

Knowledge Organiser: Mathematics

Year 8 Spring 2



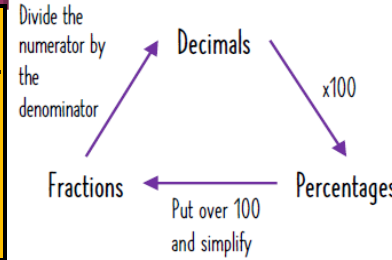
Suggested websites: Maths Genie, Save My Exams and Corbett Maths

Big Idea: Number

Key Vocabulary

Estimate, Rounding, Conversion, Multiplier, Decrease, Invest, Reverse, Growth, Integer, Profit, Loss, Interest, Change, Base, Index/Power/Exponent/Indices, Standard form/ Scientific notation, Negative, Place value, Commutative, Zero, Reciprocal, Root.

Convert between fractions, decimals and percentages



Percentage Increase : Multipliers

Increase 50 by 20%
 Add the percentage to 100%
 $100\% + 20\% = 120\%$
 Convert this to a decimal
 $120\% \div 100 = 1.2$
 Multiply by the amount
 $1.2 \times 50 = 60$

Finding the percentage of an amount (mental)

Find 30% of 600
 Start by finding 10%
 $10\% = 60$
 Then multiply to find the amount you want
 $30\% = 180$
 Find 95% of 700
 Start by finding 10%
 $10\% = 70$
 Then find 5%
 $5\% = 35$
 Then subtract 35 from 700 to find 95%
 $700 - 35 = 665$

Express numbers as fractions or percentages

Express 20 out of 50 as a fraction and a percentage
 Put 20 as the numerator and 50 as the denominator:
 $20/50$
 To change this into a percentage, multiply it by 100:
 $20/50 \times 100 = 40\%$

What do I need to be able to do?

By the end of the unit you should be able to:

- Investigate positive and negative powers of 10
- Work with numbers in standard form
- Compare and order numbers in standard form
- Mentally calculate with numbers in standard form
- Use operations with standard form
- Use a calculator to work with numbers in standard form
- Use negative/fractional indices

What do I need to be able to do?

By the end of the unit you should be able to:

- Convert between fractions, decimals and percentages
- Calculate fractions, decimals and percentages of amounts with/without a calculator
- Use multipliers to increase and decrease numbers
- Express numbers as fractions or percentages
- Find percentage change
- Reverse percentages

Finding the percentage of an amount (calculator)

Find 37% of 656
 Convert your percentage into a decimal
 $37 \div 100 = 0.37$
 Multiply the amount by the decimal
 $656 \times 0.37 = 242.72$

Percentage Decrease : Multipliers

Decrease 50 by 20%
 Subtract the percentage from 100%
 $100\% - 20\% = 80\%$
 Convert this to a decimal
 $120\% \div 100 = 0.8$
 Multiply by the amount
 $0.8 \times 50 = 40$

Reverse Percentages:

A coat is reduced by 60% to \$80 in a sale, what was the original price of the coat?
 $40\% = \$80$
 $1\% = \$2$
 $100\% = \$200$

Standard Form

Standard form is a way of writing all numbers in a similar form.

$$a \times 10^b$$

a is a number between 1 and 9.999999
 b is an integer

Standard Form - Mental Calculations

Example:

$$3 \times (6 \times 10^5)$$

$$3 \times 6 \times 10^5$$

$$18 \times 10^5$$

Not in standard form

$$18 \div 10 = 1.8$$

If we divide 18 by 10, then we need to increase the power to compensate.

$$1.8 \times 10^6$$

Standard Form - Mental Calculations

Example:

$$3 \times (6 \times 10^5)$$

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Standard Form - Adding and Subtracting

- Convert from standard form into an ordinary number.
- Then add or subtract them.
- Finally convert them back into standard form.

$$9 \times 10^5 + 8 \times 10^6$$

$$900000 + 8000000$$

$$8900000$$

$$8.9 \times 10^6$$

Standard Form - Multiplying and Dividing

Multiply the first numbers together
 $3 \times 7 = 21$
 Multiply the powers of 10 together (remember you add the indices)
 $10^4 \times 10^5 = 10^9$
 Check that your answer is in standard form (convert it if it is not)

$$21 \times 10^9 \longrightarrow 2.1 \times 10^{10}$$

Positive powers of 10

$$10 \times 10 \times 10 = 10^3$$

$$10^4 \times 10^5 = 10^9$$

Negative powers of 10

$$10^{-1} = 1/10$$

$$10^{-2} = 1/100$$

Ordering numbers in standard form

Look at the power of 10. The larger the number, the bigger it is. If you have two that are the same, look at the first part and see which is larger.

Big Idea: Number

Key Vocabulary

Per cent, Decimal, Fraction, Equivalent, Reduce, Growth, Integer, Invest.

What do I need to be able to do?

- By the end of this unit you should be able to:
- Convert between FDP less than and more than 100
 - Increase or decrease using multipliers
 - Express an amount as a percentage
 - Find percentage change

Convert FDP



70/100 → This also means 70 out of 100 squares → 70 "hundredths" - 7 "tenths" → 0.7 → 70 hundredths - 70%

Using a calculator → $\frac{70}{100}$ → S-D → Convert to a decimal → × 100 converts to a percentage

Be careful of recurring decimals
eg $\frac{1}{3} = 0.3333333$
The dot above the 3

Convert FDP < and > 100%

100 hundredths 10 tenths 100% → 40 hundredths 4 tenths 40% → 140 hundredths 14 tenths 140%

100% + 40% = 1 + 0.40 = 140

Express as a % - Non-calculator

Percent - per hundred

7 per every 10 are orange → $\frac{7}{10}$ → This means that 70 per every 100 are orange → $\frac{70}{100}$ → 70%

27 per every 50 shaded → $\frac{27}{50}$ → 54 per every 100 shaded → $\frac{54}{100}$ → 54%

Denominator 100 Equivalent fractions

Fraction/ Percentage of amount



Find $\frac{3}{5}$ of £60 → £36

Remember $\frac{3}{5} = 60\%$

10% of £60 = £6
50% of £60 = £30
60% of £60 = £36

Remember $\frac{3}{5} = 60\% = 0.6$
60% of £60 = $0.6 \times 60 = £36$

Percentage decrease: Multipliers

100% → 42% → Decrease by 58%

100% - 58% = 42% Multiplier Less than 1

$100 - 0.58 = 0.42$

Percentage increase: Multipliers

100% → 12% → Increase by 12%

100% + 12% = 112% Multiplier More than 1

$100 + 0.12 = 112$

Express as a % - Calculator

Rosie $\frac{13}{30}$ → $\frac{13}{30}$ → × 100 → 43.3333...% → 43%

Can't use equivalence easily to find 'per hundred'

This the same as 13 ÷ 30

Decimal percentages are still a percentage

Percentage change

I bought a phone for £200. A year later sold it for £125.

I bought a house for £180,000, I later sold it for £216,000.

All values of change compare to the ORIGINAL value

Percentage loss: $\frac{75}{200} \times 100 = 37.5\%$

Percentage profit: $\frac{36000}{180000} \times 100 = 20\%$

Difference in value × 100 / Original value

Choose appropriate method

The language and wording of the question is the key

Have you represented the question in a bar model?
Can you use a calculator?