

# UNDERSTANDING PERCENTAGES and FRACTIONS

## Key Concept FDP equivalence

F	D	P
$\frac{1}{100}$	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%
$\frac{3}{4}$	0.75	75%

## Key Words

**Fraction:** A fraction is made up of a numerator (top) and a denominator (bottom).

**Integer:** Whole number.

**Ascending Order:** Place in order, smallest to largest.

**Descending Order:** Place in order, largest to smallest.

## Ordering Examples

Make the denominators the same.

$$\begin{array}{c} 3 \\ \hline 4 \\ \downarrow \\ 6 \\ \hline 8 \\ \downarrow \\ 1 \\ \hline 4 \end{array}$$

3

$$\begin{array}{c} 3 \\ \hline 8 \\ \downarrow \\ 3 \\ \hline 8 \\ \downarrow \\ 3 \\ \hline 8 \end{array}$$

1

$$\begin{array}{c} 1 \\ \hline 2 \\ \downarrow \\ 4 \\ \hline 8 \\ \downarrow \\ 1 \\ \hline 2 \end{array}$$

2

Convert them all to decimals.

56%	$\frac{3}{4}$	0.871	23%	$\frac{6}{7}$
0.56	0.75	0.871	0.23	0.857...
2	3	5	1	4
23%	56%	$\frac{3}{4}$	$\frac{6}{7}$	0.871

# sparx

M429, M152,  
M803, M001, M835  
M937, M437

## Tip

- A larger denominator does not mean a larger fraction.
- To find equivalent fractions multiply/divide the numerator and denominator by the same number.

## Questions

1) Place these lists in ascending order.

a)  $\frac{2}{3}, \frac{3}{4}, \frac{5}{6}, \frac{7}{12}$     b)  $\frac{3}{7}, \frac{1}{2}, 0.49, 0.2$     c)  $\frac{7}{32}, 25\%, 0.05, \frac{29}{100}$

3

2)  $0.2, \frac{7}{3}, 0.49, \frac{2}{1}$

ANSWERS: 1)  $\frac{7}{12}, \frac{3}{4}, \frac{5}{6}, \frac{29}{100}, 0.05, \frac{7}{32}, 25\%$

# FRACTIONS & PERCENTAGES AS OPERATORS

## Key Concept

### Multipliers

Find 15%	$\times 0.15$
Increase by 15%	$\times 1.15$
Decrease by 15%	$\times 0.85$

For **reverse percentage** problems you can divide by the multiplier to find the original amount.

## Key Words

**Percentage:** Is a proportion that shows a number as parts per hundred.

**Fraction:** A fraction is made up of a numerator (top) and a denominator (bottom).

**Multiplier:** A quantity by which a given number is to be multiplied.

## Examples

### Non-Calculator

$$\frac{3}{4} \text{ of } 32 = 32 \div 4 \times 3 = 24$$

$$\begin{array}{l} 16\% \text{ of } 240 \\ 10\% = 24 \\ 5\% = 12 \\ 1\% = 2.4 \end{array} \left. \vphantom{\begin{array}{l} 16\% \text{ of } 240 \\ 10\% = 24 \\ 5\% = 12 \\ 1\% = 2.4 \end{array}} \right\} \begin{array}{l} = 24 + 12 + 2.4 \\ = 38.4 \end{array}$$

### Calculator

Find **32%** of 54.60 = **0.32**  $\times$  54.60 = 17.472

Increase 45 by **12%** = 45  $\times$  **1.12** = 50.4

**sparx**

M157,U475

M958,M264,U88

M437

## Tip

There is a % function on your calculator.

To find 25% of 14 on a calculator:

**2, 5, SHIFT, (,  $\times$ , 1, 4, =**

## Questions

1) Find these fractions of amounts:

a)  $\frac{1}{3}$  of 15    a)  $\frac{1}{5}$  of 65    a)  $\frac{2}{7}$  of 14    a)  $\frac{4}{9}$  of 45

2) a) 35% of 140    b) 21% of 360    c) Increase 60 by 15%

# FRACTIONS, DECIMALS AND PERCENTAGES

## Key Concepts

A **fraction** is a numerical quantity that is not a whole number.

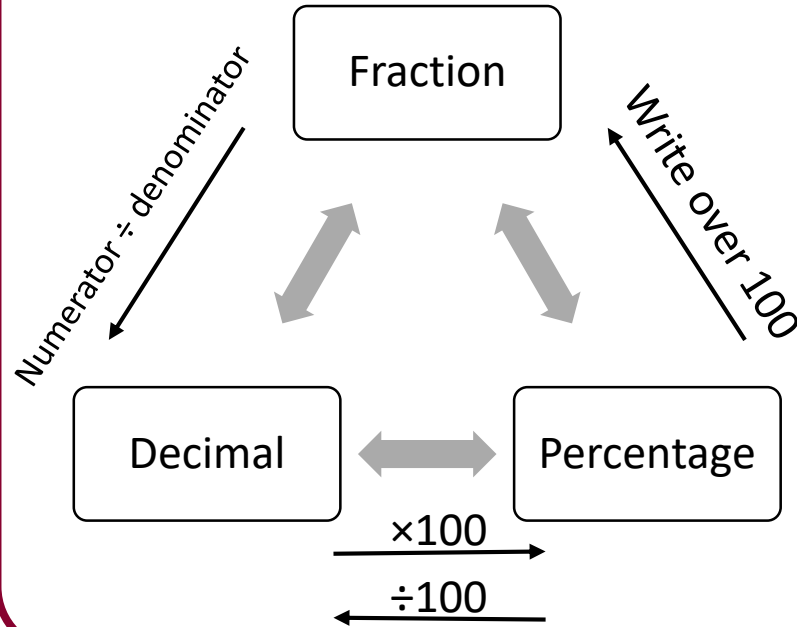
A **decimal** is a number written using a system of counting based on the number 10.

Thousands	Hundreds	Tens	Ones	.	Tenths	Hundredths	Thousandths
8	7	6	5	.	4	3	2

A **percentage** is an amount out of 100.

## Examples

Order the following in ascending order:



$\frac{3}{5}$	62%	0.67	$\frac{7}{10}$	0.665
$\times 20$			$\times 10$	
$\frac{60}{100}$		$\times 100$	$\frac{70}{100}$	$\times 100$
60%	62%	67%	70%	66.5%
$\frac{3}{5}$	62%	0.665	0.67	$\frac{7}{10}$

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M958  
M264  
M922

## Key Words

Fraction  
Decimal  
Percentage  
Division  
Multiply

1) Convert the following into percentages:

a) 0.4   b) 0.08   c)  $\frac{6}{20}$    d)  $\frac{3}{25}$

2) Compare and order the following in ascending order:

$\frac{3}{4}$    76%   0.72    $\frac{4}{5}$    0.706

# FRACTIONS

## Key Concepts

$$\frac{x}{y} \rightarrow \begin{array}{l} \text{Numerator} \\ \text{Denominator} \end{array}$$

**Equivalent fractions** have the same value as one another.

Eg.  $\frac{1}{4} = \frac{2}{8} = \frac{3}{12}$

## Examples

Calculate  $\frac{4}{5}$  of 65:

$$65 \div 5 = 13$$

Divide by the denominator

$$13 \times 4 = 52$$

Multiply this by the numerator

$\frac{4}{5}$  of a number is 52, what is the original number?

$$52 \div 4 = 13$$

Divide by the numerator

$$13 \times 5 = 65$$

Multiply this by the denominator

Order these fractions in ascending order:

$\frac{2}{5}$	$\frac{1}{2}$	$\frac{5}{6}$	$\frac{7}{15}$
$\downarrow \times 6$	$\downarrow \times 15$	$\downarrow \times 5$	$\downarrow \times 2$
$\frac{12}{30}$	$\frac{15}{30}$	$\frac{25}{30}$	$\frac{14}{30}$
①	③	④	②

To be able to compare fractions we must have a **common denominator**

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M601, M835, M931,  
M157, M197, M110,  
M265, M671

## Key Words

Fraction  
Equivalent  
Reciprocal  
Numerator  
Denominator

- 1) Calculate  $\frac{2}{7}$  of 56.
- 2)  $\frac{3}{8}$  of a number is 36, what is the original number?
- 3) Order the following in ascending order:

$\frac{2}{3}$	$\frac{5}{6}$	$\frac{3}{8}$	$\frac{7}{12}$
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# PERCENTAGES

## Key Concepts

**Calculating percentages of an amount without a calculator:**

10% = divide the value by 10

1% = divide the value by 100

**Calculating percentages of an amount with a calculator:**

Amount  $\times$  percentage  
as a decimal

**Calculating percentage increase/decrease:**

Amount  $\times$  (1  $\pm$  percentage  
as a decimal)

**Calculating a percentage – non calculator:**

Calculate 32% of 500g:

$$10\% \rightarrow 500 \div 10 = 50$$

$$30\% \rightarrow 50 \times 3 = 150$$

$$1\% \rightarrow 500 \div 100 = 5$$

$$2\% \rightarrow 5 \times 2 = 10$$

$$32\% = 150 + 10 \\ = 160\text{g}$$

**Calculating a percentage – calculator:**

Calculate 32% of 500g:

$$\text{Value} \times (\text{percentage} \div 100) \\ = 500 \times 0.32 \\ = 160\text{g}$$

**Percentage change:**

## Examples

A dress is reduced in price by 35% from £80. What is its **new price**?

$$\text{Value} \times (1 - \text{percentage as a decimal}) \\ = 80 \times (1 - 0.35) \\ = £52$$

A house price appreciates by 8% in a year. It originally costs £120,000, what is the **new value** of the house?

$$\text{Value} \times (1 + \text{percentage as a decimal}) \\ = 120,000 \times (1 + 0.08) \\ = £129,600$$

**sparx**

M433, M905,  
M476, M533

## Key Words

Percent  
Increase/decrease  
Appreciate  
Depreciate  
Multiplier  
Divide

- 1) Write the following as a decimal multiplier: a) 45% b) 3% c) 2.7%
- 2) Calculate 43% of 600 without using a calculator
- 3) Calculate 72% of 450 using a calculator
- 4a) Decrease £500 by 6%
- b) Increase 65g by 24%
- c) Increase 70m by 8.5%

# PERCENTAGES AND INTEREST

## Key Concepts

Calculating percentages of an amount without a calculator:

10% = divide the value by 10

1% = divide the value by 100

**Per annum** is often used in monetary questions meaning **per year**.

**Depreciation** means that the value of something is going down or reducing.

**sparx**  
M901

## Examples

### Simple interest:

Joe invest £400 into a bank account that pays 3% **simple interest** per annum. Calculate how much money will be in the bank account after 4 years.

$$\begin{aligned} 3\% &= £4 \times 3 \\ &= £12 \end{aligned}$$

$$4 \text{ years} = £12 \times 4$$

$$\text{Interest} = £48$$

$$\begin{aligned} \text{Total in bank account} &= £400 + £48 \\ &= £448 \end{aligned}$$

### Compound interest:

Joe invest £400 into a bank account that pays 3% **compound interest** per annum. Calculate how much money will be in the bank account after 4 years.

$$\begin{aligned} \text{Value} &\times (1 \pm \text{percentage as a decimal})^{\text{years}} \\ &= 400 \times (1 + 0.03)^4 \\ &= 400 \times (1.03)^4 \\ &= £450.20 \end{aligned}$$

### Key Words

Percent  
Depreciate  
Interest  
Annum  
Simple  
Compound  
Multiplier

- 1) Calculate a) 32% of 48 b) 18% of 26
- 2) Kane invests £350 into a bank account that pays out simple interest of 6%. How much will be in the bank account after 3 years?
- 3) Jane invests £670 into a bank account that pays out 4% compound interest per annum. How much will be in the bank account after 2 years?