

Pupils should be taught to:

Construct and solve linear equations, selecting an appropriate method

As outcomes, Year 7 pupils should, for example:

Use, read and write, spelling correctly: equation, solution, unknown, solve, verify, prove, therefore (\therefore).

Construct and solve simple linear equations with integer coefficients, the unknown on one side only.

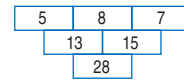
Choose a suitable unknown and form expressions leading to an equation. Solve the equation by using inverse operations or other mental or written methods.

For example:

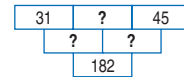
- I think of a number, subtract 7 and the answer is 16. What is my number?
Let n be the number.
 $n - 7 = 16$
 $\therefore n = 16 + 7 = 23$

- A stack of 50 sheets of card is 12 cm high. How thick is one sheet of card?
Let d cm be the thickness of each sheet.
 $50d = 12$
 $\therefore d = \frac{12}{50} = \frac{24}{100} = 0.24$
The thickness of each sheet is 0.24 cm.

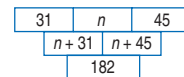
- In this diagram, the number in each cell is formed by adding the two numbers above it.



What are the missing numbers in this diagram?



Let n be the number in the top centre cell. Form the first row and the subsequent row. It follows that:



$$n + 31 + n + 45 = 182$$

$$\therefore 2n = 106$$

$$n = 53$$

What if the top three numbers are swapped around?
What if you start with four numbers?

- I think of a number, multiply it by 6 and add 1. The answer is 37. What is my number?
- There are 26 biscuits altogether on two plates. The second plate has 8 fewer biscuits than the first plate. How many biscuits are there on each plate?
- Find the angle a in a triangle with angles a , $a + 10$, $a + 20$.
- Solve these equations:

a. $a + 5 = 12$	c. $7h - 3 = 20$	e. $2c + 3 = 19$
b. $3m = 18$	d. $7 = 5 + 2z$	f. $6 = 2p - 8$

Check solutions by substituting into the original equation.

As outcomes, Year 8 pupils should, for example:

Use vocabulary from previous year and extend to: linear equation...

Consolidate forming and solving linear equations with an unknown on one side.

Choose a suitable unknown and form expressions leading to an equation. Solve the equation by removing brackets, where appropriate, collecting like terms and using inverse operations.

For example:

- There are 376 stones in three piles. The second pile has 24 more stones than the first pile. The third pile has twice as many stones as the second. How many stones are there in each pile?

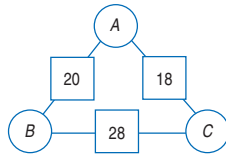
Let s stand for the number in the first pile.

Pile 1	Pile 2	Pile 3	Total
s	$s + 24$	$2(s + 24)$	376

$$\begin{aligned}
 s + (s + 24) + 2(s + 24) &= 376 \\
 \therefore s + s + 24 + 2s + 48 &= 376 \\
 4s + 72 &= 376 \\
 4s &= 376 - 72 = 304 \\
 s &= 76
 \end{aligned}$$

- In an arithmagon, the number in a square is the sum of the numbers in the two circles on either side of it.

In this triangular arithmagon, what could the numbers A, B and C be?



Let x stand for the number in the top circle. Form expressions for the numbers in the other circles, $(20 - x)$ and $(18 - x)$. Then form an equation in x and solve it.

$$\begin{aligned}
 (20 - x) + (18 - x) &= 28 \\
 \therefore 38 - 2x &= 28 \\
 2x &= 10 \\
 x &= 5 \\
 \text{So } A = 5, B = 15, C = 13.
 \end{aligned}$$

- On Dwain's next birthday, half of his age will be 16. How old is Dwain now?
- Solve these equations:

a. $5x = 7$	c. $2(p + 5) = 24$
b. $3 = \frac{12}{n}$	d. $2.4z + 5.9 = 14.3$
	e. $4(b - 1) + 5(b + 1) = 100$

Check solutions by substituting into the original

As outcomes, Year 9 pupils should, for example:

Use vocabulary from previous years and extend to: inequality, region... and, or...

Construct and solve linear equations with negative signs anywhere in the equation, negative solution...

Solve linear equations using inverse operations, by transforming both sides in the same way or by other methods.

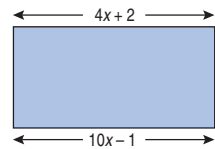
For example:

- Compare different ways of solving 'think of a number' problems and decide which would be more efficient - retaining brackets and using inverse operations, or removing brackets first. For example:
I think of a number, add 3, multiply by 4, add 7, divide by 9, then multiply by 15. The final answer is 105. What was the number that I thought of?

- Jack, Jo and Jim are sailors. They were shipwrecked on an island with a monkey and a crate of 185 bananas. Jack ate 5 more bananas than Jim. Jo ate 3 more bananas than Jim. The monkey ate 6 bananas. How many bananas did each sailor eat?

- The length of a rectangle is three times its width. Its perimeter is 24 centimetres. Find its area.

- The area of this rectangle is 10 cm^2 .



Calculate the value of x and use it to find the length and width of the rectangle.

- In $\triangle ABC$, $\angle B$ is three quarters of $\angle A$, and $\angle C$ is one half of $\angle A$. Find all the angles of the triangle.
- Solve these equations:

a. $3c - 7 = -13$	d. $4(b - 1) - 5(b + 1) = 0$
b. $1.7m^2 = 10.625$	e. $\frac{12}{(x + 1)} = \frac{21}{(x + 4)}$
c. $4(z + 5) = 8$	

Check solutions by substituting into the original equation.