

Year 8 Knowledge Organiser

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.

Tip

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

Examples

Make the denominators the same.

$$\begin{array}{ccccc}
 \frac{3}{4} & \frac{3}{8} & \frac{1}{2} & \frac{7}{8} & \frac{1}{4} \\
 \downarrow & \downarrow & \downarrow & \downarrow & \downarrow \\
 \frac{6}{8} & \frac{3}{8} & \frac{4}{8} & \frac{7}{8} & \frac{2}{8} \\
 \downarrow & \downarrow & \downarrow & \downarrow & \downarrow \\
 \frac{1}{4} & \frac{3}{8} & \frac{1}{2} & \frac{3}{4} & \frac{7}{8}
 \end{array}$$

Convert them all to decimals.

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



Clip Numbers

52-55, 73-83, 97

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) $\frac{7}{32}, 25\%, 0.05, \frac{29}{100}$

ANSWERS: 1) $\frac{7}{12}, \frac{3}{4}, \frac{5}{6}$ 2) $0.2, \frac{1}{3}, \frac{7}{10}, 0.49, \frac{3}{7}$ 3) $0.05, \frac{32}{100}, 25\%, \frac{29}{100}$

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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

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

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

Calculator

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

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



Clip Numbers
77, 84-89, 96

Tip

There is a % function on your calculator.

To find 25% of 14 on a calculator:

2, 5, SHIFT, (, ×, 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%

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FRACTIONS, DECIMALS AND PERCENTAGES

Key Concepts

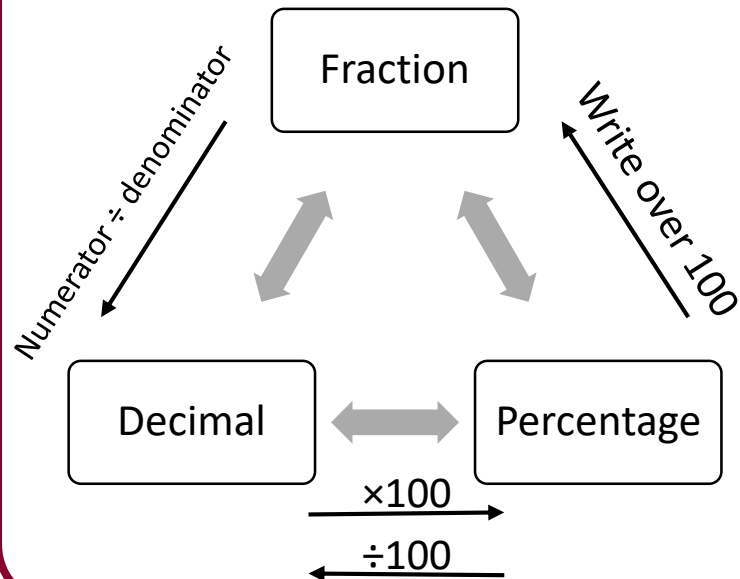
A **fraction** is a numerical quantity that is not a whole number.

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

 **hegarty**maths
73-76, 82-83

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

ANSWERS 1a) 40% b) 8% c) 30% d) 12% 2) 0.706 0.72 $\frac{3}{4}$ 76% $\frac{4}{5}$

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



61, 63-70

Examples

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

$$65 \div 5 = 13$$

$$13 \times 4 = 52$$

Divide by the denominator

Multiply this by the

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

$$52 \div 4 = 13$$

$$13 \times 5 = 65$$

Divide by the numerator

Multiply this by the

denominator

Order these fractions in ascending order:

$\frac{2}{5}$	$\frac{1}{2}$	$\frac{5}{6}$	$\frac{7}{15}$
↓ ×6	↓ ×15	↓ ×5	↓ ×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**

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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4 OPERATIONS WITH FRACTIONS

Key Concepts

An **improper fraction** is when the numerator is larger than the denominator e.g. $\frac{20}{12}$

Converting from a mixed number into an improper fraction:

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

A **reciprocal** is the value that when multiplied by another gives the answer of 1.

Eg. $\frac{1}{8}$ is the reciprocal of 8.
 $\frac{2}{5}$ is the reciprocal of $\frac{5}{2}$

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

$$= \frac{5}{3} + \frac{9}{4} \quad \text{Convert into an improper fraction}$$

$$= \frac{20}{12} + \frac{27}{12} \quad \text{Find a common denominator}$$

$$= \frac{47}{12}$$

$$= 3 \frac{11}{12} \quad \text{Convert back into a mixed number}$$

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

$$= \frac{8}{3} - \frac{5}{4}$$

$$= \frac{32}{12} - \frac{15}{12}$$

$$= \frac{17}{12}$$

$$= 1 \frac{5}{12}$$

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

$$= \frac{4}{3} \times \frac{11}{4}$$

$$= \frac{44}{12}$$

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

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

$$= \frac{7}{3} \div \frac{8}{5} \quad \text{Find the reciprocal of the second fraction...}$$

$$= \frac{7}{3} \times \frac{5}{8} \quad \text{...and multiply}$$

$$= \frac{35}{24}$$

$$= 1 \frac{11}{24}$$

Examples



61, 63-70

Key Words

Fraction
 Equivalent
 Reciprocal
 Numerator
 Denominator
 Improper/Top heavy
 Mixed number

Calculate:

1) $1 \frac{2}{3} + 2 \frac{3}{4}$

2) $3 \frac{3}{4} - 1 \frac{1}{3}$

3) $3 \frac{1}{5} \times 1 \frac{2}{3}$

4) $1 \frac{3}{5} \div 2 \frac{7}{10}$

What is the reciprocal of:

5) $\frac{2}{3}$ 7) 0.75

6) 9

ANSWERS A 1) $4 \frac{12}{5}$ 2) $2 \frac{12}{5}$ 3) $5 \frac{1}{16}$ 4) $\frac{27}{16}$ 5) $\frac{3}{2}$ 6) $\frac{1}{9}$ 7) $\frac{3}{7}$

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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 $50 \times 3 = 150$ **32% = 150 + 10**
1% \rightarrow $500 \div 100 = 5$ **= 160g**
2% \rightarrow $5 \times 2 = 10$

Calculating a percentage – calculator:

Calculate 32% of 500g:

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

Percentage change:

Examples

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

Value \times (1
– 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?

Value \times (1
+ percentage as a decimal)
 $= 120,000 \times (1 + 0.08)$

$= £129,600$

- 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%

Key Words

Percent
Increase/decrease
Appreciate
Depreciate
Multiplier
Divide

Year 8 Knowledge Organiser

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.

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?