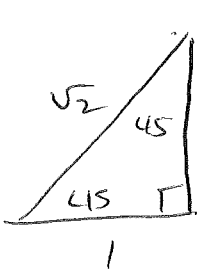
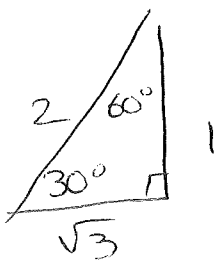
Unit 5 Review

(22) a) $\sin 45° = \frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2}$





b) $\cos 210°$

S	A
T	C

$= -\cos 30°$

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

c) $\csc 30° = \frac{1}{\sin 30°}$

$= \frac{2}{1}$

d) $\cot 315° = \frac{1}{\tan 315°}$ (Q4)

$= -\frac{1}{\tan 45} = -1$

(23) a) $\sin\theta = \frac{\sqrt{3}}{2}$

S	A
T	C

In Q1, Q2

$\theta = 60°, 120°$

b) $\cos\theta = -\frac{1}{3}$

RAA: $\alpha = \cos^{-1}(1/3) = 71°$

Q2: $\theta = 180 - 71° = 109°$

Q3: $\theta = 180 + 79° = 259°$

c) $\tan\theta = 5$

RAA: $\alpha = \tan^{-1}(5) = 79°$

Q1: $\theta = 79°$

Q3: $\theta = 180° + 70°$
$= 259°$

d) $\sec\theta = -2$

$\frac{1}{\cos\theta} = \frac{-2}{1}$

$\cos\theta = -\frac{1}{2}$ (RAA: 60°)

Q2: $\theta = 120°$

Q3: $\theta = 240°$

(24) a) $\frac{\tan x}{\cos x} = \frac{\sin x}{1-\sin^2 x}$

$LS = \frac{\tan x}{\cos x} = \frac{\sin x}{\cos x} \div \cos x$

$= \frac{\sin x}{\cos^2 x}$

$RS = \frac{\sin x}{1-\sin^2 x}$

$= \frac{\sin x}{\cos^2 x}$

$LS = RS$.

Q.E.D.

b) $1 + \sec\theta = \frac{\cos\theta + 1}{\cos\theta}$

$RS = \frac{\cos\theta + 1}{\cos\theta}$

$= \frac{\cos\theta}{\cos\theta} + \frac{1}{\cos\theta}$

$= 1 + \sec\theta = LS$ Q.E.D.

c) $\frac{1-\cos\theta}{\sin\theta} = \csc\theta - \cot\theta$

$LS = \frac{1-\cos\theta}{\sin\theta} = \frac{1}{\sin\theta} - \frac{\cos\theta}{\sin\theta}$

$= \csc\theta - \cot\theta$

d) $\tan x + \frac{1}{\tan x} = \frac{1}{\sin x \cos x}$

$LS = \frac{\sin x}{\cos x} + \frac{\cos x}{\sin x}$ common denom.

$= \frac{\sin^2 x + \cos^2 x}{\sin x \cos x}$

$= \frac{1}{\sin x \cos x} = RS$ Q.E.D.

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

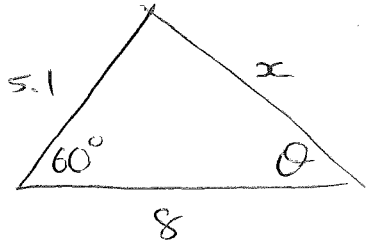
$LS = \frac{\sin^2 x}{1-\cos x} = \frac{1-\cos^2 x}{1-\cos x}$ ✓ DOS FACTOR

$= \frac{(1-\cos x)(1+\cos x)}{1-\cos x}$

$= 1+\cos x$ Q.E.D

$= RS.$

(25)



USE COSINE LAW TO FIND x

$x^2 = 5.1^2 + 8^2 - 2(5.1)(8)(\cos 60)$

$x^2 = 49.21$

$x = 7.01$

USE SINE LAW TO FIND θ

$\frac{\sin\theta}{5.1} = \frac{\sin 60}{7.01}$

$\sin\theta = \frac{(5.1)(\sin 60)}{7.01}$

$\sin\theta = 0.63$

$\theta = 39°$

∴ Roberto can install the system himself.

UNIT 6

(26) a) $y = 2\cos(x-45) + 1$

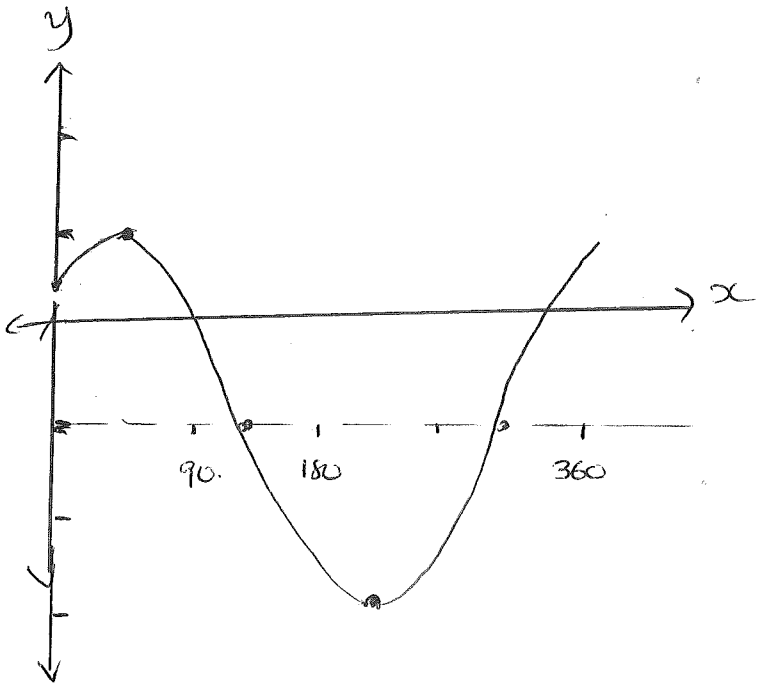
amp = 2

max = 1

min = −3

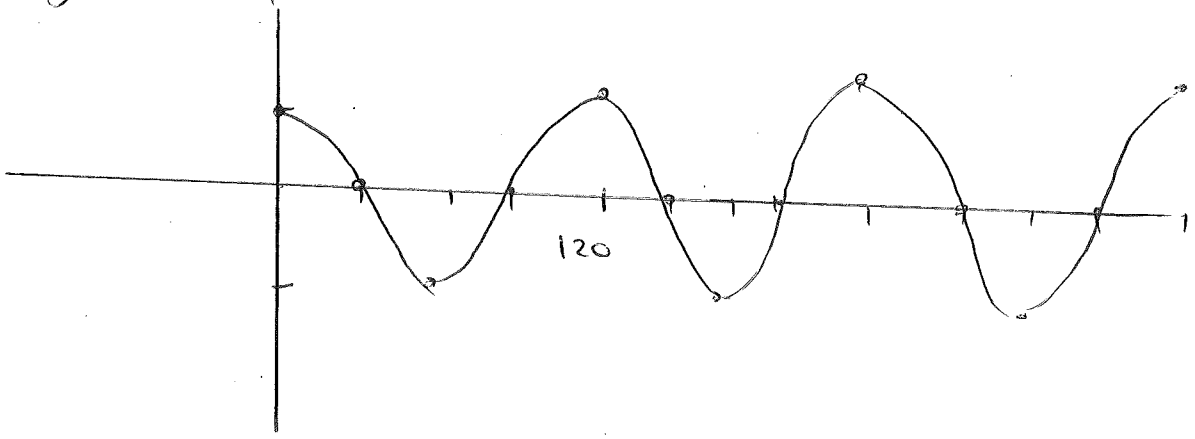
a.o.c : $y = -1$

period = 360°



b) $a(x) = -\sin[3(x+30)]$

a.o.c : $y = 0$ amp = 1 max = 1 min = −1 $P = 120°$



(27) max = 3

min = −1

$c = \frac{\max + \min}{2} = \frac{3+(-1)}{2} = 1$

$a = \frac{\max - \min}{2} = \frac{3+1}{2} = 2$

$P = 720° \Rightarrow k = 1/2$

Reflection in x-axis

$y = -2\sin\frac{1}{2}x + 1$

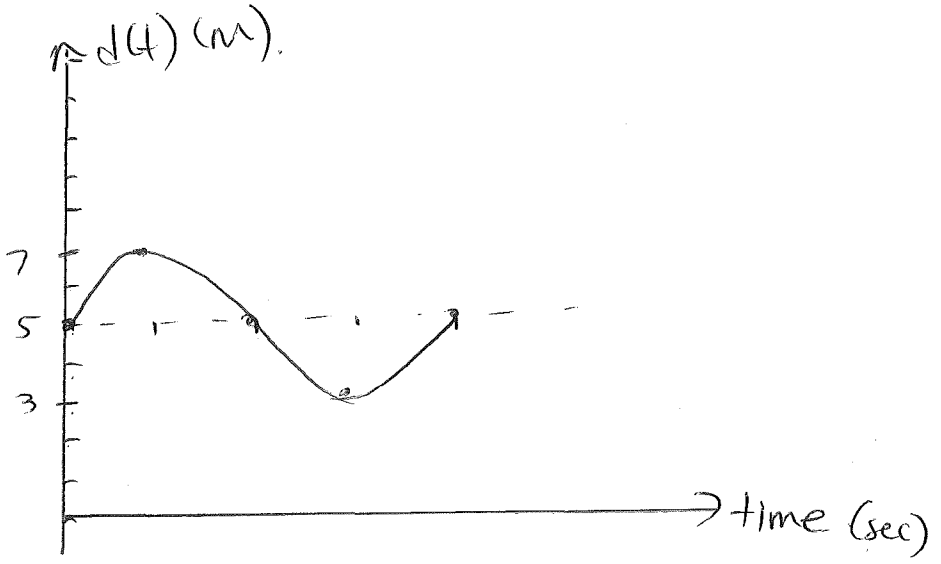
28) $d(t) = 2\sin 30t + 5$

a) $P = \frac{360}{30} = 12$ ∴ It takes 12 seconds for the ship to come back up.

b) 5m

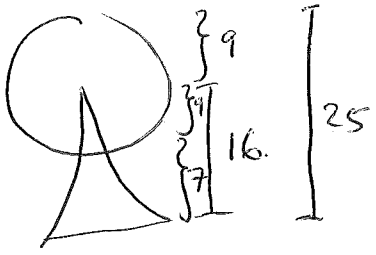
c) $\{d(t) \in \mathbb{R} \mid 3 \leq d(t) \leq 7\}$
(3: min, 7: max)

d)



29) a) 80 sec [time it takes to complete one full revolution]

b) $c = \frac{max+min}{2} = \frac{25+7}{2} = 16$ → Centre of the Ferris wheel.



c) 7m

d) $a = \frac{max-min}{2} = \frac{25-7}{2} = 9$

e) The Ferris wheel goes in motion since it starts at the heighest point.