Rearranging formulae: powers and roots

ANSWERS

1

Make x the subject of $y = x^2 + 9$

$y = x^2 + 9$ $\quad -9$

$y - 9 = x^2$ $\quad \pm\sqrt{}$

$\pm\sqrt{y-9} = x$

$x = \pm\sqrt{y-9}$

2

Make x the subject of $a = 6x^2$

$a = 6x^2$ $\quad \div 6$

$\frac{a}{6} = x^2$ $\quad \pm\sqrt{}$

$\pm\sqrt{\frac{a}{6}} = x$

$x = \pm\sqrt{\frac{a}{6}}$

3

Make x the subject of $p = \frac{x^2}{5}$

$p = \frac{x^2}{5}$ $\quad \times 5$

$5p = x^2$ $\quad \pm\sqrt{}$

$\pm\sqrt{5p} = x$

$x = \pm\sqrt{5p}$

4

Make x the subject of $y = 3x^2 - 2$

$y = 3x^2 - 2$ $\quad +2$

$y + 2 = 3x^2$ $\quad \div 3$

$\frac{y+2}{3} = x^2$ $\quad \pm\sqrt{}$

$\pm\sqrt{\frac{y+2}{3}} = x$

$x = \pm\sqrt{\frac{y+2}{3}}$

5

Make x the subject of $k = \frac{x^2}{2} + 5$

$k = \frac{x^2}{2} + 5$ $\quad -5$

$k - 5 = \frac{x^2}{2}$ $\quad \times 2$

$2(k-5) = x^2$ $\quad \pm\sqrt{}$

$\pm\sqrt{2(k-5)} = x$

$x = \pm\sqrt{2(k-5)}$

6

Make x the subject of $y = \sqrt{x} + 8$

$y = \sqrt{x} + 8$ $\quad -8$

$y - 8 = \sqrt{x}$ $\quad$ square

$(y-8)^2 = x$

$x = (y-8)^2$

7

Make x the subject of $w = \sqrt{x-2}$

$w = \sqrt{x-2}$ $\quad$ square

$w^2 = x - 2$ $\quad +2$

$w^2 + 2 = x$

$x = w^2 + 2$

8

Ben makes x the subject of $y = \sqrt{x} + 3$.
He writes $x = y^2 - 3$.
Explain his mistake.

He squared first. Take away 3 first, then square: $x = (y-3)^2$

Rearranging formulae: powers and roots *further practice*

ANSWERS

9

Make x the subject of $y = 5x^2 - 6$

$y + 6 = 5x^2$

$\frac{y+6}{5} = x^2$

Answer $x = \pm\sqrt{\frac{y+6}{5}}$

10

A cube has edges s cm long.
Its surface area is $A = 6s^2$ cm^2.
Make s the subject. Then find s when $A = 150$.

$\frac{A}{6} = s^2$

$\sqrt{25} = 5$: a length is positive

Answer $s = \sqrt{\frac{A}{6}}$, $s = 5$ cm

11

Make x the subject of $y = \frac{\sqrt{x}}{3}$

$3y = \sqrt{x}$

$(3y)^2 = x$

Answer $x = (3y)^2 = 9y^2$

12

Make x the subject of $m = x^2 + c$

$m - c = x^2$

Answer $x = \pm\sqrt{m-c}$

13

A wave in water d metres deep moves at about v m/s, where $v = 3\sqrt{d}$.
Make d the subject. Then find how deep the water is when the wave moves at 6 m/s.

$\frac{v}{3} = \sqrt{d}$

$(6 \div 3)^2 = 4$

Answer $d = (\frac{v}{3})^2$, 4 m

14

A square tile with sides x cm long costs C pence, where $C = 3x^2 + 20$.
Make x the subject. Then find the length of the sides of a tile that costs 320 pence.

$\frac{C-20}{3} = x^2$

$\sqrt{100} = 10$: a length is positive

Answer $x = \sqrt{\frac{C-20}{3}}$, 10 cm

15

Mia makes x the subject of $t = 2\sqrt{x}$.
She writes $x = 2t^2$. Explain her mistake.

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

square: $\frac{t^2}{4} = x$

Answer Divide by 2, not multiply: $x = \frac{t^2}{4}$

16

Make x the subject of $y = (x+2)^2$.
Then explain why $x = 1$ and $x = -5$ both give $y = 9$.

$\pm\sqrt{y} = x + 2$

$\sqrt{9} = 3$: $x = -2 + 3 = 1$ or $-2 - 3 = -5$

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