

FUNCTIONS

Answers

1 a $= (x - 4)^2 - 16 + 18$

$= (x - 4)^2 + 2$

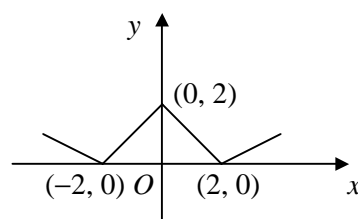
b vertex = (4, 2)

$\therefore \text{dist.} = \sqrt{4^2 + 2^2}$

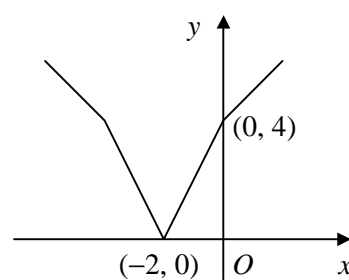
$= \sqrt{20} = 2\sqrt{5}$

c translation by 4 units in +ve x -direction
translation by 2 units in +ve y -direction
(either first)

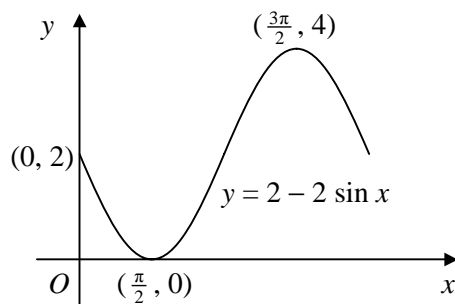
2 a



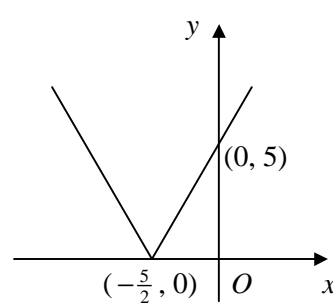
b



3



4 a



b $f(-4) = |-3| = 3$

$ff(-4) = f(3) = |11| = 11$

c $-\frac{5}{2}$

5

a $(0, 2) \therefore a = 2$

$(90, 7) \therefore 7 = 2 + b \therefore b = 5$

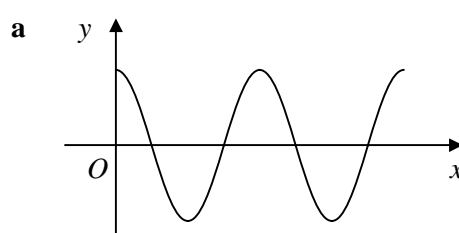
b $2 + 5 \sin x = 0$

$\sin x = -0.4$

$x = 180 + 23.6, 360 - 23.6$

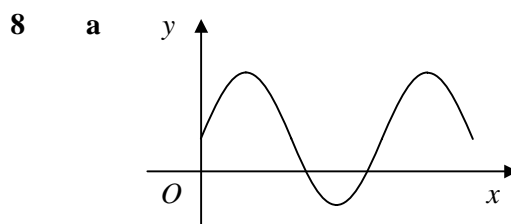
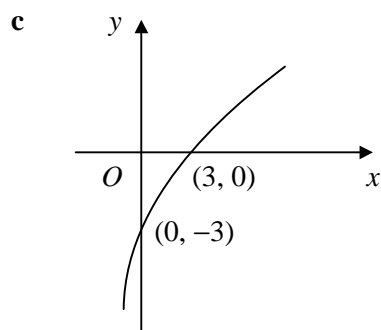
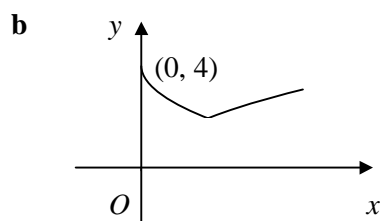
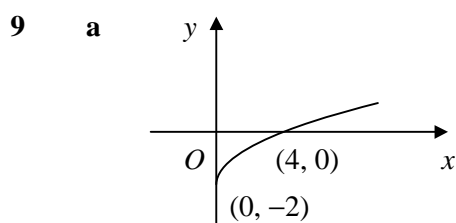
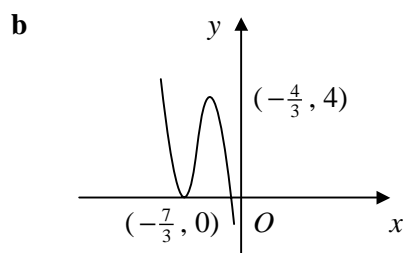
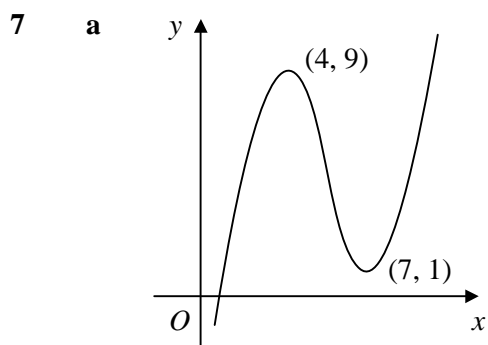
$x = 203.6^\circ, 336.4^\circ$ (1dp)

6



b $(45, 0), (135, 0), (225, 0), (315, 0)$

c $(0, 3), (90, -3), (180, 3), (270, -3), (360, 3)$



b $(30^\circ, 1.5), (90^\circ, -0.5), (150^\circ, 1.5)$

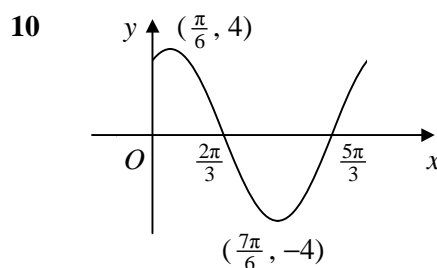
c $\frac{1}{2} + \sin 3x = 0$

$$\sin 3x = -\frac{1}{2}$$

$$3x = 180 + 30, 360 - 30$$

$$= 210, 330$$

$$x = 70^\circ, 110^\circ$$



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

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

$$xy - 2x = 3y - 5$$

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

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

$$f^{-1}(x) = \frac{2x-5}{x-3}, x \in \mathbb{R}, x \neq 3$$

b $f(x) = 4 \Rightarrow x = f^{-1}(4) = 3$

c $f(x) = \frac{3(x-2)+1}{x-2} = 3 + \frac{1}{x-2}$

$$\therefore a = 3, b = 1$$

d translation by 2 in the positive x -direction and translation by 3 in the positive y -direction (either first)