Rearranging Formulae: Powers, Roots and Brackets

ANSWERS

1

Make x the subject of

$$y = \sqrt{\frac{x-3}{2}} + 5$$

$y - 5 = \sqrt{\frac{x-3}{2}}$

$2(y-5)^2 = x - 3$

Answer $x = 2(y-5)^2 + 3$

2

Make x the subject of $p = 4 - 3x^2$

$3x^2 = 4 - p$

$x^2 = \frac{4-p}{3}$

Answer $x = \pm\sqrt{\frac{4-p}{3}}$

3

Make x the subject of

$m = (2x-1)^3 + 4$

$\sqrt[3]{m-4} = 2x - 1$

Answer $x = \frac{\sqrt[3]{m-4}+1}{2}$

4

Make x the subject of $y = \frac{k}{x^2-3}$

$x^2 - 3 = \frac{k}{y}$

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

5

An equilateral triangle with sides s cm long has area $A = \frac{\sqrt{3}}{4}s^2$ cm^2.

Make s the subject. Then find the length of a side when the area is $9\sqrt{3}$ cm^2.

$s^2 = \frac{4A}{\sqrt{3}}$

$\frac{4 \times 9\sqrt{3}}{\sqrt{3}} = 36$

Answer $s = \sqrt{\frac{4A}{\sqrt{3}}}$, 6 cm

6

Sam makes x the subject of $y = \sqrt{x^2+16}$ and writes $x = y - 4$.

Choose a value of x to show Sam is wrong. Then make x the subject correctly.

$x = 3$: $y = 5$, but $5 - 4 = 1$

$y^2 = x^2 + 16$

Answer $x = \pm\sqrt{y^2 - 16}$

7

A sphere of radius r has surface area $A = 4\pi r^2$ and volume $V = \frac{4}{3}\pi r^3$.

Show that $V = \frac{1}{6}\sqrt{\frac{A^3}{\pi}}$

$V = \frac{4\pi}{3}\frac{A\sqrt{A}}{8\pi\sqrt{\pi}}$

$= \frac{A\sqrt{A}}{6\sqrt{\pi}}$

Proof $r = \sqrt{\frac{A}{4\pi}}$, so $V = \frac{4}{3}\pi\left(\frac{A}{4\pi}\right)^{3/2}$

8

Make x the subject of $y = (x-2)^2 + 3$.

For which values of y does this give a value of x? Explain why.

$(x-2)^2$ is never negative, so $y \geq 3$

Answer $x = 2 \pm \sqrt{y-3}$, for $y \geq 3$