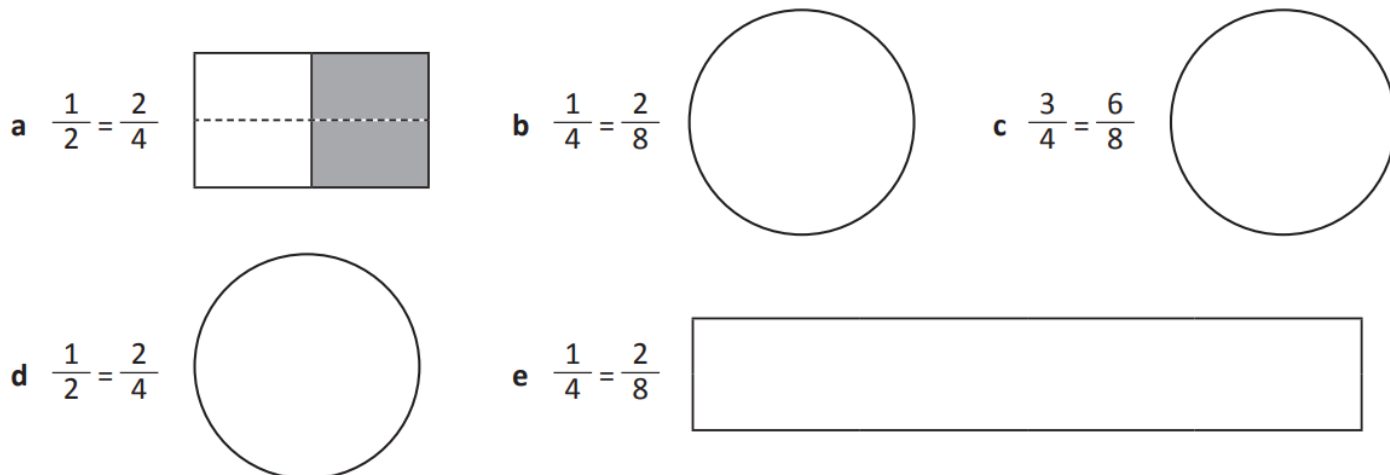
7 Complete the number lines. The first has been done for you.



Complete the following using the number lines above.

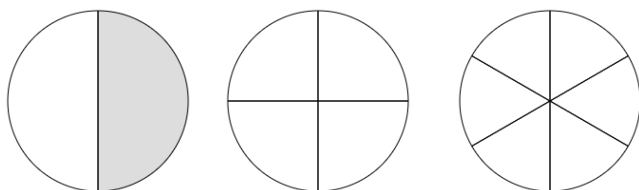
a	$\frac{1}{4} = \frac{\square}{\square} = \frac{\square}{\square} = \frac{\square}{\square}$	b	$\frac{\square}{\square} = \frac{4}{8} = \frac{\square}{\square} = \frac{\square}{\square}$	c	$\frac{\square}{\square} = \frac{\square}{\square} = \frac{3}{12} = \frac{\square}{\square}$
d	$\frac{5}{8} = \frac{\square}{\square}$	e	$\frac{\square}{\square} = \frac{\square}{\square} = \frac{\square}{\square} = \frac{16}{16}$	f	$\frac{\square}{\square} = \frac{14}{16}$

8 Divide and shade the shapes to show equivalent fractions.

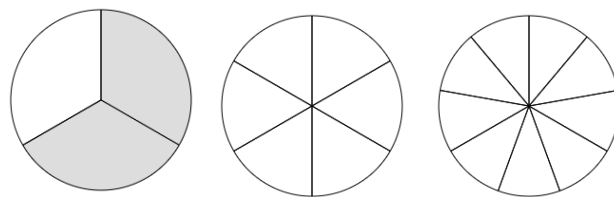


- 9 Produce equivalent fractions by shading these circles.

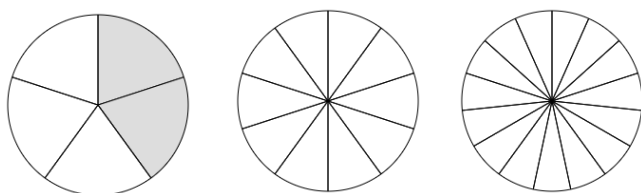
$$\frac{1}{2} = \frac{\quad}{4} = \frac{\quad}{6}$$



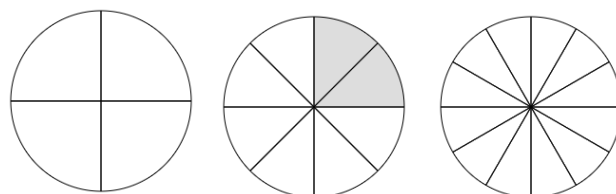
$$\frac{2}{3} = \frac{\quad}{6} = \frac{\quad}{9}$$



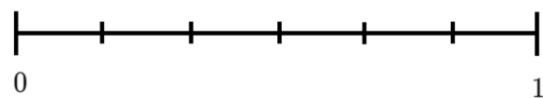
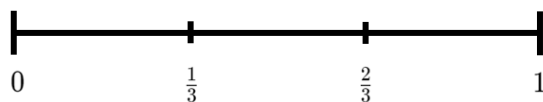
$$\frac{2}{5} = \frac{\quad}{10} = \frac{\quad}{15}$$



$$\frac{1}{4} = \frac{2}{8} = \frac{\quad}{12}$$



- 10 Using the shapes and the number lines, show that $\frac{2}{3} = \frac{4}{6}$



- 11 Samira has drawn two bar models.



She says that $\frac{5}{7} = \frac{3}{9}$

Explain why she is incorrect.

.....

.....

EQUIVALENT FRACTIONS USING THE RULE

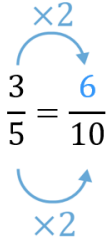
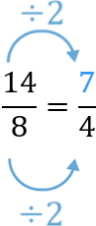
🌟 Equivalent Fractions: <https://www.geogebra.org/m/b58khnqu>

- To create equivalent fractions:
- Multiply or divide **both** the **numerator** and **denominator** by the same number.
- This is the same as multiplying or dividing by 1.

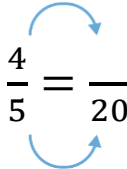
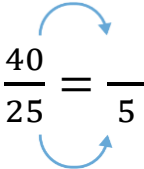
$$\frac{1}{2} \times 1 = \frac{1}{2}$$

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

Example Produce equivalent fractions.

$\frac{3}{5} = \frac{\square}{10}$ 	Why does multiplying the numerator and denominator by the same number produce an equivalent fraction? <i>This is the same as multiplying by, which keeps the value the same.</i>
$\frac{14}{8} = \frac{\square}{4}$ 	Why does dividing the numerator and denominator by the same number produce an equivalent fraction? <i>This is the same as dividing by, which keeps the value the same.</i>

Determine the equivalent fraction:

a $\frac{4}{5} = \frac{\square}{20}$ 	b $\frac{40}{25} = \frac{\square}{5}$ 
c $\frac{2}{3} = \frac{\square}{12}$	d $\frac{10}{20} = \frac{\square}{2}$
e $\frac{12}{15} = \frac{\square}{5}$	f $\frac{6}{8} = \frac{\square}{24}$

Key ideas

1. Equivalent fractions are fractions that have the same
2. When multiplying or dividing any number by, its value stays the same.
3. To produce equivalent fractions, multiply or divide the and by the same number.

1 Fill in the missing number to produce equivalent fractions.

a $\frac{3}{4} = \frac{\square}{8}$ 6	b $\frac{3}{4} = \frac{\square}{\square}$ $\frac{9}{12}$	c $\frac{3}{4} = \frac{\square}{\square}$ $\frac{15}{20}$	d $\frac{3}{4} = \frac{30}{40}$ $\times 10$	e $\frac{2}{5} = \frac{14}{35}$ $\times 7$	f $\frac{4}{7} = \frac{12}{21}$ $\times 3$
--	---	--	--	---	---

2 Fill in the missing number to produce equivalent fractions.

a $\frac{4}{9} = \frac{20}{45}$ $\times 5$	b $\frac{16}{24} = \frac{2}{3}$ $\div 8$	c $\frac{7}{11} = \frac{\square}{77}$ $\times 7$	d $\frac{5}{15} = \frac{1}{\square}$ $\div 5$
---	---	---	--

3 Write four equivalent fractions for these fractions.

a $\frac{2}{3} = _ = _ = _ = _$ $\frac{2}{3} = \frac{6}{9} = \frac{8}{12} = \frac{10}{15}$	b $\frac{3}{5} = _ = _ = _ = _$ Many answers possible
---	--

4 Write these equivalent fractions.

a $\frac{1}{3} = \frac{\square}{12}$ 4	b $\frac{1}{2} = \frac{3}{\square}$ 6	c $\frac{2}{3} = \frac{\square}{9}$ 6	d $\frac{3}{8} = \frac{\square}{40}$ 15
e $\frac{1}{3} = \frac{\square}{9}$ 3	f $\frac{1}{4} = \frac{\square}{8}$ 2	g $\frac{3}{4} = \frac{15}{\square}$ 20	h $\frac{2}{4} = \frac{\square}{2}$ 1

5 Find the unknown value to make the equation true.

a $\frac{1}{3} = \frac{\square}{24}$ 8	b $\frac{2}{8} = \frac{\square}{24}$ 6	c $\frac{1}{2} = \frac{\square}{24}$ 12	d $\frac{5}{12} = \frac{\square}{24}$ 10
e $\frac{5}{6} = \frac{\square}{24}$ 20	f $\frac{5}{1} = \frac{\square}{24}$ 120	g $\frac{3}{4} = \frac{\square}{24}$ 18	h $\frac{7}{8} = \frac{\square}{24}$ 21

6 Find the unknown value to make the equation true.

a $\frac{1}{5} = \frac{\square}{30}$ 6	b $\frac{2}{6} = \frac{\square}{30}$ 10	c $\frac{5}{10} = \frac{\square}{30}$ 15	d $\frac{3}{1} = \frac{\square}{30}$ 90
e $\frac{2}{3} = \frac{\square}{30}$ 20	f $\frac{22}{60} = \frac{\square}{30}$ 11	g $\frac{5}{2} = \frac{\square}{30}$ 75	h $\frac{150}{300} = \frac{\square}{30}$ 15

7 Find the unknown value to make the equation true.

a $\frac{2}{5} = \frac{\square}{15}$ 6	b $\frac{2}{3} = \frac{\square}{12}$ 8	c $\frac{1}{4} = \frac{\square}{16}$ 4	d $\frac{3}{7} = \frac{\square}{14}$ 6
e $\frac{3}{8} = \frac{\square}{40}$ 15	f $\frac{5}{6} = \frac{\square}{18}$ 15	g $\frac{21}{50} = \frac{\square}{100}$ 42	h $\frac{3}{20} = \frac{\square}{100}$ 15

8 Find the unknown value to make the equation true.

a $\frac{1}{5} = \frac{\square}{10}$ 2	b $\frac{1}{5} = \frac{\square}{100}$ 20	c $\frac{2}{5} = \frac{4}{\square}$ 10	d $\frac{3}{4} = \frac{\square}{40}$ 30
e $\frac{2}{3} = \frac{12}{\square}$ 18	f $\frac{3}{2} = \frac{6}{\square}$ 4	g $\frac{15}{10} = \frac{\square}{2}$ 3	h $\frac{90}{100} = \frac{\square}{10}$ 9
i $\frac{2}{5} = \frac{\square}{15}$ 6	j $\frac{7}{9} = \frac{14}{\square}$ 18	k $\frac{7}{14} = \frac{1}{\square}$ 2	l $\frac{21}{30} = \frac{\square}{10}$ 7
m $\frac{4}{3} = \frac{\square}{21}$ 28	n $\frac{8}{5} = \frac{80}{\square}$ 50	o $\frac{3}{12} = \frac{\square}{60}$ 15	p $\frac{7}{11} = \frac{28}{\square}$ 44

9 Complete these equivalent fractions (hint: whole numbers have denominator of 1).

a $2 = \frac{\square}{3}$ 6	b $7 = \frac{\square}{5}$ 35	c $11 = \frac{\square}{2}$ 22	d $3 = \frac{12}{\square}$ 4
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10 Read the example carefully and answer the questions.

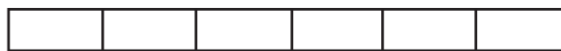
Name: Ellie

Fill in the box to make the fractions equivalent.

$$\frac{1}{6} = \frac{\boxed{7}}{12}$$

Shade the two diagrams below to show that $\frac{1}{6}$ is not equivalent to $\frac{7}{12}$

Shade $\frac{1}{6}$.



Shade $\frac{7}{12}$.



Ellie added instead of multiplying. Complete the number sentence to show what number Ellie should have multiplied by

$$\frac{1}{6} = \frac{1 \times \boxed{}}{6 \times \boxed{}} = \frac{2}{12}$$

× 2

11 Fill in the missing numbers to complete these equivalent fractions.

a $\frac{1}{3} = \frac{\boxed{}}{6} = \frac{4}{\boxed{}} = \frac{\boxed{}}{30} = \frac{\boxed{}}{60} = \frac{100}{\boxed{}}$

2, 12, 10, 20, 300

b $\frac{2}{8} = \frac{\boxed{}}{4} = \frac{\boxed{}}{12} = \frac{6}{\boxed{}} = \frac{\boxed{}}{80} = \frac{10}{\boxed{}}$

1, 3, 24, 20, 40

12 Fill in the blanks to make these fractions equivalent.

a $\frac{2}{3} = \frac{\boxed{}}{9}$

6

b $\frac{2}{3} = \frac{\boxed{}}{12}$

8

c $\frac{2}{3} = \frac{\boxed{}}{21}$

14

d $\frac{2}{3} = \frac{\boxed{}}{6}$

4

e $\frac{2}{3} = \frac{22}{\boxed{}}$

33

f $\frac{2}{3} = \frac{20}{\boxed{}}$

30

g $\frac{2}{5} = \frac{20}{\boxed{}}$

50

h $\frac{2}{5} = \frac{\boxed{}}{30}$

12

13 Find the numerator of the fraction equivalent to two-thirds with a denominator of 15.

$$\frac{2}{3} = \frac{10}{15}$$

14 Circle the numbers that could be the denominator of a fraction that is equivalent to one-quarter.

8, 12, 15, 19, 22, 24, 30, 32, 35, 40

Explain your reasoning.

8, 12, 24, 40. These are multiples of 4.

15 Complete the following.

a $\frac{\boxed{}}{6} = \frac{15}{18} = \frac{25}{\boxed{}}$

5, 30

b $\frac{\boxed{}}{15} = \frac{36}{45} = \frac{16}{\boxed{}}$

12, 20

c $\frac{\boxed{}}{12} = \frac{12}{18} = \frac{18}{\boxed{}}$

8, 27

d $\frac{\boxed{}}{8} = \frac{15}{12} = \frac{25}{\boxed{}}$

10, 20

e $\frac{\boxed{}}{15} = \frac{24}{18} = \frac{16}{\boxed{}}$

20, 12

f $\frac{\boxed{}}{10} = \frac{9}{15} = \frac{15}{\boxed{}}$

6, 25

g $\frac{\boxed{}}{28} = \frac{36}{84} = \frac{15}{\boxed{}}$

12, 35

h $\frac{\boxed{}}{16} = \frac{15}{24} = \frac{25}{\boxed{}}$

10, 40

i $\frac{\boxed{}}{21} = \frac{10}{14} = \frac{35}{\boxed{}}$

15, 49

16 Complete the following.

a $\frac{3}{4} = \frac{\boxed{}}{8} = \frac{\boxed{}}{12} = \frac{\boxed{}}{16} = \frac{\boxed{}}{28} = \frac{\boxed{}}{320}$

6, 8, 12, 21, 240

b $\frac{\boxed{}}{5} = \frac{\boxed{}}{10} = \frac{\boxed{}}{15} = \frac{\boxed{}}{30} = \frac{\boxed{}}{60} = \frac{480}{600}$

4, 8, 12, 24, 48

c $\frac{\boxed{}}{3} = \frac{\boxed{}}{9} = \frac{8}{12} = \frac{\boxed{}}{18} = \frac{\boxed{}}{30} = \frac{\boxed{}}{150}$

2, 6, 12, 20, 100

d $\frac{\boxed{}}{8} = \frac{\boxed{}}{16} = \frac{\boxed{}}{32} = \frac{25}{40} = \frac{\boxed{}}{64} = \frac{\boxed{}}{400}$

5, 10, 20, 40, 250

17 Write either = or $\neq$ between the fractions to state whether these fractions are equivalent or not.

a $\frac{1}{2} \boxed{} \frac{5}{8}$
 $\neq$

b $\frac{4}{8} \boxed{} \frac{2}{4}$
 $=$

c $\frac{3}{7} \boxed{} \frac{30}{60}$
 $\neq$

d $\frac{5}{9} \boxed{} \frac{15}{18}$
 $\neq$

e $\frac{11}{15} \boxed{} \frac{33}{45}$
 $=$

f $\frac{1}{2} \boxed{} \frac{402}{804}$
 $=$

g $\frac{12}{36} \boxed{} \frac{1}{3}$
 $=$

h $\frac{18}{24} \boxed{} \frac{21}{28}$
 $=$

i $\frac{6}{18} \boxed{} \frac{11}{33}$
 $=$

- 18 Explain why this working out is **incorrect**.

$$\frac{4}{5} = \frac{4^2}{5^2} = \frac{16}{25}$$


By squaring the numerator and denominator, you have multiplied numerator by 4 and denominator by 5.
To keep a fraction equivalent, you must multiply the numerator and denominator by the same number.

- 19 Flo got $\frac{3}{4}$ of the questions on an online quiz correct.

She then got $\frac{21}{28}$ of the questions on a written test correct.

Flo thinks she did better on the written test than on the online test because 21 is greater than 3.
Explain why she is incorrect.

The two fractions are equivalent, so she performed the same on both tests.

- 20 These fractions are equivalent.

Determine five possible pairs of values that could make the statement correct.

$$\frac{\square}{20} = \frac{10}{\square}$$

$$\frac{\square}{20} = \frac{10}{\square}$$

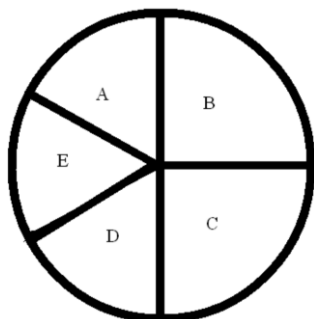
$$\frac{\square}{20} = \frac{10}{\square}$$

$$\frac{\square}{20} = \frac{10}{\square}$$

$$\frac{\square}{20} = \frac{10}{\square}$$

Many answers possible.

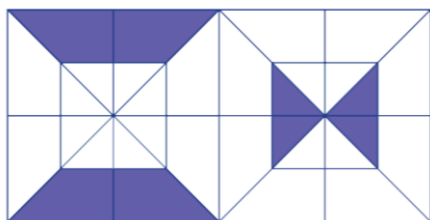
- 21 What fraction of the circle is part D?



D is one sixth. Six of D would make a whole circle.

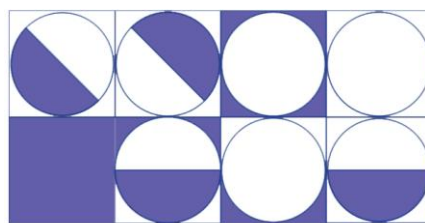
- 22 For each of the diagrams shown, work out what fraction of the rectangle is shaded.

a



$\frac{1}{4}$

b



$\frac{3}{8}$

c



$\frac{1}{2}$

d



$\frac{1}{3}$

SIMPLIFYING FRACTIONS

- Simplifying means writing an equivalent fraction with smaller numbers.
- **Divide** both the **numerator** and **denominator** by their **common factors**.
- A fraction is fully simplified when its numerator and denominator share no factors.

Example Simplify fractions.

Simplify $\frac{8}{12}$ $\frac{8}{12} = \frac{2}{3}$	How do we know what number to divide the numerator and denominator by? <i>We divide the numerator and denominator by the</i> What is happening in the area model when we simplify fractions? <i>We are reducing the number of</i>
Simplify $\frac{36}{48}$ $\frac{36}{48} = \frac{9}{12} = \frac{3}{4}$	How do we know when a fraction is <i>fully</i> simplified? <i>A fraction is fully simplified when the numerator and denominator have no more common</i> To simplify in a single step, what should we divide the numerator and denominator by? <i>We divide by the HCF of 36 and 48, which is</i>

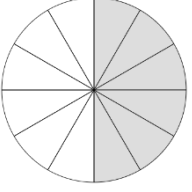
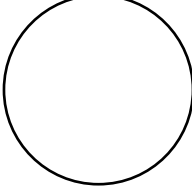
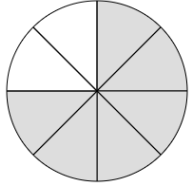
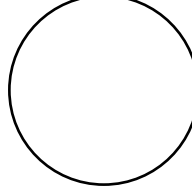
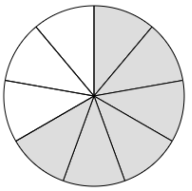
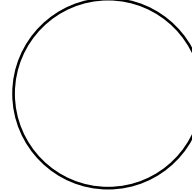
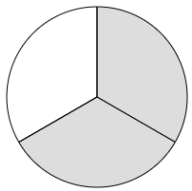
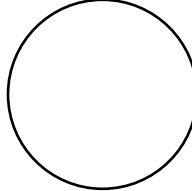
Fully simplify:

a $\frac{9}{21} = \frac{3}{7}$	b $\frac{15}{45} = \frac{3}{9} = \frac{1}{3}$
c $\frac{8}{24} = \frac{1}{3}$	d $\frac{12}{72} = \frac{1}{6}$

Key ideas

1. A simplified fraction has no between the numerator and denominator.
2. To simplify, the numerator and denominator by the

1 Rewrite these fractions in the simplest way (split into the least equal pieces)

 $\frac{6}{12} = \frac{\quad}{\quad}$		 $\frac{6}{8} = \frac{\quad}{\quad}$	
 $\frac{6}{9} = \frac{\quad}{\quad}$		 $\frac{2}{3} = \frac{\quad}{\quad}$	
$\frac{1}{2}$	$\frac{2}{3}$	$\frac{3}{4}$	Can't simplify

2 Fill in the missing number to simplify these fractions.

a $\frac{18}{24} = \frac{3}{\square}$ $\div 6$ $\div 6$	b $\frac{9}{21} = \frac{3}{\square}$ $\div 3$ $\div 3$	c $\frac{40}{48} = \frac{5}{\square}$ $\div 8$ $\div 8$
4	7	6
d $\frac{12}{18} = \frac{\square}{3}$	e $\frac{12}{21} = \frac{4}{\square}$	f $\frac{25}{40} = \frac{\square}{8}$
2	7	5

3 Fill in the missing number to simplify these fractions.

a $\frac{10}{30} = \frac{\square}{\square}$ $\div 10$ $\div 10$	b $\frac{4}{8} = \frac{1}{4}$ $\div \square$ $\div \square$	c $\frac{2}{6} = \frac{1}{3}$ $\div \square$ $\div \square$	d $\frac{9}{12} = \frac{3}{4}$ $\div \square$ $\div \square$	e $\frac{20}{28} = \frac{5}{7}$ $\div \square$ $\div \square$	f $\frac{9}{18} = \frac{\square}{\square}$ $\div 9$ $\div 9$
$\frac{1}{3}$	$\div 4$	$\div 2$	$\div 3$	$\div 4$	$\frac{1}{2}$

4 Find the HCF and then simplify

a $\frac{15}{20}$ HCF is $\rightarrow \frac{15}{20} \div \frac{\text{HCF}}{\text{HCF}} = \frac{\text{HCF}}{\text{HCF}}$

$\div 5, \frac{3}{4}$

b $\frac{9}{30}$ HCF is $\rightarrow \frac{9}{30} \div \frac{\text{HCF}}{\text{HCF}} = \frac{\text{HCF}}{\text{HCF}}$

$\div 3, \frac{3}{10}$

c $\frac{16}{24}$ HCF is $\rightarrow \frac{16}{24} \div \frac{\text{HCF}}{\text{HCF}} = \frac{\text{HCF}}{\text{HCF}}$

$\div 8, \frac{2}{3}$

d $\frac{12}{36}$ HCF is $\rightarrow \frac{12}{36} \div \frac{\text{HCF}}{\text{HCF}} = \frac{\text{HCF}}{\text{HCF}}$

$\div 12, \frac{1}{3}$

5 Wally says he has simplified these fractions as much as he can. Is he correct?
If not, find the simplest fraction in each case.

a $\frac{16}{20} \rightarrow \frac{8}{10}$

No
 $\frac{4}{5}$

b $\frac{50}{100} \rightarrow \frac{25}{50} \rightarrow \frac{5}{10}$

No
 $\frac{1}{2}$

c $\frac{24}{36} \rightarrow \frac{4}{6}$

No
 $\frac{2}{3}$

d $\frac{15}{20} \rightarrow \frac{3}{4}$

Yes

6 Match up these fractions to their simplest form.

$\frac{15}{20}$

$\frac{25}{100}$

$\frac{9}{81}$

$\frac{60}{100}$

$\frac{12}{18}$

$\frac{40}{80}$

$\frac{1}{2}$

$\frac{2}{3}$

$\frac{3}{5}$

$\frac{1}{9}$

$\frac{1}{4}$

$\frac{3}{4}$

7 Simplify the following fractions.

a $\frac{6}{12} =$ $\frac{1}{2}$	b $\frac{4}{12} =$ $\frac{1}{3}$	c $\frac{3}{12} =$ $\frac{1}{4}$	d $\frac{9}{12} =$ $\frac{3}{4}$
e $\frac{18}{24} =$ $\frac{3}{4}$	f $\frac{9}{24} =$ $\frac{3}{8}$	g $\frac{6}{16} =$ $\frac{3}{8}$	h $\frac{16}{6} =$ $\frac{8}{3}$
i $\frac{16}{16} =$ 1	j $\frac{32}{16} =$ 2	k $\frac{16}{32} =$ $\frac{1}{2}$	l $\frac{15}{31} =$ $\frac{15}{31}$

8 Write the following fractions in simplest form.

If you can't identify the HCF straight away, start by dividing the numerator and denominator by any common factor. You will eventually get the answer.

a $\frac{15}{20} =$ $\frac{3}{4}$	b $\frac{12}{18} =$ $\frac{2}{3}$	c $\frac{10}{30} =$ $\frac{1}{3}$	d $\frac{8}{22} =$ $\frac{4}{11}$
e $\frac{14}{35} =$ $\frac{2}{5}$	f $\frac{2}{22} =$ $\frac{1}{11}$	g $\frac{8}{56} =$ $\frac{1}{7}$	h $\frac{9}{27} =$ $\frac{1}{3}$
i $\frac{35}{45} =$ $\frac{7}{9}$	j $\frac{36}{96} =$ $\frac{3}{8}$	k $\frac{120}{144} =$ $\frac{5}{6}$	l $\frac{700}{140} =$ 5

9 Express these times as fractions of an hour in simplest form.

a 30 minutes $\frac{1}{2}$	b 60 minutes 1
c 20 minutes $\frac{1}{3}$	d 15 minutes $\frac{1}{4}$
e 45 minutes $\frac{3}{4}$	f 5 minutes $\frac{1}{12}$
g 3 minutes $\frac{1}{20}$	h 2 minutes $\frac{1}{30}$

10 Solve the following problems by answering in simplest form.

- a Luke scored $\frac{16}{20}$ on a test. What fraction was incorrect?
- b Marika scored $\frac{12}{20}$ on the same test. What fraction did she get right?
- c 25 out of the 75 kids in Year 6 ride their bikes to school. What fraction does this represent?
- d Out of the 26 students in 6F, 14 rate Maths as their favourite subject. What fraction is this?
- e What fraction did not choose Maths as their favourite subject?

$\frac{1}{5}$

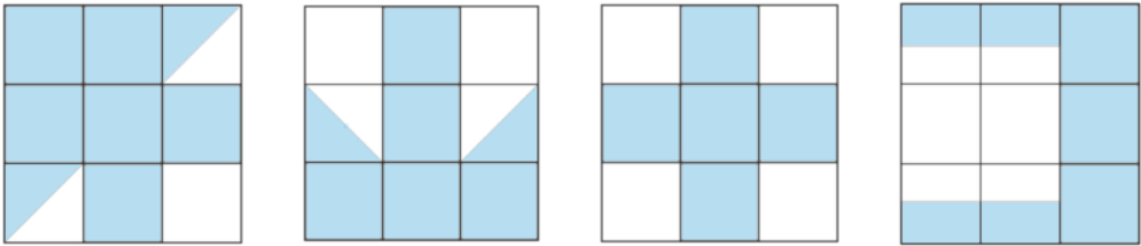
$\frac{3}{5}$

$\frac{1}{3}$

$\frac{7}{13}$

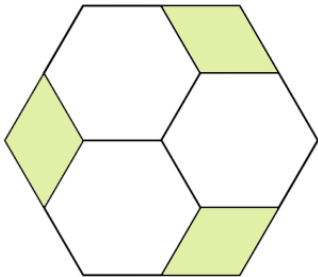
$\frac{6}{13}$

11 Which of these shows exactly two thirds?



Second pattern

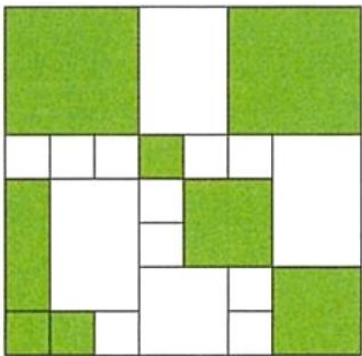
12 What fraction of the shape is shaded?



By splitting the shape based on the diamond, there are 3 shaded out of 12.

$\frac{1}{4}$

13 Explain why $\frac{1}{2}$ of this diagram is shaded,



By splitting the shape up based on the smallest square, there are 32 shaded out of 64

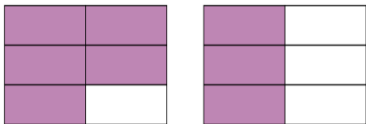
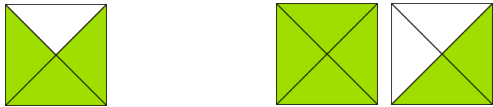
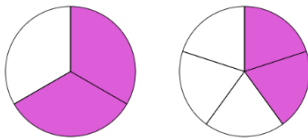
COMPARING FRACTIONS: SAME NUMERATOR / DENOMINATOR

- If two fractions have the same denominator, the larger numerator is the larger value.
- If two fractions have the same numerator, the smaller denominator is the larger value.

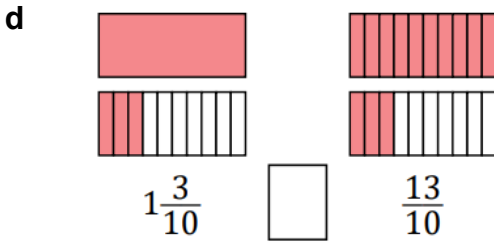
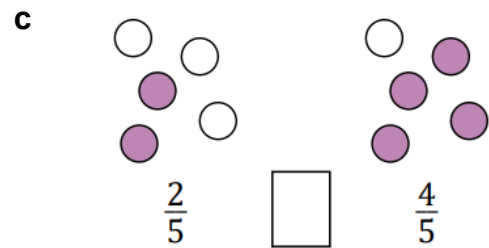
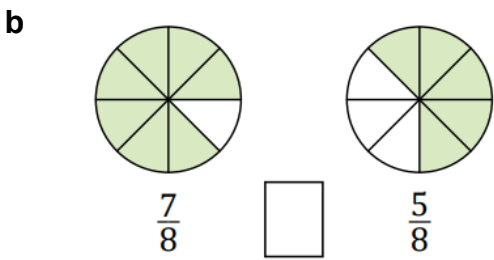
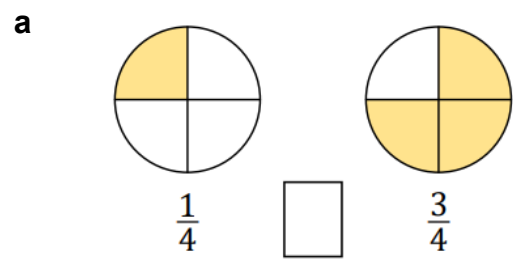
Example Compare fractions with the same numerator or denominator.

Choose the correct relational symbol (<, >, =) to put in the box. $\frac{1}{7} \boxed{<} \frac{5}{7}$ 	When denominators are the same, why does the larger fraction have the larger numerator? <i>A larger numerator represents more parts.</i>
Choose the correct relational symbol (<, >, =) to put in the box. $\frac{1}{7} \boxed{<} \frac{1}{4}$ 	When numerators are the same, why does the larger fraction have the smaller denominator? <i>A smaller denominator means the whole is split into fewer parts, meaning each part is</i>

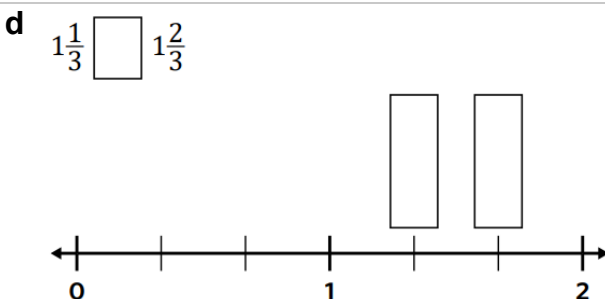
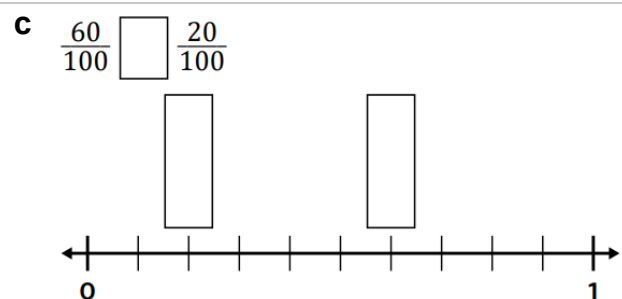
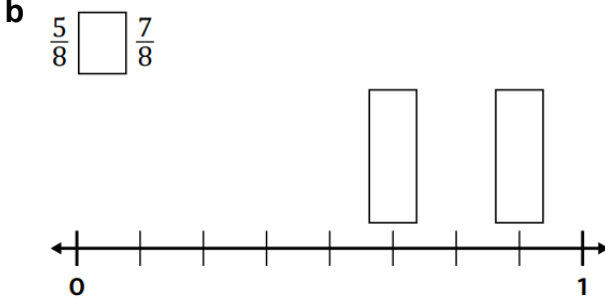
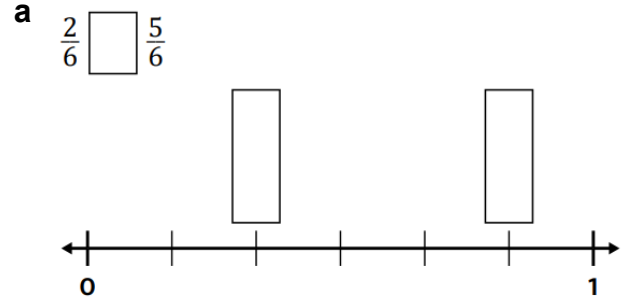
Choose the correct relational symbol (<, >, =) to put in the box.

$\frac{5}{6} \boxed{>} \frac{3}{6}$ 	$\frac{3}{4} \boxed{<} \frac{6}{4}$ 
$\frac{1}{4} \boxed{<} \frac{1}{3}$ 	$\frac{2}{3} \boxed{<} \frac{2}{5}$ 
$\frac{2}{3} \boxed{<} \frac{5}{3}$	$\frac{3}{6} \boxed{<} \frac{3}{7}$

1 Compare these fractions.



2 Compare these fractions using a number line.



3 Circle the largest fraction in each list

a $\frac{3}{7}, \frac{2}{7}, \frac{5}{7}, \frac{1}{7}$

b $\frac{4}{3}, \frac{2}{3}, \frac{7}{3}, \frac{5}{3}$

c $\frac{5}{11}, \frac{9}{11}, \frac{3}{11}, \frac{4}{11}$

d $\frac{8}{5}, \frac{4}{5}, \frac{6}{5}, \frac{7}{5}$

4 Circle the largest fraction in each list.

a $\frac{1}{4}, \frac{1}{7}, \frac{1}{12}, \frac{1}{3}$

b $\frac{4}{12}, \frac{4}{1}, \frac{4}{9}, \frac{4}{2}$

c $\frac{2}{3}, \frac{2}{5}, \frac{2}{12}, \frac{2}{4}$

d $\frac{1}{123}, \frac{1}{2241}, -\frac{1}{2}, \frac{1}{42}$

5 Read the examples carefully and answer the questions.

X Name: Bradley

Compare the fractions by writing $<$, $>$, or $=$ in the circle.

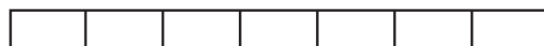
$$\frac{1}{12} \bigcirc \frac{1}{7}$$

Bradley compared the denominators since the numerators are the same. However, he did not do it correctly. Help Bradley check his work by shading the diagrams below to represent each fraction.

Shade $\frac{1}{12}$.



Shade $\frac{1}{7}$.



Explain why $\frac{1}{12}$ is actually less than $\frac{1}{7}$.

In $\frac{1}{7}$, the whole is split into less pieces, so each piece is larger.

Compare the fractions by writing $<$, $>$ or $=$ in the circle.

$$\frac{2}{3} \bigcirc \frac{2}{11}$$

>

X Name: Nadine

Compare the fractions by writing $<$, $>$, or $=$ in the circle. Then explain your reasoning.

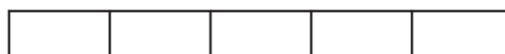
$$\frac{2}{5} \bigcirc \frac{1}{4}$$

Explanation:

Fourths are greater than fifths.

Nadine is correct that fourths are greater than fifths. Use the diagrams above to explain why that doesn't mean $\frac{1}{4}$ is greater than $\frac{2}{5}$

Shade $\frac{2}{5}$.



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



Compare the fractions by writing $<$, $>$ or $=$ in the circle.

$$\frac{10}{12} \bigcirc \frac{2}{5}$$

>

COMPARING FRACTIONS: RELATED DENOMINATORS

Review of prior knowledge

1 Determine the lowest common multiple of these numbers.

a 4 and 6

b 5 and 10

c 8 and 6

2 Determine the lowest common multiple of these denominators.

a $\frac{\quad}{3}$ $\frac{\quad}{12}$

b $\frac{\quad}{4}$ $\frac{\quad}{8}$

c $\frac{\quad}{6}$ $\frac{\quad}{18}$

d $\frac{\quad}{60}$ $\frac{\quad}{20}$

e $\frac{\quad}{15}$ $\frac{\quad}{45}$

f $\frac{\quad}{8}$ $\frac{\quad}{20}$

3 Determine the equivalent fraction.

a $\frac{3}{7} = \frac{\quad}{21}$

b $\frac{10}{9} = \frac{\quad}{45}$

c $\frac{\quad}{13} = \frac{21}{39}$

d $\frac{6}{10} = \frac{\quad}{15}$

e $\frac{92}{150} = \frac{\quad}{75}$

f $\frac{2}{24} = \frac{\quad}{72}$

4 Compare these fractions using the relational symbols < and >

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

b $\frac{1}{5}$ $\frac{1}{3}$

c $\frac{2}{5}$ $\frac{2}{11}$

d $\frac{3}{8}$ $\frac{3}{2}$

e $\frac{4}{8}$ $\frac{7}{8}$

f $\frac{15}{13}$ $\frac{3}{13}$

g $\frac{16}{78}$ $\frac{59}{78}$

h $\frac{4}{6}$ $\frac{1}{3}$

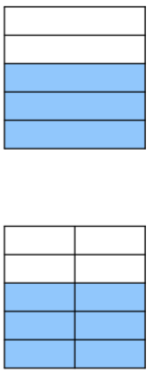
i $\frac{8}{20}$ $\frac{2}{5}$

FRACTIONS WITH RELATED DENOMINATORS

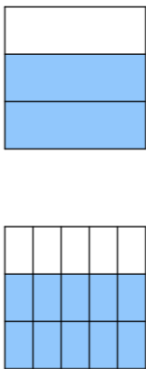
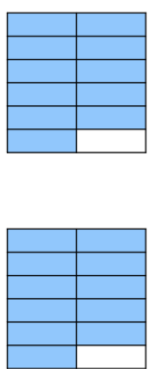
🌟 Comparing Fractions: <https://www.geogebra.org/m/madk3hpt>

- **Related denominators** are when one denominator is a multiple of the other.
- To compare fractions with related denominators:
 1. Rewrite the fractions with the **lowest common multiple** of the denominators.
 2. Compare the numerators.

Example Compare fractions with related denominators.

$\frac{3}{5}$ $\times 2$ $\times 2$ $\downarrow$ $\frac{6}{10}$  $\frac{7}{10}$ $\downarrow$ $\frac{7}{10}$ $\frac{3}{5} < \frac{7}{10}$	What does it mean for two fractions to have “related” denominators? <i>One denominator is a of the other.</i> How did we know what to multiply the numerator and denominator by? <i>We want to make the denominators the</i> How do we compare fractions with the same denominator? <i>When the denominators are the same, the larger fraction has the larger</i>
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Choose the correct relational symbol (<, >, =) to put in the box.

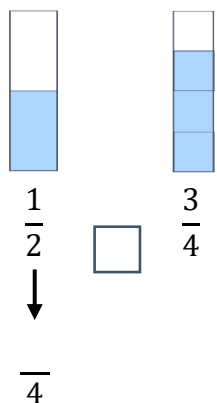
$\frac{2}{3} \quad \square \quad \frac{9}{15}$ $\frac{2}{3}$ $\times 5$ $\times 5$ $\downarrow$ $\frac{10}{15}$  $\frac{9}{15}$ $\downarrow$ $\frac{9}{15}$ $\frac{2}{3} > \frac{9}{15}$	$\frac{11}{12} \quad \square \quad \frac{5}{6}$ $\frac{11}{12}$ $\downarrow$ $\frac{11}{12}$  $\frac{5}{6}$ $\times$ $\times$ $\downarrow$ $\frac{10}{12}$ $\frac{11}{12} > \frac{5}{6}$
$\frac{3}{4} \quad \square \quad \frac{6}{8}$ $\frac{3}{4}$ $\times 2$ $\times 2$ $\downarrow$ $\frac{6}{8}$  $\frac{6}{8}$ $\downarrow$ $\frac{6}{8}$ $\frac{3}{4} = \frac{6}{8}$	$\frac{2}{6} \quad \square \quad \frac{7}{18}$ $\frac{2}{6}$ $\times 3$ $\times 3$ $\downarrow$ $\frac{6}{18}$  $\frac{7}{18}$ $\downarrow$ $\frac{7}{18}$ $\frac{2}{6} < \frac{7}{18}$

Key ideas

1. To compare two fractions with different numerators and denominators, first make the the same by using your knowledge of fractions, then compare the

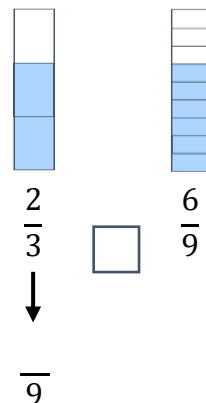
1 Determine the larger fraction by writing both fractions with the same denominator.

a



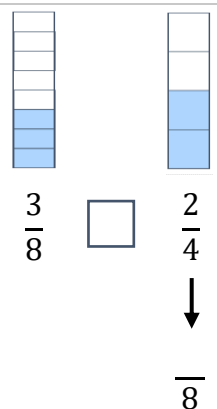
$\frac{2}{4} < \frac{3}{4}$

b



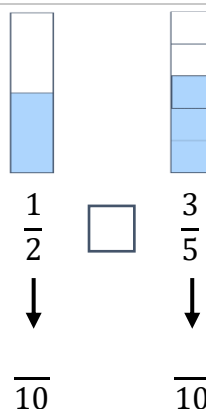
$\frac{6}{9} = \frac{6}{9}$

c



$\frac{3}{8} < \frac{4}{8}$

d



$\frac{5}{10} < \frac{6}{10}$

2 Compare these fractions by making their denominators the same.

a $\frac{4}{9} = \frac{12}{27} > \frac{10}{27}$

b $\frac{1}{2} = \frac{\quad}{4} < \frac{3}{4}$

c $\frac{3}{5} = \frac{\quad}{10} < \frac{6}{10}$

d $\frac{8}{90} = \frac{\quad}{45} < \frac{4}{45}$

4, =

e $\frac{8}{12} = \frac{\quad}{36} < \frac{30}{48}$

$\frac{32}{48} >$

f $\frac{3}{7} = \frac{\quad}{28} < \frac{12}{28}$

$\frac{12}{28} =$

g $\frac{3}{4} = \frac{\quad}{80} < \frac{70}{80}$

$\frac{60}{80} <$

h $\frac{63}{70} = \frac{\quad}{70} < \frac{8}{10}$

$\frac{9}{10} >$

3 Compare these fractions using the <, = or > symbols.

a $\frac{3}{5} < \frac{1}{5}$

>

b $\frac{7}{9} < \frac{2}{9}$

>

c $\frac{2}{2} < \frac{3}{3}$

=

d $\frac{13}{18} < \frac{17}{18}$

<

e $\frac{1}{4} < \frac{1}{3}$

<

f $\frac{1}{10} < \frac{1}{20}$

>

g $\frac{3}{5} < \frac{18}{30}$

=

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

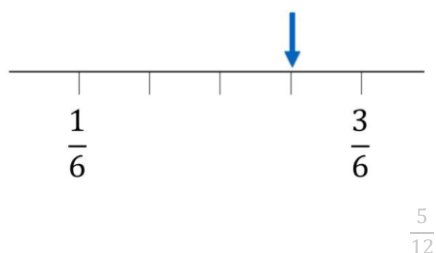
>

i $\frac{5}{7} < \frac{15}{21}$

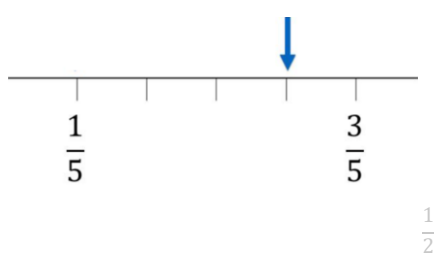
=

- 4 What fraction is the arrow pointing to?
(Hint: write an equivalent fraction with a different denominator)

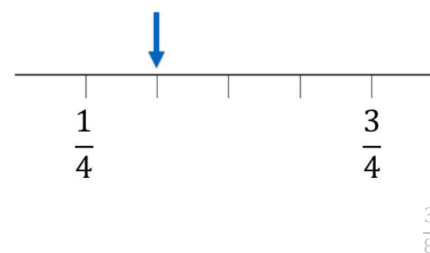
a



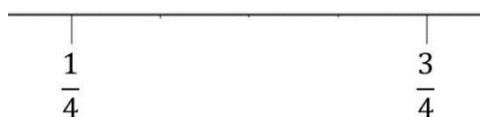
b



c



- 5 Which of these fractions could **not** be placed between the fractions marked on the number line?



a $\frac{10}{12}$

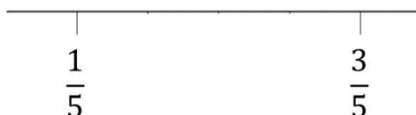
b $\frac{1}{3}$

c $\frac{24}{48}$

d $\frac{17}{32}$

$\frac{10}{12}$, as it is larger than $\frac{3}{4}$

- 6 Which of these fractions could **not** be placed between the fractions marked on the number line?



a $\frac{2}{5}$

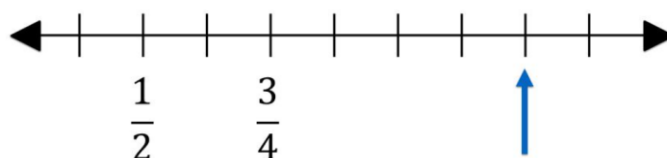
b $\frac{75}{150}$

c $\frac{1}{4}$

d $\frac{10}{15}$

$\frac{10}{15}$, as it is larger than $\frac{3}{5}$

- 7 What fraction is the arrow pointing to on the number line?



By changing denominators to 8, the arrow is pointing to $\frac{10}{8} = \frac{5}{4}$.

COMPARING FRACTIONS: UNRELATED DENOMINATORS

Review of prior knowledge

1 Determine the lowest common multiple of these numbers.

a 5 and 12

b 9 and 12

c 12 and 16

d 18 and 3

e 10 and 15

f 8 and 12

2 Determine the lowest common multiple of these denominators.

a $\frac{\quad}{9}$ $\frac{\quad}{12}$

b $\frac{\quad}{3}$ $\frac{\quad}{7}$

c $\frac{\quad}{8}$ $\frac{\quad}{9}$

d $\frac{\quad}{15}$ $\frac{\quad}{5}$

e $\frac{\quad}{4}$ $\frac{\quad}{10}$

f $\frac{\quad}{15}$ $\frac{\quad}{6}$

3 Compare these fractions using the relational symbols $<$, $>$, and $=$

a $\frac{3}{8}$ $\frac{4}{8}$

b $\frac{2}{3}$ $\frac{4}{9}$

c $\frac{1}{2}$ $\frac{3}{8}$

d $\frac{3}{5}$ $\frac{6}{10}$

e $\frac{17}{12}$ $\frac{5}{4}$

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

4 Complete these equivalent fractions:

a $\frac{2}{7} = \frac{\quad}{21}$

b $\frac{5}{9} = \frac{\quad}{45}$

c $\frac{1}{3} = \frac{\quad}{60}$

d $\frac{6}{7} = \frac{\quad}{42}$

e $\frac{7}{8} = \frac{\quad}{32}$

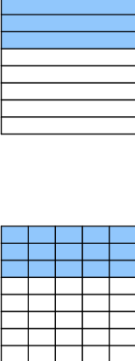
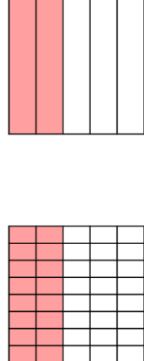
f $\frac{4}{13} = \frac{\quad}{39}$

FRACTIONS WITH UNRELATED DENOMINATORS

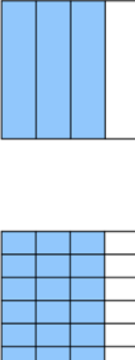
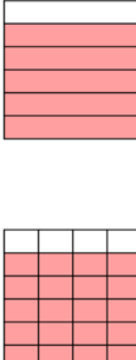
🌟 Comparing Fractions: <https://www.geogebra.org/m/madk3hpt>

- To compare fractions with **unrelated denominators**:
 - Rewrite the fractions with the lowest common multiple of the denominators.
Do this by multiplying each fraction by the other's denominator.
 - Compare the numerators.

Example Compare fractions with unrelated denominators.

$\frac{3}{8}$ $\times 5$ $\times 5$ $\downarrow$ $\frac{15}{40}$  $\frac{2}{5}$ $\times 8$ $\times 8$ $\downarrow$ $\frac{16}{40}$  $\frac{3}{8} < \frac{2}{5}$	How did we know what to multiply the numerator and denominator by? <i>We multiply the numerator and denominator by the of the other fraction.</i> <i>The denominator we end up with is always a of the original denominators.</i>
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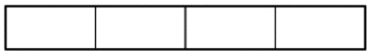
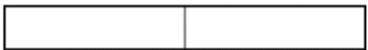
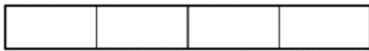
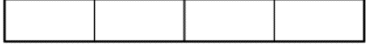
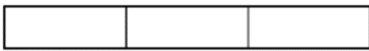
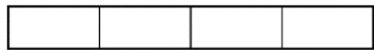
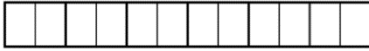
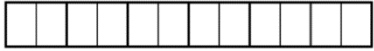
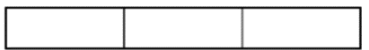
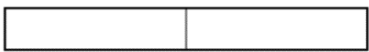
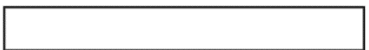
Choose the correct relational symbol (<, >, =) to put in the box.

$\frac{3}{4} \quad \square \quad \frac{5}{6}$ $\frac{3}{4}$ $\times 6$ $\times 6$ $\downarrow$ $\frac{18}{24}$  $\frac{5}{6}$ $\times 4$ $\times 4$ $\downarrow$ $\frac{20}{24}$  $\frac{3}{4} \quad \square \quad \frac{2}{3}$	$\frac{4}{7} \quad \square \quad \frac{3}{5}$ $\frac{6}{8} \quad \square \quad \frac{5}{6}$
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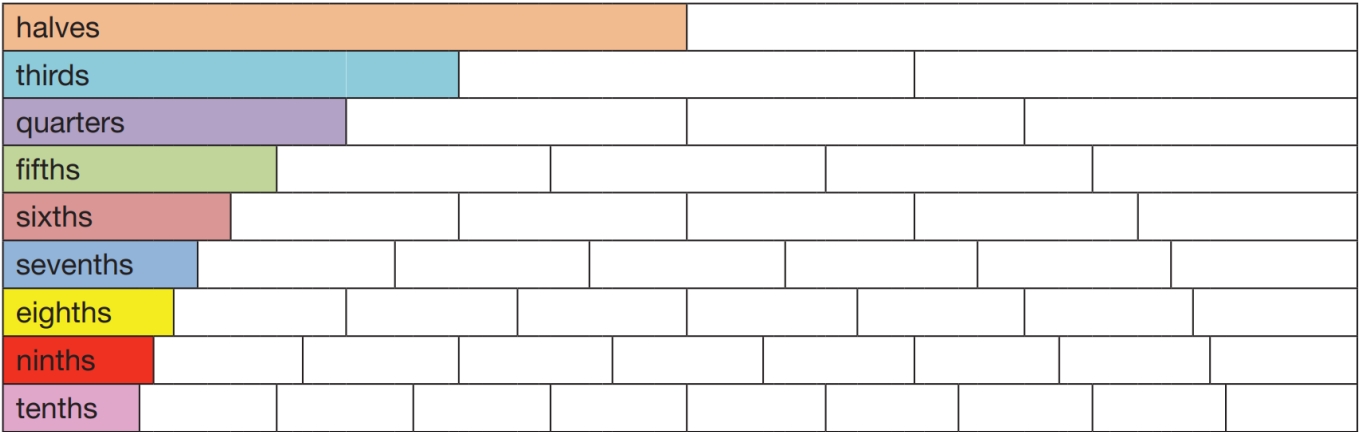
Key ideas

- To compare two fractions with different numerators and denominators, first make the the same, then compare the
- A quick way to find a common denominator is to multiply the numerator and denominator of each fraction by the of the other fraction.

1 Fill in the table to compare the fractions.

Fraction 1		Fraction 2	
	$\frac{2}{3}$	$\frac{3}{5}$	
	$\frac{10}{15}$	$\frac{9}{15}$	
		>	
	$\frac{3}{4}$	$\frac{1}{2}$	
	$\frac{1}{4}$	$\frac{3}{4}$	
		$\frac{3}{4} > \frac{1}{4}$	
	$\frac{2}{3}$	$\frac{3}{4}$	
	$\frac{8}{12}$	$\frac{9}{12}$	
		$\frac{8}{12} < \frac{9}{12}$	
	$\frac{2}{3}$	$\frac{1}{2}$	
	$\frac{4}{6}$	$\frac{3}{6}$	
		$\frac{4}{6} > \frac{3}{6}$	

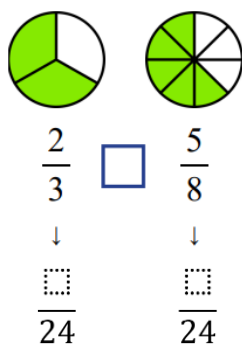
2 Use the fraction wall to compare these fractions using relational symbols <, >, and =.



i $\frac{1}{3} \square \frac{2}{5}$	<	ii $\frac{1}{3} \square \frac{3}{9}$	=	iii $\frac{1}{3} \square \frac{3}{10}$	>	iv $\frac{1}{4} \square \frac{2}{8}$	=
v $\frac{1}{4} \square \frac{2}{9}$	>	vi $\frac{1}{4} \square \frac{3}{10}$	<	vii $\frac{1}{5} \square \frac{2}{9}$	<	viii $\frac{1}{5} \square \frac{2}{10}$	=
ix $\frac{4}{6} \square \frac{6}{9}$	=	x $\frac{8}{9} \square \frac{9}{10}$	<	xi $\frac{2}{3} \square \frac{7}{10}$	<	xii $\frac{7}{10} \square \frac{5}{7}$	<

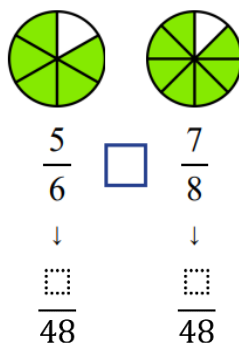
- 3 Compare these fractions by changing them to their lowest common denominator then using $<$, $>$, or $=$

a



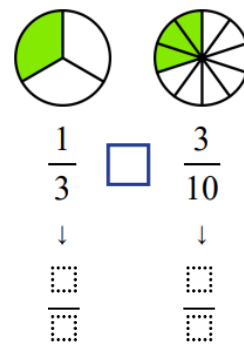
$$\frac{16}{24} > \frac{15}{24}$$

b



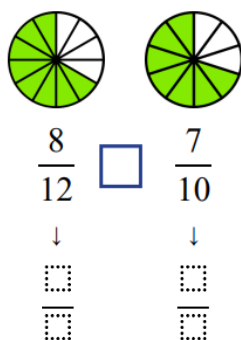
$$\frac{40}{48} < \frac{42}{48}$$

c



$$\frac{10}{30} > \frac{9}{30}$$

d



<

>

>

e

$$\frac{4}{5} \quad \square \quad \frac{3}{4}$$

$$\downarrow \qquad \qquad \downarrow$$

f

$$\frac{5}{3} \quad \square \quad \frac{3}{2}$$

$$\downarrow \qquad \qquad \downarrow$$

g

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

$$\downarrow \qquad \qquad \downarrow$$

<

h

$$\frac{2}{5} \quad \square \quad \frac{5}{8}$$

$$\downarrow \qquad \qquad \downarrow$$

<

i

$$\frac{6}{8} \quad \square \quad \frac{4}{6}$$

$$\downarrow \qquad \qquad \downarrow$$

>

j

$$\frac{5}{6} \quad \square \quad \frac{9}{10}$$

$$\downarrow \qquad \qquad \downarrow$$

<

k

$$\frac{7}{11} \quad \square \quad \frac{3}{5}$$

$$\downarrow \qquad \qquad \downarrow$$

>

l

$$\frac{12}{5} \quad \square \quad \frac{19}{8}$$

$$\downarrow \qquad \qquad \downarrow$$

>

m

$$\frac{15}{7} \quad \square \quad \frac{10}{4}$$

$$\downarrow \qquad \qquad \downarrow$$

<

n

$$\frac{8}{5} \quad \square \quad \frac{15}{8}$$

$$\downarrow \qquad \qquad \downarrow$$

<

o

$$\frac{5}{3} \quad \square \quad \frac{12}{7}$$

$$\downarrow \qquad \qquad \downarrow$$

<

4 Circle the largest fraction by making their denominators the same

a $\frac{1}{2}$ $\frac{2}{3}$ $\frac{3}{9}$

$\frac{2}{3}$

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

$\frac{1}{2}$

c $\frac{3}{4}$ $\frac{2}{3}$ $\frac{4}{8}$

$\frac{3}{4}$

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

$\frac{3}{4}$

5 Circle the smallest fraction by making their denominators the same

a $\frac{3}{8}$ $\frac{2}{4}$ $\frac{5}{6}$

$\frac{3}{8}$

b $\frac{4}{7}$ $\frac{1}{2}$ $\frac{11}{14}$

$\frac{1}{2}$

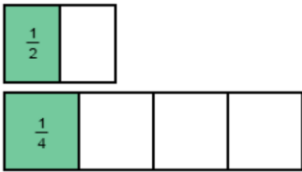
c $\frac{1}{3}$ $\frac{5}{8}$ $\frac{4}{6}$

$\frac{1}{3}$

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

$\frac{1}{2}$

6 Sam shaded two rectangles and decided $\frac{1}{2}$ is smaller than $\frac{1}{4}$.
Do you agree? Explain why or why not.



In this case, yes, but only because the whole is different sizes.

7 Arrange these fractions in ascending order by:

$1\frac{3}{5}, \frac{7}{4}, \frac{3}{2}, 2\frac{1}{4}, \frac{11}{5}$

- a Expressing as improper fractions:

b Determining the LCD:

c Rewriting fractions with the LCD:

d Ordering the fractions by comparing numerators:

e Rewriting fractions back in their original form.

$\frac{3}{2}, 1\frac{3}{5}, \frac{7}{4}, \frac{11}{5}, 2\frac{1}{4}$

8 Compare these fractions.

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

>

b $-3\frac{1}{5}$ $-2\frac{3}{7}$

<

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

>

d $-\frac{3}{5}$ $\frac{1}{11}$

<

e $-\frac{4}{9}$ $-\frac{5}{9}$

>

f $\frac{4}{9}$ $\frac{5}{9}$

<

CHECK YOUR UNDERSTANDING

HCF

1 A common factor of 6 and 9 is:

a 3

b 6

c 9

d 18

2 A common factor of 8 and 20 is:

a 40

b 20

c 8

d 4

3 What is the highest common factor of 12 and 18?

a 36

b 2

c 6

d 3

4 What is the highest common factor of 16 and 20?

a 40

b 80

c 8

d 1

5 The HCF of 54 and 60 is:

a 3

b 2

c 6

d 12

6 Which pair of numbers have a HCF of 15?

a 1 and 15

b 30 and 60

c 15 and 45

d Both B and C
are correct

7 Which pair of numbers have a HCF of 12?

a 24 and 72

b 3 and 12

c Both A and D
are correct

d 36 and 60

LCM

1	Which if these is a common multiple of 5 and 6?						
a	1	b	11	c	30	d	No common multiple
2	What is the lowest common multiple of 6 and 9?						
a	2	b	3	c	18	d	54
3	What is the lowest common multiple of 10 and 12?						
a	120	b	22	c	2	d	60
4	What is the lowest common multiple of 12 and 15?						
a	180	b	60	c	15	d	3
5	What is the LCM of 4 and 12?						
a	12	b	48	c	24	d	4
6	48 is the LCM of which two numbers?						
a	2 and 24	b	3 and 16	c	4 and 12	d	A, B, and C
7	24 is the LCM of which two numbers?						
a	2 and 8	b	8 and 6	c	4 and 12	d	A, B, and C

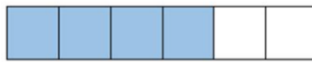
Equivalent fractions

1 Use the diagrams to identify which fractions are equivalent.

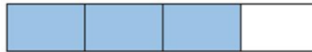
a $\frac{4}{8}$ and $\frac{1}{2}$



b $\frac{4}{6}$ and $\frac{3}{4}$

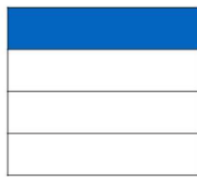


c $\frac{4}{8}$ and $\frac{1}{3}$

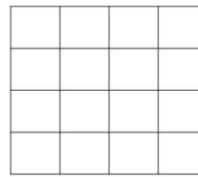


d $\frac{1}{2}$ and $\frac{3}{7}$

2 How many parts should be shaded to make the fractions equivalent?



=



a 4

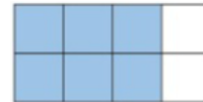
b 6

c 1

d 3

3 Complete the equivalent fraction.

$\frac{?}{4} = \frac{6}{8}$



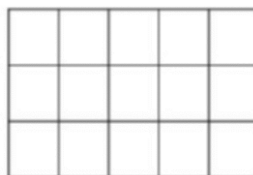
a 3

b 4

c 6

d 8

4 Sam needs to shade $\frac{2}{5}$ of the diagram below. How many squares should he shade in?



a 5

b 6

c 2

d 3

Equivalent fractions

1	Determine the missing number:	$\frac{1}{4} = \frac{3}{?}$		
a	4	b	8	c 12 d 16
2	Determine the missing number:	$\frac{2}{5} = \frac{?}{20}$		
a	10	b	8	c 6 d 4
3	Determine the missing number:	$\frac{12}{21} = \frac{?}{7}$		
a	4	b	6	c 36 d 3
4	Which fraction is equivalent to $\frac{3}{5}$			
a	$\frac{5}{3}$	b	$\frac{10}{6}$	c $\frac{6}{10}$ d $\frac{9}{10}$
5	Which fraction is equivalent to $\frac{3}{8}$			
a	$\frac{1}{6}$	b	$\frac{4}{9}$	c $\frac{6}{8}$ d $\frac{6}{16}$
6	Determine the missing number:	$\frac{1}{4} = \frac{1+?}{4+8}$		
a	12	b	8	c 11 d 2
7	Determine the missing number:	$\frac{?}{10} = \frac{9}{15}$		
a	3	b	4	c 6 d 9

Simplifying fractions

1 Simplify: $\frac{16}{36}$

a $\frac{8}{18}$

b $\frac{1}{2}$

c $\frac{4}{9}$

d $\frac{12}{30}$

2 Simplify: $\frac{4}{20}$

a $\frac{2}{10}$

b $\frac{1}{4}$

c $\frac{1}{5}$

d 0.2

3 Simplify: $\frac{12}{16}$

a $\frac{6}{8}$

b $\frac{3}{4}$

c $\frac{1}{4}$

d $\frac{4}{8}$

4 Simplify: $\frac{40}{64}$

a $\frac{6}{8}$

b $\frac{5}{8}$

c $\frac{8}{12}$

d $\frac{10}{16}$

5 Simplify: $\frac{30}{90}$

a $\frac{3}{9}$

b $\frac{15}{45}$

c $\frac{2}{3}$

d $\frac{1}{3}$

6 Which fraction is not fully simplified?

a $\frac{13}{18}$

b $\frac{4}{5}$

c $\frac{101}{157}$

d $\frac{57}{111}$

Comparing fractions

1 What sign would make this statement true?

$$\frac{4}{5} \square \frac{10}{15}$$

a $<$

b $>$

c $=$

d $\leq$

2 Which fraction is greater than $\frac{5}{12}$?

a $\frac{8}{24}$

b $\frac{1}{3}$

c $\frac{1}{2}$

d $\frac{2}{6}$

3 Which fraction is the greatest?

a $\frac{4}{9}$

b $\frac{5}{6}$

c $\frac{2}{3}$

d $\frac{13}{18}$

4 Which fraction is the smallest value?

a $\frac{3}{3}$

b $\frac{1}{2}$

c $\frac{3}{12}$

d $\frac{1}{3}$

5 Which fraction is the smallest value?

a $\frac{3}{4}$

b $\frac{2}{3}$

c $\frac{1}{2}$

d $\frac{5}{12}$

6 Order these fractions in ascending order

$$\frac{25}{30}, \frac{9}{10}, \frac{4}{5}$$

a $\frac{4}{5}, \frac{9}{10}, \frac{25}{30}$

b $\frac{25}{30}, \frac{9}{10}, \frac{4}{5}$

c $\frac{4}{5}, \frac{25}{30}, \frac{9}{10}$

d $\frac{25}{30}, \frac{9}{10}, \frac{4}{5}$

Comparing fractions

1 Which fraction is smallest?

a $\frac{11}{10}$

b $\frac{4}{11}$

c $\frac{1}{2}$

d $\frac{1}{5}$

2 What is a possible value that will make this statement true?

$$\frac{4}{?} < \frac{20}{35}$$

a 5

b 6

c 7

d 8

3 What fraction is greater than $\frac{3}{8}$?

a $\frac{4}{16}$

b $\frac{9}{24}$

c $\frac{3}{9}$

d $\frac{14}{32}$

4 What fraction is greater than $\frac{4}{10}$?

a $\frac{3}{10}$

b $\frac{2}{5}$

c $\frac{1}{5}$

d $\frac{1}{2}$

5 What fraction is greater than $\frac{4}{16}$?

a $\frac{1}{3}$

b $\frac{3}{16}$

c $\frac{1}{4}$

d $\frac{1}{5}$

6 These fractions are in ascending order. What could the missing number be?

$$\frac{2}{5}, \frac{1}{7}, ?, \frac{2}{18}$$

a $\frac{1}{13}$

b $\frac{2}{15}$

c $\frac{1}{9}$

d $\frac{2}{19}$