

Rearranging Equations - Worksheet

Skill

Group A - Rearranging linear equations

Rearrange each equation to make a the subject of the formula.

 1) a + b = c 2) b + a = c 3) a + 2b + c = 0

 4) 2a - b = c 5) b - 2a = c 6) 2a + b + 2c = 0

 7) $\frac{a}{b} = c$ 8) $c = \frac{a}{2b}$ 9) $2c = \frac{a}{b} - 2$

Group B - Rearranging equations with indices and the same variable on both sides Rearrange each equation to make *m* the subject of the formula.

1) $m^2 = n$ **2)** $m^2 + 5 = n$ **3)** $(m - 10)^2 = 6n$ **4)** $n = \frac{m+3}{p}$ **5)** $n = \frac{m+3}{p} + 5$ **6)** $n = \frac{p}{m+3}$ **7)** 5(m + n) = 4(m + 3n) **8)** 3(3m + 4) = 6(m + 2n)**9)** 2(2m - 2) = 6(m - 3n)

Group C - Rearranging equations with fractions and factorising

Rearrange the equation to make x the subject of the formula.

1) xy = x + 12) $y = \frac{x+1}{x}$ 3) $y = \frac{x+2}{x+1}$ 4) $2y + 1 = \frac{x+1}{x}$ 5) $2y = \frac{2x+3}{x} - 1$ 6) $y^2 = \frac{x+4}{x}$ 7) $y = \frac{ax}{a-x}$ 8) $\frac{3x+2}{y} = \frac{x+1}{z}$ 9) $y = \frac{z^2+x}{z+x}$

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Rearranging Equations - Worksheet

Applied

1) Make *k* the subject of the formula

$$a(k-5) = b$$

2) The distance, *d*, you can see to the horizon in relation to your height above sea level, *h*, is given by the formula shown below:

$$d = \sqrt{\frac{3h}{2}}$$

Make h the subject of the formula.

3) Rearrange the following formula to make *u* the subject

$$\frac{1}{u} + \frac{1}{v} = \frac{1}{f}$$

4) Make *b* the subject of the equation $a = \sqrt{b^2 + c^2}$.



Rearranging Equations - Exam Questions

1) Make *x* the subject of the formula:

y = 2x + 4

(2 marks)

2) Make *s* the subject of the formula:

$$v^2 = u^2 + 2as$$

(2 marks)

3) Make *g* the subject of the formula:

$$Y = \sqrt{\frac{g+6}{5}}$$

(3 marks)

4)



Rearranging Equations - Exam Questions

Make v the subject of the formula:

$$w = \frac{20(t-3v)}{v}$$

(5 marks)

5) Make *t* the subject of the formula:

$$k = \frac{2(t+3)}{t-3}$$

(5 marks)

6)



Rearranging Equations - Exam Questions

Make *x* the subject of the formula:

$$\frac{x}{x+b} = \frac{a}{c}$$

(5 marks)

7) Make *m* the subject of the formula:

-

$$\frac{m}{v} - \frac{t}{b} = \frac{m-t}{r}$$

.....

(5 marks)



Rearranging Equations - Answers

| | Question | Answer |
|---------|----------------------------------------------------------------------|--------------------------------------------------------------|
| | Skill Questions | |
| Group A | Rearrange each equation to make <i>a</i> the subject of the formula. | |
| | 1) $a + b = c$ | 1) $a = c - b$ |
| | 2) $b + a = c$ | 2) $a = c - b$ |
| | 3) $a + 2b + c = 0$ | 3) $a = -2b - c$ |
| | 4) $2a - b = c$ | 4) $a = \frac{b+c}{2}$ |
| | 5) $b - 2a = c$ | 5) $a = \frac{b-c}{2}$ |
| | 6) $2a + b + 2c = 0$ | 6) $a = \frac{-b - 2c}{2}$ or $a = -\frac{b + 2c}{2}$ |
| | 7) $\frac{a}{b} = c$ | 7) a = bc |
| | $\mathbf{8)} \ c \ = \ \frac{a}{2b}$ | 8) $a = 2bc$ |
| | 9) $2c = \frac{a}{b} - 2$ | 9) $a = 2b + 2bc$ |
| Group B | Rearrange each equation to make m the subject of the formula. | |
| | 1) $m^2 = n$ | 1) $m = \pm \sqrt{n}$ |
| | 2) $m^2 + 5 = n$ | 2) $m = \pm \sqrt{n-5}$ |
| | 3) $(m - 10)^2 = 6n$ | 3) $m = \pm \sqrt{6n} + 10$ |
| | 4) $n = \frac{m+3}{p}$ | 4) $m = np - 3$ |
| | 5) $n = \frac{m+3}{p} + 5$ | 5) $m = np - 5p - 3$ |
| | 6) $n = \frac{p}{m+3}$ | 6) $m = \frac{p}{n} - 3$ or $m = \frac{p - 3n}{n}$ |
| | 7) $5(m + n) = 4(m + 3n)$ | 7) $m = 7n$ |
| | 8) $3(3m + 4) = 6(m + 2n)$ | 8) $m = 4n - 4$ or $m = 4(n - 1)$ |
| | 9) $2(2m-2) = 6(m-3n)$ | 9) $m = 9n - 2$ |

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Rearranging Equations - Answers

| Group C | Rearrange the equation to make <i>x</i> the subject of the formula. | |
|---------|---------------------------------------------------------------------|------------------------------------------------------------------------|
| | 1) $xy = x + 1$ | 1) $x = \frac{1}{y-1}$ |
| | $2) y = \frac{x+1}{x}$ | $2) x = \frac{1}{y-1}$ |
| | 3) $y = \frac{x+2}{x+1}$ | 3) $x = \frac{2-y}{y-1}$ or $x = \frac{y-2}{1-y}$ |
| | 4) $2y + 1 = \frac{x+1}{x}$ | 4) $x = \frac{1}{2y}$ |
| | 5) $2y = \frac{2x+3}{x} - 1$ | 5) $x = \frac{3}{2y - 1}$ |
| | 6) $y^2 = \frac{x+4}{x}$ | 6) $x = \frac{4}{y^2 - 1}$ |
| | 7) $y = \frac{ax}{a-x}$ | 7) $x = \frac{ay}{a+y}$ |
| | 8) $\frac{3x+2}{y} = \frac{x+1}{z}$ | 8) $x = \frac{y - 2z}{3z - y}$ or $x = \frac{2z - y}{y - 3z}$ |
| | 9) $y = \frac{z^2 + x}{z + x}$ | 9) $x = \frac{z^2 - yz}{y - 1}$ or $x = \frac{yz - z^2}{1 - y}$ |



Rearranging Equations - Answers

| | Question | Answer |
|----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------|
| | Applied Questions | |
| 1) | Make k the subject of the formula a(k - 5) = b | $k = \frac{5a+b}{a}$ or $k = \frac{b}{a} + 5$ |
| 2) | The distance, d , you can see to the horizon in relation to your height above sea level, h , is given by the formula shown below: $d = \sqrt{\frac{3h}{2}}$ | $h = \frac{2d^2}{3}$ |
| 3) | Rearrange the following formula to make u the subject $\frac{1}{u} + \frac{1}{v} = \frac{1}{f}$ | $u = \frac{fv}{v-f}$ |
| 4) | Make <i>b</i> the subject of the equation $a = \sqrt{b^2 + c^2}.$ | $b = \sqrt{a^2 - c^2}$ |

THIRD SPACE

Rearranging Equations - Mark Scheme

| | Question | Answer | |
|----|-------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|---------------------------------|
| | Exam Questions | | |
| 1) | Make x the subject of the formula y = 2x + 4 | $y - 4 = 2x$ $x = \frac{y-4}{2}$ | (1) (1) |
| 2) | Make <i>s</i> the subject of the formula $v^{2} = u^{2} + 2as$ | $v^{2} - u^{2} = 2as$ $s = \frac{v^{2} - u^{2}}{2a}$ | (1) (1) |
| 3) | Make g the subject of the formula $Y = \sqrt{\frac{g+6}{5}}$ | $Y^{2} = \frac{g+6}{5}$ $5Y^{2} = g + 6$ $g = 5Y^{2} - 6$ | (1) (1) (1) |
| 4) | Make v the subject of the formula $w = \frac{20(t-3v)}{v}$ | $vw = 20(y - 3v)$ $vw = 20y - 60v$ $vw + 60v = 20y$ $v(w + 60) = 20y$ $v = \frac{20y}{w+60}$ | (1) (1) (1) (1) (1) |
| 5) | Make <i>t</i> the subject of the formula $k = \frac{2(t+3)}{t-3}$ | $k(t - 3) = 2(t + 3)$ $kt - 3k = 2t + 6$ $kt - 2t = 3k + 6$ $t(k - 2) = 3(k + 2)$ $t = \frac{3(k+2)}{k-2}$ | (1) (1) (1) (1) (1) |
| 6) | Make x the subject of the formula $\frac{x}{x+b} = \frac{a}{c}$ | $cx = a(x + b)$ $cx = ax + ab$ $cx - ax = ab$ $x(c - a) = ab$ $x = \frac{ab}{c-a}$ | (1) (1) (1) (1) (1) |



Rearranging Equations - Mark Scheme

| 7) | Make m the subject of the formula | $\frac{bm-tv}{bv} = \frac{m-t}{r}$ | |
|----|---------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|
| | $\frac{m}{v} - \frac{t}{b} = \frac{m-t}{r}$ | r(bm - tv) = bv(m - t) bmr - rtv = bmv - btv bmr - bmv = rtv - btv m(br - bv) = tv(r - b) $m = \frac{tv(r-b)}{b(r-v)} oe$ | (1) (1) (1) (1) (1) |

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