

Linear Inequalities

Starter

1. **(Review of last lesson)** Prove that the answer to every line of the pattern below is 3.
 $2 \times 4 - 1 \times 5$ $3 \times 5 - 2 \times 6$ $4 \times 6 - 3 \times 7$

Working: Look at how the digits of each calculation are connected to each other.
 The n th line of pattern is $(n + 1)(n + 3) - n(n + 4)$

Expand: $n^2 + 3n + n + 3 - n^2 - 4n$

Collect like terms: $n^2 + 4n + 3 - n^2 - 4n = 3$

2. **(Review of last lesson)** Prove that the sum of the squares of any two consecutive integers is an odd number.

Working: Let the consecutive integers be x and $x + 1$

$$\text{Sum} = x^2 + (x + 1)^2$$

$$= x^2 + x^2 + 2x + 1$$

$$= 2(x^2 + x) + 1$$

$$= 2 \times \text{"a number"} + 1 \text{ which is the form of an odd number.}$$

3. **(Review of Y9 material)**

Solve: (a) $2x - 1 = 5$ (find the value)
 (b) $2x - 1 > 5$ (find the range of values).

Working: (a) $2x - 1 = 5$
 $2x = 6$
 $x = 3$

(b) $2x - 1 > 5$
 $2x > 6$
 $x > 3$

E.g. 1 Solve the inequality $-2x < 8$.

N.B. It can be solved in two ways.

Divide by -2 , change the direction of the inequality

$$-2x < 8$$

$$x > -\frac{8}{2}$$

$$x > -4$$

Swap $-2x$ and 8 over

$$-2x < 8$$

$$-8 < 2x$$

$$-\frac{8}{2} < x$$

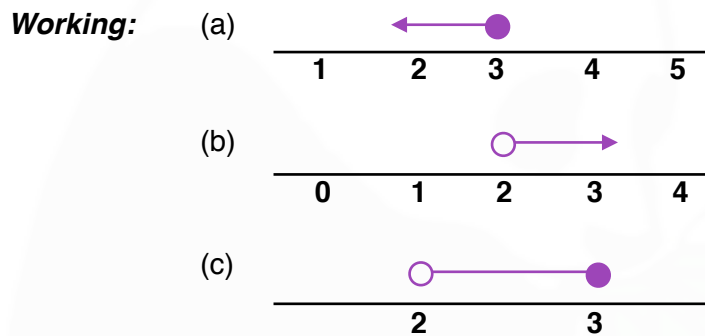
E.g. 2 Solve the inequalities: (a) $-\frac{x}{3} > -5$ (b) $-4x + 19 \geq -5$

Working: (a) $-\frac{x}{3} > -5$
Times by -3 : $x < 15$ *direction of inequality changes*

(b) $-4x + 19 \geq -5$
Subtract 19: $-4x \geq -24$
Divide by -4 : $x \leq 6$ *direction of inequality changes*

E.g. 3 Express these inequalities diagrammatically:

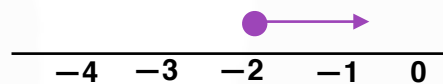
(a) $x \leq 3$ (b) $x > 2$ (c) $2 < x \leq 3$



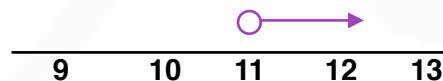
E.g. 4 Solve these inequalities, expressing your answer as both an inequality and its diagram form:

(a) $-3x - 7 \leq -1$ (b) $65 - 7x < -12$

Working: (a) $-3x - 7 \leq -1$
 Add 7: $-3x \leq 6$
 Divide by -2 : $x \geq -2$ *direction of inequality changes*



(b) $65 - 7x < -12$
 $-7x < -77$
 $x > 11$ *direction of inequality changes*



Video: [Solving inequalities \(one sign\)](#)

[Solutions to Starter and E.g.s](#)

Exercise

- 9-1 class textbook: p509 M16.1 Qu 1, 2a-d, 3
- A*-G class textbook: p465 M16.1 Qu 1, 2a-d, 3
- 9-1 homework book: p171 M16.1 Qu 1, 3, 4a, 6ab
- A*-G homework book: p128 M16.1 Qu 1, 3, 4a, 6ab

Homework book answers (only available during a lockdown)