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) $xy = x + 1$

2) $y = \frac{x+1}{x}$

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) $y = \frac{z^2+x}{z+x}$

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)

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2) Make s the subject of the formula:

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

.....

(2 marks)

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3) Make g the subject of the formula:

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

.....

(3 marks)

Rearranging Equations - Exam Questions

4) Make v the subject of the formula:

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

.....

(5 marks)

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5) Make t the subject of the formula:

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

.....

(5 marks)

Rearranging Equations - Exam Questions

6) Make x the subject of the formula:

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

.....

(5 marks)

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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 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)** $2c = \frac{a}{b} - 2$	**1)** $a = c - b$ **2)** $a = c - b$ **3)** $a = -2b - c$ **4)** $a = \frac{b+c}{2}$ **5)** $a = \frac{b-c}{2}$ **6)** $a = \frac{-b-2c}{2}$ or $a = -\frac{b+2c}{2}$ **7)** $a = bc$ **8)** $a = 2bc$ **9)** $a = 2b + 2bc$
Group B	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)** $2(2m - 2) = 6(m - 3n)$	**1)** $m = \pm\sqrt{n}$ **2)** $m = \pm\sqrt{n - 5}$ **3)** $m = \pm\sqrt{6n} + 10$ **4)** $m = np - 3$ **5)** $m = np - 5p - 3$ **6)** $m = \frac{p}{n} - 3$ or $m = \frac{p-3n}{n}$ **7)** $m = 7n$ **8)** $m = 4n - 4$ or $m = 4(n - 1)$ **9)** $m = 9n - 2$

Rearranging Equations - Answers

Group C	Rearrange the equation to make x 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 b the subject of the equation $a = \sqrt{b^2 + c^2}$.	$b = \sqrt{a^2 - c^2}$

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 s 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 t 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 $\frac{m}{v} - \frac{t}{b} = \frac{m-t}{r}$	$\frac{bm-tv}{bv} = \frac{m-t}{r}$ $r(bm - tv) = bv(m - t)$ $bmr - rtv = bmv - btv$ $bmr - bmv = rtv - btv$ $m(br - bv) = tv(r - b)$ $m = \frac{tv(r-b)}{b(r-v)}$ oe	**(1)** **(1)** **(1)** **(1)** **(1)**