DEGREE ⟷ RADIAN CONVERSION

$180^\circ \longrightarrow \pi$ RADIAN

$360^\circ \longrightarrow 2\pi$ RADIAN

$90^\circ \longrightarrow \frac{\pi}{2}$ RADIAN

$270^\circ \longrightarrow \frac{3\pi}{2}$ RADIAN

Ex. CONVERT THE FOLLOWING ANGLES INTO DEGREES.

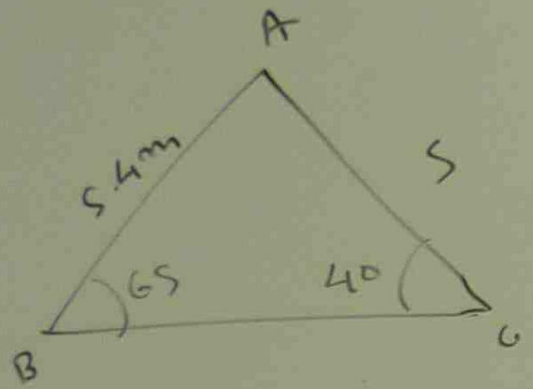
(a) $\frac{\pi}{4}$ (b) π (c) $\frac{\pi}{2}$ (d) $\frac{\pi}{10}$ (e) $\frac{5\pi}{12}$

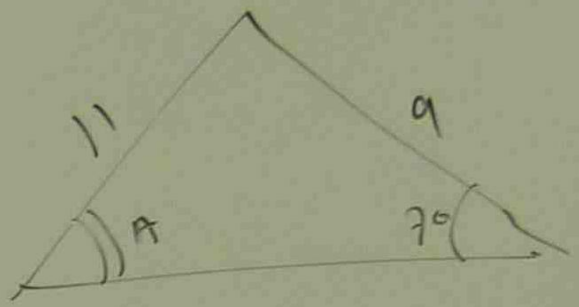
(a) $\frac{\pi}{4} \rightarrow \frac{180}{4} = 45^\circ$ (c) $\frac{\pi}{2} \rightarrow \frac{180}{2} = 90^\circ$ (e) $\frac{5\pi}{12} \rightarrow \frac{5 \times 180}{12} = 75^\circ$

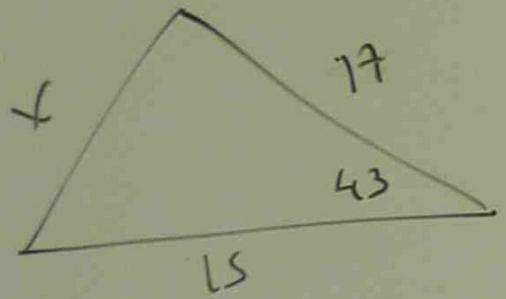
(b) $\pi \rightarrow 180^\circ$ (d) $\frac{\pi}{10} \rightarrow \frac{180}{10} = 18^\circ$

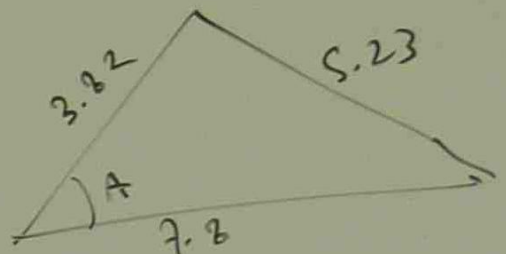
EXERCISE

IN EACH TRIANGLE BELOW, FIND THE LENGTH OF THE SIDES LABELLED









PLOTTING THE TRIGONOMETRIC FUNCTION GRAPH

$A \sin(\omega t - \phi)$ ← FORMAT

EX SKETCH THE CURVE $5.37 \sin(136 \times 10^3 t - 0.955)$ mA

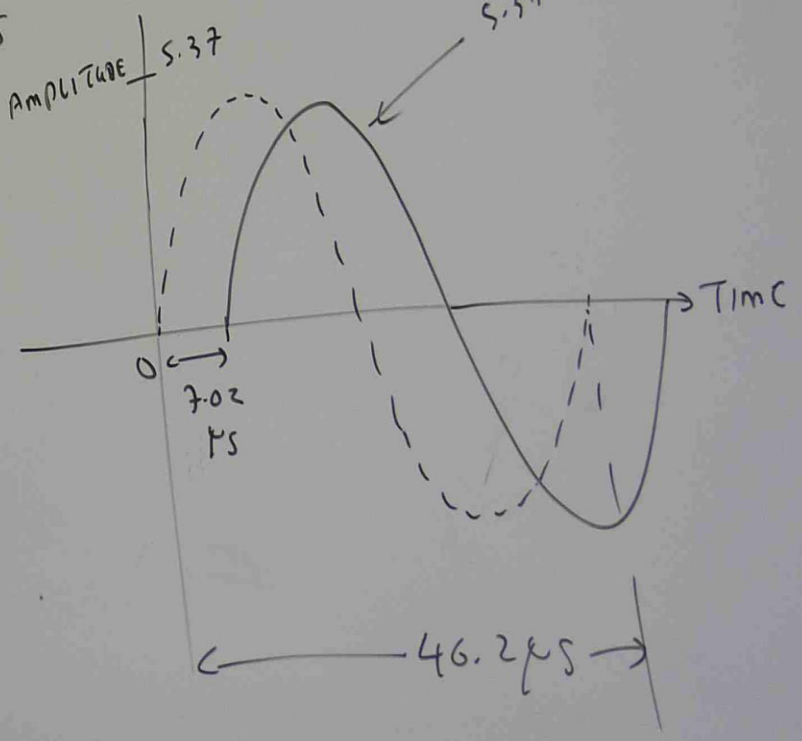
ω ↑ ϕ ↑

PERIOD = $T = \frac{2\pi}{\omega}$

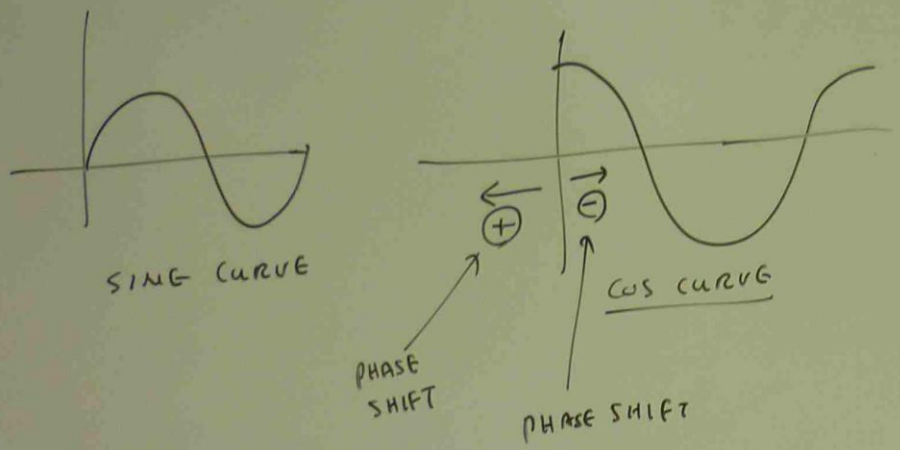
$= \frac{2 \times 3.1416}{136 \times 10^3} = 46.2\ \mu s$

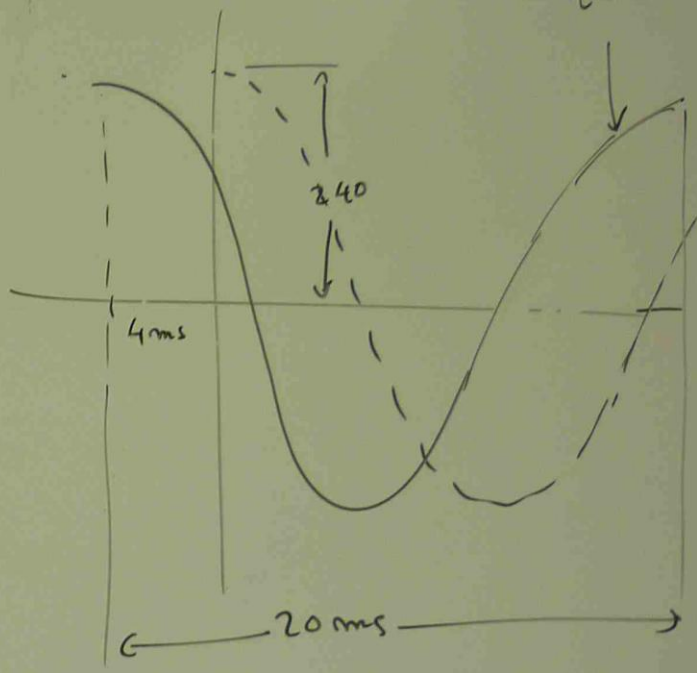
PHASE SHIFT = $\frac{\phi}{\omega}$

$= \frac{0.955}{136 \times 10^3} = 7.02\ \mu s$



Ex SKETCH $V = 240 \cos(314t + 73)$ V





$$T = \frac{2\pi}{\omega} = \frac{2 \times 3.1416}{314} = 20\,\text{ms}$$

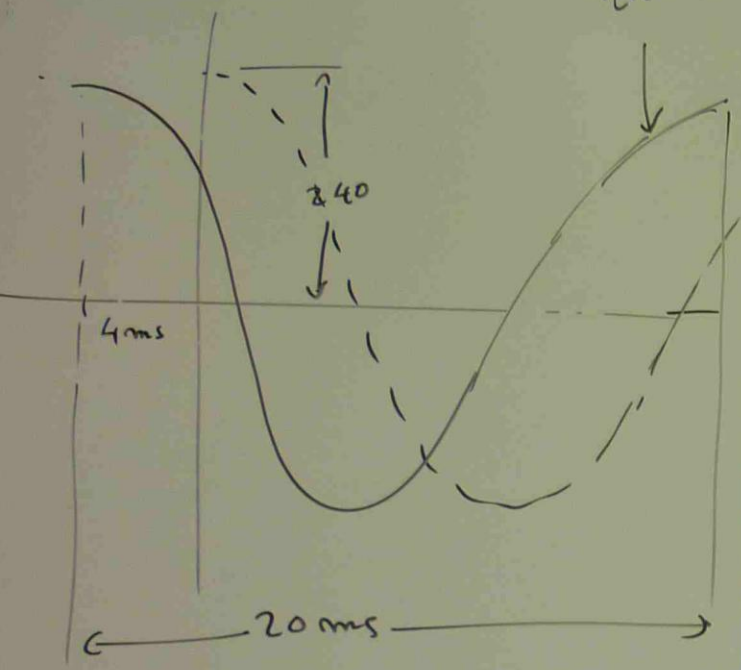
$$\text{PHASE SHIFT} = \frac{\phi}{\omega} = \frac{\phi\,(\text{RADIAN})}{\omega}$$

$180^\circ \longrightarrow \pi$ RADIAN

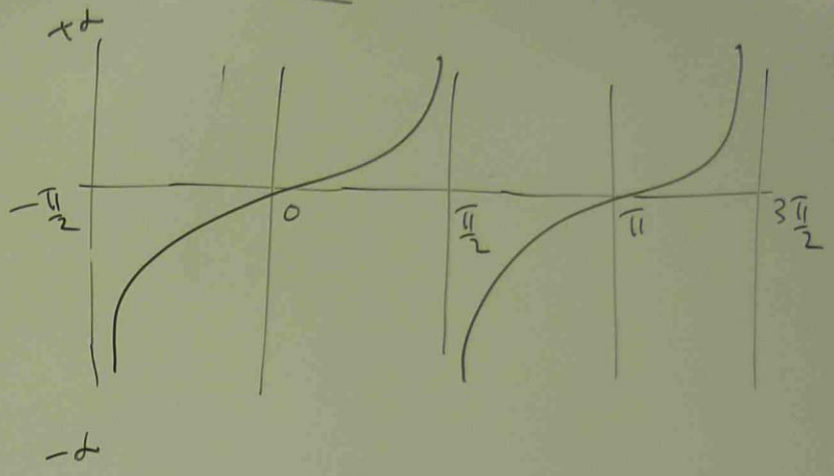
$$73^\circ \longrightarrow ? = \frac{3.1416 \times 73}{180} = 1.274\ \text{RAD}$$

$$\text{PHASE SHIFT} = \frac{\phi}{\omega} = \frac{1.274}{314} = 0.004 = 4\,\text{ms}$$

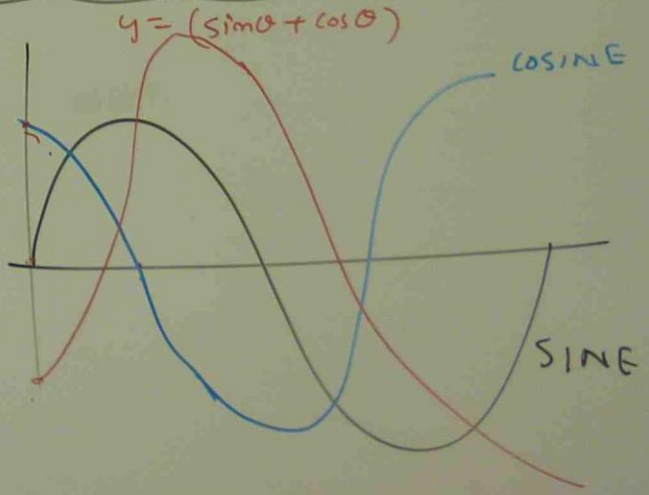
$240\cos(3.14t+73)$ V



TANGENT GRAPH



ADDING SINE AND COSINE FUNCTIONS



Ex FIND (i) PERIOD & ANGULAR VELOCITY of (a) 50 Hz (b) 65 kHz (c) 28 MHz

FIND THE FREQUENCY AND ANGULAR VELOCITY OF

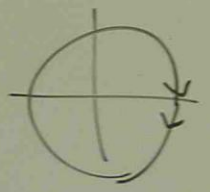
(a) 2 sec

(a) $f = 50\,Hz$

$$T = \frac{1}{f} = \frac{1}{50} = 0.02 \text{ sec}$$

$f = 50\,Hz = 50$ cycle/sec

(1 cycle $= 2\pi$ RADIAN)



$\omega = 50 \times 2\pi$ rad/s

$\omega = 314$ rad/s

(b) $f = 65\,kHz$

$$T = \frac{1}{f} = \frac{1}{65 \times 10^3} = 0.065 \text{ sec}$$

$= 65$ ms

$f = 65\,kHz = 65000\,Hz$

$= 65000$ cycle/sec

$\omega = 65000 \times 2\pi$ rad/sec

$= 408408$ rad/sec.

(c) $f = 28\,MHz$

$$T = \frac{1}{f} = \frac{1}{28 \times 10^6} = 0.0357\ \mu s$$

of (a) 50 Hz (b) 65 kHz (c) 28 MHz

elocity of

2 sec

(b) $f = 65\text{kHz}$

$$T = \frac{1}{f} = \frac{1}{65\times10^3} = 0.065 \text{ sec}$$

$$= 65 \text{ ms}$$

$f = 65\text{kHz} = 65000 \text{ Hz}$

$= 65000 \text{ cycle/sec}$

$\omega = 65000 \times 2\pi \text{ rad/sec}$

$= 408408 \text{ rad/sec}.$

(c) $f = 28\text{MHz}$

$$T = \frac{1}{f} = \frac{1}{28\times10^6} = 0.0357 \ \mu s$$

$\omega = 28\times10^6 \text{ cycle/sec}$

$= 28\times10^6 \times 2\pi \text{ rad/sec}$

$= 175.9\times10^6 \text{ rad/sec}$

(b) 2 sec

$T = 2 \text{ sec}$

$$f = \frac{1}{T} = \frac{1}{2} = 0.5 \text{ Hz}$$

$= 0.5 \text{ cycle/sec}$

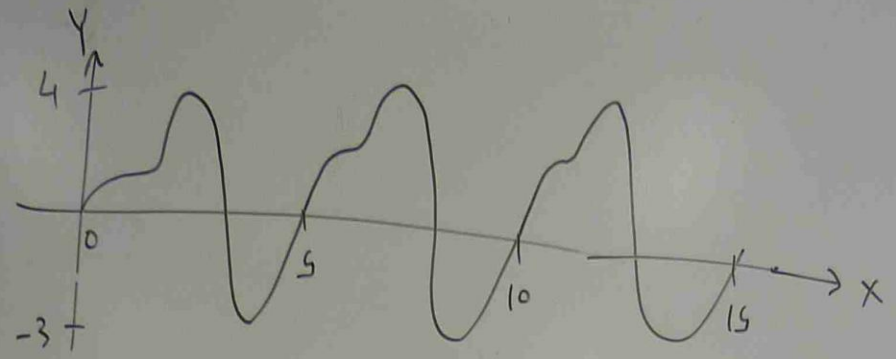
$= 0.5 \times 2\pi \text{ rad/sec}$

$= 0.5 \times 2 \times 3.1416 \text{ rad/sec}$

$= 3.1416 \text{ rad/sec}.$

Ex CALCULATE
(i) PERIOD
(ii) AMPLITUDE
OF THE GIVEN CURVES

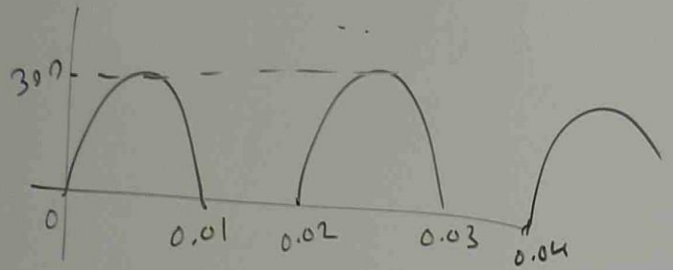
(a)



(a) PERIOD = 5 UNIT

AMPLITUDE = 4 + 3 = 7 UNIT

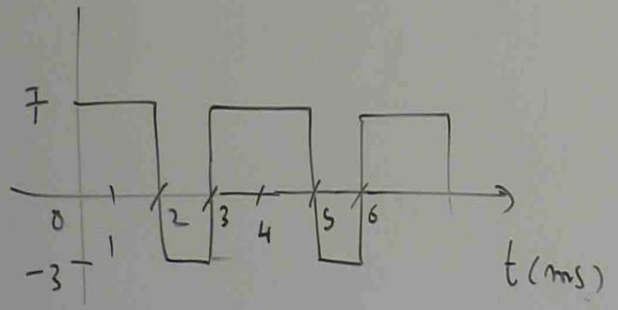
(b)



(b) PERIOD = 0.02

AMPLITUDE = 300

(c)



(c) PERIOD = 3 UNIT

AMPLITUDE = 7 + 3 = 10 UNIT

Ex plot (a) $y = 7\sin 2\theta$

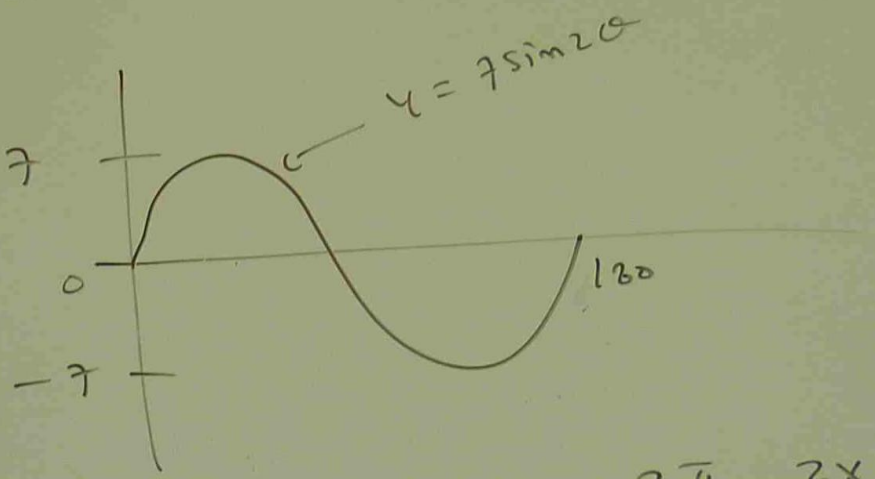
(b) $y = 220 \sin 0.4\theta$

(a) $y = 7 \sin 2\theta$

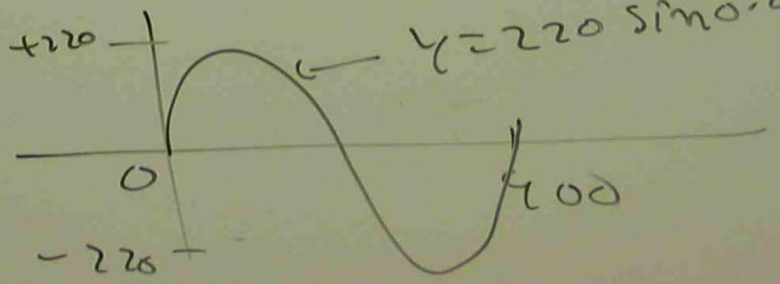
7 ↑ HALF of AMPLITUDE

2 ↑ ω

$\text{PERIOD} = \frac{2\pi}{\omega} = \frac{2 \times 180}{2} = 180$



(b) $y = 220 \sin 0.4\theta \rightarrow \text{PERIOD} = \frac{2\pi}{\omega} = \frac{2 \times 180}{0.4} = 900$



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7 ← HALF OF AMPLITUDE

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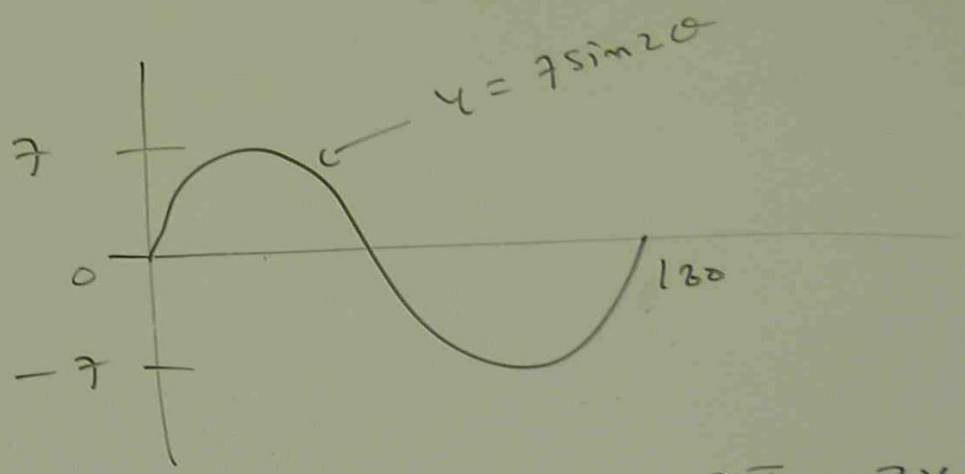
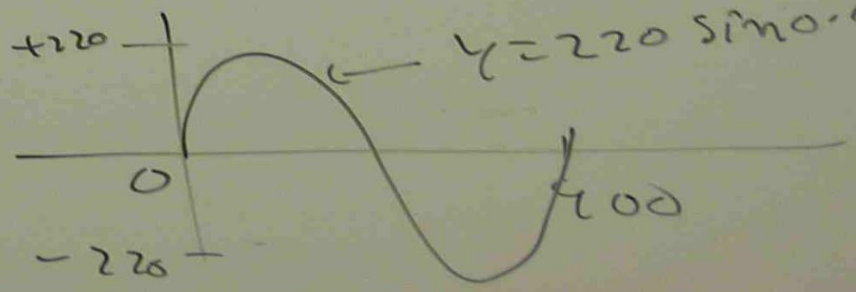
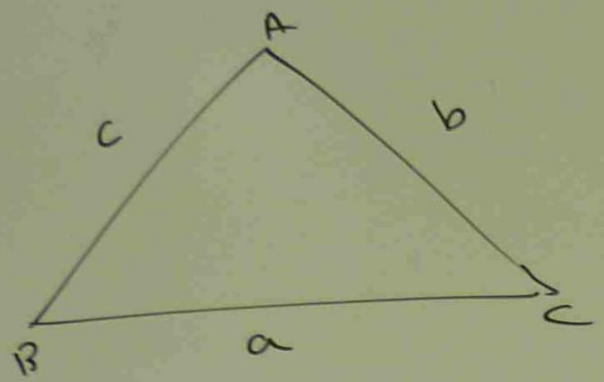


(b) $y = 220 \sin 0.4\theta \rightarrow$ PERIOD $= \frac{2\pi}{\omega} = \frac{2 \times 180}{0.4} = 900$



TRIGOMETRY AND OBLIQUE ANGLES



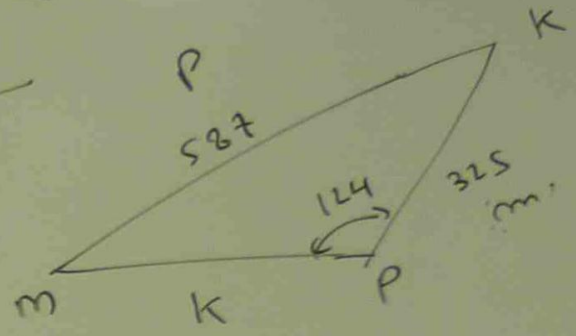
$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$a^2 = b^2 + c^2 - 2bc\cos A$$

$$b^2 = c^2 + a^2 - 2ca\cos B$$

$$c^2 = a^2 + b^2 - 2ab\cos C$$

EX



CALCULATE ANGLE M

$$\frac{P}{\sin P} = \frac{m}{\sin M}$$

$$\frac{587}{\sin 124} = \frac{325}{\sin M}$$

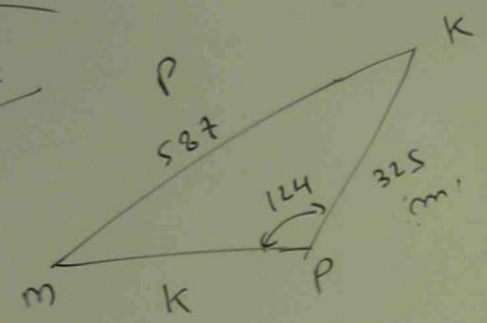
$$\sin M = \frac{325 \sin 124}{587}$$

$$\sin M = 0.459$$

$$m = \sin^{-1} 0.459 = 27.32$$

ANGLES

EX



CALCULATE ANGLE M.

$$\frac{P}{\sin P} = \frac{m}{\sin M}$$

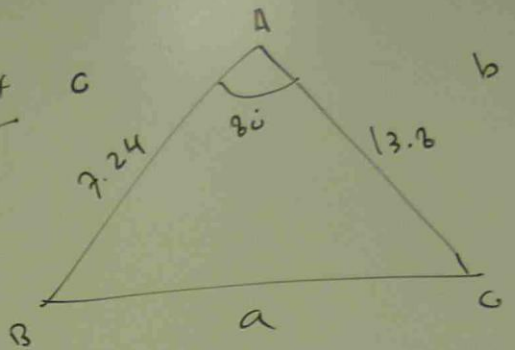
$$\frac{587}{\sin 124} = \frac{325}{\sin M}$$

$$\sin M = \frac{325 \sin 124}{587}$$

$$\sin M = 0.459$$

$$m = \sin^{-1} 0.459 = 27.3°$$

EX



FIND "a"

$$a^2 = b^2 + c^2 - 2bc \cos A$$

$$a^2 = 13.8^2 + 7.24^2 - 2 \times 13.8 \times 7.24 \cos 80$$

$$a^2 = 52.42 + 190.4 - 34.7$$

$$a^2 = 208.2$$

$$a = \sqrt{208.2} = 14.4 \text{ mm}$$