

# Rearranging Harder Formulae

## Mark Scheme

Level	GCSE
Subject	Maths
Exam Board	Edexcel GCSE
Topic	Rearranging Harder Formulae
Grade Level	Grade 7
Booklet	Mark Scheme

**Time Allowed:** 58 minutes

**Score:** /48

**Percentage:** /100

**Grade Boundaries:**

1. Rearrange  $a(q - c) = d$  to make  $q$  the subject.

$$aq - ac = d$$

$$aq = d + ac$$

$$q = \frac{d + ac}{a}$$

$$q = \frac{d + ac}{a}$$

(3)

(Total 5 marks)

2. (a) Make  $n$  the subject of the formula  $m = 5n - 21$

$$m + 21 = 5n$$

$$n = \frac{m + 21}{5}$$

$$n = \frac{m + 21}{5}$$

(2)

(b) Make  $p$  the subject of the formula

$$4(p - 2q) = 3p + 2$$

$$4p - 8q = 3p + 2$$

$$p - 8q = 2$$

$$p = 2 + 8q$$

$$p = \dots\dots\dots 2 + 8q \dots\dots\dots$$

(3)

(Total 5 marks)

3.

$$P = \pi r + 2r + 2a$$

Make  $r$  the subject of the formula

$$P = \pi r + 2r + 2a$$

$$P - 2a = \pi r + 2r$$

$$P - 2a = r(\pi + 2)$$

$$r = \frac{P - 2a}{\pi + 2}$$

$$r = \dots\dots\dots \frac{P - 2a}{\pi + 2} \dots\dots\dots$$

(Total 3 marks)

4. Make  $a$  the subject of the formula

$$2(3a - c) = 5c + 1$$

$$6a - 2c = 5c + 1$$

$$6a = 7c + 1$$

$$a = \frac{7c + 1}{6}$$

$$a = \frac{7c + 1}{6} \dots\dots\dots$$

(Total 3 marks)

5. Make  $m$  the subject of the formula

$$2(2p + m) = 3 - 5m$$

$$4p + 2m = 3 - 5m$$

$$4p + 7m = 3$$

$$7m = 3 - 4p$$

$$m = \frac{3 - 4p}{7}$$

$$m = \frac{3 - 4p}{7} \dots\dots\dots$$

(Total 3 marks)

6. Make  $x$  the subject of

$$5(x - 3) = y(4 - 3x)$$

$$5x - 15 = 4y - 3xy$$

$$5x - 15 + 3xy = 4y$$

$$5x + 3xy = 4y + 15$$

$$x(5 + 3y) = 4y + 15$$

$$x = \frac{4y + 15}{5 + 3y}$$

$$x = \frac{4y + 15}{5 + 3y} \dots\dots\dots$$

(Total 4 marks)

7. When you are  $h$  feet above sea level, you can see  $d$  miles to the horizon, where

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

Make  $h$  the subject of the formula

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

$$2d^2 = 3h$$

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

$$h = \frac{2d^2}{3} \dots\dots\dots$$

(Total 4 marks)

8.  $y = \frac{2pt}{p-t}$

Rearrange the formula to make  $t$  the subject.

$$y = \frac{2pt}{p-t}$$

$$y(p-t) = 2pt$$

$$py - ty = 2pt$$

$$py = 2pt + ty$$

$$py = t(2p+y)$$

$$t = \frac{py}{2p+y}$$

$$t = \frac{py}{2p+y}$$

(Total 4 marks)

9. Make  $b$  the subject of the formula  $a = \frac{2-7b}{b-5}$

$$a(b-5) = 2-7b$$

$$ab - 5a = 2 - 7b$$

$$ab - 5a + 7b = 2$$

$$ab + 7b = 2 + 5a$$

$$b(a+7) = 2+5a$$

$$b = \frac{2+5a}{a+7}$$

$$b = \frac{2+5a}{a+7}$$

(Total 4 marks)

10.  $P = \frac{n^2 + a}{n + a}$

Rearrange the formula to make  $a$  the subject.

$$P(n + a) = n^2 + a$$

$$Pn + Pa = n^2 + a$$

$$Pa = n^2 - Pn + a$$

$$Pa - a = n^2 - Pn$$

$$a(P - 1) = n^2 - Pn$$

$$a = \frac{n^2 - Pn}{P - 1}$$

$$a = \frac{n^2 - Pn}{P - 1}$$

(Total 4 marks)

11.  $\frac{x}{x + c} = \frac{p}{q}$

Make  $x$  the subject of the formula.

$$xq = p(x + c)$$

$$xq = px + cp$$

$$xq - px = cp$$

$$x(q - p) = cp$$

$$x = \frac{cp}{q - p}$$

$$x = \frac{cp}{q - p}$$

(Total 4 marks)

12.

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

to make  $u$  the subject of the formula.

Give your answer in its simplest form.

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

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

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

$$f(v+u) = uv$$

$$fv + fu = uv$$

$$fv = uv - fu$$

$$fv = u(v - f)$$

$$u = \frac{fv}{v-f}$$

$$u = \frac{fv}{v-f}$$

(Total 5 marks)