Interleaved: rearranging formulae

ANSWERS

1

Make x the subject of

$p = 3x - 2q$

Which method? Inverse operations; Inverse of a power or root; Collect, then factorise

x once: $3x = p + 2q$, then $\div 3$

Answer $x = \frac{p + 2q}{3}$

2

Make x the subject of

$y = 2x^2 + 9$

Which method? Inverse operations; Inverse of a power or root; Collect, then factorise

$x^2 = \frac{y - 9}{2}$, then $\pm$ square root

Answer $x = \pm\sqrt{\frac{y - 9}{2}}$

3

Make x the subject of

$3x + k = mx - 4$

Which method? Inverse operations; Inverse of a power or root; Collect, then factorise

x twice: $3x - mx = -4 - k$, $x(3 - m) = -4 - k$

Answer $x = \frac{k + 4}{m - 3}$

4

Make x the subject of

$t = \sqrt{\frac{x}{5}} + 2$

Which method? Inverse operations; Inverse of a power or root; Collect, then factorise

$\sqrt{\frac{x}{5}} = t - 2$, then square both sides

Answer $x = 5(t - 2)^2$

5

Make x the subject of

$y = \frac{12}{x} - a$

Which method? Inverse operations; Inverse of a power or root; Collect, then factorise

x once, in the denominator: $y + a = \frac{12}{x}$, $x(y + a) = 12$

Answer $x = \frac{12}{y + a}$

6

Make x the subject of

$p = \frac{3x - 1}{x + 2}$

Which method? Inverse operations; Inverse of a power or root; Collect, then factorise

$p(x + 2) = 3x - 1$, $px - 3x = -1 - 2p$

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

7

From h metres above the sea you can see about d km to the horizon, where

$d = 3.6\sqrt{h}$

Make h the subject. How high up do you need to be to see 18 km?

Which method? Inverse operations; Inverse of a power or root; Collect, then factorise

$\sqrt{h} = \frac{d}{3.6}$, square both sides; $\sqrt{h} = 5$

Answer $h = \frac{d^2}{12.96}$, $h = 25$ m

8

Two resistors of a ohms and b ohms joined in parallel have a total resistance of R ohms, where

$R = \frac{ab}{a + b}$

Make a the subject.

Which method? Inverse operations; Inverse of a power or root; Collect, then factorise

$Ra + Rb = ab$, $ab - Ra = Rb$, $a(b - R) = Rb$

Answer $a = \frac{Rb}{b - R}$

Interleaved: rearranging formulae *further practice*

ANSWERS

9

The volume of a cone is

$V = \frac{1}{3}\pi r^2 h$

Make r the subject.

$r^2 = \frac{3V}{\pi h}$, then square root

Answer $r = \sqrt{\frac{3V}{\pi h}}$

10

Make a the subject of

$s = ut + \frac{1}{2}at^2$

a once, the square is on t: $\frac{1}{2}at^2 = s - ut$

Answer $a = \frac{2(s - ut)}{t^2}$

11

Make x the subject of

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

$5x - 5a = 2b - bx$, $5x + bx = 5a + 2b$

Answer $x = \frac{5a + 2b}{b + 5}$

12

Make x the subject of

$y = (x - 3)^2 + k$

$(x - 3)^2 = y - k$, $\pm$ square root, then $+ 3$

Answer $x = 3 \pm \sqrt{y - k}$

13

Make x the subject of

$ax^2 - 5 = c + 2x^2$

$ax^2 - 2x^2 = c + 5$, $x^2(a - 2) = c + 5$, then $\pm$ square root

Answer $x = \pm\sqrt{\frac{c + 5}{a - 2}}$

14

Make x the subject of

$\frac{x - 2y}{5} = y + a$

x once (y twice): $x - 2y = 5y + 5a$

Answer $x = 7y + 5a$

15

The same number x is added to the numerator and the denominator of $\frac{3}{8}$ to make a new fraction

$p = \frac{3 + x}{8 + x}$

Make x the subject. Find x when $p = \frac{2}{3}$.

$8p + px = 3 + x$, $x(p - 1) = 3 - 8p$, $x = \frac{7}{3} \div \frac{1}{3}$

Answer $x = \frac{8p - 3}{1 - p}$, $x = 7$

16

Jo makes x the subject of $y = x^2 + 16$. She writes $x = \sqrt{y} - 4$. Explain her mistake and give the right answer.

she rooted each term: $\sqrt{y - 16}$ is not $\sqrt{y} - 4$ ($y = 25$ gives 3, not 1)

Answer $x = \pm\sqrt{y - 16}$