

Y1 TRIGONOMETRY 3

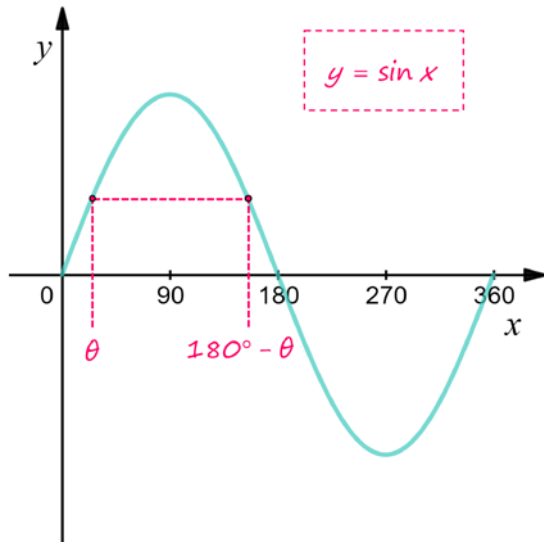
5.1 Symmetry Properties of Sine and Cosine



lesson link: parkermaths.com/y1trig

SYMMETRY PROPERTY FOR SINE

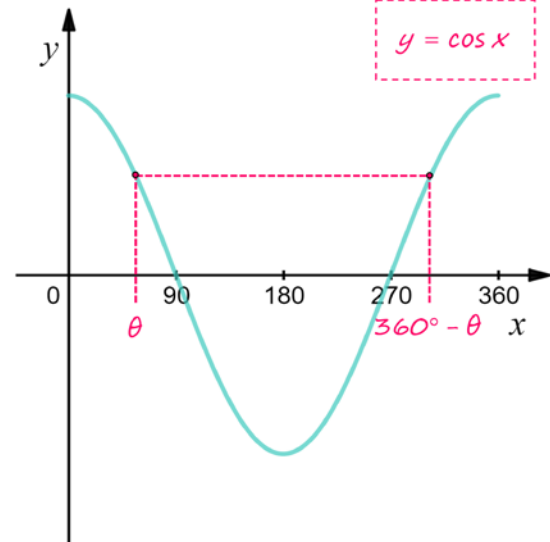
$$\sin \theta = \sin(180^\circ - \theta)$$



SYMMETRY PROPERTIES FOR COSINE

$$\cos \theta = \cos(360^\circ - \theta)$$

$$\cos \theta = \cos(-\theta)$$



Examples: Solving Trigonometric Equations

5.4e. Solve the following equations.
Give non-exact answers to 3 significant figures.

(a) $2 \sin x + 3 = 4$, $0^\circ < x < 360^\circ$

$$2 \sin x + 3 = 4$$

$$2 \sin x = 1$$

$$\sin x = \frac{1}{2}$$

$$x = 30^\circ, 150^\circ$$

symmetry property: $\theta_2 = 180^\circ - \theta_1$

(b) $5 \cos x = 4$, $0^\circ < x < 360^\circ$

$$5 \cos x = 4$$

$$\cos x = \frac{4}{5}$$

$$x = 36.9^\circ, 143^\circ \text{ (3 s.f.)}$$

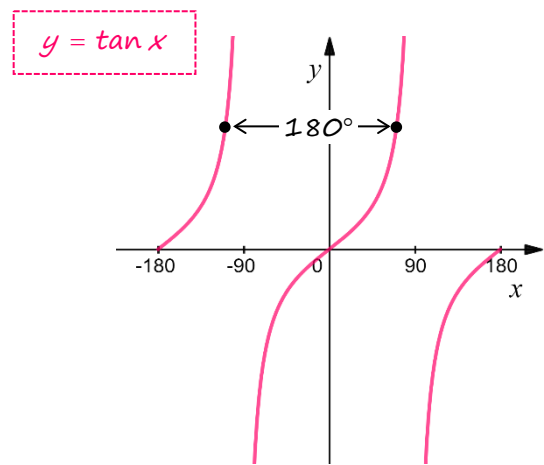
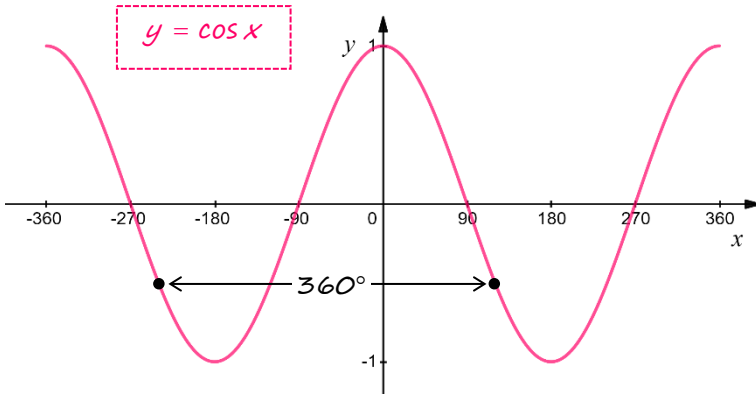
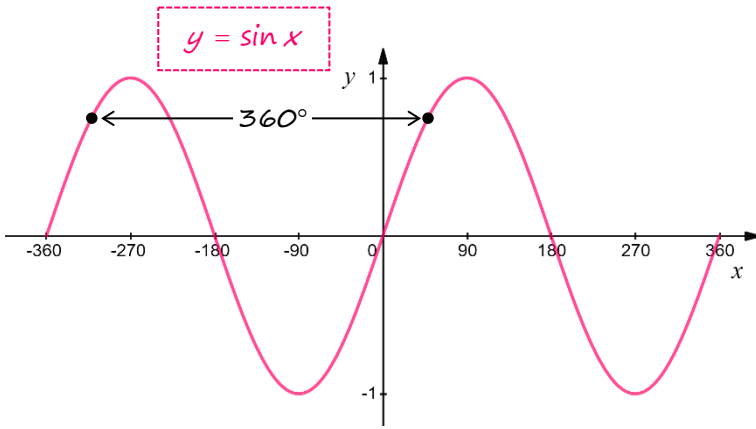
symmetry property
($\theta_2 = 360^\circ - \theta_1$)

5.4p. Solve the following equations.
Give non-exact answers to 3 significant figures.

(a) $\sqrt{2} \cos x - 5 = -4$, $0^\circ < x < 360^\circ$

(b) $\frac{1}{3} \sin x = \frac{2}{7}$, $0^\circ < x < 360^\circ$

5.5 Periodic Properties of Sine, Cosine and Tangent



f(x) PERIODIC PROPERTIES

$$\sin \theta = \sin(\theta \pm 360^\circ)$$

$$\cos \theta = \cos(\theta \pm 360^\circ)$$

$$\tan \theta = \tan(\theta \pm 180^\circ)$$

5.6e. Solve the following equations.
Give non-exact answers to 3 significant figures.

(a) $\sin x = -\frac{1}{3}, \quad 0^\circ < x < 360^\circ$

$\sin x = -\frac{1}{3}$
symmetry property
 $x = -19.47\dots^\circ, 199.4\dots^\circ, 340.5\dots^\circ$
 $\therefore x = 199^\circ, 341^\circ$ (3 s.f.)
periodic property
 $\theta_2 = \theta_1 \pm 360^\circ$

(b) $\cos x = 0.7, \quad 0^\circ < x < 720^\circ$

$\cos x = 0.7$
symmetry property
 $x = 45.6^\circ, 314^\circ, 406^\circ, 674^\circ$ (3 s.f.)
 $+360^\circ \quad +360^\circ$

(c) $\tan x = 0.5, \quad -180^\circ < x < 180^\circ$

$\tan x = 0.5$
periodic property
 $\theta_2 = \theta_1 \pm 180^\circ$
 $x = 26.6^\circ, -153^\circ$ (3 s.f.)

5.6p. Solve the following equations.
Give non-exact answers to 3 significant figures.

(a) $\tan x = -5, \quad -360^\circ < x < 360^\circ$

(b) $\sin x = \frac{2}{5}, \quad 0^\circ < x < 720^\circ$

(c) $\cos x = -0.1, \quad -360^\circ < x < 360^\circ$
