4.11.1 Review: Trigonometric Functions (Graphing & Applications) Date: _____

1. a) For each trigonometric function, state the amplitude, period, phase shift, vertical translation, maximum value, and minimum value.
   b) Then graph each on the grid below.

i) $y = \cos\left(2\left(x - 150°\right)\right) + 2$

Amplitude: _____

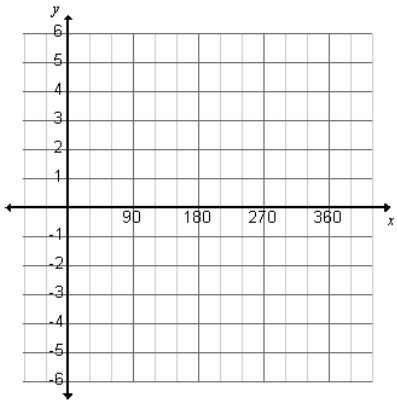
Period: _____

Phase Shift: _____

Vertical Translation: _____

Maximum Value: _____

Minimum Value: _____



ii) $y = 3\sin\left(\frac{1}{2}\left(x + 30°\right)\right) - 1$

Amplitude: _____

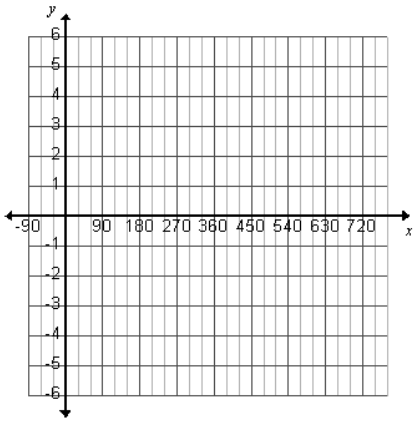
Period: _____

Phase Shift: _____

Vertical Translation: _____

Maximum Value: _____

Minimum Value: _____



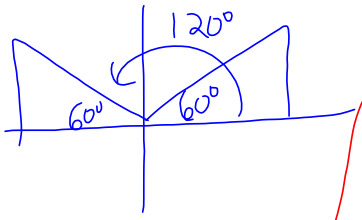
2. If point $A\left(x, \frac{\sqrt{3}}{2}\right)$ is on the graph of $y = \sin(x+45)$, find two possible values for x.

$\frac{\sqrt{3}}{2} = \sin(x+45^\circ)$

if

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

$\theta = 60^\circ$ or $\theta = 120^\circ$



$\theta = x + 45^\circ$

$60^\circ = x + 45^\circ$

$\therefore x = 15^\circ$

or

$120^\circ = x + 45^\circ$

$x = 120^\circ - 45^\circ$

$= 75^\circ$

3. The average monthly temperature in a region of Australia is modelled by the function $T(m) = 23\sin(30m - 270)° + 9$, where T is the temperature in degrees Celsius and m is the month of the year.

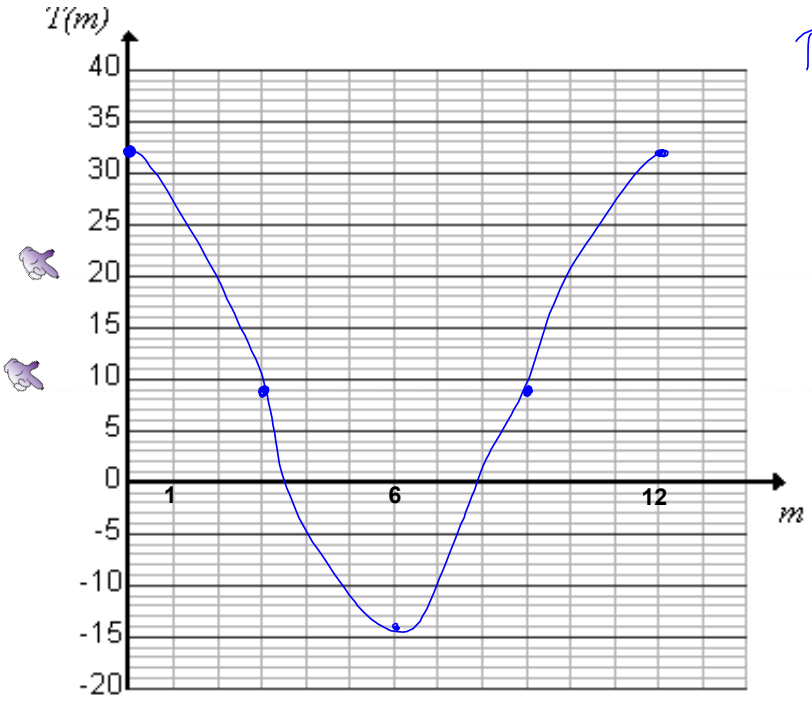
Note: For m = 0, the month is January.

a) State the range of the function.

b) Use the grid provided to graph T(m) for 1 year.

c) In which month does the region reach its maximum temperature? Minimum?

d) If travellers wish to tour Australia when the temperature is below 20°C, which months should be chosen for their tour?

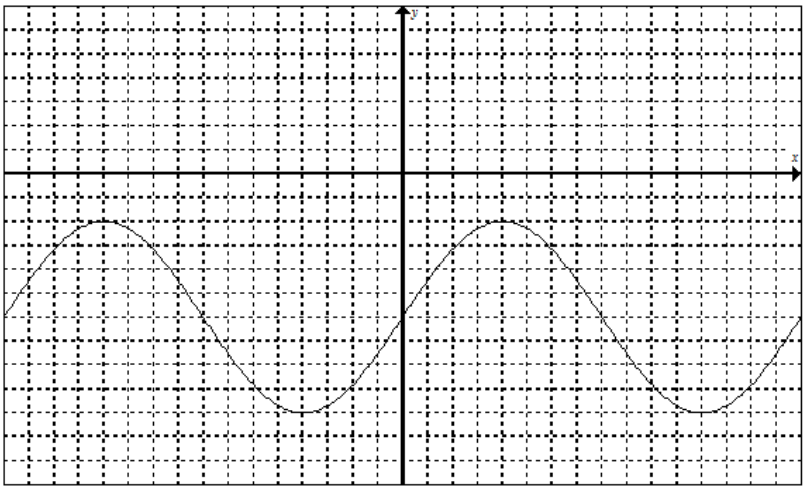


$T(m) = 23\sin(30(m-9)°) + 9$

period $= \frac{360°}{30} = 12$

4. State both equations for each of the following curves (one as sine **and** the other as cosine).

a) ***Each space*** *on this graph is equal to one unit on the y axis and* ***15°*** ***on the x- axis.***

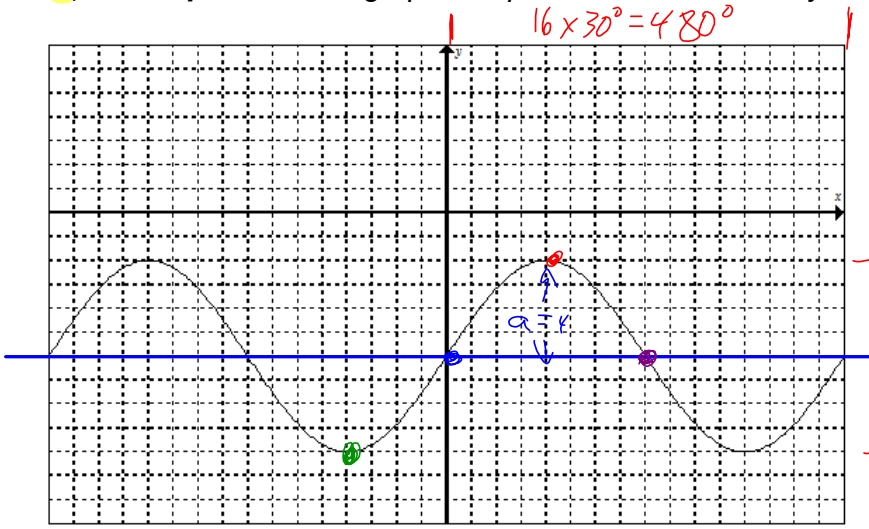


b) ***Each space*** *on this graph is equal to one unit on the y axis and* ***30°*** ***on the x- axis.***

(on next slide)

4. State both equations for each of the following curves (one as sine **and** the other as cosine).

b) ***Each space** on this graph is equal to one unit on the y axis and **30°** on the x- axis.*



Period = 480°

$k = \frac{360^\circ}{\text{period}} = \frac{360^\circ}{480^\circ} = \frac{3}{4}$

$\text{period} = \frac{360^\circ}{k}$

$2a = 8$

$\therefore a = 4$

$y = 4\sin\left(\frac{3}{4}(x - 0^\circ)\right) - 6$

$y = -4\sin\frac{3}{4}(x - 240^\circ) - 6$

$y = 4\cos\left(\frac{3}{4}(x - 120^\circ)\right) - 6$

$= -4\cos\left(\frac{3}{4}(x + 120^\circ)\right) - 6$

5. The point P(–6, 1) lies on the terminal arm of θ. Determine the primary trig ratios.

6. Angle θ is in standard position. If $\sin\theta = \frac{2}{3}$, determine cosθ and tanθ.

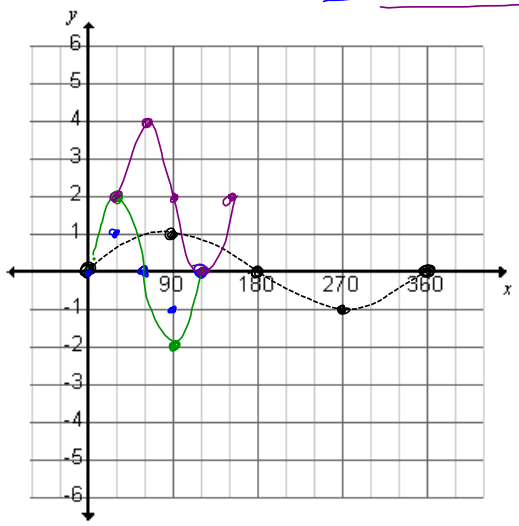
7. Evaluate (use exact values)

a) sin225° b) cos330° c) tan150°

9. If $\cos\theta = \frac{-1}{\sqrt{2}}$, determine θ.

10. If $\tan\theta = -2.246$, determine θ.

11. Sketch $y = 2\sin\left(3\left(x - 30°\right)\right) + 2$ and complete the Key Properties.



Key Properties

Domain: $\{x \in \mathbb{R}\}$

Maximum Value: 4

Minimum Value: 0

Range: $\{y \in \mathbb{R} \mid 0 \le y \le 4\}$

x-intercepts: 120°

Amplitude: 2

Period: 120°

Increasing Intervals: $30° \le x \le 60°$, $120° \le x \le 150°$

Decreasing Intervals: $60° \le x \le 120°$

$$\text{period} = \frac{360°}{b}$$

$$= \frac{360°}{3}$$

$$= 120°$$