

GCSE Maths: Higher: the subject appears twice (Higher): answers

GCSE Maths - Substitution and Formulae - Higher - Lesson 8.8

Answers. Final answers to the worksheet questions. Full step-by-step solutions for every question are free at websink.site/gcse/maths/ch08-substitution-formulae/higher/higher-the-subject-appears-twice/

Exercise 8I Subject appears twice Non-calculator

1 Make x the subject of each formula.

- (a) Make x the subject of $px + q = rx + s$

Answer: $x = \frac{s - q}{p - r}$

- (b) Make x the subject of $b + ax = d + cx$

Answer: $x = \frac{d - b}{a - c}$

- (c) Make x the subject of $mx + k = nx + t$

Answer: $x = \frac{t - k}{m - n}$

2 Expand the brackets, then make x the subject.

- (a) Make x the subject of $p(x + q) = r(x + s)$

Answer: $x = \frac{rs - pq}{p - r}$

- (b) Make x the subject of $a(x + b) = c(x + d)$

Answer: $x = \frac{cd - ab}{a - c}$

3 Make x the subject of each formula.

- (a) Make x the subject of $y = \frac{ax + b}{x}$

Answer: $x = \frac{b}{y - a}$

- (b) Make x the subject of $y = \frac{px + q}{x}$

Answer: $x = \frac{q}{y - p}$

- (c) Make x the subject of $T = x + kx$

Answer: $x = \frac{T}{1 + k}$

4 Make x the subject of each formula.

- (a) Make x the subject of $y = \frac{x + 3}{x - 2}$

Answer: $x = \frac{3 + 2y}{y - 1}$

(b) Make x the subject of $y = \frac{x+5}{x-1}$

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

(c) Make x the subject of $y = \frac{x+p}{x-q}$

Answer: $x = \frac{p+yq}{y-1}$

5 Make x the subject of each formula.

(a) Make x the subject of $y = \frac{ax+b}{cx+d}$

Answer: $x = \frac{b-yd}{yc-a}$

(b) Make x the subject of $y = \frac{px+q}{rx+s}$

Answer: $x = \frac{q-ys}{yr-p}$

6 Make x the subject of each formula.

(a) Make x the subject of $ax^2 + b = cx^2 + d$

Answer: $x = \sqrt{\frac{d-b}{a-c}}$

(b) Make x the subject of $px^2 + q = rx^2 + s$

Answer: $x = \sqrt{\frac{s-q}{p-r}}$

7 Make n the subject.

(a) Make n the subject of $a + bn = c + dn$

Answer: $n = \frac{c-a}{b-d}$

8 Firm A charges £ a plus £ b per mile and Firm B charges £ c plus £ d per mile. The two firms charge the same for n miles when $a + bn = c + dn$.

(a) Make n the subject of $a + bn = c + dn$.

Answer: $n = \frac{c-a}{b-d}$

(b)

Firm A charges £30 plus £4 per mile. Firm B charges £12 plus £7 per mile. For what distance do they charge the same?

Answer: 6 miles

9 Make x the subject of $\frac{x}{a} + \frac{x}{b} = c$.

Answer: $x = \frac{abc}{a+b}$

10 Ali is asked to make x the subject of $xy - x = 3$. He writes $x(y-1) = 3$ and then $x-1 = \frac{3}{y}$. Explain his mistake and give the correct answer.

Answer: $x = 3/(y - 1)$

- 11** The lens formula is $\frac{1}{f} = \frac{1}{u} + \frac{1}{v}$. Make v the subject.

Answer: $v = \frac{fu}{u - f}$

- 12** (a) Make x the subject of $y = \frac{x+1}{x-1}$. (b) What do you notice about your answer? Use $x = 3$ to explain.

- (a) Make x the subject

Answer: $x = \frac{1+y}{y-1}$

- (b) What do you notice?

Answer: The new formula has the same shape as the original