Year 6 into 7 Mathematics Workbook

Understand and Use Equivalent Fractions

Answers

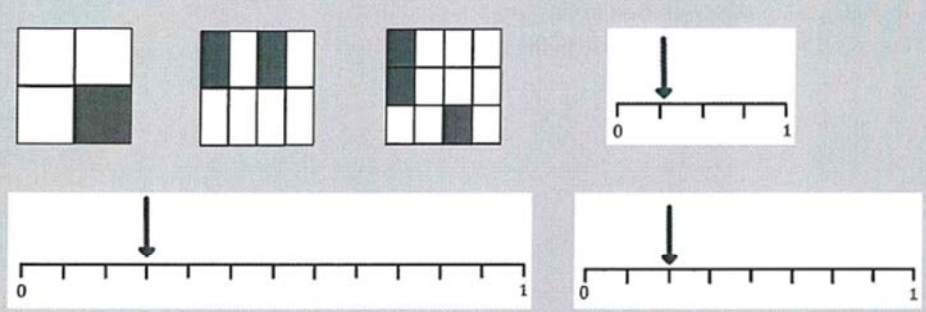
Unit 14: Understand and use equivalent fractions

14.1 Understand and use equivalent fractions

Concept Corner

Fractions which are equal are called **equivalent fractions.**

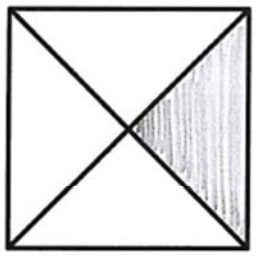
Each of these diagrams represents $\frac{1}{4}$ of a whole.



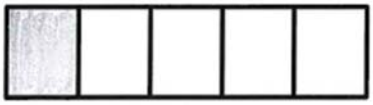
These diagrams show that $\frac{1}{4} = \frac{\boxed{2}}{8} = \frac{3}{\boxed{12}}$

Suggest some other fractions that are equivalent to $\frac{1}{4}$ $\frac{4}{16}, \frac{5}{20}, \frac{200}{800}$, etc.

1. Shade in the shapes to represent the following fractions:



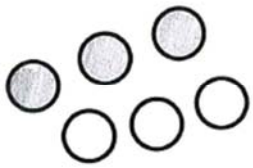
$\frac{1}{4}$



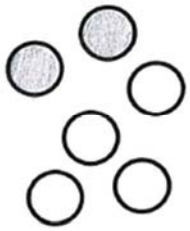
$\frac{1}{5}$

$\frac{2}{3}$

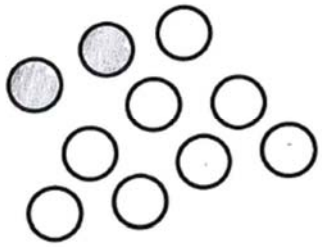
2. Shade in the fraction of counters indicated.



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

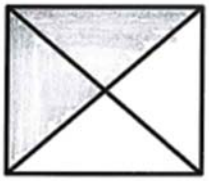


b) $\frac{1}{3}$



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

Method 1:



Method 2:

Method 3:

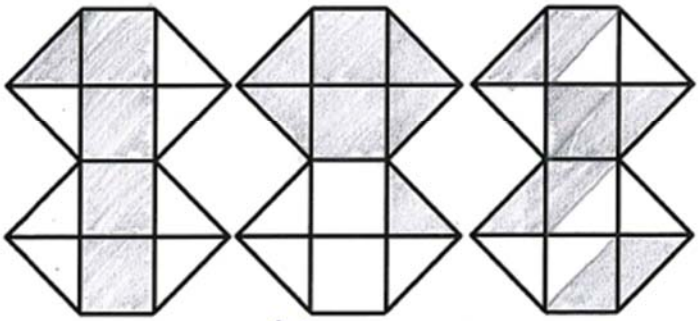
Method 1:

Method 2:

Method 3:

$\frac{9}{16}$

Method 1: Method 2: Method 3:



Multiple answers possible.

4. Write the following as a fraction:

a) One third $\frac{1}{3}$

b) One tenth $\frac{1}{10}$

c) Three-quarters $\frac{3}{4}$

d) Five-eighths $\frac{5}{8}$

5. Write the following fractions in words:

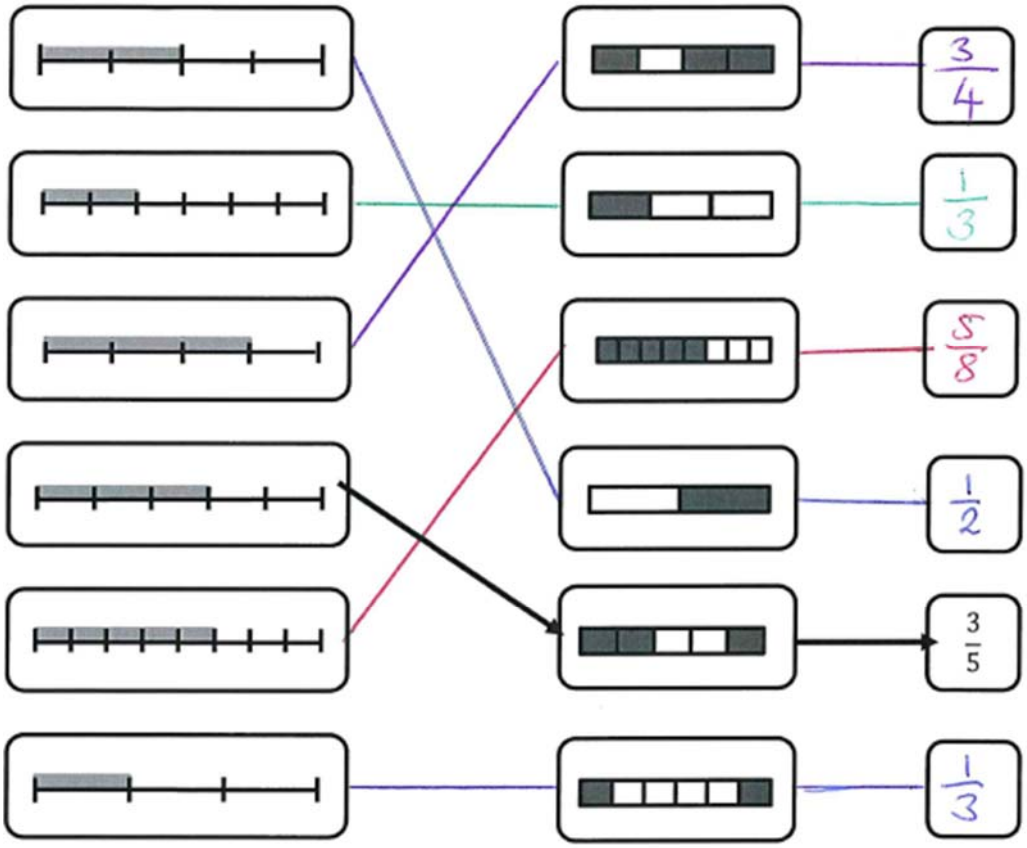
a) $\frac{1}{4}$ One quarter

b) $\frac{1}{5}$ One fifth

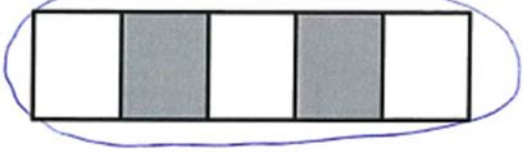
c) $\frac{1}{12}$ One twelfth

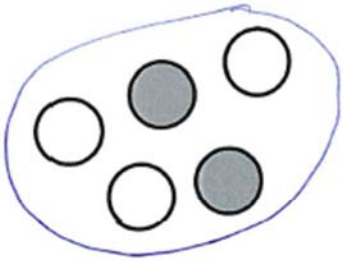
d) $\frac{3}{7}$ Three sevenths

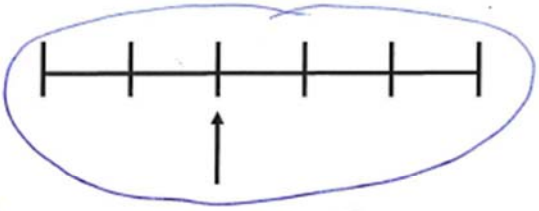
6. Match up the following diagrams and write down the fraction they represent. One has been done for you.



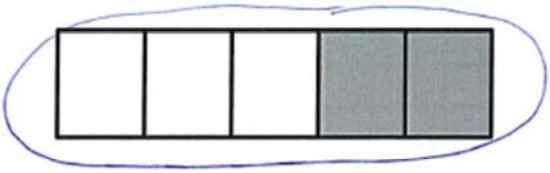
7. Circle the diagrams which correctly represent $\frac{2}{5}$. For those that don't, explain why they don't.

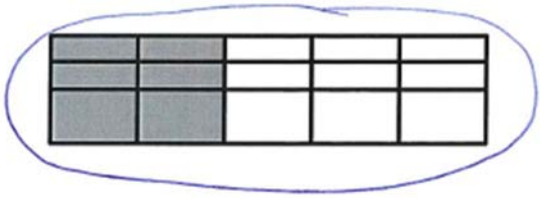






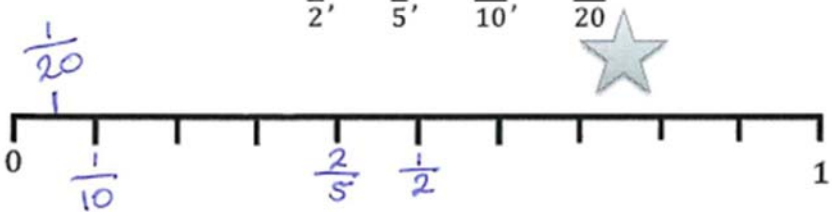
Shape not divided into equal part





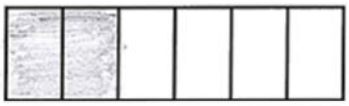
8. Place the following fractions on the number line

$\frac{1}{2}$, $\frac{2}{5}$, $\frac{1}{10}$, $\frac{1}{20}$



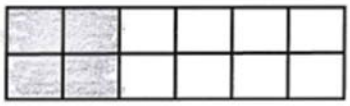
9. a) Shade $\frac{1}{3}$ of this shape

b) Shade $\frac{2}{6}$ of this shape



c) Shade $\frac{2}{3}$ of this shape

d) Shade $\frac{1}{3}$ of this shape



Which is the odd one out? Explain why:

$\frac{2}{3}$ because it is not equal in size or equivalent to the others.

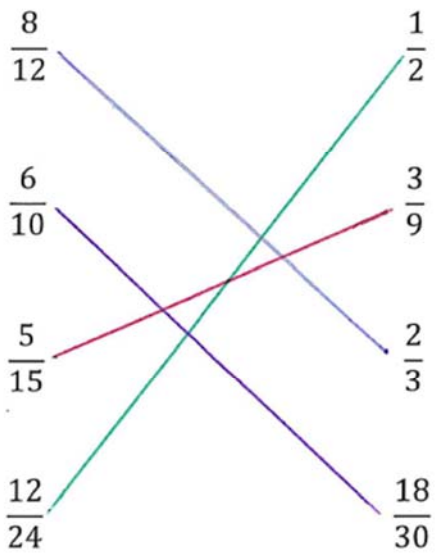
10. a) Fill in the missing numbers so that each fraction is equivalent to $\frac{1}{2}$.

$\frac{2}{4}$, $\frac{4}{8}$, $\frac{3}{6}$, $\frac{8}{16}$

b) Fill in the missing numbers so that each fraction is equivalent to $\frac{1}{3}$.

$\frac{2}{6}$, $\frac{3}{9}$, $\frac{4}{12}$, $\frac{6}{18}$

11. Match up the equivalent fractions:



12. Fill in the missing numbers in these equivalent fractions:

a) $\frac{3}{8} = \frac{15}{40}$

b) $\frac{2}{5} = \frac{8}{20}$

c) $\frac{5}{15} = \frac{15}{45} = \frac{1}{3}$

d) $\frac{5}{20} = \frac{2}{8}$

e) $\frac{3}{90} = \frac{1}{30}$ OR $\frac{3}{45} = \frac{2}{30}$ OR $\frac{3}{15} = \frac{6}{30}$, etc.

Is there more than one way to complete part e)? Why?

The numerator and denominator entered will always multiply to equal 90. eg.

$\frac{3}{\boxed{10}} = \frac{\boxed{9}}{30}$ $9 \times 10 = 90$

13. Write down three fractions which are equivalent to:

a) $\frac{1}{4}$ = e.g. $\frac{2}{8}$, $\frac{3}{12}$, $\frac{4}{16}$, etc.

b) $\frac{12}{16}$ = e.g. $\frac{3}{4}$, $\frac{6}{8}$, $\frac{9}{12}$, etc.

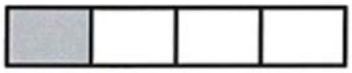
c) Write down three fractions equivalent to $\frac{1}{5}$ where the numerator is a prime number.

$\frac{2}{10}$, $\frac{3}{15}$, $\frac{5}{25}$, $\frac{7}{35}$, $\frac{11}{55}$, $\frac{13}{65}$, $\frac{17}{85}$, $\frac{19}{95}$, etc.

14.

$\frac{1}{5}$

$\frac{1}{4}$



Carlos says that the diagram above shows that $\frac{1}{5}$ is always bigger than $\frac{1}{4}$.

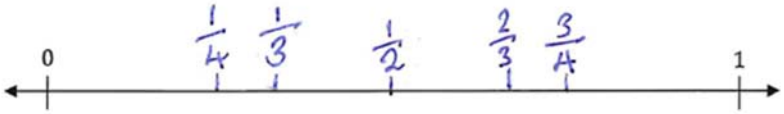
Carlos is **wrong**. Explain why.

Fractions should always be compared with the same, equal whole, i.e.

compared with:

15. Place these fractions on the number line below:

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



16. Write > or < in between each pair of fractions.

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

b) $\frac{1}{11}$ < $\frac{1}{9}$

c) $\frac{2}{3}$ > $\frac{2}{5}$

d) $\frac{4}{5}$ < $\frac{7}{8}$

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

f) $\frac{5}{8}$ > $\frac{6}{10}$

g) $\frac{4}{9}$ < $\frac{5}{11}$

Simplifying fractions

Concept Corner

factor	numerator	denominator

To simplify fractions, you divide the numerator and the denominator by a common factor

For example, to simplify $\frac{12}{36} \overset{\div 4}{\underset{\div 4}{=}} \frac{3}{9} \overset{\div 3}{\underset{\div 3}{=}} \frac{1}{3}$ or $\frac{12}{36} \overset{\div 12}{\underset{\div 12}{=}} \frac{1}{4}$

17. Write these fractions in their simplest form.

a) $\frac{10}{20} = \frac{1}{2}$

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

c) $\frac{12}{36} = \frac{1}{3}$

d) $\frac{8}{72} = \frac{1}{9}$

e) $\frac{24}{84} = \frac{2}{7}$

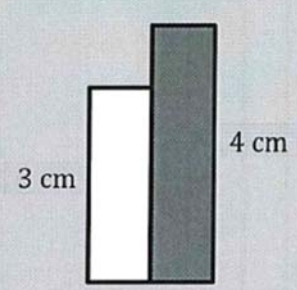
f) $\frac{17}{51} = \frac{17}{51}$

14.2 Writing one quantity as a fraction of another

Concept Corner

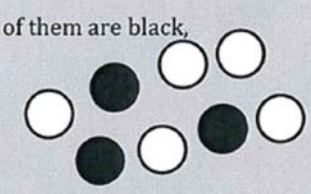
One quantity can be expressed as a fraction of another.

If I have a white bar which is 3 cm long and a grey bar which is 4 cm long, then the white bar is $\frac{3}{4}$ the length of the grey bar:

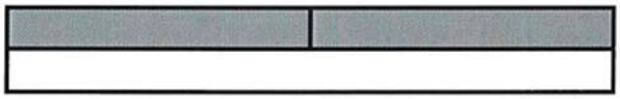


If Harriet has 8 counters and 3 of them are black,

$\frac{3}{8}$ of the counters are black.



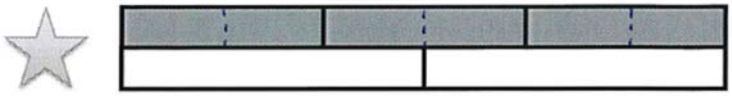
1. What fraction of one white bar is one grey bar in each diagram below?



$\frac{1}{2}$

$\frac{1}{4}$

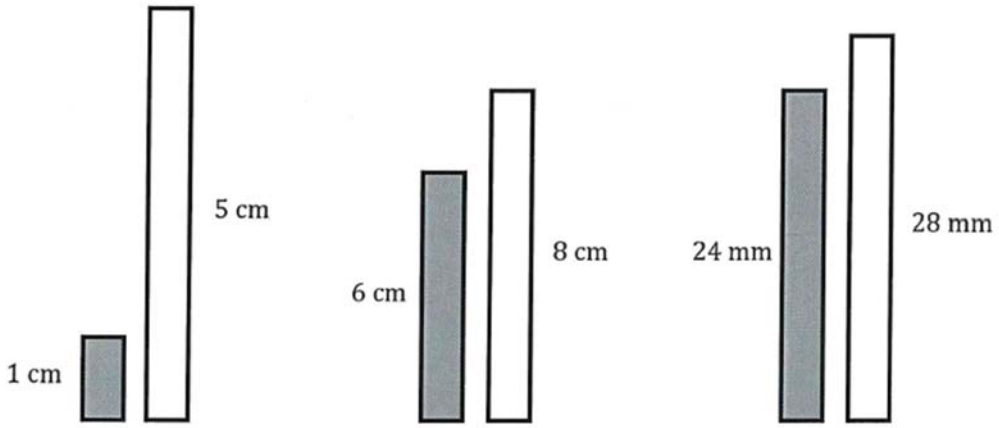
$\frac{1}{3}$



$\frac{2}{3}$

$\frac{3}{5}$

2. What fraction of the white bar is one grey bar in each diagram below? Write your answers in their simplest form.



$\frac{1}{5}$ $\frac{3}{4}$ $\frac{6}{7}$

3. In a class, 12 students were boys and 18 were girls.
What fraction of students were boys?

Write your answer in its simplest form.

$\frac{12}{30} = \frac{2}{5}$

4. Conor had 34 sweets. He ate 12 of them.
Conor gave 7 of the sweets he had left to Harris and the rest to Flora.
What fraction of the original sweets did Flora get?

$\frac{15}{34}$

14.3 Improper fractions and mixed numbers

Concept Corner

Use the words and numbers from the box to fill in the spaces below:

$\frac{11}{5}$	improper fractions	$3\frac{2}{3}$
mixed numbers		
	denominator	

Numbers like $2\frac{1}{2}$, $1\frac{1}{3}$ and ...$3\frac{2}{3}$..... are called ....mixed.... ....numbers..... because they contain both whole numbers and fractions.

Mixed numbers can also be written as ..improper..... ..fractions..... These are fractions where the numerator is larger than the ..denominator...

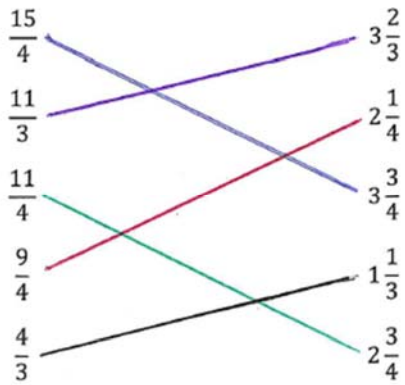
A)

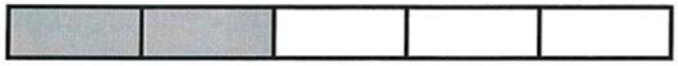
$2\frac{1}{4} = \frac{9}{4}$

B)

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

1. Match each improper fraction to its equivalent mixed number representation.



2. 

Explain how this diagram represents:

a) $\frac{2}{5}$ Out of five equal parts, two are shaded.

b) $\frac{3}{5}$ Out of five equal parts, three are unshaded.

c) $\frac{5}{2}$ Where the shaded rectangle represents one whole, the diagram represents five halves

3. Write the following fractions in **ascending order**.

$\frac{17}{6}$, $\frac{16}{3}$, $\frac{7}{4}$, $\frac{19}{5}$

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

Order

$\frac{7}{4}$, $\frac{17}{6}$, $\frac{19}{5}$, $\frac{16}{3}$

4. Write a >, = or < between these improper factions and mixed numbers.

$\frac{13}{4} > 2\frac{3}{4} = \frac{11}{4}$

$\frac{18}{5} = 3\frac{3}{5} = \frac{18}{5}$

$\frac{56}{9} = 6\frac{2}{9} > \frac{20}{5} = 4$

$\frac{26}{17} = 1\frac{9}{17} < \frac{17}{9} = 1\frac{8}{9}$

5. Write these fractions in ascending order.

$$\frac{5}{7}, \quad \frac{6}{9}, \quad \frac{9}{6}, \quad \frac{7}{5}$$

$$\frac{6}{9}, \frac{5}{7}, \frac{7}{5}, \frac{9}{6}$$

14.4 Equivalence of fractions and decimals

Concept Corner

Tens	Ones	Tenths	Hundredths
	0	• 7	
	0	• 3	1

$\frac{1}{10}$	$\frac{1}{100}$

Tenths and hundredths can be written using fractions as ....$\frac{1}{10}$..... and ....$\frac{1}{100}$.

This means that decimals can easily be converted to fractions.

For example, $0.7 = \frac{7}{10}$ and $0.31 = \frac{31}{100}$

1. Fill in the gaps in the table below. Some of the numbers can be written in more than one way.

Decimal	Words	Fraction
0.74	• seventy-four hundredths • seven tenths and four hundredths	$\frac{74}{100}$
0.6	• sixty hundredths • six tenths	
0.09	• nine hundredths • ninety thousandths	
0.11	• eleven hundredths • one tenth and one hundredth	
0.37	• thirty-seven hundredths • three tenths and seven hundedths	$\frac{37}{100}$

2. Express as a decimal:

a) $\frac{1}{10}$ 0.1

b) $\frac{3}{100}$ 0.03

c) $\frac{7}{1000}$ 0.007

d) $\frac{38}{100}$ 0.38

e) $\frac{131}{1000}$ 0.131

3. Express $\frac{2}{5}$ as a decimal. 0.4

Explain your answer.

Two fifths is equivalent to four tenths.

4. Express the following as decimals:

a) $\frac{14}{10}$ 1.4

b) $\frac{12}{20}$ 0.6

c) $12\frac{1}{2}$ 12.5

5. Why are these wrong?
Give reasons for your answers. (Some suggestions below)

a) $2.8 = \frac{2}{8}$ 2.8 is larger than one whole whereas $\frac{2}{8}$ is equivalent to $\frac{1}{4}$ and therefore smaller than one whole.

b) $\frac{6}{100} = 0.6$ 0.6 is equal to six tenths which is ten times larger than $\frac{6}{100}$.

c) $\frac{4}{25} = 0.4$ $\frac{4}{25}$ is equivalent to $\frac{16}{100}$, which is smaller than $\frac{4}{10}$ (0.4).

6. In each question write the decimal as a fraction in its simplest form, using mixed numbers where necessary.

a) 0.2 $\frac{1}{5}$

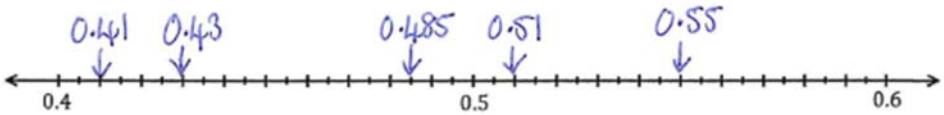
b) 0.001 $\frac{1}{1000}$

c) 1.8 $1\frac{4}{5}$

d) 15.05 $15\frac{1}{20}$

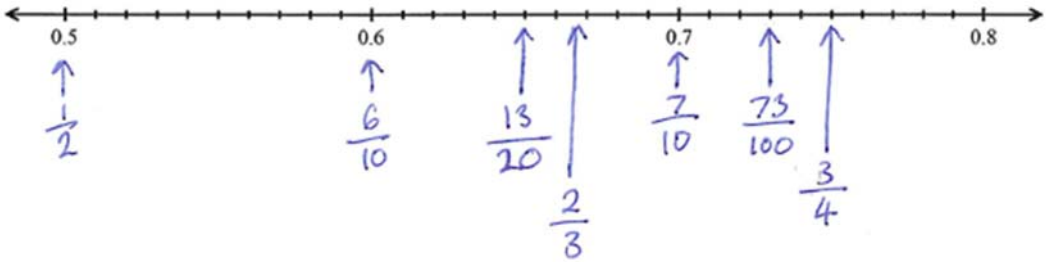
7. Place the following decimals on the number line:

0.41, 0.55, 0.43, 0.51, 0.485



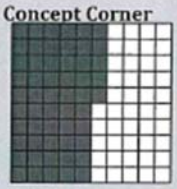
8. Place the following fractions on the number line:

$\frac{1}{2}$, $\frac{6}{10}$, $\frac{73}{100}$, $\frac{3}{4}$, $\frac{7}{10}$, $\frac{13}{20}$, $\frac{2}{3}$



14.5 Percentages

Concept Corner



The shaded region of this 100-square could be represented as a vulgar fraction, a decimal fraction or a percentage.

$\frac{55}{100} = \frac{11}{20}$, 0.55 and ...55...%

1. Use the cards below to write down fractions and decimals equivalent to:

a) 3% $= \frac{3}{100} = 0.03$

b) 30% $= \frac{30}{100} = 0.3$

c) 300% $= \frac{3}{1} = 3$

0.3	3	$\frac{3}{1}$	$\frac{3}{100}$
0.03	0.30	$\frac{3}{10}$	$\frac{30}{100}$

2. Use the cards below to write down fractions and decimals equivalent to:

a) 12% $= \frac{3}{25} = 0.12$

b) 1.2% $= \frac{3}{250} = 0.012$

c) 10.2% $= \frac{51}{500} = 0.102$

d) 120% $= 1\frac{1}{5} = 1.2$

1.2	0.012	$1\frac{1}{5}$	$\frac{3}{250}$
0.12	0.102	$\frac{3}{25}$	$\frac{51}{500}$

3. Write these fractions as percentages

a) $\frac{22}{100} = 22\%$

b) $\frac{1}{10} = 10\%$

c) $\frac{6}{10} = 60\%$

d) $\frac{17}{50} = 34\%$

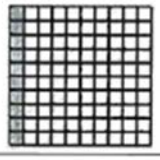
Concept Corner

Here are some equivalences that are helpful to know:

Fraction	Decimal	Percentage
$\frac{1}{4}$	0.25	25%
$\frac{1}{3}$	$0.\dot{3} = 0.333...$	$33\frac{1}{3}\%$
$\frac{1}{2}$	0.5	50%
$\frac{3}{4}$	0.75	75%

What other equivalences do you know?

4.

Pictorial (shading)	Fraction	Decimal	$\frac{\quad}{100}$	Percentage
	$\frac{1}{2}$	0.5	$\frac{50}{100}$	50%
	$\frac{3}{10}$	0.3	$\frac{30}{100}$	30%
	$\frac{1}{10}$	0.1	$\frac{10}{100}$	10%
	$\frac{7}{10}$	0.7	$\frac{70}{100}$	70%
	$\frac{11}{20}$	0.55	$\frac{55}{100}$	55%

5. Place the following values on the number line:

1.2, 0.85, 30%, 5%, $\frac{1}{4}$, $\frac{3}{4}$, $\frac{1}{5}$, $\frac{13}{10}$, 110%, 195%