

Student Name

Mathematics Stage 4

FRACTIONS DECIMALS PERCENTAGES

Book 4 Identify and make use of the relationship between fractions, decimals, and percentages to carry out simple conversions

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OVERVIEW

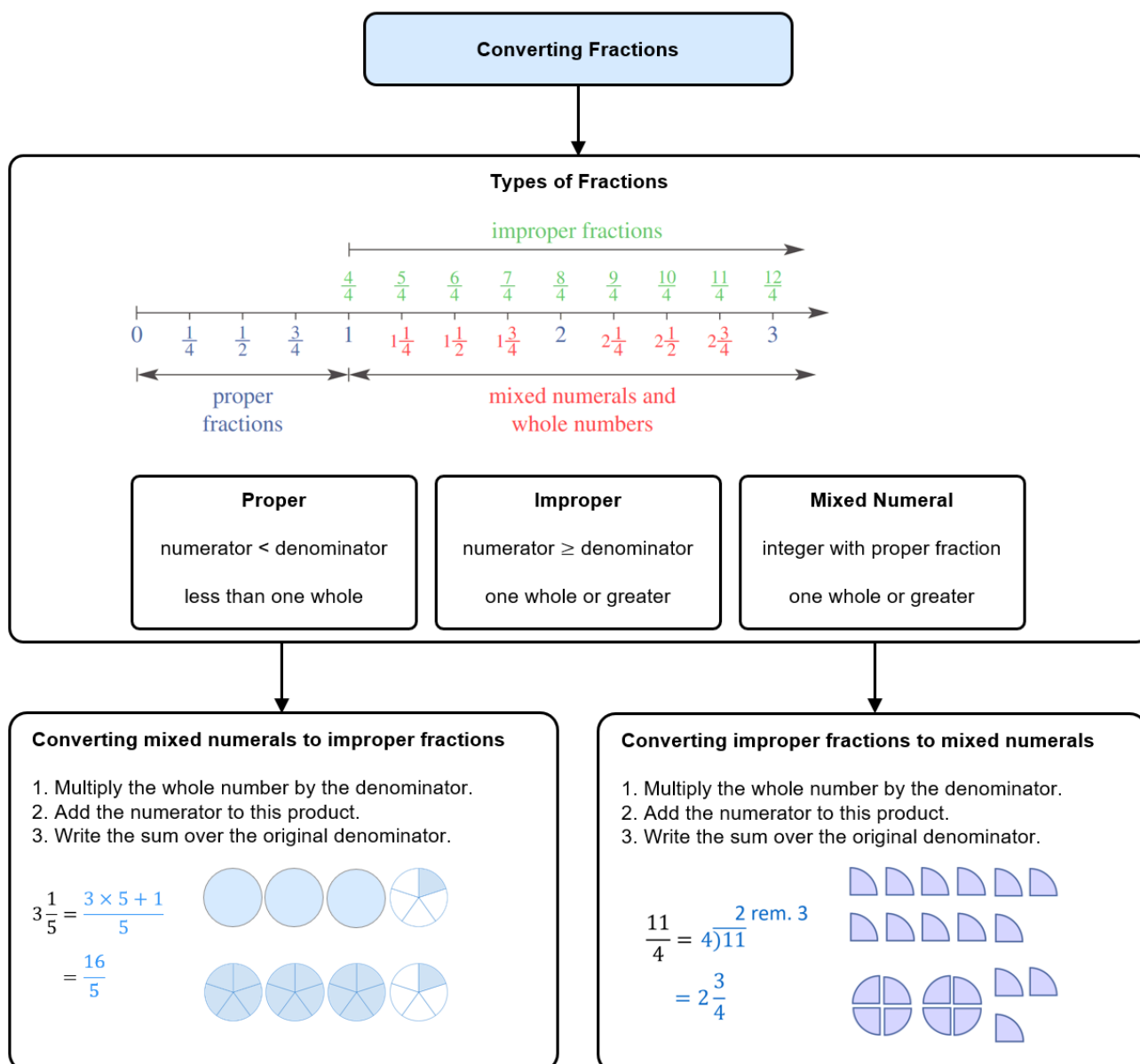
SYLLABUS CONTENT

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

Identify and make use of the relationship between fractions, decimals and percentages to carry out simple conversions

- Define rational numbers as numbers that can be written in the form $\frac{a}{b}$, where a and b are integers and $b \neq 0$
- Classify fractions and percentages as rational numbers
- Recognise and explain that numbers with terminating or recurring decimals are rational
- Represent fractions as decimals (terminating and recurring) and percentages
- Represent terminating decimals as fractions and percentages
- Represent improper fractions as mixed numbers and decimals, and vice versa
- Represent percentages as fractions and decimals

SUMMARY



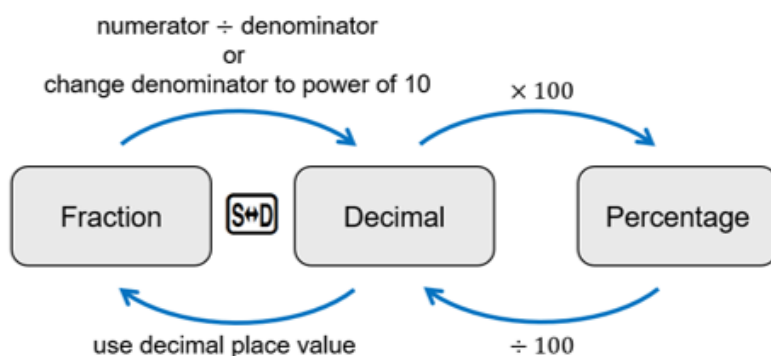
Converting FDP

Rational Numbers

A rational number can be written as $\frac{a}{b}$ where a and b are integers, and $b \neq 0$.

Fractions	Integers	Percentages	Terminating Decimals	Recurring Decimals
$\frac{2}{3}$	$2 \rightarrow \frac{2}{1}$	$47\% \rightarrow \frac{47}{100}$	$0.125 \rightarrow \frac{125}{1000}$	$0.666666 \dots \rightarrow \frac{2}{3}$

Converting between Fractions Decimals Percentages



Decimals to Fractions

- Convert decimal to fraction using place value of the digits.
- Simplify the fraction.

$$0.6 = \frac{6}{10} \\ = \frac{2}{5}$$

$$0.85 = \frac{85}{100} \\ = \frac{17}{20}$$

Fractions to Decimals using Equivalent Fractions

- Rewrite fraction with denominator of a power of 10.
- Use decimal place value to convert fraction to a decimal.

$$\frac{1}{5} = \frac{2}{10} \\ = 0.2$$

$$\frac{11}{20} = \frac{55}{100} \\ = 0.55$$

Percentage to Decimal

- Divide the percentage by 100.
To divide by 100, move the decimal 2 places to the left.

$$82\% = 82 \div 100 \\ = 0.82$$

$$0.5\% = 0.5 \div 100 \\ = 0.005$$

Decimal to Percentage

- Multiply the decimal by 100.
To multiply by 100, move the decimal 2 places to the right.

$$0.48 = 0.48 \times 100\% \\ = 48\%$$

$$2.5 = 2.5 \times 100\% \\ = 250\%$$

Percentage to Fraction

- Write the percentage as a fraction with denominator 100.
- Simplify the fraction.

$$6\% = \frac{6}{100} \\ = \frac{3}{50}$$

$$120\% = \frac{120}{100} \\ = \frac{12}{10} = \frac{6}{5}$$

$$10.5\% = \frac{10.5}{100} \\ = \frac{21}{200}$$

REVIEW OF PRIOR KNOWLEDGE

1 Work out the following:

a $2 \times 4 + 3$

b $6 \times 7 + 3$

c $4 \times 9 + 3$

2 Determine the quotient and remainder of these divisions:

a $9 \div 4$

b $13 \div 5$

c $26 \div 3$

d $33 \div 6$

e $21 \div 7$

f $55 \div 12$

3 Circle the fractions, decimals and percentages that are greater than one whole.

99% $\frac{7}{6}$ 0.107 2.56 123% $\frac{4}{19}$ 101%
 1.001 $\frac{15}{8}$ $\frac{12}{99}$ 17.001 3076% 62.5% 0.879

4 Simplify these fractions.

a $\frac{10}{22}$

b $\frac{14}{35}$

c $\frac{12}{18}$

d $\frac{46}{50}$

e $\frac{75}{100}$

f $\frac{550}{1000}$

5 Express these percentages as a fraction.

a 50%

b 25%

c 75%

d 10%

e 20%

f 80%

6 Express these decimals as a fraction.

a 0.5

b 0.1

c 0.05

d 0.85

e 0.7

f 0.002

7 Express these recurring decimals using dot or bar notation.

a 0.777777777777 ...

b 0.37777777777777 ...

c 0.82828282828282 ...

d 0.872872872872872 ...

e 0.702170217021 ...

f 0.82555555555555 ...

8 Using a calculator, express these fractions as decimals using division.

a $\frac{1}{3}$

b $\frac{1}{6}$

c $\frac{10}{12}$

d $\frac{17}{18}$

e $\frac{293}{300}$

f $\frac{4}{9}$

9 Write down the place value of the 6 in each number.

a 362

b 0.06

c 27.6

d 0.60

e 28.006

f 6.291

10 Write each of these as decimals and fractions.

a One tenth

b One hundredth

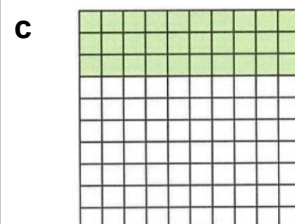
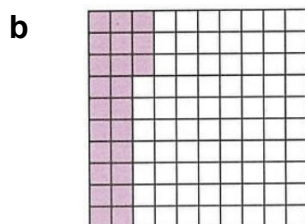
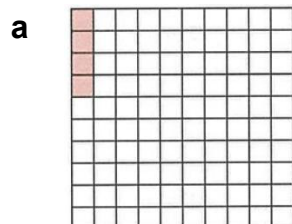
c Three hundredths

d Five tenths

e Twenty hundredths

f Twenty tenths

11 Determine how much of each hundred-square is shaded, as a fraction and a decimal.



12 Determine the equivalent fraction.

a $\frac{4}{5} = \frac{\square}{10}$

b $\frac{1}{2} = \frac{\square}{10}$

c $\frac{7}{25} = \frac{\square}{100}$

d $\frac{23}{50} = \frac{\square}{100}$

e $\frac{7}{20} = \frac{\square}{100}$

f $\frac{3}{8} = \frac{\square}{1000}$

13 Work out the following:

a $70 \div 100$

b $21 \div 100$

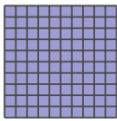
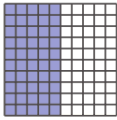
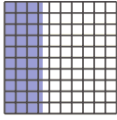
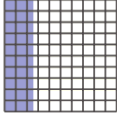
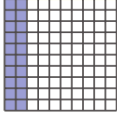
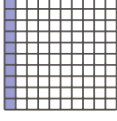
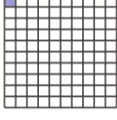
c 0.06×100

d $9 \div 100$

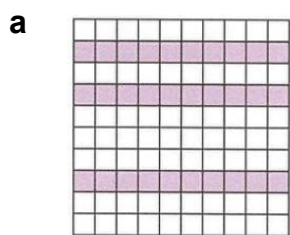
e $0.2 \div 100$

f 0.003×100

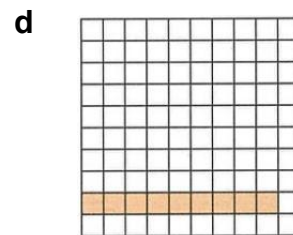
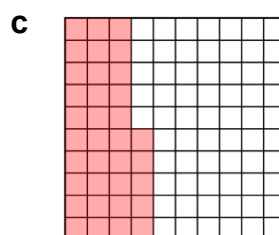
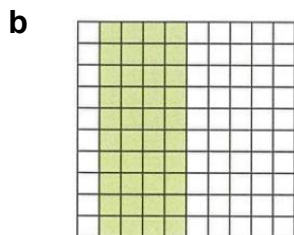
14 Fill in this table of common conversions.

Words	Diagram	Fraction	Decimal	Percentage
one whole				
one-half				
one-third				
one-quarter				
one-fifth				
one-tenth				
one-hundredth				

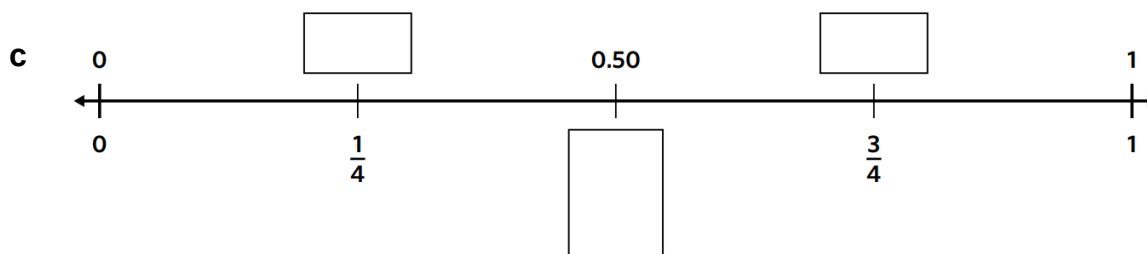
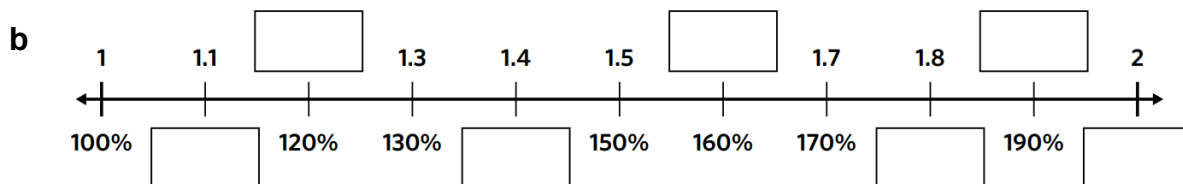
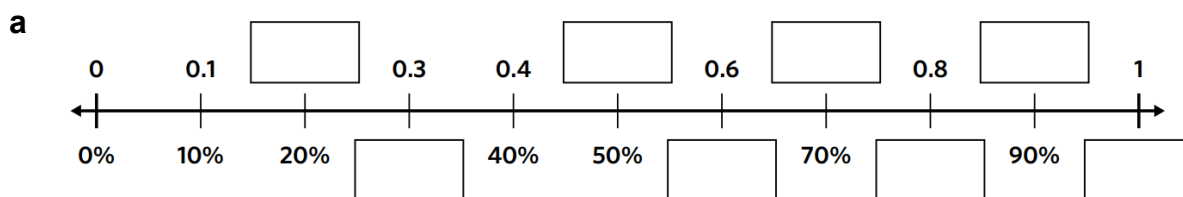
15 Write the fraction out of 100, the decimal, and the percentage.



$\frac{\quad}{100} = \dots\dots\dots$
 $= \dots\dots\%$

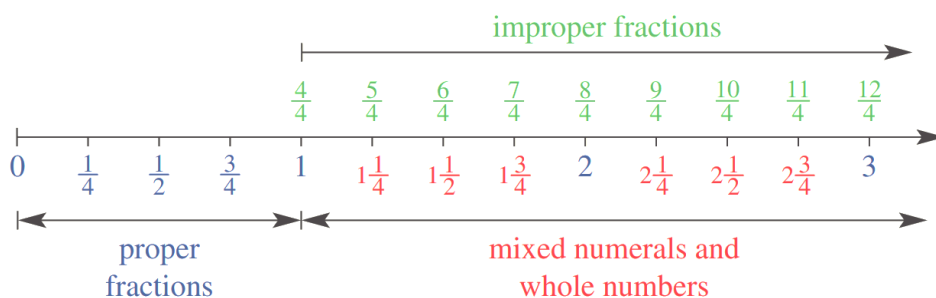


16 Complete these number lines.



MIXED NUMBERS AND IMPROPER FRACTIONS

Proper	Improper	Mixed Numeral
$\frac{3}{4}$	$\frac{3}{3}, \frac{4}{3}$	$2\frac{1}{2}$
Numerator < denominator	Numerator $\geq$ denominator	Integer with proper fraction
Less than one whole	One whole or greater	One whole or greater



Example Classify fractions as proper, improper, and mixed numerals.

a	$\frac{1}{3}$	b	$\frac{99}{100}$	c	$\frac{99}{98}$	d	$1\frac{2}{3}$
e	$3\frac{1}{7}$	f	$\frac{8}{12}$	g	$\frac{9}{11}$	h	$\frac{12}{8}$

Key ideas

- Improper fractions have a numerator that is than the denominator.
- A number is another way of representing an improper fraction, it shows how many there are.
- Both mixed numbers and improper fractions represent values greater than
- An improper fraction is a whole number if the is a multiple of the denominator.

1 Which of these fractions are less than one whole? How do you know?

$\frac{3}{5}$ $\frac{7}{9}$ $\frac{15}{17}$ $\frac{21}{20}$ $\frac{15}{15}$ $\frac{4}{3}$ $\frac{7}{11}$

$\frac{11}{7}$ $\frac{3}{3}$ $\frac{15}{14}$ $\frac{37}{37}$ $\frac{1}{8}$ $\frac{9}{7}$ $\frac{4}{4}$

$\frac{3}{5}, \frac{7}{9}, \frac{15}{17}, \frac{7}{11}, \frac{1}{8}$. The numerator is less than the denominator.

2 Which of these fractions are equal to one whole? How do you know?

$\frac{3}{5}$ $\frac{7}{9}$ $\frac{15}{17}$ $\frac{21}{20}$ $\frac{15}{15}$ $\frac{4}{3}$ $\frac{7}{11}$

$\frac{11}{7}$ $\frac{3}{3}$ $\frac{15}{14}$ $\frac{37}{37}$ $\frac{1}{8}$ $\frac{9}{7}$ $\frac{4}{4}$

$\frac{15}{15}, \frac{3}{3}, \frac{37}{37}, \frac{4}{4}$. The numerator is equal to the denominator.

3 Which of these fractions are greater than one whole? How do you know?

$\frac{3}{5}$ $\frac{7}{9}$ $\frac{15}{17}$ $\frac{21}{20}$ $\frac{15}{15}$ $\frac{4}{3}$ $\frac{7}{11}$

$\frac{11}{7}$ $\frac{3}{3}$ $\frac{15}{14}$ $\frac{37}{37}$ $\frac{1}{8}$ $\frac{9}{7}$ $\frac{4}{4}$

$\frac{7}{9}, \frac{21}{20}, \frac{4}{3}, \frac{11}{7}, \frac{15}{14}, \frac{9}{7}$. The numerator is greater than the denominator.

4 Between which two whole numbers do these mixed numbers lie?

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

3 and 4

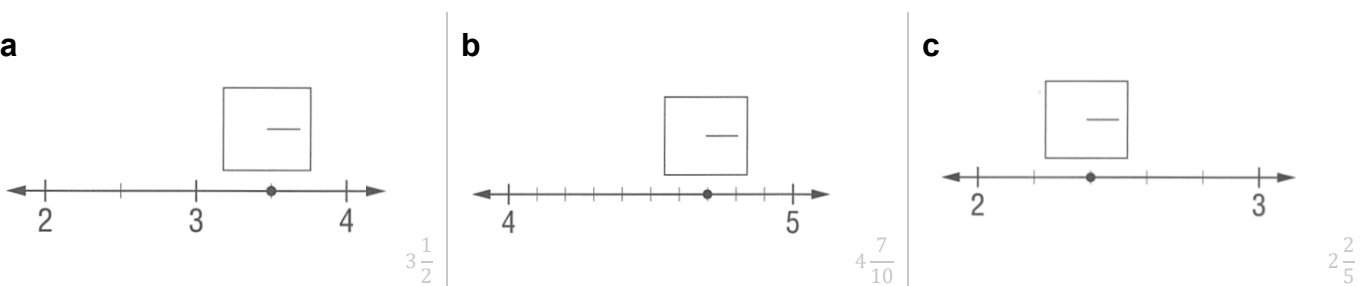
b $10\frac{3}{7}$

10 and 11

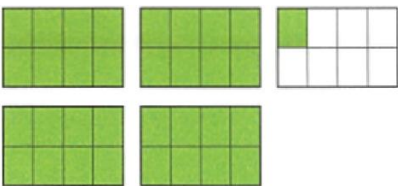
c $23\frac{7}{22}$

23 and 24

5 Write the mixed numbers at the marked points.



6 Consider the diagram:



- a

How many wholes are there in the diagram?

4
- b

What does the diagram represent as a mixed numeral?

$4\frac{1}{8}$
- c

How many eighths are shown in the diagram?

33
- d

Write this as an improper fraction.

$\frac{33}{8}$

7 Consider the number line:



a What fraction does each interval represent?

$\frac{1}{8}$

b What mixed number is the arrow pointing to?

$1\frac{7}{8}$

c How many eighths is this?

15

8 What mixed number is the arrow pointing at?



$1\frac{5}{8}$



$1\frac{7}{8}$



$2\frac{1}{5}$



$1\frac{1}{3}$

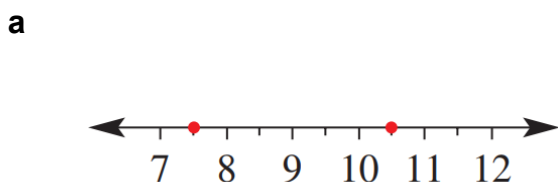


$2\frac{3}{5}$

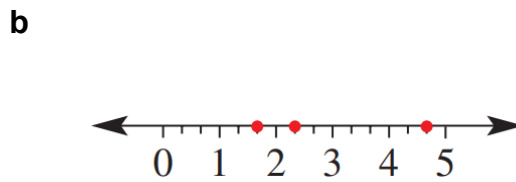


$2\frac{4}{5}$

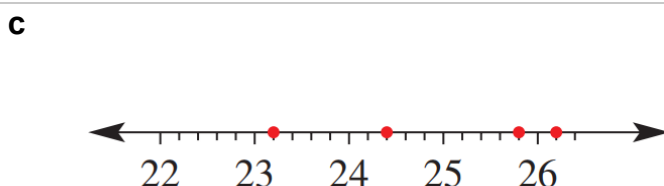
9 Identify the mixed numbers shown on these number lines.



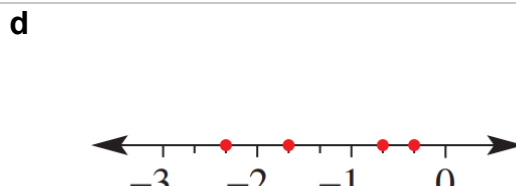
$7\frac{1}{2}, 10\frac{1}{2}$



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



$23\frac{1}{5}, 24\frac{2}{5}, 25\frac{4}{5}, 26\frac{1}{5}$

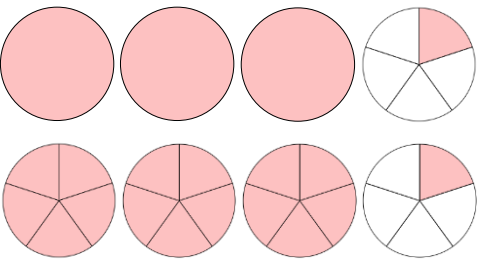


$-2\frac{1}{3}, -1\frac{2}{3}, -\frac{2}{3}, -\frac{1}{3}$

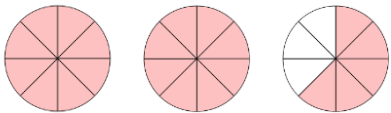
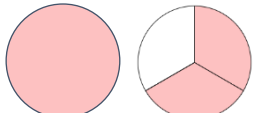
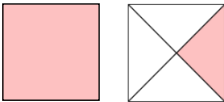
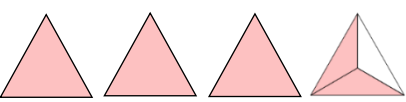
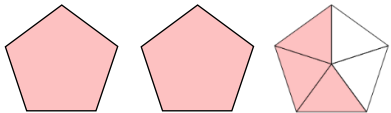
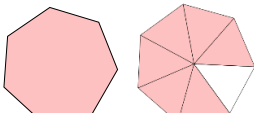
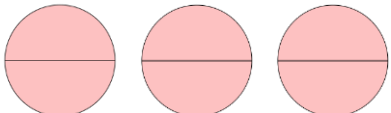
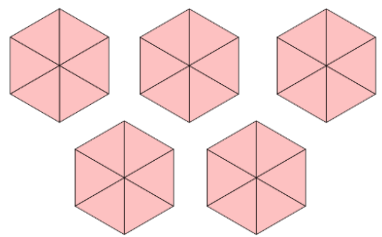
CONVERTING MIXED NUMBERS AND IMPROPER FRACTIONS

- To convert **mixed numbers** to **improper fractions**:
 - Split each whole into parts based on the **denominator**.
 - Count the number of shaded parts.

Example Convert mixed numbers to improper fractions visually.

$3\frac{1}{5}$ $= \frac{16}{5}$		Explain how we knew how many parts to split each whole into. <i>Since the is 5, we split each whole into 5 parts.</i>
--	---	---

Convert these mixed numbers to improper fractions.

a $2\frac{5}{8}$ $= \frac{\quad}{8}$	 $\frac{21}{8}$	b $1\frac{2}{3}$ $=$	 $\frac{5}{3}$
c $1\frac{1}{4}$ $= \frac{\quad}{4}$	 $\frac{5}{4}$	d $3\frac{2}{3}$ $=$	 $\frac{11}{3}$
e $2\frac{3}{5}$ $= \frac{\quad}{5}$	 $\frac{13}{5}$	f $1\frac{6}{7}$ $= \frac{\quad}{7}$	 $\frac{13}{7}$
g 3 $= \frac{\quad}{2}$	 $\frac{6}{2}$	h 5 $= \frac{\quad}{6}$	 $\frac{30}{6}$

CONVERTING IMPROPER FRACTIONS TO MIXED NUMBERS

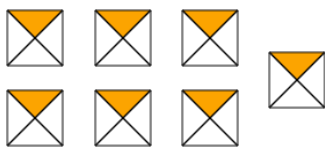
- To convert **improper fractions** to **mixed numbers**:
 - Group parts into wholes, then count the leftovers.

Example Convert improper fractions to mixed numbers.

$\frac{5}{2}$ 	Explain how we knew how many wholes there were. <i>We combined 4 to make 2 wholes.</i>
$= 2\frac{1}{2}$ 	

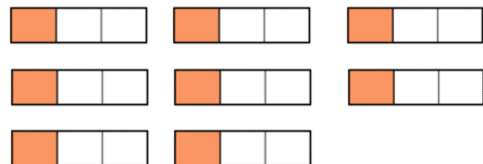
Convert these improper fractions to mixed numbers.

a $\frac{7}{4}$



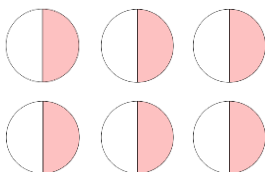
$1\frac{3}{4}$

b $\frac{8}{3}$



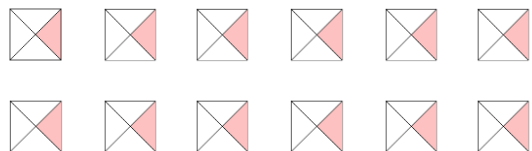
$2\frac{2}{3}$

c $\frac{6}{2}$



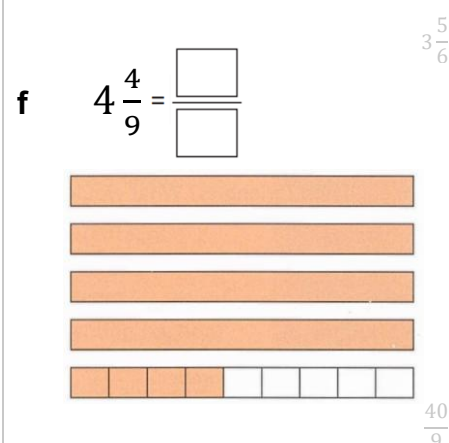
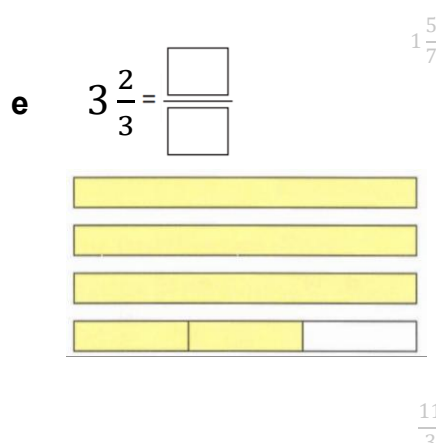
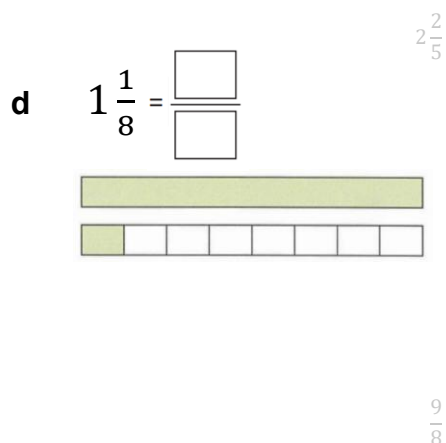
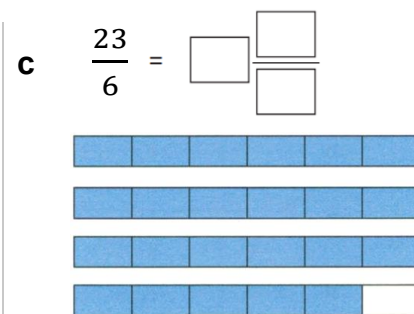
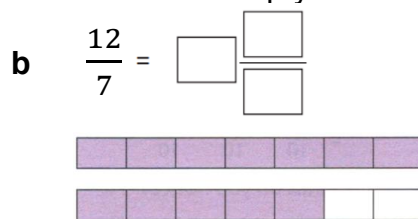
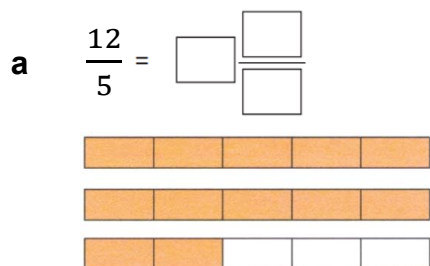
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d $\frac{12}{4}$

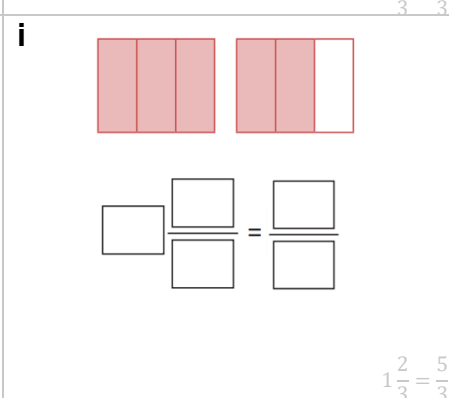
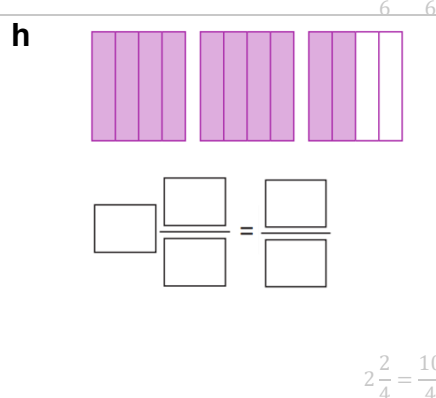
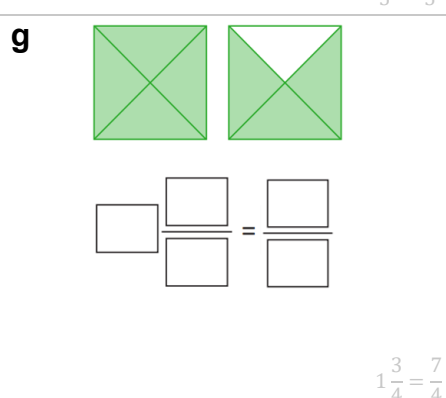
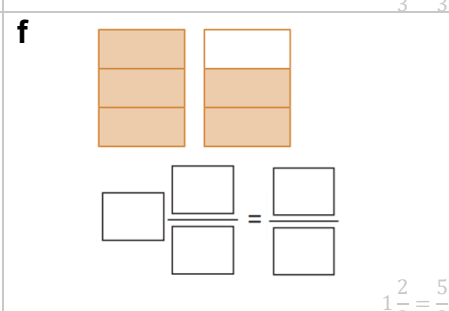
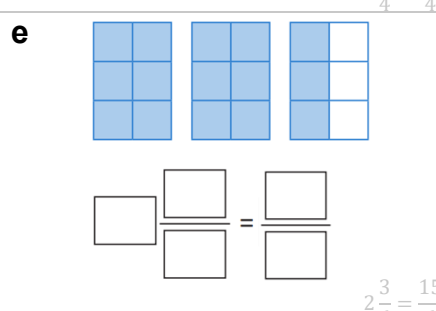
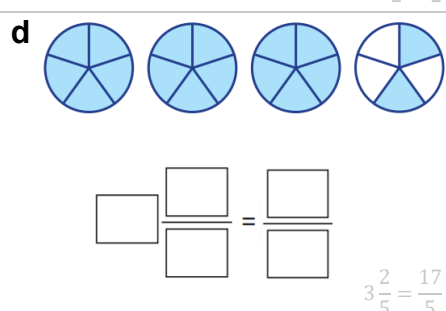
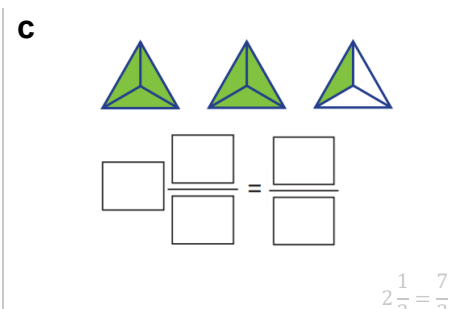
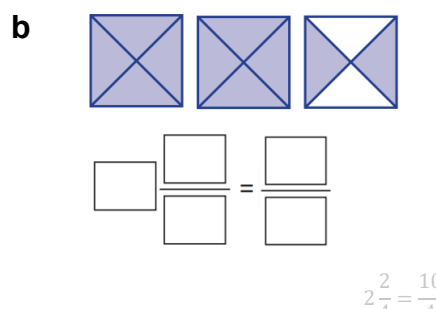
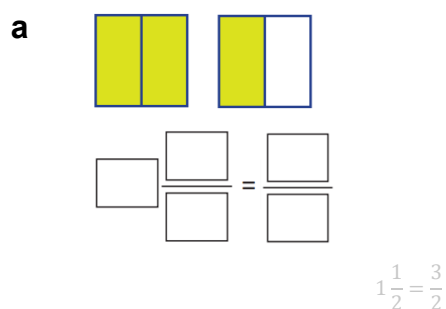


3

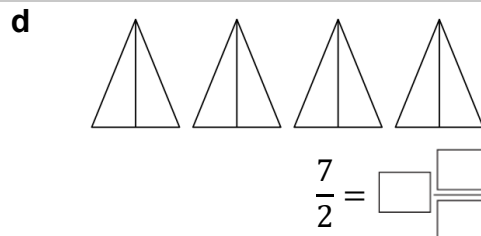
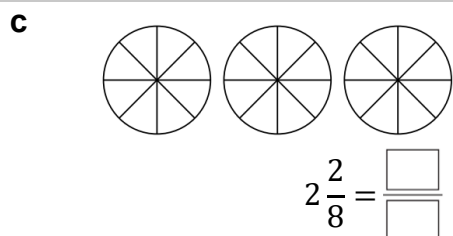
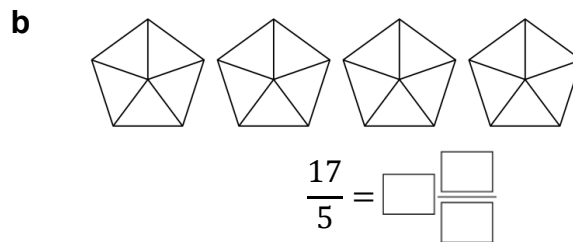
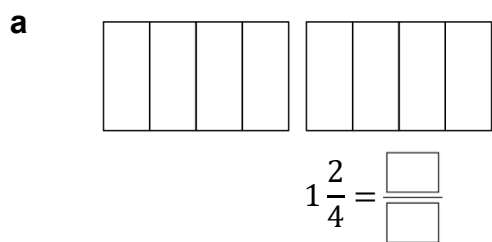
1 Convert these fractions. Use the bar models to help you.



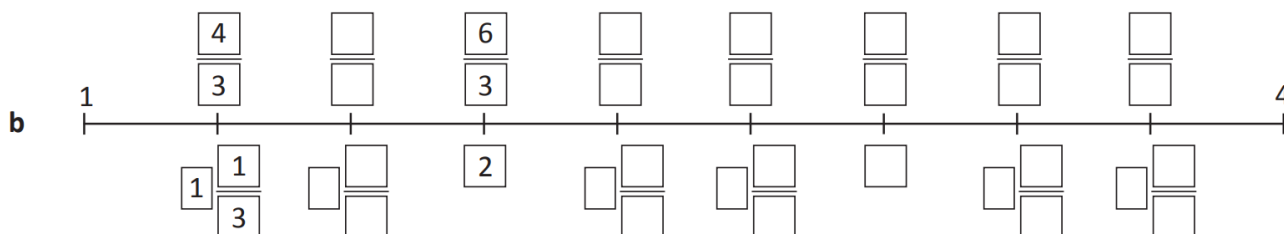
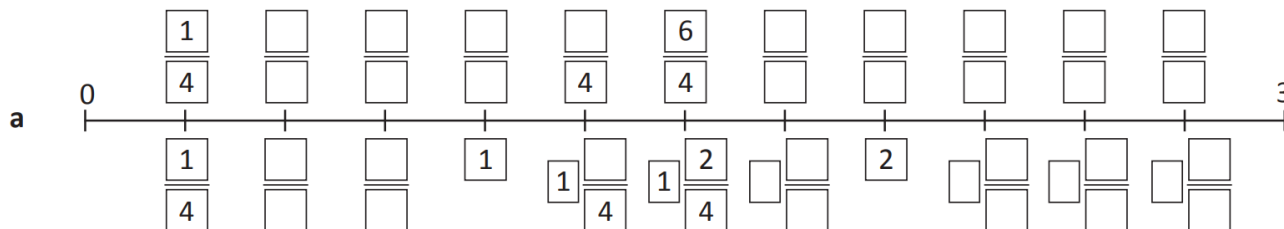
2 For each of these diagrams, write the mixed numeral and the improper fraction.



3 Shade these shapes to represent the given fraction and fill in the boxes.



4 Complete these number lines.



5 Use the number lines above to complete these.

a $1\frac{1}{3} = \frac{\boxed{}}{\boxed{}}$

b $2\frac{1}{3} = \frac{\boxed{}}{\boxed{}}$

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

d $\frac{\boxed{}}{\boxed{}} = 2\frac{1}{3}$

e $\frac{\boxed{}}{\boxed{}} = 1\frac{3}{4}$

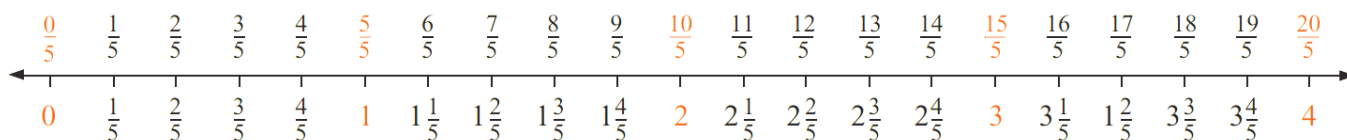
f $\frac{\boxed{}}{\boxed{}} = 1\frac{2}{3}$

g $\frac{6}{4} = \frac{\boxed{}}{\boxed{}}$

h $\frac{4}{3} = \frac{\boxed{}}{\boxed{}}$

i $\frac{\boxed{}}{\boxed{}} = 2\frac{3}{4}$

6 Use the number line to answer the questions.



Write these as mixed numbers:

a $\frac{7}{5}$	b $\frac{9}{5}$	c $\frac{12}{5}$	d $\frac{19}{5}$
$1\frac{2}{5}$	$1\frac{4}{5}$	$2\frac{2}{5}$	$3\frac{4}{5}$

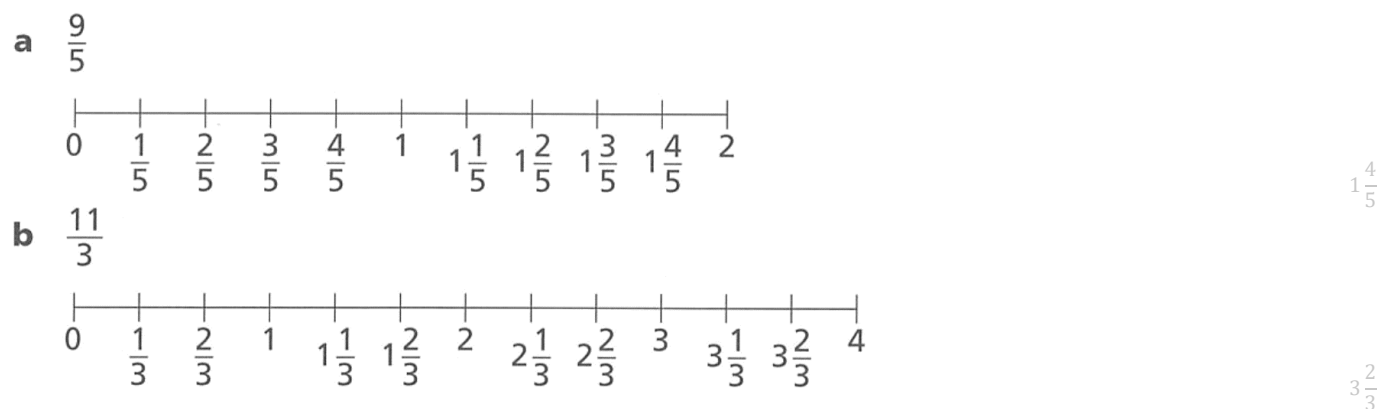
Write these as improper fractions

a $1\frac{3}{5}$	b $2\frac{1}{5}$	c $2\frac{4}{5}$	d $3\frac{3}{5}$
$\frac{8}{5}$	$\frac{11}{5}$	$\frac{14}{5}$	$\frac{18}{5}$

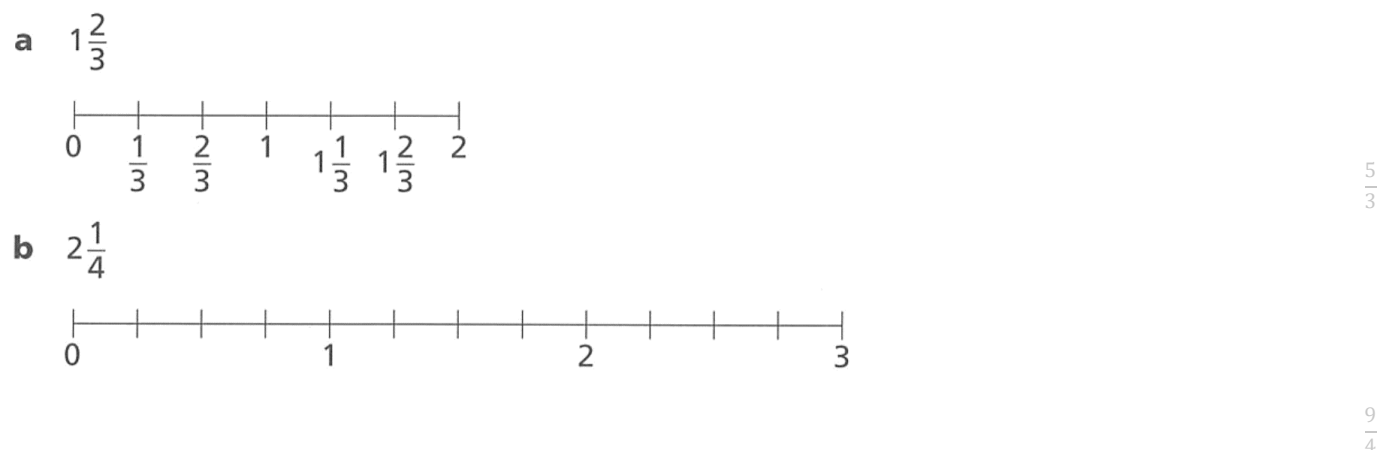
How many fifths are in:

a 1 whole	b 2 wholes	c 3 wholes	d 10 wholes
5	10	15	50

7 Use the number lines to convert these improper fractions to mixed numbers.

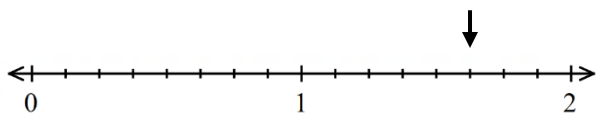


8 Use the number lines to convert each mixed number to an improper fraction.



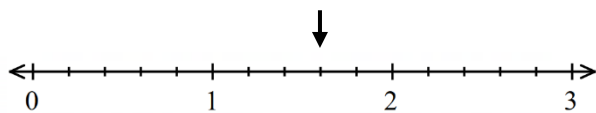
9 Determine the improper fraction shown by the number line.

a



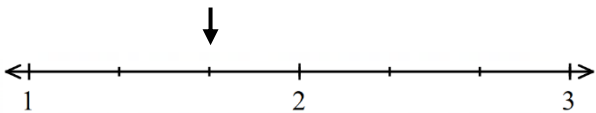
$1\frac{5}{8}$

b



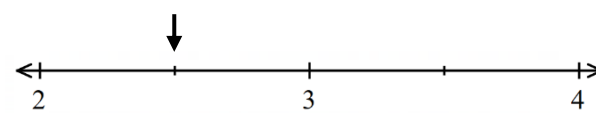
$1\frac{3}{5}$

c



$1\frac{2}{3}$

d



$2\frac{1}{2}$

e



$1\frac{2}{3}$

f



$1\frac{3}{4}$

10 Fill in the gaps in these number patterns.

a

$\frac{3}{7}, \frac{5}{7}, 1, 1\frac{2}{7}, _, 1\frac{6}{7}, _, 2\frac{3}{7}, 2\frac{5}{7}, _, 3\frac{2}{7}, _, _$

$1\frac{4}{7}, 2\frac{1}{7}, 3, 3\frac{4}{7}, 3\frac{6}{7}$

b

$\frac{3}{5}, 1\frac{1}{5}, 1\frac{4}{5}, _, 3, 3\frac{3}{5}, _, _, 5\frac{2}{5}, _, 6\frac{3}{5}, _$

$2\frac{2}{5}, 4\frac{1}{5}, 4\frac{4}{5}, 6, 7\frac{1}{5}$

MIXED NUMBERS AND IMPROPER FRACTIONS USING RULES

CONVERTING MIXED NUMBERS TO IMPROPER FRACTIONS

- To convert **mixed numbers** to **improper fractions**:
 - Multiply the whole number by the denominator.
 - Add the numerator to this product.
 - Write the sum over the original denominator.

Converting Mixed Numbers to Improper Fractions
$\frac{(\text{denominator} \times \text{whole number}) + \text{numerator}}{\text{denominator}}$
$a\frac{b}{n} = \frac{a \times n + b}{n}$

Example Convert decimals to fractions and percentages equivalent fractions.

$2\frac{1}{3} = \frac{2 \times 3 + 1}{3}$ $= \frac{7}{3}$	Show why this rule works using the visual model of $2\frac{1}{3}$
---	--

Convert these mixed numbers to improper fractions.

a $2\frac{1}{3} = \frac{\times}{3} + \frac{+}{3}$ $= \frac{\quad}{\quad}$ $\frac{7}{3}$	b $4\frac{5}{6} = \frac{\times}{6} + \frac{+}{6}$ $= \frac{\quad}{\quad}$ $\frac{29}{6}$	c $3\frac{2}{7} = \frac{\quad}{\quad}$ $= \frac{\quad}{\quad}$ $\frac{23}{7}$
d $1\frac{7}{8} = \frac{\quad}{\quad}$ $\frac{15}{8}$	e $5\frac{2}{3} = \frac{\quad}{\quad}$ $\frac{17}{3}$	f $11\frac{1}{4} = \frac{\quad}{\quad}$ $\frac{45}{4}$

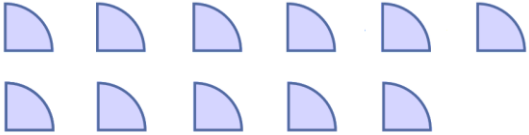
Key ideas

- To convert mixed numbers to improper fractions:
 - Multiply the whole number by the of the fraction.
 - Add the to the result.
 - Write the sum over the original of the fraction.

CONVERTING IMPROPER FRACTIONS TO MIXED NUMBERS

- To convert **improper fractions** to **mixed numbers**:
 1. Divide the numerator by the denominator.
 2. The quotient represents the whole number.
 3. Write the remainder over the original denominator.

Example Convert improper fractions to mixed numbers.

$\frac{11}{4} = 4 \overline{)11} \quad \begin{array}{l} \text{2 rem. 3} \\ \end{array} = 2 \frac{3}{4}$	Show why this rule works using the visual model of $\frac{11}{4}$ 
---	--

Convert these improper fractions to mixed numerals.

a $\frac{6}{5} = 1 \text{ rem. } 1$ $=$ $1 \frac{1}{5}$	b $\frac{13}{5} =$ $=$ $2 \frac{3}{5}$	c $\frac{7}{3} =$ $=$ $2 \frac{1}{3}$
d $\frac{23}{7} =$ $3 \frac{2}{7}$	e $\frac{12}{5} =$ $2 \frac{2}{5}$	f $\frac{27}{12} =$ $2 \frac{1}{4}$

Key ideas

- To convert improper fractions to mixed numbers:
 - a. Divide the by the
 - b. The is the number of wholes.
 - c. Write the over the original denominator of the fraction.

1 Convert these mixed numerals to improper fractions.

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

$$= \frac{4 \times \square + 1}{4} = \frac{\square}{4}$$

$$\frac{4 \times 3 + 1}{4} = \frac{13}{4}$$

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

$$= \frac{\square \times 2 + \square}{5} = \frac{\square}{\square}$$

$$\frac{5 \times 2 + 3}{5} = \frac{13}{5}$$

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

$$= \frac{2 \square 5 \square 1}{\square} = \frac{11}{\square}$$

$$\frac{2 \times 5 + 1}{2} = \frac{11}{2}$$

d $2\frac{1}{5}$

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

f $3\frac{1}{3}$

$$\frac{11}{5}$$

$$\frac{8}{5}$$

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

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

h $4\frac{2}{7}$

i $11\frac{1}{2}$

$$\frac{17}{3}$$

$$\frac{30}{7}$$

$$\frac{23}{2}$$

2 Convert these improper fractions to mixed numerals.

a $\frac{7}{5}$

$$7 \div 5 = 1 \text{ r } 2 = \square \frac{\square}{\square}$$

b $\frac{4}{3}$

$$4 \div 3 = \dots \text{ r } \dots = \square \frac{\square}{\square}$$

c $\frac{7}{4}$

$$7 \div 4 = \dots \text{ r } \dots = \square \frac{\square}{\square}$$

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

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

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

d $\frac{10}{4}$

e $\frac{21}{5}$

f $\frac{19}{6}$

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

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

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

g $\frac{41}{4}$

h $\frac{81}{10}$

i $\frac{78}{7}$

$$10\frac{1}{4}$$

$$8\frac{1}{10}$$

$$11\frac{1}{7}$$

3 Circle the improper fractions that are equivalent to integers.

$$\frac{17}{7}$$

$$\frac{51}{5}$$

$$\frac{70}{8}$$

$$\frac{64}{8}$$

$$\frac{100}{25}$$

$$\frac{49}{7}$$

$$\frac{63}{9}$$

$$\frac{42}{4}$$

$$\frac{64}{8}, \frac{100}{25}, \frac{49}{7}, \frac{63}{9}$$

4 Convert to an improper fraction.

a $1\frac{1}{5}$	b $2\frac{1}{5}$	c $3\frac{1}{5}$	d $3\frac{2}{5}$
$\frac{6}{5}$	$\frac{11}{5}$	$\frac{16}{5}$	$\frac{17}{5}$
e $3\frac{3}{5}$	f $3\frac{3}{10}$	g $3\frac{3}{9}$	h $4\frac{3}{9}$
$\frac{18}{5}$	$\frac{33}{10}$	$\frac{30}{9}$	$\frac{39}{9}$

5 Convert to a mixed number.

a $\frac{7}{4}$	b $\frac{9}{4}$	c $\frac{9}{8}$	d $\frac{18}{8}$
$1\frac{3}{4}$	$2\frac{1}{4}$	$1\frac{1}{8}$	$2\frac{1}{4}$
e $\frac{36}{8}$	f $\frac{36}{4}$	g $\frac{36}{2}$	h $\frac{37}{2}$
$4\frac{1}{2}$	9	18	$18\frac{1}{2}$

6 Complete the table.

Division	Written Calculation	Mixed Number	Improper
$13 \div 5$	$\begin{array}{r} 2 \text{ r } 3 \\ 5 \overline{)13} \end{array}$	$2\frac{3}{5}$	$\frac{13}{5}$
$11 \div 4$		$2\frac{3}{4}$	$\frac{11}{4}$
$12 \div 7$		$1\frac{5}{7}$	$\frac{12}{7}$
$18 \div 5$	$\begin{array}{r} 3 \text{ r } 3 \\ 5 \overline{)18} \end{array}$	$3\frac{3}{5}$	$\frac{18}{5}$
$17 \div 2$	$\begin{array}{r} 8 \text{ r } 1 \\ 2 \overline{)17} \end{array}$	$8\frac{1}{2}$	$\frac{17}{2}$
$21 \div 5$		$4\frac{1}{5}$	$\frac{21}{5}$
$11 \div 3$		$3\frac{2}{3}$	$\frac{11}{3}$
$22 \div 7$		$3\frac{1}{7}$	$\frac{22}{7}$
$39 \div 7$		$5\frac{4}{7}$	$\frac{39}{7}$

- 7** Four friends order three large pizzas for their dinner. Each pizza is cut into eight equal slices. Simone has three slices, Isabella has four slices, Mark has five slices and Alex has three slices.
- How many pizza slices do they eat in total?
15
 - How many pizzas do they eat in total as a mixed numeral?
 $1\frac{7}{8}$
 - How many pizza slices are left uneaten?
9
 - How many pizzas are left uneaten as a mixed numeral?
 $1\frac{1}{8}$
- 8** Convert to a mixed number, then simplify.
- | | | | |
|--------------------------|--------------------------|--------------------------|--------------------------|
| a $\frac{10}{4}$ | b $\frac{28}{10}$ | c $\frac{16}{12}$ | d $\frac{8}{6}$ |
| $2\frac{1}{2}$ | $2\frac{4}{5}$ | $1\frac{1}{3}$ | $1\frac{1}{3}$ |
| e $\frac{18}{16}$ | f $\frac{30}{9}$ | g $\frac{40}{15}$ | h $\frac{60}{25}$ |
| $1\frac{1}{8}$ | $3\frac{1}{3}$ | $2\frac{2}{3}$ | $2\frac{2}{5}$ |
- 9** Use $<$, $>$, or $=$ to compare these pairs of numbers.
- | | | | |
|---|---|-------------------------------------|---|
| a $3\frac{4}{5} \bigcirc \frac{18}{5}$ | b $7\frac{2}{3} \bigcirc \frac{23}{3}$ | c $\frac{96}{7} \bigcirc 14$ | d $\frac{71}{9} \bigcirc \frac{35}{3}$ |
| $>$ | $=$ | $<$ | $<$ |
- 10**
- Patricia has three sandwiches that are cut into quarters, and she eats all but one-quarter. How many quarters does she eat?
11 quarters
 - Phillip has five sandwiches that are cut into thirds, and he eats all but one-third. How many thirds does he eat?
14 thirds
 - Crystal has x sandwiches that are cut into quarters and she eats all but one-quarter. How many quarters does she eat?
 $4x - 1$ quarters
 - Byron has y sandwiches that are cut into thirds and he eats all but one-third. How many thirds does he eat?
 $3y - 1$ thirds
 - Felicity has m sandwiches that are cut into n pieces and she eats them all. How many pieces does she eat?
 mn pieces

11 Jakub has some number cards.

15

10

9

4

3

He wants to make a fraction using two of the cards.
He wants to make a number as close to 4 as he can. Which two cards should he choose?
Explain your reasoning.

15 and 4.
For a fraction to be 4, the numerator must be 4 times the denominator.
15 and 4 are the closest pair possible.

12 Fill in the missing number to make these equations true.

a $2\frac{\square}{5} = \frac{11}{5}$

b $\square\frac{3}{4} = \frac{7}{4}$

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

d $\frac{24}{\square} = \square\frac{3}{7}$

e $\frac{39}{7} = 5\frac{\square}{7}$

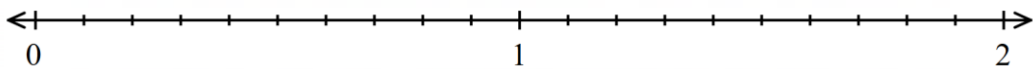
f $\frac{39}{7} = 4\frac{\square}{7}$

g $\frac{39}{7} = 3\frac{\square}{7}$

h $\frac{39}{7} = 2\frac{\square}{7}$

13 Consider the number line below.

- a Show the position of 1.6
- b Show the position of $\frac{7}{10}$
- c Estimate the position of 0.75
- d If the line represents 2 m, show the position of 90 cm.



14 A fully simplified mixed numeral between 2 and 3 is written as an improper fraction with a numerator of 17. List all the possible mixed numerals matching this description.

$2\frac{5}{6}, 2\frac{3}{7}, 2\frac{1}{8}$

REVIEW OF COMMON CONVERSIONS

- Fractions, decimals, and percentages are three different ways of representing values between whole numbers.
- Memorise these common conversions between fractions, decimals, and percentages.

Fraction	Decimal	Percentage
1	1	100%
$\frac{1}{2}$	0.5	50%
$\frac{1}{3}$	0.3	33.3%
$\frac{1}{4}$	0.25	25%
$\frac{1}{5}$	0.2	20%
$\frac{1}{10}$	0.1	10%
$\frac{1}{20}$	0.05	5%
$\frac{1}{50}$	0.02	2%
$\frac{1}{100}$	0.01	1%

1 Fill in the table.

Fraction	Decimal	Percentage
1	1	100%
$\frac{1}{2}$	0.5	50%
$\frac{1}{3}$	0.3	33.3%
$\frac{1}{4}$	0.25	25%
$\frac{1}{5}$	0.2	20%
$\frac{1}{10}$	0.1	10%
$\frac{1}{20}$	0.05	5%
$\frac{1}{50}$	0.02	2%
$\frac{1}{100}$	0.01	1%
$\frac{1}{10}$	0.1	10%
$\frac{1}{5}$	0.2	20%
$\frac{1}{4}$	0.25	25%
$\frac{1}{2}$	0.5	50%
$\frac{1}{3}$	0.3	33.3%
$\frac{1}{50}$	0.02	2%
$\frac{1}{20}$	0.05	5%
$\frac{1}{3}$	0.3	33.3%
$\frac{1}{20}$	0.05	5%

RATIONAL NUMBERS

- A **rational** number can be written as a ratio (or fraction):

$$\frac{a}{b}$$

where a and b are integers, and $b \neq 0$

- Rational numbers include:

Fractions	Integers	Percentages	Terminating Decimals	Recurring Decimals
$\frac{2}{3}$	$2 \rightarrow \frac{2}{1}$	$47\% \rightarrow \frac{47}{100}$	$0.125 \rightarrow \frac{125}{1000}$	$0.666666 \dots \rightarrow \frac{2}{3}$

FOUNDATION

- Describe what is meant by a “rational” number.

A number that can be written as a fraction with integer numerator and denominator.

- Explain why all integers are rational numbers.

Every integer can be written with a denominator of 1.

Write these integers in the form $\frac{a}{b}$ where a and b are integers.

a 5	b 65	c 173	d -173
$\frac{5}{1}$	$\frac{65}{1}$	$\frac{173}{1}$	$-\frac{173}{1}$

- Explain why all percentages are rational numbers.

Every percentage can be written as a fraction over a power of 10.

Write these percentages in the form $\frac{a}{b}$ where a and b are integers.

a 60%	b 1%	c 0.5%	d 12.5%
$\frac{60}{100} = \frac{3}{5}$	$\frac{1}{100}$	$\frac{0.5}{100} = \frac{5}{1000} = \frac{1}{200}$	$\frac{12.5}{100} = \frac{125}{1000} = \frac{1}{8}$

- Explain why all terminating decimals are rational numbers.

We can write terminating decimals as a fraction over a power of 10.

Write these terminating decimals in the form $\frac{a}{b}$ where a and b are integers.

a 0.4	b 0.42	c 0.425	d -1.0008
$\frac{4}{10} = \frac{2}{5}$	$\frac{42}{100} = \frac{21}{50}$	$\frac{425}{1000} = \frac{17}{40}$	$-\frac{10008}{10000} = -1\frac{8}{10000} = -1\frac{1}{1250}$

- Simplify all the fractions in questions 3 to 5, if you haven't already.

CONVERTING FRACTIONS AND DECIMALS

DECIMALS TO FRACTIONS USING PLACE VALUE

- To convert **decimals** to **fractions**:
 - Write the decimal as a fraction using place value.
 - Count the decimal places.
 - Write the number without the decimal point as the numerator.
 - Put 1 followed by the same number of zeroes as decimal places for the denominator.
 - Simplify the fraction.

Example Convert decimals to fractions and percentages equivalent fractions.

$0.6 = \frac{6}{10}$ $= \frac{2}{5}$	How do we convert a decimal to a fraction using place value of the digits? <i>We look at the of the digit. The first decimal place is tenths, so we write it over</i>
$0.85 = \frac{85}{100}$ $= \frac{17}{20}$	How do you know when a fraction can be simplified? <i>A fraction can be simplified if the numerator and denominator share</i>

Write these decimals as fractions, then simplify if possible.

a $0.3 = \frac{\quad}{\quad}$ $\frac{3}{10}$	b $0.75 = \frac{\quad}{100} = \frac{\quad}{\quad}$ $\frac{3}{4}$	c $0.66 = \frac{\quad}{\quad} = \frac{\quad}{\quad}$ $\frac{33}{50}$
d $0.05 = \frac{\quad}{\quad}$ $\frac{1}{20}$	e $0.002 = \frac{\quad}{\quad}$ $\frac{1}{500}$	f $0.054 = \frac{\quad}{\quad}$ $\frac{27}{500}$
g $0.405 = \frac{\quad}{\quad}$ $\frac{81}{200}$	h $1.12 = \frac{\quad}{\quad}$ $\frac{28}{25}$	

FRACTIONS TO DECIMALS USING EQUIVALENT FRACTIONS

- To convert **fractions** to **decimals**:
 - Rewrite the fraction with a denominator of a power of 10: 10, 100, 1000 etc.
 - Use place value to write the fraction to a decimal.
 - 10 means one decimal place, 100 means two decimal places, etc.
 - Write the numerator as the digits after the decimal point.

Example Convert fractions to decimals using equivalent fractions.

$\frac{1}{5} = \frac{2}{10}$ $= 0.2$	Why do you want the denominator to be a power of 10? <i>Decimal: tenths, hundredths, thousandths are based on powers of 10.</i>
$\frac{11}{20} = \frac{55}{100}$ $= 0.55$	How do you decide whether to make the denominator 10, 100 or 1000? <i>We want to keep the a whole number.</i>

Convert these fractions to decimals.

a $\frac{7}{10} =$	b $\frac{3}{100} =$	c $\frac{4}{20} = \frac{\quad}{10}$
0.7	0.03	0.2
d $\frac{22}{50} =$	e $\frac{3}{25} =$	f $\frac{21}{30} =$
0.44	0.12	0.7
g $\frac{12}{20} =$	h $\frac{16}{40} =$	i $\frac{18}{75} =$
0.6	0.4	0.24

Key ideas

- Fractions and decimals are two ways of representing values integers.
- To convert fractions to decimals, we can rewrite them as an fraction with a of 10, 100, 1000 etc.
- We convert decimals to fractions by using the of the digits.

1 Write the missing numbers.

a $\frac{3}{10} = \frac{\boxed{}}{100}$

30

b $0.3 = \frac{\boxed{}}{10}$

3

c $0.3 = \frac{30}{\boxed{}}$

100

2 Write the missing numbers.

a $0.7 = \frac{\boxed{}}{10}$

7

b $0.07 = \frac{\boxed{}}{100}$

7

c $0.\boxed{} = \frac{9}{10}$

9

d $0.17 = \frac{17}{\boxed{}}$

100

e $\frac{\boxed{}}{\boxed{}} = 0.8$

$\frac{8}{10}$

f $0.04 = \frac{\boxed{}}{\boxed{}}$

$\frac{4}{100} = \frac{1}{25}$

3 Write the missing numbers.

a $5.2 = \frac{52}{\boxed{}}$

10

b $0.52 = \frac{52}{\boxed{}}$

100

c $0.052 = \frac{52}{\boxed{}}$

1000

d $0.0052 = \frac{52}{\boxed{}}$

10000

e $0.8 = \frac{8}{\boxed{}} = \frac{4}{\boxed{}}$

10, 5

f $0.06 = \frac{6}{\boxed{}} = \frac{\boxed{}}{50}$

100, 3

g $0.056 = \frac{56}{\boxed{}} = \frac{\boxed{}}{125}$

1000, 7

4 Write the missing numbers, then write as a decimal.

a $\frac{4}{5} = \frac{\boxed{}}{10} = \dots\dots\dots$

8

b $\frac{1}{2} = \frac{\boxed{}}{10} = \dots\dots\dots$

5

c $\frac{7}{20} = \frac{\boxed{}}{100} = \dots\dots\dots$

35

d $\frac{23}{50} = \frac{\boxed{}}{100} = \dots\dots\dots$

46

e $5\frac{19}{20} = 5\frac{\boxed{}}{100} = \dots\dots\dots$

95

f $3\frac{1}{4} = 3\frac{\boxed{}}{100} = \dots\dots\dots$

25

g $\frac{5}{2} = \frac{\boxed{}}{10} = \dots\dots\dots$

25

h $\frac{3}{8} = \frac{\boxed{}}{1000} = \dots\dots\dots$

375

i $\frac{7}{25} = \frac{\boxed{}}{100} = \dots\dots\dots$

28

5 Match the equivalent decimals and fractions.

$\frac{3}{4}$

$\frac{34}{100}$

$\frac{1}{2}$

$\frac{7}{100}$

$\frac{70}{100}$

0.7

0.75

0.34

0.5

0.07

$\frac{3}{4} = 0.75, \frac{34}{100} = 0.34, \frac{1}{2} = 0.5, \frac{7}{100} = 0.07, \frac{70}{100} = 0.7$

6 Write each of these fractions as a decimal.

a $\frac{1}{2} = \frac{\square}{10} = 0.5$ 5	b $\frac{1}{4} = \frac{25}{\square} = 0.25$ 100	c $\frac{3}{4} = \frac{\square}{100} = 0.\square5$ 75, 7
d $\frac{2}{\square} = \frac{4}{10} = 0.\square$ 5, 4	e $0.2 = \frac{\square}{10} = \frac{1}{5}$ 2	f $0.15 = \frac{\square}{100} = \frac{3}{\square}$ 15, 20
g $0.8 = \frac{8}{\square} = \frac{\square}{5}$ 10, 4	h $0.64 = \frac{64}{100} = \frac{\square}{25}$ 16	

7 Write these fraction sums as decimals using your knowledge of place value.

a $\frac{3}{10}$ 0.3	b $\frac{7}{100}$ 0.07	c $\frac{1}{10} + \frac{3}{100}$ 0.13
d $\frac{3}{10} + \frac{8}{100}$ 0.38	e $\frac{7}{10} + \frac{9}{100}$ 0.79	f $2 + \frac{5}{10} + \frac{8}{100}$ 2.58
g $3 + \frac{1}{10} + \frac{4}{100}$ 3.14	h $\frac{1}{1000}$ 0.001	i $\frac{1}{10} + \frac{2}{100} + \frac{3}{1000}$ 0.123
j $\frac{7}{10} + \frac{3}{1000}$ 0.703	k $\frac{3}{100} + \frac{7}{1000}$ 0.037	l $13 + \frac{9}{10} + \frac{7}{100} + \frac{5}{1000}$ 13.975

8 Using a calculator, express the following fractions as recurring decimals.

a $\frac{1}{3}$ 0.3	b $\frac{5}{9}$ 0.5	c $\frac{5}{6}$ 0.83	d $\frac{8}{11}$ 0.72
e $\frac{3}{7}$ 0.428571	f $\frac{5}{13}$ 0.384615	g $3\frac{2}{15}$ 3.13	h $4\frac{6}{7}$ 4.857142

9 Convert these decimals to fractions in their simplest form. Do not answer as mixed numerals.

a 0.5	b 6.4	c 10.15	d 18.12
e 3.25	f 0.05	g 9.075	h 5.192

10 Convert these fractions to decimals.

a $\frac{7}{10}$	b $\frac{9}{10}$	c $\frac{31}{100}$	d $\frac{79}{100}$
e $\frac{121}{100}$	f $\frac{329}{100}$	g $\frac{123}{1000}$	h $\frac{3}{100}$

11 Convert these fractions to decimals by first changing them to an equivalent fraction with a denominator of 10, 100, or 1000.

a $\frac{4}{5}$	b $\frac{1}{2}$	c $\frac{7}{20}$	d $\frac{23}{50}$
e $\frac{5}{2}$	f $\frac{39}{20}$	g $\frac{7}{4}$	h $\frac{21}{300}$

12 Complete the fraction to decimal table.

Fraction	$\frac{1}{2}$	$\frac{1}{3}$	$\frac{1}{4}$	$\frac{1}{5}$	$\frac{1}{6}$	$\frac{1}{7}$	$\frac{1}{8}$	$\frac{1}{9}$	$\frac{1}{10}$
Decimal									

a Describe what happens to the value of the decimal as the denominator increases.

The decimal value decreases.

b Explain why this happens.

TERMINATING AND RECURRING DECIMALS AS FRACTIONS

- Every terminating decimal can be written as a fraction using knowledge of place value:

$$\begin{aligned} 0.827 &= 827 \text{ thousandths} \\ &= \frac{827}{1000} \end{aligned}$$

- Every recurring decimal can also be written as a fraction by looking at patterns. You will learn a formal proof after learning algebraic equations.

$$0.\dot{3} \rightarrow \frac{1}{3}$$

FOUNDATION

1 $\frac{1}{3}$ as a decimal is 0.333333333333333...

a Express this recurring decimal using the correct notation.

0. $\dot{3}$

b Without using a calculator, what would $\frac{2}{3}$ be?

0. $\dot{6}$

c Check $2 \div 3$ on a calculator. Explain why it is different to your answer to part b.

The calculator ran out of digits in its display, so it rounded the last digit up to 7.

2 Convert to a decimal:

a $\frac{1}{3} = 0.3333333333333333 \dots = 0.\dot{3}$

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

0. $\overline{142857}$

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

i $\frac{2}{7} =$

0. $\overline{285714}$

c $\frac{2}{6} =$

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

0. $\overline{428571}$

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

k $\frac{4}{7} =$

0. $\overline{571428}$

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

l $\frac{5}{7} =$

0. $\overline{714285}$

f $\frac{6}{6} =$

m $\frac{6}{7} =$

0. $\overline{857142}$

g $\frac{7}{6} =$

1.1 $\dot{6}$

3 Using a calculator, convert these to decimals.

a $\frac{1}{9}$

0.1

b $\frac{2}{9}$

0.2

c $\frac{3}{9}$

0.3

d $\frac{4}{9}$

0.4

e $\frac{7}{9}$

0.7

f $\frac{8}{9}$

0.8

Using the pattern above, express these as fractions:

g $0.\dot{4}$

$\frac{4}{9}$

h $0.\dot{8}$

$\frac{8}{9}$

i $0.\dot{6}$

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

4 Using a calculator, convert these to decimals.

a $\frac{1}{99}$

0.01

b $\frac{8}{99}$

0.08

c $\frac{14}{99}$

0.14

d $\frac{48}{99}$

0.48

e $\frac{72}{99}$

0.72

f $\frac{87}{99}$

0.87

Using the pattern above, express these as fractions:

g $0.\overline{64}$

$\frac{64}{99}$

h $0.\overline{05}$

$\frac{5}{99}$

i $0.\overline{93}$

$\frac{93}{99} = \frac{31}{33}$

5 Using a calculator, convert these to decimals.

a $\frac{1}{999}$

0.001

b $\frac{12}{999}$

0.012

c $\frac{412}{999}$

0.412

Using the pattern above, express these as fractions:

d $0.\overline{942}$

$\frac{942}{999} = \frac{314}{333}$

e $0.\overline{023}$

$\frac{23}{999}$

f $0.\overline{138}$

$\frac{138}{999}$

6 Convert these decimals to fractions.

a 0. $\dot{3}$ $\frac{1}{3}$	g 0.1 $\dot{4}$ $\frac{1}{10} + \frac{4}{90} = \frac{13}{90}$	m 1.0 $\overline{14}$ $1\frac{144}{990} = 1\frac{7}{445}$
b 0. $\overline{34}$ $\frac{34}{99}$	h 0.01 $\dot{4}$ $\frac{1}{100} + \frac{4}{900} = \frac{13}{900}$	n 2. $\dot{4}$ $2\frac{4}{9}$
c 0. $\overline{35}$ $\frac{35}{99}$	i 0. $\overline{014}$ $\frac{14}{999}$	o 2. $\overline{43}$ $2\frac{43}{99}$
d 0. $\overline{357}$ $\frac{357}{999}$	j 1. $\dot{4}$ $1\frac{4}{9}$	p 3. $\overline{43}$ $3\frac{43}{99}$
e 0. $\dot{4}$ $\frac{4}{9}$	k 1.0 $\dot{4}$ $1\frac{13}{90}$	q 3.0 $\overline{43}$ $3\frac{43}{990}$
f 0.0 $\dot{4}$ $\frac{4}{90} = \frac{2}{45}$	l 1. $\overline{14}$ $1\frac{14}{99}$	

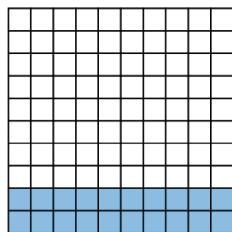
7 Every recurring decimal is a rational number. Do you agree with this statement?

Yes.

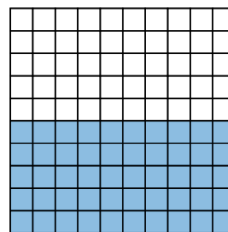
PERCENTAGES TO FRACTIONS AND DECIMALS

CONVERTING PERCENTAGES TO FRACTIONS

- To convert a **percentage** to a **fraction**:
 - Write the percentage as a fraction with denominator 100.
 - Simplify the fraction.



$$\frac{20}{100} = 20\%$$



$$\frac{50}{100} = 50\%$$

Percentage to Fraction

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

Example Convert percentages to fractions or mixed numbers.

$$6\% = \frac{6}{100} \\ = \frac{3}{50}$$

$$120\% = \frac{120}{100} \\ = \frac{12}{10} = \frac{6}{5}$$

$$10.5\% = \frac{10.5}{100} \\ = \frac{21}{200}$$

Represent these percentages as fractions.

a $8\% = \frac{\quad}{100}$
=

$$\frac{2}{25}$$

b $10\% =$
=

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

c 88%

$$\frac{22}{25}$$

d 66%

$$\frac{33}{50}$$

e 600%

$$6$$

f 125%

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

g 17.5%

$$\frac{7}{40}$$

h 0.2%

$$\frac{1}{500}$$

i 0.05%

$$\frac{1}{2000}$$

CONVERTING PERCENTAGES TO DECIMALS

- To convert a **percentage** to a **decimal**, divide by 100.

Percentage to Decimal

$$n\% = n \div 100$$

- A shortcut for dividing by 100 is moving the decimal 2 places to the left.

Example Convert percentages to decimals.

$82\% = 82 \div 100$ $= 0.82$	$0.5\% = 0.5 \div 100$ $= 0.005$
----------------------------------	-------------------------------------

Represent these percentages as decimals.

a $82\% = 82 \div 100$ $=$ 0.82	b $8\% =$ $=$ 0.08	c 60% 0.6
d 8% 0.08	e 35% 0.35	f 12.5% 0.125
g 180% 1.8	h 275% 2.75	i 0.8% 0.008
j 21.5% 0.215	k 17.02% 0.1702	l 0.25% 0.0025

Key ideas

- Percent means “out of
- To convert percentages to fractions, write the number over
- To convert percentages to decimals, either write it as a fraction first or divide by

1 Express these percentages as fractions out of 100, then simplify if possible.

a $55\% = \frac{11 \cancel{55}}{20 \cancel{100}} = \frac{11}{20}$

b $30\% = \frac{\quad}{100} = \frac{\quad}{\quad}$
 $\frac{3}{10}$

c $20\% = \frac{\quad}{100} = \frac{\quad}{\quad}$
 $\frac{1}{5}$

d $12\% = \frac{\quad}{100} = \frac{\quad}{\quad}$
 $\frac{3}{25}$

e $34\% = \frac{\quad}{100} = \frac{\quad}{\quad}$
 $\frac{17}{50}$

f $44\% = \frac{\quad}{100} = \frac{\quad}{\quad}$
 $\frac{11}{25}$

g $15\% = \frac{\quad}{100} = \frac{\quad}{\quad}$
 $\frac{3}{20}$

h $85\% = \frac{\quad}{100} = \frac{\quad}{\quad}$
 $\frac{17}{20}$

i $64\% = \frac{\quad}{100} = \frac{\quad}{\quad}$
 $\frac{16}{25}$

j $120\% = \frac{\quad}{100} = \frac{\quad}{\quad}$
 $= \frac{\quad}{\quad} \frac{\quad}{\quad}$
 $1\frac{1}{5}$

k $250\% = \frac{\quad}{100} = \frac{\quad}{\quad}$
 $= \frac{\quad}{\quad} \frac{\quad}{\quad}$
 $2\frac{1}{2}$

l $110\% = \frac{\quad}{100} = \frac{\quad}{\quad}$
 $= \frac{\quad}{\quad} \frac{\quad}{\quad}$
 $1\frac{1}{10}$

m $180\% = \frac{\quad}{100} = \frac{\quad}{\quad}$
 $= \frac{\quad}{\quad} \frac{\quad}{\quad}$
 $1\frac{4}{5}$

n $125\% = \frac{\quad}{100} = \frac{\quad}{\quad}$
 $= \frac{\quad}{\quad} \frac{\quad}{\quad}$
 $1\frac{1}{4}$

o $105\% = \frac{\quad}{100} = \frac{\quad}{\quad}$
 $= \frac{\quad}{\quad} \frac{\quad}{\quad}$
 $1\frac{1}{20}$

2 Express these fractions as fractions out of 100, then as percentages.

a $\frac{3}{20} = \frac{15}{100} = 15\%$

b $\frac{4}{5} = \frac{\quad}{100} = \frac{\quad}{\quad}\%$
80%

c $\frac{6}{10} = \frac{\quad}{100} = \frac{\quad}{\quad}\%$
60%

d $\frac{7}{20} = \frac{\quad}{100} = \frac{\quad}{\quad}\%$
35%

e $\frac{17}{50} = \frac{\quad}{100} = \frac{\quad}{\quad}\%$
34%

f $\frac{3}{4} = \frac{\quad}{100} = \frac{\quad}{\quad}\%$
75%

g $\frac{7}{4} = \frac{\quad}{100} = \frac{\quad}{\quad}\%$
175%

h $\frac{12}{200} = \frac{\quad}{100} = \frac{\quad}{\quad}\%$
6%

i $\frac{350}{500} = \frac{\quad}{100} = \frac{\quad}{\quad}\%$
70%

j $2\frac{1}{4} = \frac{200}{100} + \frac{25}{100} = \frac{225}{100}$
 $= 225\%$

k $4\frac{7}{10} = \frac{\quad}{100} + \frac{\quad}{100} = \frac{\quad}{100}$
 $= \frac{\quad}{\quad}\%$
470%

l $5\frac{1}{2} = \frac{\quad}{100} + \frac{\quad}{100} = \frac{\quad}{100}$
 $= \frac{\quad}{\quad}\%$
550%

3 Use your knowledge of factors of 100 to write these fractions as decimals.

a $\frac{9}{15} = \frac{\boxed{3}}{\boxed{5}} = \frac{\boxed{60}}{100} = \underline{60\%}$	b $\frac{6}{8} = \frac{\boxed{}}{4} = \frac{\boxed{}}{100} = \underline{\%}$	c $\frac{3}{12} = \frac{\boxed{}}{4} = \frac{\boxed{}}{100} = \underline{\%}$
d $\frac{32}{40} = \frac{\boxed{}}{20} = \frac{\boxed{}}{100} = \underline{\%}$	e $\frac{36}{80} = \frac{\boxed{}}{\boxed{}} = \frac{\boxed{}}{100} = \underline{\%}$	f $\frac{24}{120} = \frac{\boxed{}}{\boxed{}} = \frac{\boxed{}}{100} = \underline{\%}$
g $\frac{39}{60} = \frac{\boxed{}}{\boxed{}} = \frac{\boxed{}}{100} = \underline{\%}$	h $\frac{18}{24} = \frac{\boxed{}}{\boxed{}} = \frac{\boxed{}}{100} = \underline{\%}$	i $\frac{33}{110} = \frac{\boxed{}}{\boxed{}} = \frac{\boxed{}}{100} = \underline{\%}$
j $\frac{24}{30} = \frac{\boxed{}}{\boxed{}} = \frac{\boxed{}}{100} = \underline{\%}$	k $\frac{66}{150} = \frac{\boxed{}}{\boxed{}} = \frac{\boxed{}}{100} = \underline{\%}$	l $\frac{30}{75} = \frac{\boxed{}}{\boxed{}} = \frac{\boxed{}}{100} = \underline{\%}$

4 Express these percentages as decimals and fractions in their simplest form.

a 25% $= \frac{25}{100} = \frac{1}{4}$ $= 0.25$	b 12% $0.12, \frac{3}{25}$	c 6% $0.06, \frac{3}{50}$	d 15% $0.15, \frac{3}{20}$
e 88% $0.88, \frac{22}{25}$	f 60% $0.6, \frac{3}{5}$	g 120% $1.2, \frac{6}{5}$	h 840% $8.4, \frac{42}{5}$
i 76% $0.76, \frac{19}{25}$	j 42% $0.42, \frac{21}{50}$	k 45% $0.45, \frac{9}{20}$	l 7% $0.07, \frac{7}{100}$

5 Convert these fractions to percentages, using equivalent fractions.

a $\frac{8}{25}$ $= \frac{\quad}{100} = \text{---}$ $= 0.32$	b $\frac{8}{10}$ 80%	c $\frac{6}{50}$ 12%	d $\frac{7}{20}$ 35%
e $\frac{43}{50}$ 86%	f $\frac{18}{20}$ 90%	g $\frac{15}{25}$ 60%	h $\frac{3}{5}$ 60%
i $\frac{3}{4}$ 75%	j $\frac{7}{4}$ 175%	k $\frac{68}{50}$ 136%	l $\frac{5}{2}$ 250%
m $\frac{24}{40}$ 60%	n $\frac{9}{30}$ 30%	o $\frac{21}{15}$ 140%	p $\frac{51}{60}$ 85%

6

a If 14% of students in Year 7 are absent due to illness, what percentage of Year 7 students are at school?

86%

b If 80% of the population is vaccinated, what percentage has not been vaccinated?

20%

7 Rachel's birthday cake is cut into eight equal pieces. Rachel eats six pieces.

a What percentage did Rachel eat?

75%

b What percentage of the cake remains?

25%

8

Change these test results to equivalent scores out of 100, and therefore state the percentage.

a 7 out of 10 = out of 100 = % 70%	b 24 out of 50 = out of 100 = % 48%	c 12 out of 20 = out of 100 = % 60%
d 1 out of 5 20%	e 80 out of 200 40%	f 630 out of 1000 63%

9 Michael achieved a score of 68% in a test. If the test was out of 50, what was his mark?

$$\frac{68}{100} = \frac{34}{50}$$

34

10 Karla received 16 out of 20 marks in her test. What was her mark as a percentage?

80%

11 Brian drinks 580 mL out of a 2 litre jug of milk. How much milk is left, as a percentage?

71%

12 Geordy scores 28 out of 30 on his fractions test. What is his percentage score?

93.3%

13 Gillian pays \$80 tax out of her income of \$1600.
What percentage of her income does she keep?

95%

14 Over summer, a dam’s water volume reduces from 20 megalitres to 4 megalitres.
What fraction of the water in the dam has been lost?

80%

- 15** For a recent class test, Ross scored 45 out of 60 and Marsha scored 72 out of 100.
Use percentages to show that Ross obtained the higher mark.

Ross: 75%

Marsha: 72%

- 16** A new apartment has 300 apartments. 40% have been sold. How many apartments is this?
(hint: make an equivalent fraction with 300 as the denominator)

$$\frac{40}{100} = \frac{120}{300}$$

120 apartments

- 17** Ian gets up during the night 8% of time. How many times would he get up in 25 nights?

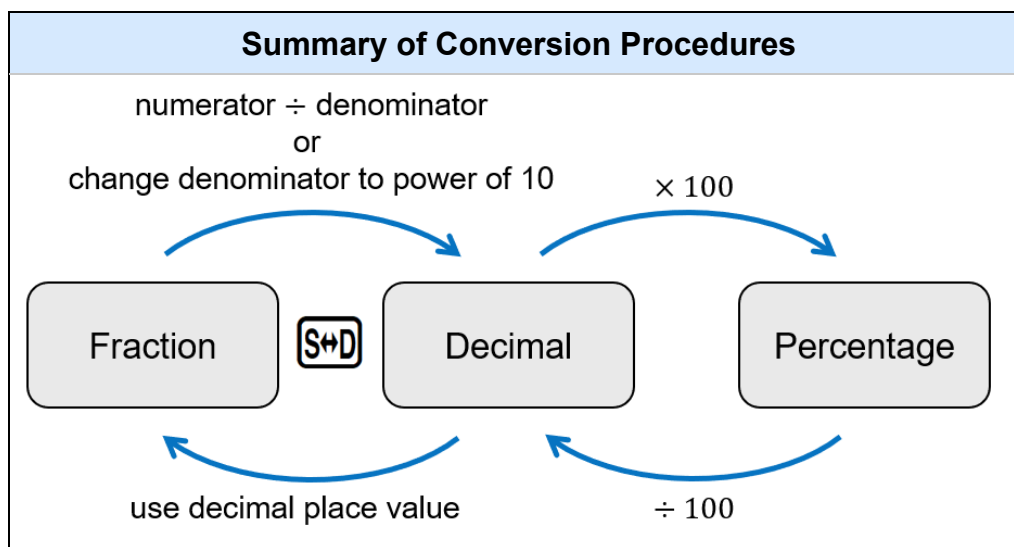
$$\frac{8}{100} = \frac{2}{25}$$

2 times

- 18** Jane scored 12 out of 20 in her previous test.
If the next test is out of 50, what must she score for the same percentage?

$$\frac{12}{20} = \frac{6}{10} = \frac{30}{50}$$

SUMMARY OF FDP CONVERSIONS



FOUNDATION

1 Complete these conversions.

a

Fraction	Decimal
$\frac{1}{5}$	0.2
$\frac{2}{5}$	0.4
$\frac{3}{5}$	0.6
$\frac{30}{50}$	0.6
$\frac{3}{500}$	0.006
$\frac{5}{3}$	1.6
$\frac{1}{6}$	0.16
$\frac{2}{6}$	0.3
$\frac{2}{60}$	0.03
$\frac{2}{600}$	0.003
$\frac{20}{60}$	0.3
$\frac{3}{60}$	0.05
$\frac{6}{30}$	0.2

b

Decimal	Fraction
0.6	$\frac{3}{5}$
0.06	$\frac{3}{50}$
0.66	$\frac{33}{50}$
0.65	$\frac{13}{20}$
0.56	$\frac{23}{50}$
0.55	$\frac{11}{20}$
0.006	$\frac{3}{500}$
0.055	$\frac{11}{200}$
0.065	$\frac{13}{200}$
0.605	$\frac{121}{200}$
6.5	$\frac{13}{2}$
6.05	$\frac{121}{20}$
6.005	$\frac{1201}{200}$

c

Percent	Decimal
32%	0.32
31%	0.31
30%	0.3
3%	0.03
0.3%	0.003
1.3%	0.013
1.23%	0.0123
12.3%	0.123
123%	1.23
1023%	10.23
1003%	10.03
103%	1.03
130%	1.3
129%	1.29
12.9%	0.129
12.92%	0.1292

d

Decimal	Percent
0.48	48%
0.49	49%
0.50	50%
0.5	50%
0.05	5%
0.005	0.5%
0.085	8.5%
0.85	85%
1.85	185%
1.085	108.5%
2.085	208.5%
2.58	258%
2.5	250%
2	200%
0.2	20%
0.25	25%

USING NUMBER FACTS TO CONVERT BETWEEN FDP

- Once you have memorised a common conversion, you can use it to convert between other fractions/decimals/percentages.

Example Use number facts to convert between FDP.

Fraction	Decimal	Percentage
$\frac{1}{4}$	0.25	25%
$\frac{3}{4}$	0.75	75%
$\frac{5}{4}$	1.25	125%

Use known facts to fill in the tables.

a

Fraction	Decimal	Percentage
$\frac{1}{5}$	0.2	20%
$\frac{3}{5}$	0.6	60%
$\frac{7}{5}$	1.4	140%

b

Fraction	Decimal	Percentage
$\frac{1}{4}$	0.25	25%
$\frac{1}{8}$	0.125	12.5%
$\frac{3}{8}$	0.375	37.5%

1 Complete these conversion tables.

a

Fraction	Decimal	Percentage
$\frac{1}{5}$	0.2	20%
$\frac{2}{5}$	0.4	40%
$\frac{6}{5}$	1.2	120%
$2\frac{3}{5}$	2.6	260%

b

Fraction	Decimal	Percentage
$\frac{1}{4}$	0.25	25%
$\frac{3}{4}$	0.75	75%
$\frac{6}{4}$	1.5	150%
$\frac{5}{4}$	1.25	125%

c

Fraction	Decimal	Percentage
$\frac{1}{10}$	0.1	10%
$\frac{1}{100}$	0.01	1%
$\frac{1}{25}$	0.04	4%
$\frac{3}{25}$	0.12	12%

d

Fraction	Decimal	Percentage
$\frac{1}{3}$	$0.\dot{3}$	$33.\dot{3}\%$
$\frac{2}{3}$	$0.\dot{6}$	$66.\dot{6}\%$
$\frac{3}{3} = 1$	$0.\dot{9} = 1$	$99.\dot{9}\%$
$1\frac{2}{3}$	$1.\dot{6}$	$166.\dot{6}\%$

e

Fraction	Decimal	Percentage
$\frac{1}{20}$	0.05	5%
$\frac{1}{40}$	0.025	2.5%
$\frac{7}{40}$	0.175	17.5%
$\frac{3}{40}$	0.075	7.5%

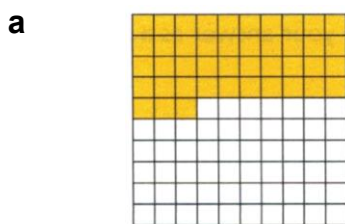
f

Fraction	Decimal	Percentage
$\frac{1}{50}$	0.02	2%
$\frac{23}{50}$	0.46	46%
$\frac{43}{50}$	0.86	86%
$2\frac{7}{50}$	2.14	214%

1

Fraction	Decimal	Percentage
$\frac{1}{10}$		
	0.2	
		25%
$\frac{1}{2}$		
		40%
	0.6	
	0.7	
	0.75	
$\frac{4}{5}$		
		90%
$\frac{1}{100}$		
	0.05	
		45%
$\frac{7}{20}$		
	0.12	

2 For each grid, write down the proportion of the total area that is shaded as:



Fraction

Decimal

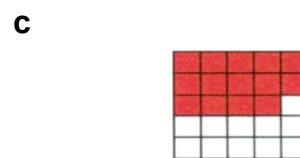
Percentage



Fraction

Decimal

Percentage

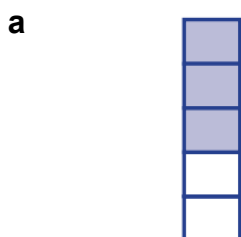


Fraction

Decimal

Percentage

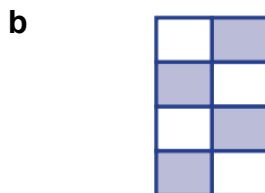
3 Write each shaded area as a fraction, decimal, and percentage of the total area.



Fraction

Decimal

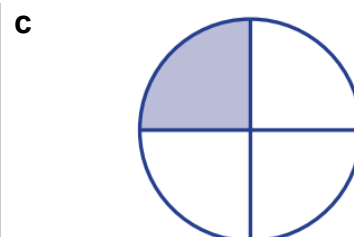
Percentage



Fraction

Decimal

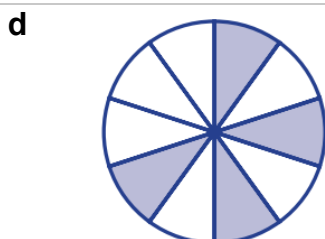
Percentage



Fraction

Decimal

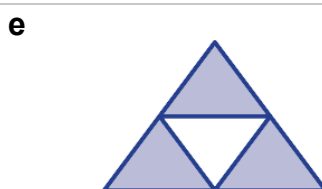
Percentage



Fraction

Decimal

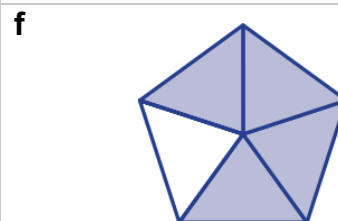
Percentage



Fraction

Decimal

Percentage



Fraction

Decimal

Percentage

4 Complete the following, writing $<$, $>$ or $=$ in the circles to make each statement correct.

a $0.4 \bigcirc 40\%$

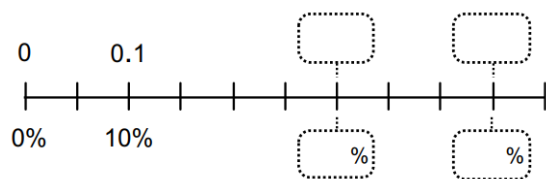
b $\frac{3}{5} \bigcirc 35\%$

c $0.6 \bigcirc \frac{5}{8}$

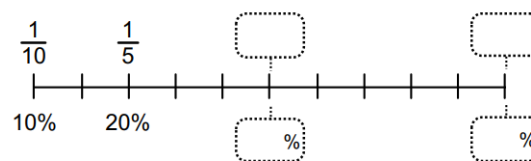
d $\frac{1}{50} \bigcirc 2\%$

5 Fill in the gaps in the number lines below.

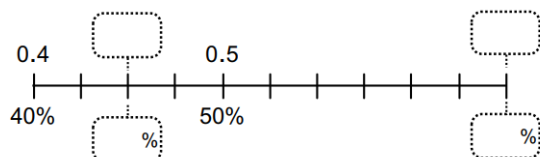
a



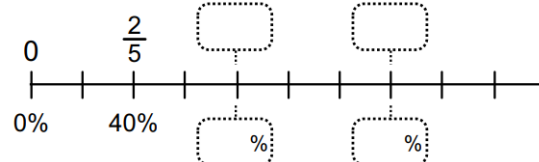
b



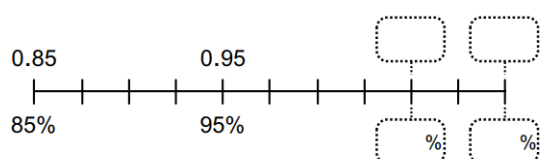
c



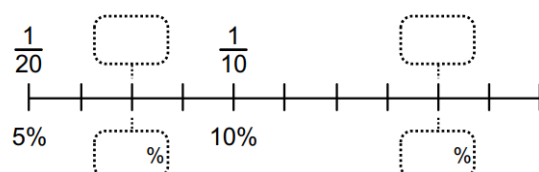
d



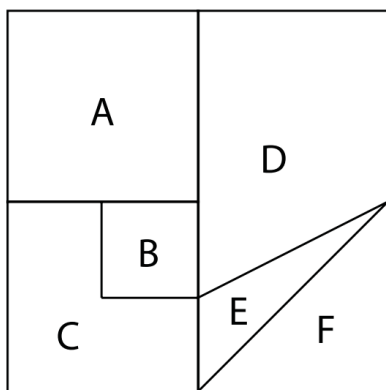
e



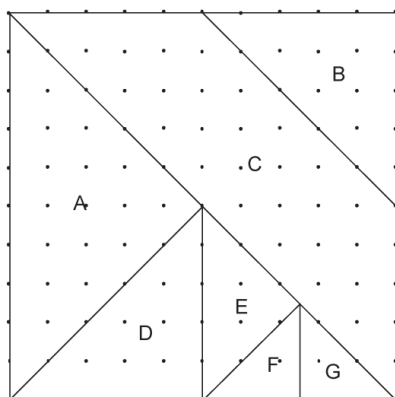
f



6 A square has been dissected into 6 pieces. Express each piece as a fraction and percentage of the whole. Check that your pieces sum to 1.



Piece	Fraction	Percentage
A		
B		
C		
D		
E		
F		



Piece	Fraction	Percentage
A		
B		
C		
D		
E		
F		

7 Write three different fractions with different denominators that are between 2.4 and 2.5.

.....

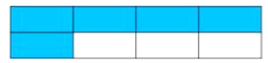
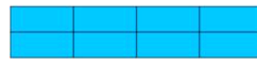
Fraction	Decimal	Percentage
		8%
		55%
$\frac{23}{50}$		
	0.36	
	0.038	
		62.5%
$\frac{13}{50}$		
$\frac{1}{10000}$		
$\frac{1}{8}$		
	0.375	
		33.75%
	4.2	
		125%
	0.8	
$\frac{5}{99}$		
		5.5%
		62%

Fraction	Decimal	Percentage
$\frac{6}{4}$		
$\frac{11}{5}$		
$\frac{5}{15}$		
	0.0375	
		$\frac{1}{2}\%$
		$1\frac{1}{2}\%$
	0.06	
		132%
	2.6	
$\frac{88}{110}$		
$\frac{37}{1000}$		
$\frac{6}{24}$		
		250%
	0.003	
$\frac{2}{7}$		
		0.09%
		119%

CHECK YOUR UNDERSTANDING

Converting mixed numbers and improper fractions

1 What mixed number is shown by the diagram?



a 4

b $7\frac{1}{4}$

c $3\frac{5}{8}$

d $\frac{29}{8}$

2 Use the diagram to convert this mixed number to an improper fraction.



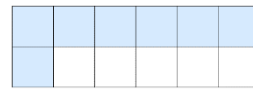
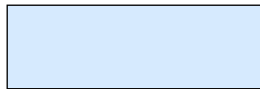
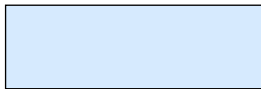
a $\frac{8}{4} + \frac{1}{4}$

b $\frac{9}{4}$

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

d $\frac{2}{4}$

3 What improper fraction is represented here?



a $3\frac{7}{12}$

b $\frac{31}{12}$

c $2\frac{7}{12}$

d $3\frac{1}{12}$

4 What mixed number is represented here?



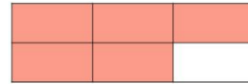
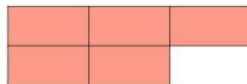
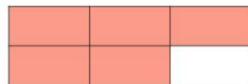
a $1\frac{1}{3}$

b $\frac{4}{3}$

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

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

5 What mixed number fraction is represented here, in simplest form?



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

b $\frac{15}{6}$

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

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

Converting mixed numbers and improper fractions

1	Convert $\frac{13}{4}$ to a mixed number.	a	$3\frac{1}{4}$	b	$\frac{26}{8}$	c	3 remainder 1	d	$3\frac{1}{13}$
2	Convert $\frac{14}{5}$ to a mixed number.	a	$4\frac{2}{5}$	b	$3\frac{1}{5}$	c	$2\frac{4}{14}$	d	$2\frac{4}{5}$
3	Convert $2\frac{5}{6}$ to a mixed number.	a	$\frac{10}{12}$	b	$\frac{10}{6}$	c	$\frac{17}{6}$	d	$\frac{17}{12}$
4	Convert $3\frac{2}{3}$ to a mixed number.	a	$\frac{11}{3}$	b	$\frac{5}{3}$	c	$\frac{32}{3}$	d	$\frac{11}{3}$
5	What is 4 as a fraction?	a	$\frac{4}{1}$	b	$\frac{1}{4}$	c	$\frac{4}{4}$	d	Integers are not fractions
6	What is the missing number? $2\frac{?}{5} = \frac{13}{5}$	a	11	b	3	c	13	d	7
7	What is the missing number? $4\frac{?}{6} = \frac{28}{6}$	a	28	b	2	c	4	d	1

Converting fractions and decimals

1 What is 0.4 as a fraction in simplest form?

a $\frac{4}{10}$

b $\frac{40}{100}$

c $\frac{2}{5}$

d $\frac{1}{4}$

2 What is 0.709 as a fraction?

a $\frac{1}{709}$

b $\frac{79}{100}$

c $\frac{709}{1000}$

d $\frac{79}{1000}$

3 What is 0.07 as a fraction?

a $\frac{7}{10}$

b $\frac{0.7}{10}$

c $\frac{7}{100}$

d $\frac{7}{1000}$

4 What is 1.6 as a fraction in simplest form?

a $\frac{5}{8}$

b $\frac{1}{6}$

c $\frac{16}{10}$

d $\frac{8}{5}$

5 What is $\frac{32}{50}$ as a decimal?

a $\frac{16}{25}$

b 32.50

c 0.64

d 0.325

6 What is $\frac{3}{20}$ as a decimal?

a 0.32

b 0.15

c 3.20

d 0.3

7 What is $\frac{3}{5}$ as a decimal?

a 0.5

b 0.3

c 0.35

d None of these.

8 What is $\frac{19}{20}$ as a decimal?

a .95

b 0.19

c 0.9

d 0.1920

Converting percentages

1	What is $\frac{6}{20}$ as a percentage?	a 60%	b 0.3%	c 3%	d 30%
2	What is $\frac{3}{5}$ as a percentage?	a 35%	b 3.5%	c 6%	d 60%
3	What is $\frac{4}{8}$ as a percentage?	a 50%	b 5%	c 55%	d 40%
4	What is 58% as a decimal?	a 5.8	b 58	c 0.58	d 0.058
5	What is 78% as a decimal?	a 78	b 0.78	c 7.8	d 0.078
6	What is 0.45% as a decimal?	a 45	b 0.45	c 0.0045	d 0.045
7	What is 0.3 as a percentage?	a 3%	b 0.3%	c 0.003%	d 30%
8	What is 0.06 as a percentage?	a 4%	b 60%	c 66%	d 6%
9	What is 0.845 as a percentage?	a 0.845%	b 84.5%	c 8.45%	d 0.00845%
10	What is 1.7 as a percentage?	a 170%	b 17%	c 1.7%	d 70%