

Review: Linear equations

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Presentation overview

- ① 1A - Linear equations
- ② 1B - Constructing linear equations
- ③ 1C - Simultaneous equations
- ④ 1D - Constructing simultaneous equations
- ⑤ 1E - Solving linear inequalities
- ⑥ 1F - Using and transposing formula

Linear equations

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Solving linear equations

Linear equation is a particular type of equation that comes with one unknown, and first power of variable.

E.g. $3x - 5 = 11$

Example 1

Solve the equation $3x + 4 = 16$ for x .

Example 2

Solve $4x + 3 = 3x - 5$.

Example 3

Solve $3(2x + 5) = 27$.

Fractions incoming!

Example 4

Solve $\frac{x}{5} - 2 = \frac{x}{3}$.

Example 5

Solve $\frac{x-3}{2} - \frac{2x-4}{3} = 5$.

Literal equations

Literal equation is just **Literally algebras only**. However, except for the variable (E.g. x), all others are treated as coefficient.

Example 6

Solve $ax + b = cx + d$ for x .

Exercise 1A

Constructing linear equations

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Word to equations

In this section, we will learn to translate the word problems into algebras and/or equations

Example 7

A chef uses the following rule for cooking a turkey:
'Allow 30 minutes for each kilogram weight of turkey and then add an extra 15 minutes.' If the chef forgot to weigh a turkey before cooking it, but knew that it had taken 3 hours to cook, calculate how much it weighed.

Word to equations 2

Example 8

Find the area of a rectangle whose perimeter is $1.08m$, if it is $8cm$ longer than it is wide.

Word to equations 3

Example 9

Adam normally takes 5 hours to travel between Higett and Logett. One day he increases his speed by $4\text{km}/\text{h}$ and finds the journey from Higett to Logett takes half an hour less than the normal time. Find his normal speed.

Exercise 1B

Simultaneous equations

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What is simultaneous equations?

Simultaneous means things are happening at the same time. Hence, equations wise, we say it as two equations are drawn or on the graph. But how do we solve the equation? Try drawing the equation for $2x - y = 4$ and $x + 2y = 3$. On the graph, if they intersect, it is the solution!

Substitution vs elimination

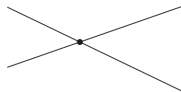
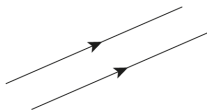
Example 10

Solve the equations $2x - y = 4$ and $x + 2y = -3$

Other simultaneous equations and geometry

Are there any simultaneous equations that do not result in 1 solution? YES!!

Two distinct straight lines are either parallel or meet at a point.



There are three cases for a system of two linear equations with two variables.

	Example	Solutions	Geometry
Case 1	$2x + y = 5$ $x - y = 4$	Unique solution: $x = 3, y = -1$	Two lines meeting at a point
Case 2	$2x + y = 5$ $2x + y = 7$	No solutions	Distinct parallel lines
Case 3	$2x + y = 5$ $4x + 2y = 10$	Infinitely many solutions	Two copies of the same line

Exercise 1C

Constructing simultaneous equations

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Example 11

The sum of two numbers is 24 and their difference is 96. Find the two numbers.

Making it alive - again 2...

Example 11

3 kg of jam and 2 kg of butter cost \$29, and 6 kg of jam and 3 kg of butter cost \$54. Find the cost per kilogram of jam and butter.

Exercise 1D

Solving linear inequalities

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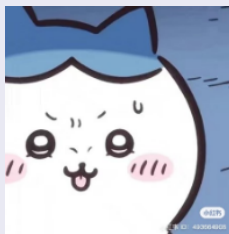
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Linear inequalities

Inequalities is basically opposite to only 1 answer. Hence, we denote with \geq , \leq , $>$, $<$. For advanced, we often use \neq in Maths

Advanced

Proof that $1 + 1 \neq 3$.



[Don't worry, you won't learn this]

Swamp of examples incoming

Example 13

Solve the inequality $2x + 1 < 4$

Example 14

Solve the inequality $3 - 2x \leq 4$

Example 15

Solve the inequality $\frac{2x+3}{5} > \frac{3-4x}{3} + 2$

Exercise 1E

Using and transposing formula

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They give you formula - We use/rearrange the formula

The most common formula we have is $A = \text{length} \times \text{width}$. The formula represents as: $A = lw$

Example 16

Find the area of a rectangle with length (l) 10 cm and width (w) 4 cm.

Example 17

Transpose the formula $v = u + at$ to make a the subject.

Example 18

Evaluate p if $2(p + q) - r = z$, and $q = 2$, $r = 3$ and $z = 11$.

More applications!

Example 19

A path x metres wide surrounds a rectangular lawn. The lawn is l metres long and b metres wide. The total area of the path is $A \text{ m}^2$.

- 1 Find A in terms of l , b and x .
- 2 Find b in terms of l , A and x .
- 3 Find the value of b if $l = 6$, $A = 72$ and $x = 1.5$.

More rearrangement

Example 20

For each of the following, make c the subject of the formula:

① $e = \sqrt{3c - 7a}$

② $\frac{1}{a} - \frac{1}{b} = \frac{1}{c-2}$

Exercise 1F