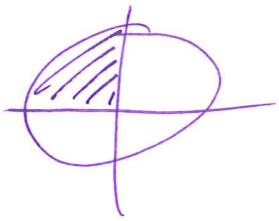
Mock Test 3.1, Version 5

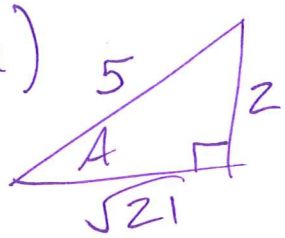
ONE:

Given that $\sin A = \frac{2}{5}$ and $\frac{\pi}{2} \leqslant A \leqslant \pi$, find:

a $\cos A$ b $\tan A$ c $\sin 2A$



a)



$\cos A = -\frac{\sqrt{21}}{5}$

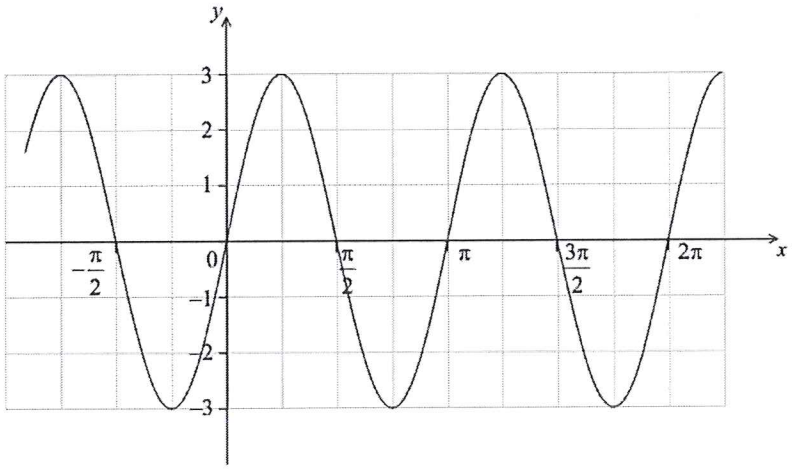
b) $\frac{-2}{\sqrt{21}}$

c) $2\left(\frac{2}{5}\right)\left(-\frac{\sqrt{21}}{5}\right)$

$= -\frac{4\sqrt{21}}{25}$

TWO:

Let $f(x) = a\sin bx$, where $b > 0$. The following diagram shows part of the graph of f.



(a) (i) Find the period of f. π

(ii) Write down the amplitude of f. 3

(b) (i) Write down the value of a. 3

(ii) Find the value of b.

2

Moderate

THREE:

Solve the equation $2\cos x = \sin 2x$, for $0 \le x \le 3\pi$.

$2\cos x = \sin 2x$

$0 = 2\sin x\cos x - 2\cos x$

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

$\cos x = 0$

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

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

$x = \frac{5\pi}{2}$

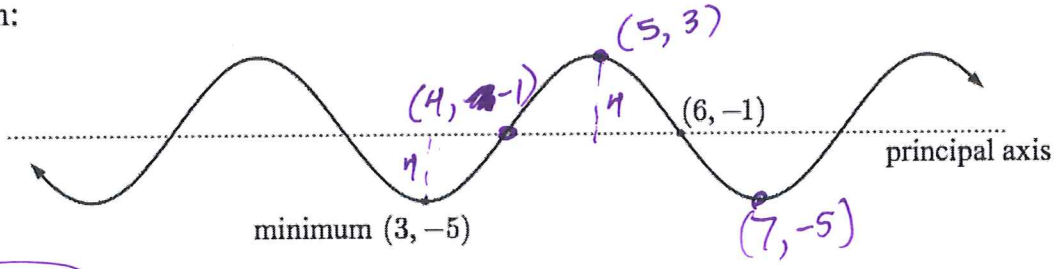
$\sin x = 1$

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

$x = \frac{5\pi}{2}$

FOUR:

Find a trigonometric equation in the form $y = a\sin(b(x-c)) + d$ which represents the following information:



$a = 4$

$d = -1$

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

$c = 4$

$b(4) = 2\pi$

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

High Challenge

FIVE:

a Suppose $\dfrac{1-\cos 2\theta}{\sin 2\theta} = \sqrt{3}$ where $0 < \theta < \frac{\pi}{2}$.

i Show that $\tan\theta = \sqrt{3}$ also.

ii Find θ.

b If $\cos 2x = 2\cos x$, find the value of $\cos x$.

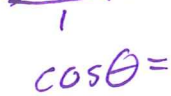
a) i) $\dfrac{1-(2\cos^2\theta - 1)}{2\sin\theta\cos\theta}$

$= \dfrac{1-(1-2\sin^2\theta)}{2\sin\theta\cos\theta}$

$= \dfrac{2\sin^2\theta}{2\sin\theta\cos\theta} = \dfrac{\sin\theta}{\cos\theta}$

$= \tan\theta$

ii) $\tan\theta = \frac{\sqrt{3}}{1}$



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

$\theta = \frac{\pi}{3}$

b) $2\cos^2 x - 2\cos x + 1 = 0$

$2a^2 - 2a - 1 = 0$

$a = \dfrac{2 \pm \sqrt{4-4(2)(-1)}}{4}$

$\dfrac{2 \pm \sqrt{12}}{4}$

$\cos\theta = \dfrac{2+\sqrt{12}}{4}$