Simultaneous equations

What do I need to be able to do?

- Determine whether (x,y) is a solution
- Solve by substituting a known variable
- Solve by substituting an expression
- Solve graphically
- Solve by subtracting/ adding equations
- Solve by adjusting equations
- Form and solve linear simultaneous equations

Keywords & definitions:

Solution: a value we can put in place of a variable that makes the equation true

Variable: a symbol for a number we don't know yet.

Substitute: replace a variable with a numerical value

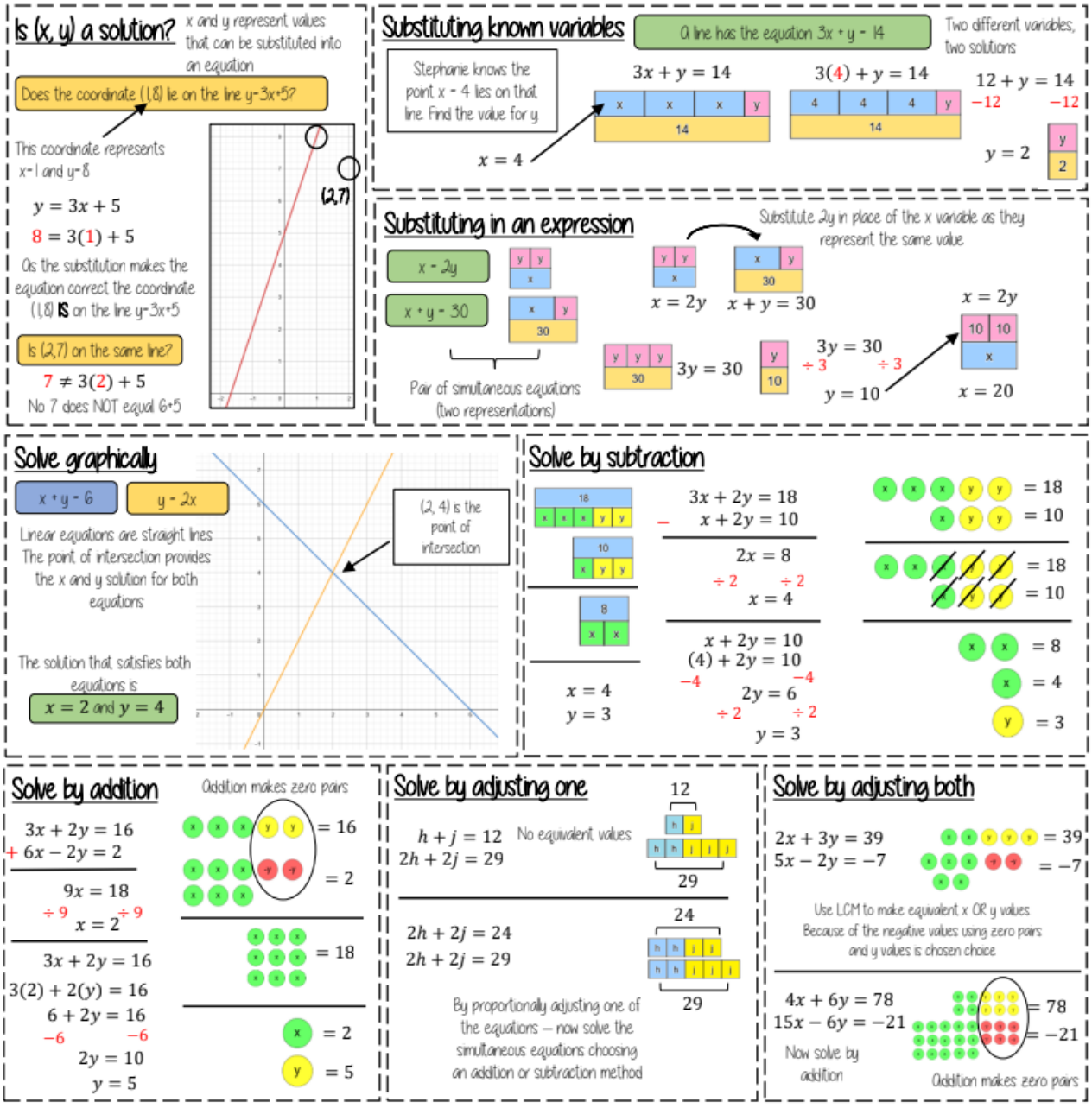
LCM: lowest common multiple (the first time the times table of two or more numbers match)

Eliminate: to remove

Expression: a maths sentence with a minimum of two numbers and at least one math operation (no equals sign)

Coordinate: a set of values that show an exact position.

Intersection: the point two lines cross or meet.



Retrieval Quiz

Answers

Non-Calculator Methods

What do I need to be able to do?

- Use mental/written methods for the four number operations
- Use four operations for fractions
- Write exact answers
- Round to decimal places and significant figures
- Estimate solutions
- Understand limits of accuracy

Keywords & definitions:

Reciprocal: the value that, when multiplied by the original number, equals 1

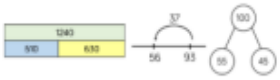
Round: making a number simpler, but keeping its place value close the what it originally was

Significant Figure: first second or third non-zero digit from the left

Overestimate: Rounding up – gives a solution higher than the actual value

Underestimate: Rounding down – gives a solution lower than the actual value

Addition/ Subtraction



Modelling methods for addition/ subtraction

- Bar models
- Number lines
- Part/ Whole diagrams

Addition is commutative

6 + 3 = 3 + 6

The order of addition does not change the result

Subtraction the order has to stay the same

360 – 147 = 360 – 100 – 40 – 7

- Number lines help for addition and subtraction
- Working in 10's first aids mental addition/ subtraction
- Show your relationships by writing fact families

Formal written methods (R)

	H	T	O
	1	8	7
+	5	4	2

	H	T	O
	4	2	7
–	2	4	9

Remember the place value of each column
You may need to move 10 ones to the ones column to be able to subtract

Decimals have the same methods remember to align the place value

Division methods

3584 ÷ 7 = 512

Short division

$$7\overline{)3\,{}^{3}5\,8\,{}^{1}4} \quad 5\ 1\ 2$$

Complex division

÷ 24 = ÷ 6 ÷ 4

Break up the divisor using factors

Division with decimals

The placeholder in division methods is essential – the decimal lines up on the dividend and the quotient

24 ÷ 0.02 → 24 ÷ 0.2 → 240 ÷ 2

All give the same solution as represent the same proportion
Multiply the values in proportion until the divisor becomes an integer

(R)

Multiplication methods

Long multiplication (column)

Grid method

Repeated addition

Less effective method especially for bigger multiplication

Multiplication with decimals (R)

Perform multiplications as integers
e.g. 0.2 x 0.3 → 2 x 3

Make **adjustments** to your answer to match the question: 0.2 x 10 = 2
0.3 x 10 = 3
Therefore 6 ÷ 100 = **0.06**

Rounding (R)

2.46192 (to 1dp) - is this closer to 246 or 247

246 ← 247

2.46|192

This shows the number is closer 246

Significant Figures

370 to 1 significant figure is 400
37 to 1 significant figure is 40
3.7 to 1 significant figure is 4
0.37 to 1 significant figure is 0.4
0.00000037 to 1 significant figure is 0.0000004

SF: Round to the first nonzero number

Estimation (R)

Round to 1 significant figure to estimate

21.4 x 3.1 ≈ 20 x 3 ≈ 60

The equal sign changes to show it is an estimation

This is an **underestimate** because both values were rounded down

It is good to check all calculations with an estimate in all aspects of maths – it helps you identify calculation errors

Limits of accuracy

A width **w** has been rounded to 6.4cm correct to 1dp

The error interval: 6.35 ≤ w < 6.45

Any value within these limits would round to 6.4 to 1dp

Retrieval Quiz

Non-Calculator Methods Quiz

1. What is the definition of a "reciprocal"?

1. Using a formal written method, calculate 187+542.

1. When performing subtraction, does the order of the numbers change the result?

1. Calculate 35.84÷7.

1. Calculate 0.2×0.3.

1. Round 2.46192 to two decimal places.

1. What is the definition of a "significant figure"?

1. Round 370 to one significant figure.

1. If you round down both values in an estimation, what type of estimate will it be (overestimate or underestimate)?

1. A width w has been rounded to 64 cm correct to 1 decimal place. Write the error interval for w.

Answers 1.The value that, when multiplied by the original number, equals 1. 2. 729 3.Yes, the order has to stay the same. 4. 5.12 5. 0.06 6. 2.46 7. The first, second, or third non-zero digit from the left. 8.400 9. Underestimate. 10. $63.5 \leq w < 64.5$.