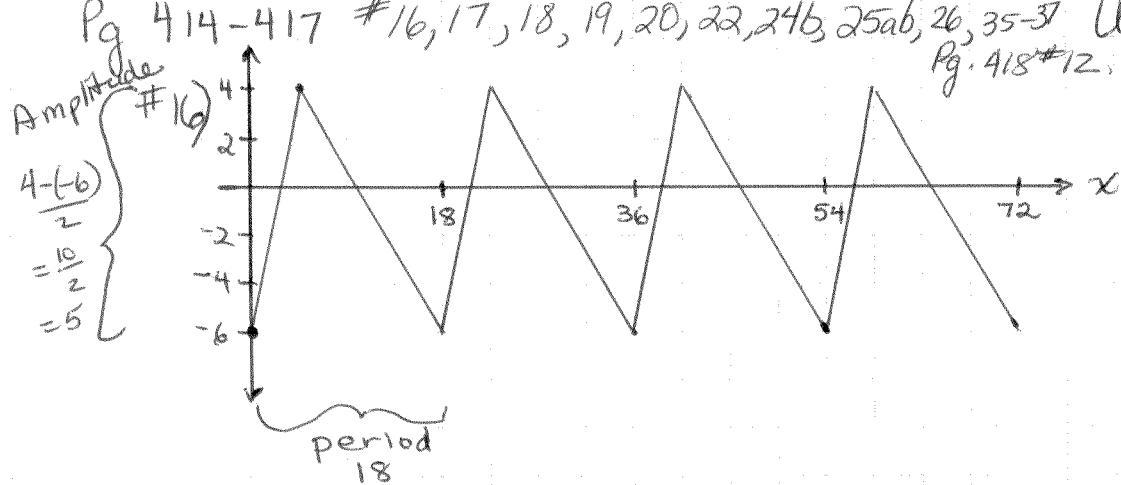


Pg 414-417 #16, 17, 18, 19, 20, 22, 24b, 25ab, 26, 35-37 Unit 7 Review pg 1 of 6

Pg. 418 #12.



* there are many, many possible correct graphs

#17 a) see attached graphs.

	period	amplitude	range
b) $y = \sin x$	360°	1	$\{-1 \leq y \leq 1\}$
$y = \cos x$	360°	1	$\{-1 \leq y \leq 1\}$

#18 a) see attached graphs

* #18 not required for test/exam
(graphing $y = \tan x$ is not part of the ministry guidelines for this course).

b)	Period	Domain
$y = \tan x$	180°	$\{-180^\circ \leq x \leq 450^\circ x \neq -90^\circ, 90^\circ, 270^\circ, 450^\circ\}$
Range $\{y \in \mathbb{R}\}$		recall: $\tan x = \frac{\sin x}{\cos x}$ (QI)

so, $\tan x$ is undefined when $\cos x = 0$
 $x = -90^\circ, 90^\circ, 270^\circ, 450^\circ$

#19 see graphs, attached function

	domain (of one cycle)	range	note
a) $y = 4\sin x$	$\{0^\circ \leq x \leq 360^\circ\}$	$\{-4 \leq y \leq 4\}$	the domain of the "entire" function for any of these is
b) $y = \frac{1}{2}\cos x$	$\{0^\circ \leq x \leq 360^\circ\}$	$\{-\frac{1}{2} \leq y \leq \frac{1}{2}\}$	
c) $y = \sin 3x$	$\{0^\circ \leq x \leq 120^\circ\}$	$\{-1 \leq y \leq 1\}$	
d) $y = \cos 2x$	$\{0^\circ \leq x \leq 180^\circ\}$	$\{-1 \leq y \leq 1\}$	
e) $y = \sin \frac{1}{3}x$	$\{0^\circ \leq x \leq 1080^\circ\}$	$\{-1 \leq y \leq 1\}$	
f) $y = \cos \frac{3}{4}x$	$\{0^\circ \leq x \leq 480^\circ\}$	$\{-1 \leq y \leq 1\}$	

#20 functionperiod

a) $y = \sin 2x$

$\frac{360^\circ}{2} = 180^\circ$

b) $y = \cos \frac{3}{2}x$

$360^\circ \div \frac{3}{2} = 360^\circ \times \frac{2}{3} = 240^\circ$

c) $y = 2 \sin \frac{1}{2}x$

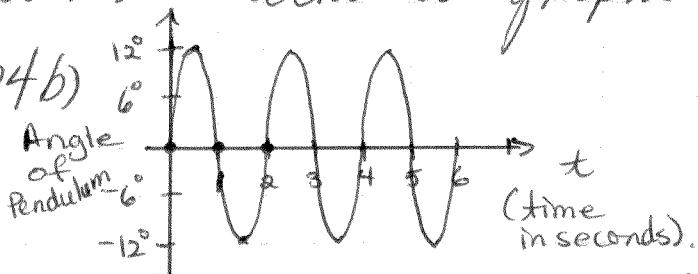
$360^\circ \div \frac{1}{2} = 360^\circ \times 2 = 720^\circ$

d) $y = 1.5 \cos 0.25x$

$360^\circ \div 0.25 = 1440^\circ$

#22. see attached graphs

#24b)



* Sine function ~
max 12°
min -12°

1 cycle takes 2 seconds
so Period = 2.

#25a) $y = 4 \sin x - 3$

function Domain (of one cycle) Range

$\{0^\circ \leq x \leq 360^\circ\}$ $\{-7 \leq y \leq 1\}$

Amplitude Period Phase Shift

4 360° —

b) $y = 3 \cos x + 2$ $\{0^\circ \leq x \leq 360^\circ\}$ $\{-1 \leq y \leq 5\}$ 3 360° —

④ See attached graphs.

#26 see attached graphs

function	domain (of one cycle)	range	Amplitude	Period	Phase Shift
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a) $y = 2 \sin \frac{3}{2}x$ $\{0^\circ \leq x \leq 240^\circ\}$ $\{-2 \leq y \leq 2\}$ 2 240° —

b) $y = -3 \cos \frac{1}{4}x$ $\{0^\circ \leq x \leq 1440^\circ\}$ $\{-3 \leq y \leq 3\}$ 3 1440° —

#35 Solve for $\{0^\circ \leq x \leq 360^\circ\}$

a) $\cos x = 0$

$x = 90^\circ \text{ or } 270^\circ$

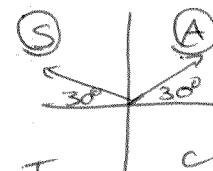
b) $2 \sin x - 1 = 0$

$2 \sin x = 1$

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

$x = 30^\circ, 180^\circ - 30^\circ$

$x = 30^\circ \text{ or } 150^\circ$



Pg. 417 #35-37

35 c) $\tan x = -1$

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

$$\sin x = -1 (\cos x)$$

$$\sin x = -\cos x$$

$$x = 180^\circ - 45^\circ \text{ or } x = 360^\circ - 45^\circ \\ = 135^\circ \quad = 315^\circ$$

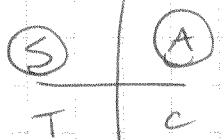
$$\therefore x = 135^\circ \text{ or } 315^\circ.$$

d) $\sqrt{2} \sin x = 1$

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

$$x = 45^\circ \text{ or } 180^\circ - 45^\circ \\ = 135^\circ$$

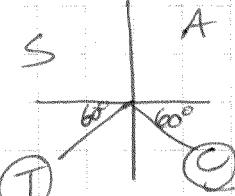
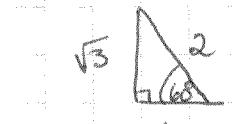
$$\therefore x = 45^\circ \text{ or } 135^\circ$$



e) $2 \cos x - 3 = 0$

$$\cos x = \frac{3}{2}$$

$$\{-1 \leq y \leq 1\} \dots \frac{3}{2} > 1 \\ \text{there is no solution.}$$



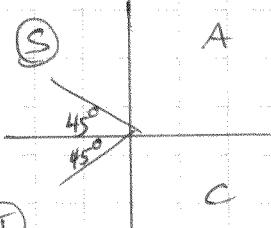
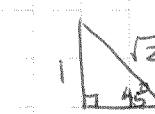
f)

$$2 \sin x + \sqrt{3} = 0$$

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

$$x = 180^\circ + 60^\circ \text{ or } 360^\circ - 60^\circ \\ = 240^\circ \quad = 300^\circ$$

$$\therefore x = 240^\circ \text{ or } 300^\circ$$



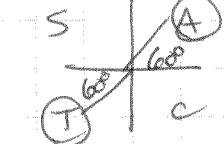
g)

$$\sqrt{2} \cos x + 1 = 0$$

$$\cos x = -\frac{1}{\sqrt{2}}$$

$$x = 180^\circ - 45^\circ \text{ or } x = 180^\circ + 45^\circ \\ = 135^\circ \quad = 225^\circ$$

$$\therefore x = 135^\circ \text{ or } 225^\circ$$



h)

$$\cos x - 1 = 0$$

$$\cos x = 1$$



$$x = 0^\circ \text{ or } 360^\circ$$

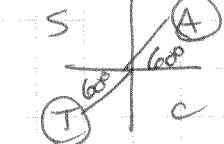
i)

$$\tan x = \sqrt{3}$$

$$\sin x = \frac{\sqrt{3}}{2}, \cos x = \frac{1}{2}$$

$$x = 60^\circ \text{ or } 180^\circ + 60^\circ \\ = 240^\circ$$

$$\therefore x = 60^\circ \text{ or } 240^\circ$$



U7 Rev Pg ③ & ⑥
 $\sin x = \cos x$ when $x = 45^\circ$
 $\sin x$ is the opposite sign of $\cos x$ in quad's 2, 4

Pg 417 # 36, 37 Pg 418 # 12

36) Solve for $0^\circ \leq x \leq 360^\circ$

$$\begin{aligned} a) \cos^2 x - 1 &= \sin^2 x \\ (1 - \sin^2 x) - 1 &= \sin^2 x \quad (\text{PI}) \\ -\sin^2 x &= \sin^2 x \\ -\sin^2 x - \sin^2 x &= 0 \\ -2\sin^2 x &= 0 \\ \sin^2 x &= 0 \\ \sin x &= 0 \end{aligned}$$

$$x = 0^\circ, 180^\circ \text{ or } 360^\circ$$

$$\begin{aligned} c) \sin^2 x + \sin x - 2 &= 0 \\ (\sin x + 2)(\sin x - 1) &= 0 \\ \sin x = -2 \text{ or } \sin x &= 1 \\ \text{Inadmissible} & \quad x = 90^\circ \end{aligned}$$

$$\therefore x = 90^\circ$$

$$\begin{aligned} e) 2\sin^2 x + 1 &= 3\sin x \\ 2\sin^2 x - 3\sin x + 1 &= 0 \\ (\sin x - 1)(2\sin x - 1) &= 0 \\ \sin x = 1 \text{ or } \sin x &= \frac{1}{2} \\ x = 90^\circ & \quad x = 30^\circ \text{ or } 150^\circ \end{aligned}$$

$$\begin{aligned} g) 2\cos^2 x - 5\cos x + 3 &= 0 \\ (\cos x - 1)(2\cos x - 3) &= 0 \\ \cos x = 1 \quad \cos x &= \frac{3}{2} \\ x = 0^\circ \text{ or } 360^\circ & \quad \text{Inadmissible} \end{aligned}$$

$$\therefore x = 0^\circ \text{ or } 360^\circ$$

$$\begin{aligned} b) 2\cos^2 x + 3\cos x &= -1 \\ 2\cos^2 x + 3\cos x + 1 &= 0 \\ (2\cos x + 1)(\cos x + 1) &= 0 \\ \cos x = -\frac{1}{2} \text{ or } \cos x &= -1 \\ x = 180^\circ - 60^\circ \text{ or } 180^\circ + 60^\circ & \quad x = 180^\circ \\ \therefore x = 120^\circ \text{ or } 240^\circ & \quad \text{Inadmissible} \end{aligned}$$

$$\begin{aligned} d) \sin x \cos x - \sin x &= 0 \\ \sin x(\cos x - 1) &= 0 \\ \sin x = 0 \text{ or } \cos x &= 1 \\ x = 0^\circ, 180^\circ, 360^\circ & \quad x = 0^\circ, 360^\circ \end{aligned}$$

$$\therefore x = 0^\circ, 180^\circ \text{ or } 360^\circ$$

$$\begin{aligned} f) \cos x + 1 &= 2\sin^2 x \\ \cos x + 1 &= 2(1 - \cos^2 x) \quad (\text{PI}) \\ \cos x + 1 &= 2 - 2\cos^2 x \\ 2\cos^2 x + \cos x + 1 - 2 &= 0 \\ 2\cos^2 x + \cos x - 1 &= 0 \\ (\cos x + 1)(2\cos x - 1) &= 0 \quad \text{Inadmissible} \\ \cos x = -1 \text{ or } \cos x &= \frac{1}{2} \\ x = 180^\circ \text{ or } & \quad x = 60^\circ \text{ or } 300^\circ \end{aligned}$$

$$\therefore x = 60^\circ, 180^\circ \text{ or } 300^\circ$$

$$\begin{aligned} h) 2\sin^2 x - 7\sin x &= 4 \\ 2\sin^2 x - 7\sin x - 4 &= 0 \\ (\sin x - 4)(2\sin x + 1) &= 0 \\ \sin x = 4 \text{ or } \sin x &= -\frac{1}{2} \\ \text{Inadmissible} & \quad \text{Inadmissible} \end{aligned}$$

$$\begin{aligned} x &= 180^\circ + 30^\circ \\ &= 210^\circ \text{ or } x = 360^\circ - 30^\circ \\ &= 330^\circ \end{aligned}$$

$$\therefore x = 210^\circ \text{ or } 330^\circ$$

Pg 417 #36, 37

$$36) i) \cos^2 x + 4 = 4\cos x$$

$$\cos^2 x - 4\cos x + 4 = 0$$

$$(\cos x - 2)^2 = 0$$

$$\cos x = 2$$

inadmissible

∴ no solutions

$$37) \{0^\circ \leq x \leq 360^\circ\}$$

round approx. answers
to 1 decimal place

$$a) 5\cos x - 4 = 0$$

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

$$x = \cos^{-1}\left(\frac{4}{5}\right)$$

$$x \approx 36.9^\circ$$

$$\text{or } x = 360^\circ - 36.9^\circ \\ = 323.1^\circ$$

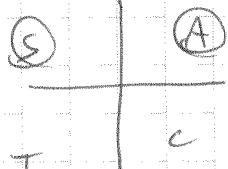
∴ $x \approx 36.9^\circ \text{ or } 323.1^\circ$

$$b) 3\sin x = 3 - \sin x$$

$$4\sin x = 3$$

$$\sin x = \frac{3}{4}$$

$$x = \sin^{-1}\left(\frac{3}{4}\right)$$



$$x \approx 48.6^\circ$$

$$\text{or } x = 180^\circ - 48.6^\circ \\ = 131.4^\circ$$

∴ $x \approx 48.6^\circ \text{ or } 131.4^\circ$

$$c) 9\cos^2 x + 6\cos x + 1 = 0$$

$$(3\cos x + 1)^2 = 0$$

$$3\cos x = -1$$

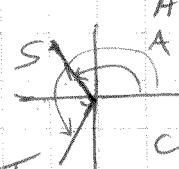
$$\cos x = -\frac{1}{3}$$

$$x \approx 109.5^\circ$$

$$\text{or } 360^\circ - 109.5^\circ$$

$$= 250.5^\circ$$

∴ $x \approx 109.5^\circ \text{ or } 250.5^\circ$



$$m9$$

$$A6$$

$$d) 6\sin^2 x - 7\sin x + 2 = 0 \quad m12$$

$$(2\sin x - 1)(3\sin x - 2) = 0 \quad A-7$$

$$\sin x = \frac{1}{2} \text{ or } \sin x = \frac{2}{3}$$

$$x = 30^\circ \text{ or } 150^\circ \text{ or } x \approx 41.8^\circ \text{ or } 138.2^\circ$$

$$\therefore x = 30^\circ \text{ or } 41.8^\circ \text{ or } 138.2^\circ \text{ or } 150^\circ$$

Pg(5) of(6)

Unit 7 Review

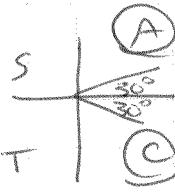
Pg 4/9 #12 $\{0^\circ \leq x \leq 360^\circ\}$ U7 Rev Pg ② of ⑥

12a) $\cos x = \sqrt{3} - \cos x$

$$2\cos x = \sqrt{3}$$

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

$$x = 30^\circ \text{ or } 330^\circ$$



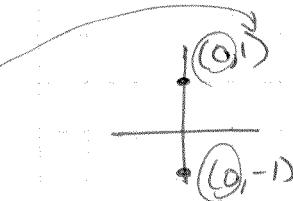
b) $\cos x \sin x - \cos x = 0$

$$\cos x (\sin x - 1) = 0$$

$$\cos x = 0 \text{ or } \sin x = 1$$

$$x = 90^\circ \text{ or } 270^\circ$$

$$x = 90^\circ$$



$$\therefore x = 90^\circ \text{ or } 270^\circ$$

c) $2\sin^2 x + 5\sin x + 3 = 0$

$$(\sin x + 1)(2\sin x + 3) = 0$$

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

$$x = 270^\circ$$

inadmissible

$$\begin{matrix} m_6 \\ A_5 \\ 2, 3 \\ \hline 2 \\ 2 \end{matrix}$$

$$\therefore x = 270^\circ$$

d) $4\sin^2 x - 1 = 0$

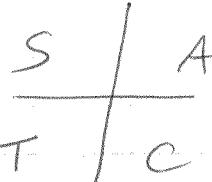
$$(2\sin x - 1)(2\sin x + 1) = 0$$

$$\sin x = \frac{1}{2} \text{ or } \sin x = -\frac{1}{2}$$

$$x = 30^\circ \text{ or } 150^\circ$$

$$\begin{aligned} x &= 180^\circ + 30^\circ \text{ or } 360^\circ - 30^\circ \\ &= 210^\circ \text{ or } 330^\circ \end{aligned}$$

$$\therefore x = 30^\circ, 150^\circ, 210^\circ \text{ or } 330^\circ$$



$$\begin{aligned} &\text{OR} \\ &4\sin^2 x - 1 = 0 \\ &4\sin^2 x = 1 \\ &\sin^2 x = \frac{1}{4} \\ &\sin x = \pm \frac{1}{2} \\ &\sin x = \pm \frac{1}{2} \end{aligned}$$

Extra Questions

Function	Domain (cycle)	Range	Amplitude	Period	Phase Shift
a) $y = 2\sin(x - 90^\circ)$	$\{90^\circ \leq x \leq 450^\circ\}$	$\{-2 \leq y \leq 2\}$	2	360°	Right 90°
b) $y = \frac{1}{2}\cos(x + 90^\circ)$	$\{-90^\circ \leq x \leq 270^\circ\}$	$\{-\frac{1}{2} \leq y \leq \frac{1}{2}\}$	$\frac{1}{2}$	360°	Left 90°
c) $y = \frac{1}{2}\sin(\frac{1}{2}x - 180^\circ) - 2$	$\{360^\circ \leq x \leq 1080^\circ\}$	$\{-\frac{5}{2} \leq y \leq -\frac{3}{2}\}$	$\frac{1}{2}$	720°	Right 360°
d) $y = 2\cos\frac{1}{2}(x - 180^\circ) + 1$	$\{180^\circ \leq x \leq 900^\circ\}$	$\{-1 \leq y \leq 3\}$	2	720°	Right 180°
e) $y = -2\cos(3x - 180^\circ) + 2$	$\{60^\circ \leq x \leq 180^\circ\}$	$\{0 \leq y \leq 4\}$	2	120°	Right 60°
	$y = -2\cos(3(x - 60^\circ)) + 2$				