

# KEYSKILLS

## APPLICATION OF NUMBER

## LEVELS 1 & 2

### FRACTIONS, DECIMALS AND PERCENTAGES

After completing this unit, you will be able to:

- Convert between fractions, decimals and percentages
- Evaluate one number as a fraction or percentage of another

#### **FRACTIONS**

A fraction is a way of expressing a part of a whole. In the fraction  $\frac{3}{4}$ , the number on the top, 3, is called the **numerator**, the number on the bottom, 4, is called the **denominator**.

If the numerator is bigger than the denominator, the fraction is **improper** and is greater than one whole, for example  $\frac{8}{5}$ .

#### **DECIMALS**

A decimal is another way of expressing a part of a whole. In the decimal number 0.35741

The 3 stands for  $\frac{3}{10}$

The 5 stands for  $\frac{5}{100}$

The 7 stands for  $\frac{7}{1000}$  etc

#### **PERCENTAGES**

A percentage is another way of expressing part of one whole. **Per cent** means **per 100**, so 30% is  $\frac{30}{100}$ .

## **CONVERTING FROM FRACTIONS TO DECIMALS**

To convert a fraction to a percentage we:

***“divide the numerator by the denominator”***

### **Examples**

1. Convert  $\frac{3}{4}$  to a decimal.

### **Solution**

The fraction  $\frac{3}{4}$  literally means  $3 \div 4$ .

To change  $\frac{3}{4}$  to a decimal we divide 3 by 4 to get  $0.75$ .

2. Convert  $\frac{1}{3}$  to a decimal.

### **Solution**

$1 \div 3$  gives  $0.33333333\dots$ . This is an example of a **recurring decimal**.

It can be written as  $0.\dot{3}$ .

## **CONVERING FROM DECIMALS TO FRACTIONS**

### **Examples**

1. Convert  $0.23$  to a fraction.

### **Solution**

We know that the 2 stands for  $\frac{2}{10}$ , and the 3 stands for  $\frac{3}{100}$ .

So  $0.23$  as a fraction would be  $\frac{23}{100}$ .

2. Convert 0.125 to a fraction.

**Solution**

0.125 can be written as  $\frac{125}{1000}$ .

We are normally expected to write fractions in **their lowest terms**.

This means that we look for a **common factor** in the numerator and the denominator. In this case  $\frac{125}{1000}$  can be **cancelled down** and written as an **equivalent fraction**.

$$\frac{125}{1000} = \frac{5}{40} \quad \text{dividing top and bottom by 25}$$

$$\frac{5}{40} = \frac{1}{8} \quad \text{dividing top and bottom by 5}$$

**CONVERTING FRACTIONS AND DECIMALS TO PERCENTAGES**

To convert a fraction or a decimal to a percentage we:

***“multiply by 100”***

**Examples**

1. Convert  $\frac{5}{8}$  to a percentage.

**Solution**

We need to work out  $\frac{5}{8} \times 100$ .

In the exam you can not use a calculator. You need to be able to work out such calculations by looking for a common factor and cancelling down.

We first write the calculation as  $\frac{5}{8} \times \frac{100}{1}$ .

We can see that 4 is a common factor. Cancelling down gives:

$$\frac{5}{2} \times \frac{25}{1} = \frac{125}{2} = 62.5\%$$

<b>Answer = 62.5%</b>
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2. Convert  $0.462$  to a percentage.

**Solution**

We need to work out  $0.462 \times 100$ .

Remember multiplying by 100 means moving the decimal point two places to the right.

$$0.462 \times 100 = 46.2\%$$

$$\text{Answer} = 46.2\%$$

**CONVERTING PERCENTAGES TO FRACTIONS AND DECIMALS**

To convert percentages to fractions and decimals we:

***“divide by 100”***

**Examples**

1. Convert 65% to a fraction.

**Solution**

$$65\% = \frac{65}{100}$$

Remember to give the fraction in its lowest terms. 5 is a common factor.

$$\frac{65}{100} = \frac{13}{20}$$

2. Convert 2.5% to a decimal.

**Solution**

$$2.5\% = \frac{2.5}{100}$$

Remember when we divide by 100 we move the decimal point two places to the left.

$$\frac{2.5}{100} = 0.025$$

**THE FOLLOWING EQUIVALENCES BETWEEN FRACTIONS DECIMALS  
AND PERCENTAGES ARE WORTH REMEMBERING**

FRACTION	DECIMAL	PERCENTAGE
$\frac{1}{10}$	0.1	10%
$\frac{1}{4}$	0.25	25%
$\frac{1}{3}$	$0.\dot{3}$	$33.\dot{3}\%$ or $33\frac{1}{3}\%$
$\frac{1}{2}$	0.5	50%
$\frac{2}{3}$	$0.\dot{6}$	$66.\dot{6}\%$ or $66\frac{2}{3}\%$
$\frac{3}{4}$	0.75	75%

**EXPRESSING ONE NUMBER AS A FRACTION OR A PERCENTAGE OF ANOTHER**

- To express a number as a fraction of another number we write:

$$\frac{\text{first number}}{\text{second number}} \text{ and express in its lowest terms.}$$

**Examples**

- Express 8 as a fraction of 12.

**Solution**

$$\frac{8}{12} = \frac{2}{3}$$

- Express 60 gms as a fraction of 1 kg.

**Solution**

In order to express one quantity as a fraction of another we must write them in the same units.

As 1 kg = 1,000 gms, we write:

$$\frac{60}{1000} = \frac{6}{100} = \frac{3}{50}$$

- To express a number as a percentage of another number we write:

$$\frac{\text{first number}}{\text{second number}} \times 100$$

### Examples

- Express 16 as a percentage of 80.

#### Solution

$$\frac{16}{80} \times \frac{100}{1} = \frac{16}{4} \times \frac{5}{1} \quad \text{dividing top and bottom by 20}$$

$$\frac{16}{4} \times \frac{5}{1} = 4 \times 5 = 20\%$$

**Answer = 20%**

- Express 55p as a percentage of £11.

#### Solution

In order to express one quantity as a percentage of another we must write them in the same units.

$$£11 = 1100p$$

$$\frac{55}{1100} \times \frac{100}{1} = \frac{5}{100} \times \frac{100}{1} = 5\%$$

**Answer = 5%**

### Exercise

- Convert the following fractions:
  - to decimals
  - to percentages
  - $\frac{1}{5}$
  - $\frac{13}{20}$
  - $\frac{9}{25}$
- Convert the following decimals:
  - to fractions
  - to percentages
  - 0.15
  - 0.375
  - 0.015
- Convert the following percentages:
  - to fractions
  - to decimals
  - 15%
  - 8%
  - 2.5%
- Write the following in order of size, smallest first.
 
$$\frac{1}{3}, 30\%, 0.32$$
- In a class of 30 pupils 21 are girls.
  - what fraction of the class are girls?
  - What fraction of the class are boys?

6. In a car park of 120 cars, 45 are made in Europe and the rest are made in Japan. What percentage of the cars are:  
 (a) made in Europe  
 (b) made in Japan
7. Express 54mm to 20 cm:  
 (a) as a fraction  
 (b) as a percentage
8. The price of a sandwich in the school canteen has risen from £1.20 to £1.40. Express the increase in price as a percentage of the original price.

**ANSWERS TO EXERCISE**

1. (a) (i) 0.2 (ii) 0.65 (iii) 0.18  
 (b) (i) 20% (ii) 65% (iii) 18%
2. (a) (i)  $\frac{3}{20}$  (ii)  $\frac{3}{8}$  (iii)  $\frac{3}{200}$   
 (b) (i) 15% (ii) 37.5% (iii) 1.5%
3. (a) (i)  $\frac{3}{20}$  (ii)  $\frac{2}{25}$  (iii)  $\frac{1}{40}$   
 (b) (i) 0.15 (ii) 0.08 (iii) 0.025
3. 30%, 0.32,  $\frac{1}{3}$
5. (a)  $\frac{7}{10}$  (b)  $\frac{3}{10}$
6. (a) 37.5% (b) 62.5%
7. (a)  $\frac{27}{100}$  (b) 27%
8.  $\frac{20}{120} \times 100 = 16\frac{2}{3}\%$

## ASSESSMENT ON FRACTIONS DECIMALS AND PERCENTAGES

A class of 25 students were asked how much time they had spent on revision and homework in one week. Questions 1, 2 and 3 are based on the results shown in the table below.

Number of Hours	Number of Students
0 to less than 5	2
5 to less than 10	6
10 to less than 15	12
15 to less than 20	4
20 or more	1

1. What fraction of the students spent more than 15 hours on their homework and revision in this particular week?

A  $\frac{1}{4}$

B  $\frac{4}{25}$

C  $\frac{1}{5}$

D  $\frac{1}{25}$

2. What percentage of the students spent between 10 to 15 hours on their homework?

A 12%

B 48%

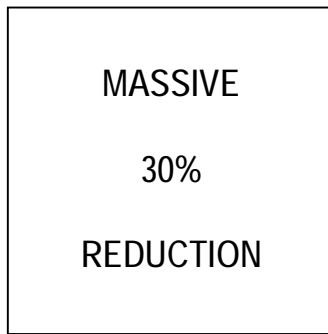
C 25%

D 15%

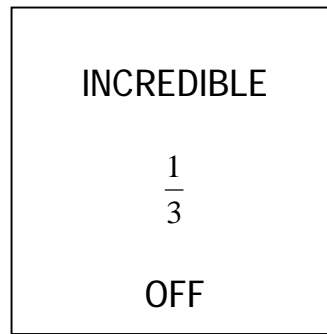
3. What decimal number describes the number of students who spent between 5 to 10 hours on their homework?
- A 0.6
  - B 0.06
  - C 0.36
  - D 0.24
4. A college decides to organise a trip to Alton Towers for a group of 150 students.  
 $\frac{1}{5}$  of the students could not go as they were booked on a field trip.  
10% of those left were not able to go as they were going on family holidays.  
 $\frac{1}{9}$  of those who said they would go were ill on the day
- How many students went to Alton Towers?
- A 82
  - B 87
  - C 90
  - D 92
5. McDonut's reduce the price of their special double burgers from £1.50 to £1.20 as part of a sales promotion.  
By what percentage have they reduced the price of their burgers?
- A 20%
  - B 25%
  - C 30%
  - D 35%

Questions 6, 7 and 8 are based on the following labels used during a sale at a clothes shop.

1.



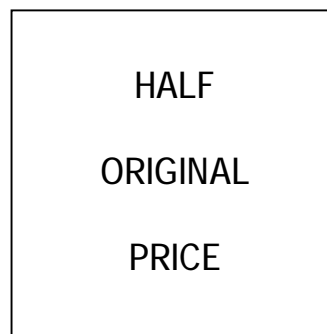
2.



3.



4.



6. Which label should be put on a dress that has been reduced from £36 to £24?

- A Label 1
- B Label 2
- C Label 3
- D Label 4

7. Which label should be put on a shirt that has been reduced from £15 to £10.50?

- A Label 1
- B Label 2
- C Label 3
- D Label 4

8. Which label should be put on a pair of trousers that have been reduced from £22 to £17.60?
- A Label 1
  - B Label 2
  - C Label 3
  - D Label 4

### **ANSWERS TO ASSESSMENT QUESTIONS**

<b>Question</b>	<b>Answer</b>
1	C
2	B
3	C
4	B
5	A
6	B
7	A
8	C