

## Essential knowledge

- Solve two-step equations and inequalities, including with brackets and with unknowns on both sides
- Form and solve equations and inequalities
- Rearrange formulae, both one and two step

## Key Vocabulary

- Inequality:** an inequality compares two values showing if one is greater than, less than or equal to another
- Variable:** a quantity that may change within the context of the problem
- Rearrange:** Change the order
- Inverse operation:** the operation that reverses the action
- Substitute:** replace a variable with a numerical value
- Solve:** find a numerical value that satisfies an equation

## Prior learning links

Year 7- Equality and Equivalence

Year 8- Brackets, Equations and Inequalities

## Solving inequalities

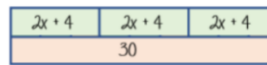
Find the possible range of values for  
 $3x + 2 > 11$

Solve

$$x \leftarrow \div 3 \leftarrow -2 \leftarrow -11$$

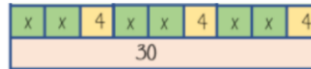
$$x > 3$$

## Solving equations with brackets



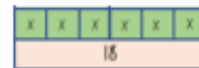
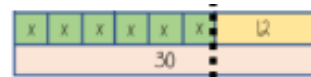
$$3(2x + 4) = 30$$

Expand the brackets



$$6x + 12 = 30$$

$$-12 \quad -12$$



$$6x = 18$$

$$\div 6 \quad \div 6$$

$$x = 3$$

## Equations with unknowns on both sides

$$4x + 5 = 3x + 24$$

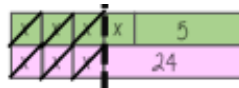
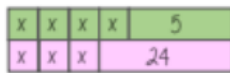
$$-3x \quad -3x$$

$$x + 5 = 24$$

$$-5 \quad -5$$

$$x = 19$$

*Solving inequalities has the same method as equations*



## Formulae and Equations

**Formulae** – all expressed in symbols

**Equations** – include numbers and can be solved

## Inequalities with negatives

Make x positive first

$$2 - 3x > 17$$

$$+3x \quad +3x$$

$$2 > 17 + 3x$$

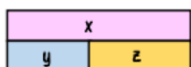
$$-17 \quad -17$$

$$-15 > 3x$$

$$\div 3 \quad \div 3$$

$$\underline{-5 > x}$$

## Rearranging formulae (one step)



$$x = y + z$$

Rearrange to make y the subject.

$$y = x - z$$

$$y \rightarrow +z \rightarrow x$$

$$y \leftarrow -z \leftarrow x$$

Using inverse operations or fact families will guide you through rearranging formulae

## Rearranging formulae (two step)

The steps are the same for solving and rearranging

In an equation (find x)

$$4x - 3 = 9$$

$$+3 \quad +3$$

$$4x = 12$$

$$\div 4 \quad \div 4$$

$$x = 3$$

In a formula (make x the subject)

$$xy - s = a$$

$$+s \quad +s$$

$$xy = a + s$$

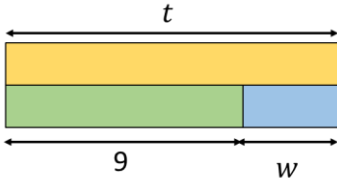
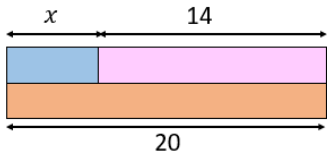
$$\div y \quad \div y$$

$$x = \underline{a + s}$$

$$y$$

## Prior learning links

Write the fact families for these bar models.



## Key Vocabulary

Use cover, look, write, check to write the definitions

**Inequality:**

**Variable:**

**Rearrange:**

**Inverse operation:**

**Substitute:**

**Solve:**

## Inequalities with negatives

Solve

$$-5x + 24 > 54$$

## Solve equations with brackets

Solve

$$3(x + 5) = 27$$

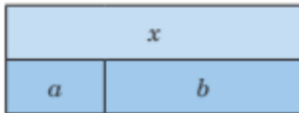
## Equations and inequalities with unknowns on both sides

Solve

$$3x + 1 = 2x + 5$$

## Rearranging formulae (one step)

Use the bar model to write  $b$  in terms of  $x$  and  $a$ .



Make  $y$  the subject:

$$c = y + z$$

Solve

$$4 + 5g < 3g - 8$$

## Rearranging formulae (two step)

Make  $a$  the subject:

$$5a + 4 = b$$

$$\frac{a}{6} - 5 = b$$