1. a) 360 - 92 = 262

b) $\frac{-\pi}{3} \times \frac{180}{\pi} = \frac{-180\pi}{3\pi} = 60°$

460 - 60 = 300

2. $cot\theta = 1.6$

$$\frac{1}{tan\theta} = \frac{1}{1.6} = 0.625$$

$$RA = 32°$$

Quad #1: 0 + 32 = 32
Quad #2: 180 + 32 = 212

3. a) $sin90°$

x=0
y=1
r=1

$$sin90° = \frac{y}{r} = \frac{1}{1} = 1$$

b) $cos\pi$

x=-1
y=0
r=1

$$cos\pi = \frac{x}{r} = \frac{-1}{1} = 1$$

c) $csc\left(\frac{3\pi}{2}\right)$

x=0
y=-1
r=1

$$csc\left(\frac{3\pi}{2}\right) = \frac{1}{sin\theta} = \frac{r}{y} = \frac{1}{-1} = -1$$

4. a) $\frac{220}{1} \times \frac{\pi}{180} = \frac{11\pi}{9}$

b) $\frac{48}{1} \times \frac{\pi}{180} = \frac{4\pi}{15}$

5. a) $\frac{3\pi}{4} \times \frac{180}{\pi} = \frac{3\pi \times 180}{4\pi} = \frac{540\pi}{4\pi}$

$\frac{540\pi}{9\pi} = 60° = 135°$

b) $1.5 \times \frac{180}{\pi}\ \frac{270}{\pi} = 86°$

6. $\frac{7\pi}{12} \times \frac{180}{\pi} = 105°$

Quad#2: $180° - 103° = 75°$

7. a) $tan\left(\frac{5\pi}{6}\right)$

$\frac{-1}{3}$

b) $cos\left(\frac{7\pi}{4}\right)$

$\frac{1}{2}$

8. $y = 3cos(x - 5) + 11$

(0,1) -> $\left(\frac{1}{k}(0) + 5, 3(1) + 11\right)$

(5,4) this is a cosine curve

9. $tan\theta = \left(\frac{4}{x}\right)$

$tan\theta = \left(\frac{-6}{-8}\right)$

$\theta = tan^{-1}\left(\frac{-6}{-8}\right)$

$\theta = 37°$

Feature $(y = tan\theta)$	**Value**
Period	π
¼ Wave	$\frac{\pi}{4}$
Vertical Asymptotes	$\frac{-3\pi}{2}, -2\pi, \frac{3\pi}{2}, 2\pi$
Domain	{XER $\neq \frac{-3\pi}{2}, -2\pi, \frac{3\pi}{2}, 2\pi$ }
Range	{YER}

Feature $(y = cot\theta)$	**Value**
Period	π
¼ Wave	$\frac{\pi}{4}$
Vertical Asymptotes	$-2\pi, -\pi, 0, \pi, 2\pi$
Range	{YER}

11. $\frac{cos11\pi}{6} = \frac{cos(12-1)\pi}{6} = cos(2\pi = \frac{\pi}{6})$

$= \frac{cos\pi}{6}$

$= cos30$

$= \frac{\sqrt{3}}{2}$

12. $(x + \frac{\pi}{2})$

$cos(x)cos\left(\frac{\pi}{2}\right) - sin(x)sin\left(\frac{\pi}{2}\right)$

$-sin(x)sin\left(\frac{\pi}{2}\right) + 0$

$-sin(x)$

13. $cosx = \frac{12}{13}, sin(2x)$

$cos = \frac{12}{13}$

$12^2 + b^2 = 13^2$

$b^2 = 13^2 - 12^2$

$b^2 = \sqrt{25}$

$sin(2x) = 2sin(x)cos(x)$

$\frac{120}{169} \vee 0.71006$

14. $2cosx - 2 = sinx^2x$

$2cosx - 2 - (1 - cos^2x) = 0$

$cos^2x + 2cosx - 1 - 2$

$cos^2x + 2cosx - 3$

$-3 + cos^2x + cosx = 0$

$cosx = 1, cosx = 3$

$x = 0 \vee x = 2\pi$

15.

Transformations	Value
Vertical Stretch	a=4 Stretch by a factor of 4
Horizontal Stretch	$k = \frac{1}{2}$ Period is 2
Vertical Shift	c=-7 -7 units downwards
Horizontal Shift	$d = \frac{\pi}{4}$ Shifts to the right

16. a) $\frac{sin^2\theta}{1cos\theta} = 1 - cos\theta$

$$\frac{(sin^2(x)(1-cosx)}{(1+cosx)(1-cosx)}$$

$$\frac{(sin^2(x)(1-cosx)}{1+cos^2(x)}$$

$$\frac{(sin^2(x)(1-cosx)}{1+cos^2x(1-cos^2(x))}$$

$$\frac{sin^2x-sin^2(x)cosx}{sin^2x}$$

$$\frac{sin^2(x)}{sin^2(x)-sin^2(x)cos(x)}$$

$$1-cos\theta$$

b) $$\frac{cos(2x)+1}{sin(2x)}=cotx$$

$$\frac{cos^{2x}-sin^{2x}+1}{sin(2x)}$$

$$\frac{2cos^2(x)}{sin(2x)}$$

$$\frac{2cos^{2x}}{2sin(x)cos(x)}$$

$$\frac{cosx}{sinx}$$

$$cotx$$

17.

Transformations	Value
Vertical Stretch	a=2

	Vertical stretch factor of 2
Horizontal Stretch	k=⅔ Period is 3π
Vertical Shift	c=5 Axis y=5 units upwards
Horizontal Shift	$d = \pi$
Domain	{XER}
Range	{YER

18. Step#1: the y-axis is where the side curve begins at the point of the graph
(0, -1)

Step#2: Amplitude of Graph (max=2, min=-4)

$$a = \frac{max - min}{2}$$

$$a = \frac{2 - (-4)}{2}$$

$$a = 3$$

Step#3: Period of the Graph (k=2)

$$K = \frac{2\pi}{P}$$

$$K = \frac{2\pi}{\pi}$$

$$K = 2$$

Step#4: Vertical Shift (max =2 min =-4, c=-1)

$$y = \frac{max + min}{2}$$

$$y = \frac{2 + (-4)}{2}$$

Y-axis = -1, graph shifted 1 unit downward

Step#5: Phase Shift of the Graph (d=0)

Transformation	**Value**
Vertical Stretch	a=3

Horizontal Stretch	k=2
Vertical Shift	c=-1
Horizontal Shift	d=0

Graph Equation: $[y = 3sin(2x) - 1]$

19. a) 1.5m + 2m + 2m = 5.5m
The maximum height above the ground is 5.5 meters.
1.5 = lowest point above the ground
2 = middle
2 = above the ground

c) Step#1: Side curve starts at the y-axis at the point of the graph
(0, 5.5)

Step#2: Amplitude of the Graph
max=5.5
min=1.5

$$a = \frac{max - min}{2}$$

$$a = \frac{5.5(-0.5)}{2}$$

$$a = 2$$

Step#3: Period of the Graph

$$P = \frac{2\pi}{K}$$

$$K = \frac{2\pi}{P}$$

$$K = \frac{2\pi}{8}$$

$$K = \frac{\pi}{4}$$

Step#4: Vertical Shift

$$y = \frac{min - max}{2}$$

$$y = \frac{(5.5) + (1.5)}{2}$$

$$y = \frac{7}{2}, c = \frac{7}{2} \vee 3.5$$

Step#5: No phase shift, therefore d=0

Transformation	Value
Vertical Stretch	a=2
Horizontal Stretch	k= $\frac{\pi}{4}$
Vertical Shift	c=3.5
Horizontal Shift	d=0

Graph Equation: $y = 2cos\left(\frac{\pi}{4}x\right) + 4$

d) $y = 2cos[\frac{\pi}{4}x] + 4, x = 7$

$y = 2cos[\frac{\pi}{4}(7)] + 4$

$y = 2[cos(\frac{7\pi}{4})] + 4$

$y = 4 + \sqrt{2}$

$[y = 3.5 + \sqrt{2} = 4.9]$

$y = 5.4$

e) $4.5 = 2cos[\frac{\pi}{4}x] + 4$

$4.5 = 4 = 2cos\frac{\pi}{4}(x)$

$0.5 = 2cos\frac{\pi}{4}(x)$

$\frac{0.5}{2} = cos\frac{\pi}{4}(x)$

$cosa = \frac{1}{4}$

$a = \pi + \frac{\pi}{4} = \frac{5\pi}{4}$

We let $a = \frac{\pi}{4}(x)$ then $\frac{\pi}{4}(x) = \frac{3\pi}{4}, \vee \frac{\pi}{4}(x) = \frac{5\pi}{4}$