Quadratic Functions Review Answers

1. a) $D: x \in \mathbb{R}$

$R: y \in \mathbb{R}$

Function

passes vertical line test

b) $D: x \in \mathbb{R}$

$R: y \geq 4, y \in \mathbb{R}$

Function

passes vertical line test.

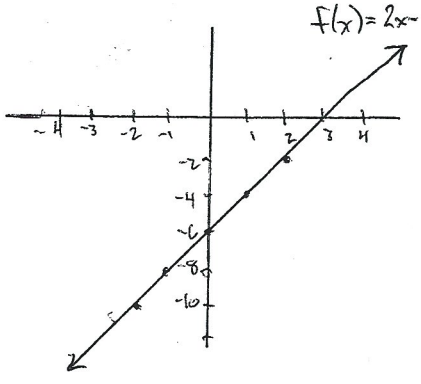
2. a) $f(-2) = 2(-2) - 6$

$= -4 - 6$

$\therefore f(-2) = -10$

b)

x	y
2	-2
1	-4
0	-6
-1	-8
-2	-10



c) Function → one y value for every x

passes the vertical line test

3.

x	$y = 3x + 1$
-3	-8
-2	-5
-1	-2
0	1
1	4
2	7
3	10

Range = $\{-8, -5, -2, 1, 4, 7, 10\}$

4. a) $x^2 - 2x - 2x + 4$

$= x^2 - 4x + 4$

b) $4(x^2 - 4x + 3x - 12) - 2(x^2 - 2x + 1)$

$= 4(x^2 - 1x - 12) - 2(x^2 - 2x + 1)$

$= 4x^2 - 4x - 48 - 2x^2 + 4x - 2$

$= 2x^2 - 50$

c) $x^2 + 4x + 4 + x^2 - 2x + 1$

$= 2x^2 + 2x + 5$

d) $3(x^2 - 2x + 1) + 4(x^2 + 2x - 1x - 2)$

$= 3x^2 - 6x + 3 + 4x^2 + 4x - 8$

$= 7x^2 - 2x - 5$

5a) $5xy(1-2x)$ b) $(x+7)(x-7)$ c) $6m^2n^2(2n+3m)$

d) $3(x^2-9)$

$=3(x+3)(x-3)$

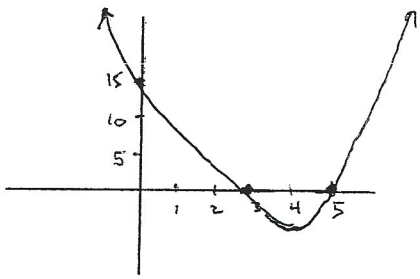
e) $(x-5)(x-4)$

f) $3(x^2+8x+15)$

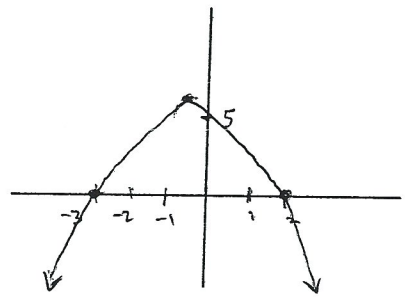
$=3(x+5)(x+3)$

g) $(x-8)(x+4)$

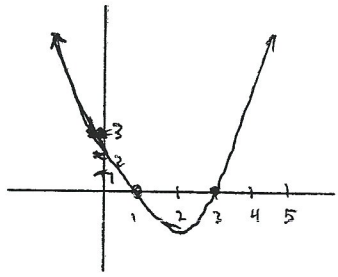
6. a)



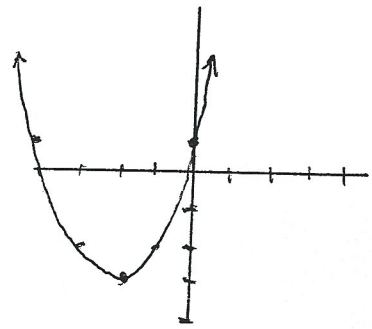
b)



c) $(x-3)(x-1)$



d)



7 a) $y = x^2 - 8x + 5$

$y = (x^2 - 8x + 16) - 16 + 5$

$\therefore y = (x-4)^2 - 11$

$V(4, -11)$

b) $y = 2x^2 - 4x - 7$

$y = 2(x^2 - 2x + 1) - 2 - 7$

$\therefore y = 2(x-1)^2 - 9$

$V(1, -9)$

8a) $2x^2 - x - 3 = 0$ (a, b, c)

$$x = \frac{+1 \pm \sqrt{(-1)^2 - 4(2)(-3)}}{2(2)}$$

$$= \frac{1 \pm \sqrt{25}}{4}$$

$$x = \frac{1+5}{4} \quad \text{or} \quad x = \frac{1-5}{4}$$

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

b) $3x^2 + 10x - 7 = 0$ (a, b, c)

$$x = \frac{-10 \pm \sqrt{10^2 - 4(3)(-7)}}{2(3)}$$

$$= \frac{-10 \pm \sqrt{184}}{6}$$

$$x = \frac{-10 + \sqrt{184}}{6} \quad \text{or} \quad x = \frac{-10 - \sqrt{184}}{6}$$

$$x \doteq -0.14 \quad \text{or} \quad x \doteq -3.2$$

9. $2x^2 - x + k = 0$

$b^2 - 4ac = 0$ for 2 distinct roots

$(-1)^2 - 4(2)k = 0$

$-8k = -1$

$\therefore k = \frac{1}{8}$

10. $h(t) = -5t^2 + 10t + 1$

using TI-83 $V(1, 6)$

or Complete the square

or factor the revised question.

$h(t) = -5(t^2 - 2t + 1) + 1 + 5$

$\therefore h(t) = -5(t - 1)^2 + 6$

$\therefore V(1, 6)$

Ball reaches max height of 6 m at a time of 1s.

11. a) shift down 4

b) shift right 3

c) vertical stretch x2, shift left 2

d) reflection in x axis, vertical stretch x3, shift left 3, shift down 4

Trigonometric Functions Review Answers

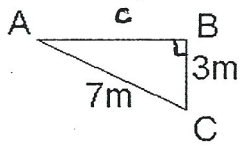
1. Evaluate each of the following to 4 decimal places using a calculator.

a) $\tan 30^\circ =$ 0.5774 b) $\cos 180^\circ =$ -1.0000 c) $\sin 270^\circ =$ -1.0000

2. Find the angle to the nearest degree using your calculator.

a) $\sin\theta = 0.4123$ $= 24^\circ$ b) $\tan\theta = 0.2345$ $= 13^\circ$ c.) $\cos\theta = 0.8585$ $= 31^\circ$

3. Solve the ΔABC for all missing sides & angles.



$c^2 = 7^2 - 3^2$

$c = \sqrt{40}$

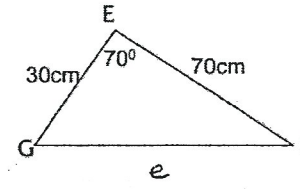
$\sin A = \frac{3}{7}$ $\angle A \doteq 25^\circ$ $\cos C = \frac{3}{7}$ $\angle C \doteq 65^\circ$

4. Solve for Side E using Cosine Law.

$e^2 = 30^2 + 70^2 - 2(30)(70)\cos 70^\circ$

$e \doteq 66$

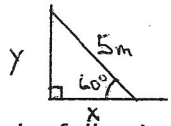
5. Solve for Angle G and F using the Sine Law.



$\frac{\sin G}{70} = \frac{\sin 70^\circ}{66}$ $\sin G = \frac{70\sin 70^\circ}{66}$ $\angle G \doteq 85^\circ$

$\frac{\sin F}{30} = \frac{\sin 70}{66}$ $\sin F = \frac{30\sin 70}{66}$ $\angle F \doteq 25^\circ$

6. A ladder is 5m long. It leans against a wall. The angle formed by the ladder and the ground is 60 degrees. How far is the foot of the ladder from the wall? How far up the wall does the ladder reach?



$\cos 60 = \frac{x}{5}$ $x = 5\cos 60^\circ$ $x \doteq 2.5\text{m}$

$\sin 60^\circ = \frac{y}{5}$ $y = 5\sin 60^\circ$ $y \doteq 4.3\text{m}$

7. Sketch a graph the following functions for two cycles on the grid provided.

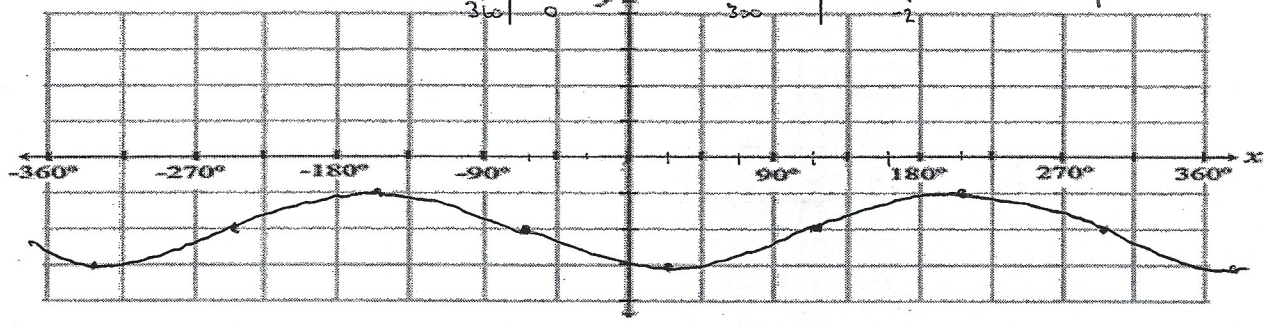
$y = a\sin(\theta - c) + d$

$y = -1\sin(\theta + 60^\circ) - 2$

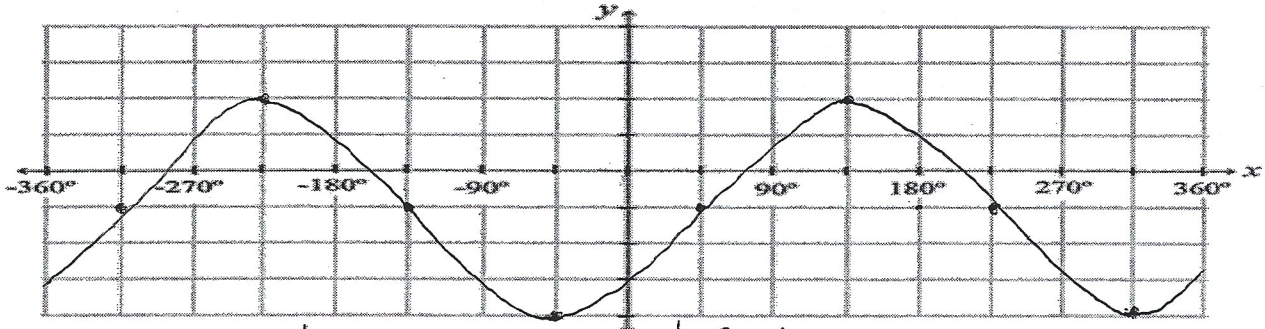
x	y
0	0
90	1
180	0
270	-1
360	0

x-60	-1y-2
-60	-2
30	-3
120	-2
210	-1
300	-2

x+c ay+d



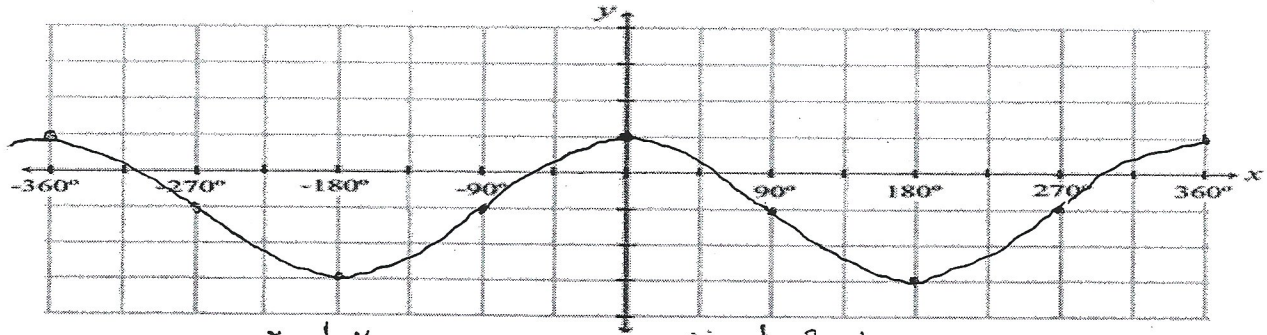
$y = 3\sin(\theta - 45^\circ) - 1$



x	y
0	0
90	1
180	0
270	-1
360	0

x+45	3y-1
45	-1
135	2
225	-1
315	-4
405	-1

$y = 2\sin(\theta + 90^\circ) - 1$



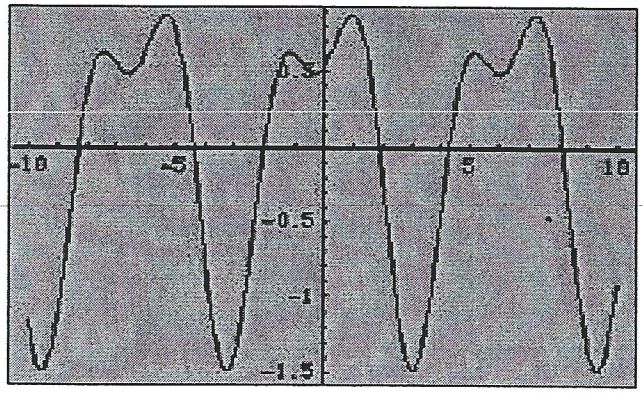
x	y
0	0
90	1
180	0
270	-1
360	0

x - 90	2y - 1
-90	-1
0	1
90	-1
180	-3
270	-1

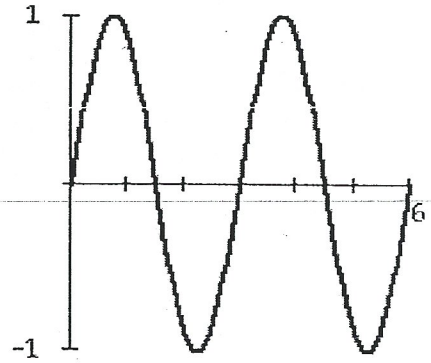
8. Complete the chart below.

Function	Amplitude	Period	Vertical Shift	Phase Shift
$y = 3\sin\theta + 2$	3	360	+ 2	—
$y = \sin\theta - 2$	1	360	- 2	—
$y = -2\sin(\theta + 90) - 1$	2	360	- 1	-90°
$y = 3\sin(\theta + 180) - 1)$	3	360	- 1	-180°

9. Identify the following two graphs as **periodic** or more specifically **sinusoidal** or **neither**.



periodic



sinusoidal

Exponential Functions Review Answers

1. a) 3^{13} b) $(-9)^{10}$ c) 5^2 d) 4^0

2. a) $\sqrt[3]{125} = 5$ b) $16^{\frac{3}{2}} = \sqrt[2]{16^3} = 64$ c) $4x^4y^2$ d) $\frac{1}{\sqrt[2]{9}} = \frac{1}{3}$

3 a) x^7 b) $20x^7$ c) x^8y^4 d) $a^2 \div a^7 = \frac{1}{a^5}$

e) $\frac{45x^9y^5}{9x^6y^7} = \frac{5x^3}{y^2}$ f) $\frac{20x^5y^5}{10x^3y} = 2x^2y^4$

4. $P = P_0(1+r)^n$

$= 10000(1+0.25)^7$

$\therefore P = 47683.72$ cells

5. a) $A = P(1+i)^n$

$A = 1600\left(1+\frac{0.10}{2}\right)^{14}$

$= 3167.89$

b) $A = 900\left(1+\frac{0.07}{12}\right)^{60}$

$= 1275.86$

6. a) $A = P(1+i)^n$

$A = 250$

$P = 200$

$n = 10 \times 1 = 10$

$i = ?$

$250 = 200(1+i)^{10}$

$1.25 = (1+i)^{10}$

$\sqrt[10]{1.25} = 1+i$

$1.02256 = 1+i$

$i = 0.0225$

2.25%

6b) $i = \frac{0.10}{4}$

$P = 525$

$A = 550$

$n = ?$

$A = P(1+i)^n$

$550 = 525\left(1+\frac{0.10}{4}\right)^n$

$1.0476 = (1.025)^n$

guess and check

$n = 2 \rightarrow$ 6 months or 0.5 yea