SUPER 12s

SUPER 12s CAN BE USED AS AN INDIVIDUALISED MASTERY LEARNING PROGRAM.

2 ALGEBRA
2.12 SIMULTANEOUS EQNS
2.12 LEVEL 1

NAME : _____

Skill description: Solving simultaneous equations by substitution.

Essential Revision

1. Solve for the unknown.

$$y - 3 = 9$$

2. Solve for the unknown.

$$6r = 24$$

3. Solve for the unknown.

$$\frac{y}{8} = 9$$

4. Solve for the unknown.

$$t + 4 = 55$$

5. Solve for the unknown.

$$8y = 24$$

6. Solve for the unknown.

$$\frac{t}{9} = 9$$

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7. Solve for the unknown.

$$h - 3 = 22$$

8. Solve for the unknown.

$$9t = 90$$

9. Solve for the unknown.

$$\frac{h}{7} = 4$$

10. Solve for the unknown.

$$z + 5 = 26$$

11. Solve for the unknown.

$$7h = 49$$

12. Solve for the unknown.

$$\frac{z}{12} = 7$$

Solutions can be found at the end of the booklet.

score $\frac{\quad}{12}$

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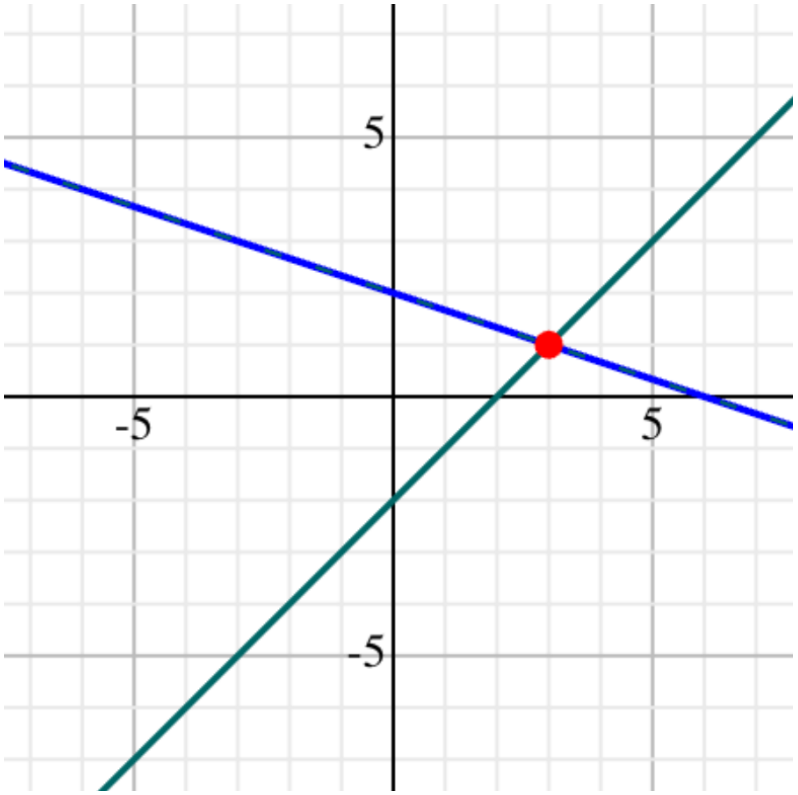
STRATEGIES TO SOLVE THE PROBLEMS

Why do we solve simultaneous equations?

Simultaneous equations algebraically represent two straight lines. When we solve simultaneous equations, we find the location of where the lines intersect.

Below is the graphical solution to:

$$x = y + 2$$
$$x + 3y = 6$$



We can see that the lines intersect at the point $(3,1)$, which is the solution to the simultaneous equations.

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There are generally two strategies used to solve simultaneous equations.

substitution or **elimination**

The strategy you choose is often determined by how the equations are presented. The strategy that makes it easiest to solve is then chosen.

The two examples below are mathematically identical pairs of equations presented differently.

If one of the equations is presented with a **variable on both sides of the equal sign**, it is often easiest to use **substitution**.

$$x = y + 2$$
$$x + 3y = 6$$

If all the **variables are on the same side of the equals sign for both equations,** use **elimination**. We will cover this in level 2.

$$x - y = 2$$
$$x + 3y = 6$$

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Example 1

Solve these simultaneous equations by substitution.

$$x = y + 2$$
$$x + 3y = 6$$

Step 1

Substitute the expression $y + 2$ (from the first equation) in for the variable x (in the second equation). This will produce an equation with only one variable.

$$x = y + 2$$

$$x + 3y = 6$$

produces

$$y + 2 + 3y = 6$$

Step 2

Combine like terms and solve.

$$y + 2 + 3y = 6$$

$$4y + 2 = 6$$

$$4y = 4$$

$$y = \frac{4}{4}$$

$$y = 1$$

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Step 3

Now that you have the value for y we need to substitute this back into one of the original equations to find the value of x. In this example, we've chosen the first equation.

$$y = 1$$

$$x = y + 2$$

$$x = 1 + 2$$

$$x = 3$$

Final solution

$$x = 3\,, y = 1$$

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QUESTIONS

Solve these equations by substitution.

1.

$$x = y + 2$$
$$3x + 2y = 6$$

2.

$$2x + 3y = 11$$
$$x = y + 3$$

3.

$$x + y = 24$$
$$y = 2x + 6$$

4.

$$x = 5y + 7$$
$$2x - 4y = 8$$

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5.

$$y = 2x + 1$$
$$5x + 3y = 14$$

6.

$$y = x - 4$$
$$2x + 5y = 43$$

7.

$$2x + y = 7$$
$$x = 2y + 6$$

8.

$$y = 2x - 3$$
$$5x - 3y = 11$$

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9.

$$x + y = -1$$
$$y = x + 5$$

10.

$$3x + 4y = 8$$
$$y = 2x + 13$$

11.

$$x = 2y - 2$$
$$3x + 2y = 34$$

12.

$$y = -2x + 5$$
$$y = \frac{1}{2}x$$

SOLUTIONS CAN BE FOUND AT THE END OF THE BOOKLET.

score $\frac{\quad}{12}$

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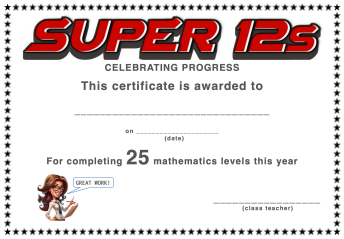
MASTERY TEST

Teacher's signature

I'VE COMPLETED

_____

LEVELS THIS YEAR



Solutions to Essential Revision

1. $y = 12$	2. $r = 4$
3. $y = 72$	4. $t = 51$
5. $y = 3$	6. $t = 81$
7. $h = 25$	8. $t = 10$
9. $h = 28$	10. $z = 21$
11. $h = 7$	12. $z = 84$

Solutions to Questions

1. $x = 2, y = 0$	2. $x = 4, y = 1$
3. $x = 6, y = 18$	4. $x = 2, y = -1$
5. $x = 1, y = 3$	6. $x = 9, y = 5$
7. $x = 4, y = -1$	8. $x = -2, y = -7$
9. $x = -3, y = 2$	10. $x = -4, y = 5$
11. $x = 8, y = 5$	12. $x = 2, y = 1$

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