SUPER 12s

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

2 ALGEBRA
2.8 REARRANGING EQUATIONS
2.8 LEVEL 4

NAME : _____

Skill description: Rearranging equations that involve multiple fractional terms.

Essential Revision

1. Solve for the unknown.

$$r + 9 = 17$$

2. Rearrange the equation to make h the subject.

$$\lambda = \frac{h}{p}$$

3. Rearrange the equation to make p the subject.

$$n = p + r$$

4. Rearrange the equation to make h the subject.

$$A = \frac{bh}{2}$$

5. Solve for the unknown.

$$\frac{p}{3} = 5$$

6. Rearrange the equation to make v the subject.

$$d = \frac{m}{v}$$

7. Rearrange the equation to make W the subject.

$$P = 2L + 2W$$

8. Rearrange the equation to make A the subject.

$$V = \frac{Ah}{3}$$

9. Solve for the unknown.

$$x + 11 = 18$$

10. Rearrange the equation to make A the subject.

$$V = Ah$$

11. Rearrange the equation to make f the subject.

$$f + v - e = 2$$

12. Rearrange the equation to make R the subject.

$$I = PRT$$

Solutions can be found at the end of the booklet.

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

EQUATIONS

At this level, you will be rearranging equations sourced from mathematics and science.

Equation	Explanation
$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$	Angles and lengths of sides of a triangle.
$\frac{\sin i}{\sin r} = \frac{v_1}{v_2}$	Physics – refraction of light.
$\frac{V_p}{V_s} = \frac{n_p}{n_s}$	Physics – transformers.
$\frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2}$	Chemistry – Combined Gas Law.

Some of these equations include trigonometric ratios. At this level, we will only isolate the trigonometric ratio, e.g. $(\sin i)$, and leave solving the ratio to determine the angle until later.

STRATEGIES TO SOLVE THE PROBLEMS

When rearranging equations, the goal is to:

Isolate the desired variable (unknown)
to one side of the equal sign.

We will see over the next few levels that we follow the order:

- **First:** isolate the term that contains the desired variable (unknown).
- **Second:** isolate the desired variable (unknown).

Example 1

Rearrange the equation to make $\sin r$ the subject.

$$\frac{\sin i}{\sin r} = \frac{v_1}{v_2}$$

Step 1

As $\sin r$ is a denominator we need to multiply both sides of the equation by $\sin r$.

$$\frac{\sin i}{\sin r} = \frac{v_1}{v_2}$$

$$\times (\sin r) = \times (\sin r)$$

$$\sin i = \frac{v_1 \sin r}{v_2}$$

Step 2

To isolate $\sin r$ multiply both sides of the equation by v_2.

$$\sin i = \frac{v_1 \sin r}{v_2}$$

$$\times v_2 = \times v_2$$

$$v_2 \sin i = v_1 \sin r$$

Step 3

To isolate $\sin r$ divide both sides of the equation by v_1.

$$v_2 \sin i = v_1 \sin r$$

$$\div v_1 = \div v_1$$

$$\frac{v_2 \sin i}{v_1} = \sin r$$

QUESTIONS

1. Rearrange the equation to make $\sin A$ the subject.

$$\frac{a}{\sin A} = \frac{b}{\sin B}$$

2. Rearrange the equation to make v_1 the subject.

$$\frac{\sin i}{\sin r} = \frac{v_1}{v_2}$$

3. Rearrange the equation to make V_p the subject.

$$\frac{V_p}{V_s} = \frac{n_p}{n_s}$$

4. Rearrange the equation to make V_1 the subject.

$$\frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2}$$

5. Rearrange the equation to make a the subject.

$$\frac{a}{\sin A} = \frac{b}{\sin B}$$

6. Rearrange the equation to make v_2 the subject.

$$\frac{\sin i}{\sin r} = \frac{v_1}{v_2}$$

7. Rearrange the equation to make V_s the subject.

$$\frac{V_p}{V_s} = \frac{n_p}{n_s}$$

8. Rearrange the equation to make T_1 the subject.

$$\frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2}$$

9. Rearrange the equation to make $\sin B$ the subject.

$$\frac{a}{\sin A} = \frac{b}{\sin B}$$

10. Rearrange the equation to make $\sin r$ the subject.

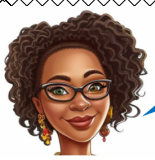
$$\frac{\sin i}{\sin r} = \frac{v_1}{v_2}$$

11. Rearrange the equation to make n_s the subject.

$$\frac{V_p}{V_s} = \frac{n_p}{n_s}$$

12. Rearrange the equation to make P_2 the subject.

$$\frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2}$$



SOLUTIONS CAN BE FOUND AT THE END OF THE BOOKLET.

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MASTERY TEST

Teacher's signature

I'VE COMPLETED

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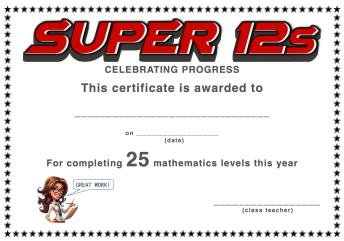
LEVELS THIS YEAR



Solutions to Essential Revision

1. $r = 8$	2. $h = \lambda p$
3. $p = n - r$	4. $h = \frac{2A}{b}$
5. $p = 15$	6. $v = \frac{m}{d}$
7. $W = \frac{P}{2} - L$	8. $A = \frac{3V}{h}$
9. $x = 7$	10. $A = \frac{V}{h}$
11. $f = 2 - v + e$	12. $R = \frac{I}{PT}$

Solutions to Questions

1. $\sin A = \frac{a \sin B}{b}$	2. $v_1 = \frac{v_2 \sin i}{\sin r}$
3. $V_p = \frac{n_p V_s}{n_s}$	4. $V_1 = \frac{T_1 P_2 V_2}{P_1 T_2}$
5. $a = \frac{b \sin A}{\sin B}$	6. $v_2 = \frac{v_1 \sin r}{\sin i}$
7. $V_s = \frac{V_p n_s}{n_p}$	8. $T_1 = \frac{P_1 V_1 T_2}{P_2 V_2}$
9. $\sin B = \frac{b \sin A}{a}$	10. $\sin r = \frac{v_2 \sin i}{v_1}$
11. $n_s = \frac{n_p V_s}{V_p}$	12. $P_2 = \frac{P_1 V_1 T_2}{T_1 V_2}$