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: _____

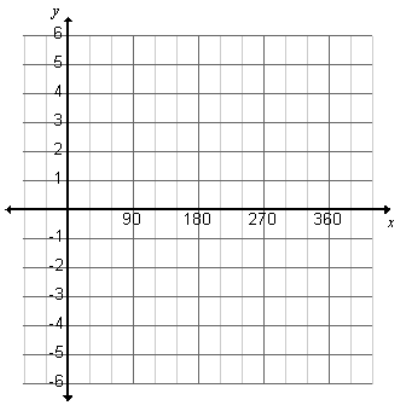
Period: _____

Phase Shift: _____

Vertical Translation: _____

Maximum Value: _____

Minimum Value: _____



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

Amplitude: _____

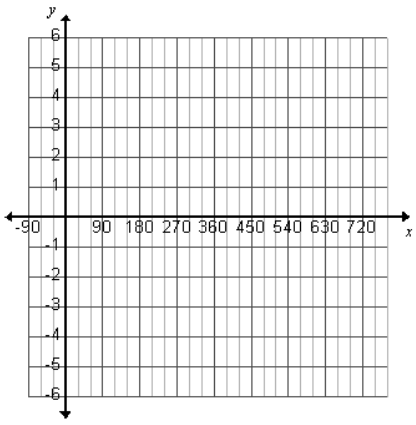
Period: _____

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.

$(\cos\theta, \sin\theta)$

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

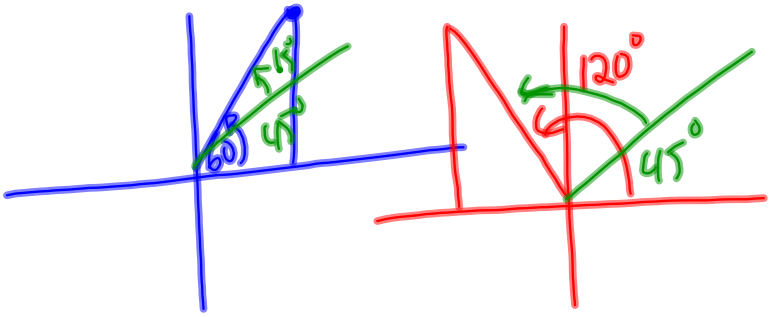
$\theta = 60°$

$\sin(x+45) = \sin 60°$

$\therefore x = 15$

$(x, \frac{\sqrt{3}}{2})$

or $x = 75°$



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.

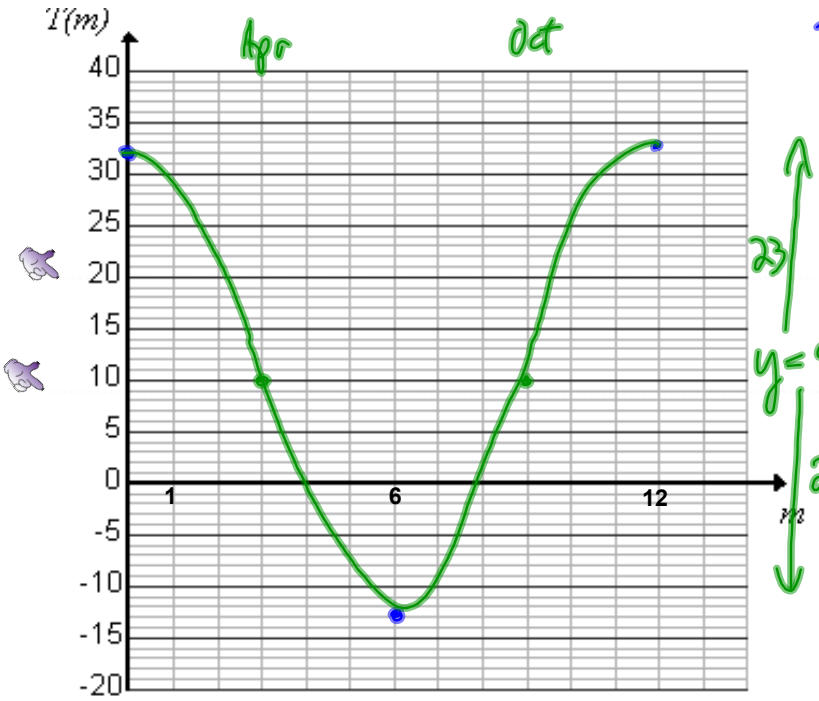
c) In which month does the region reach its maximum temperature? Minimum?

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

$T(m) = 23\sin(30(m-9)) + 9$

$\{T \in \mathbb{R} \mid -14 \le T(m) \le 32\}$

January July



Apr Oct

23

y=9

23

$T(0) = 23\sin(-270°) + 9$

$= 32$

$T(12) = 23\sin(30(12-9)) + 9$

$= 23\sin(30(3)) + 9$

$= 23\sin(90) + 9$

$= 32$

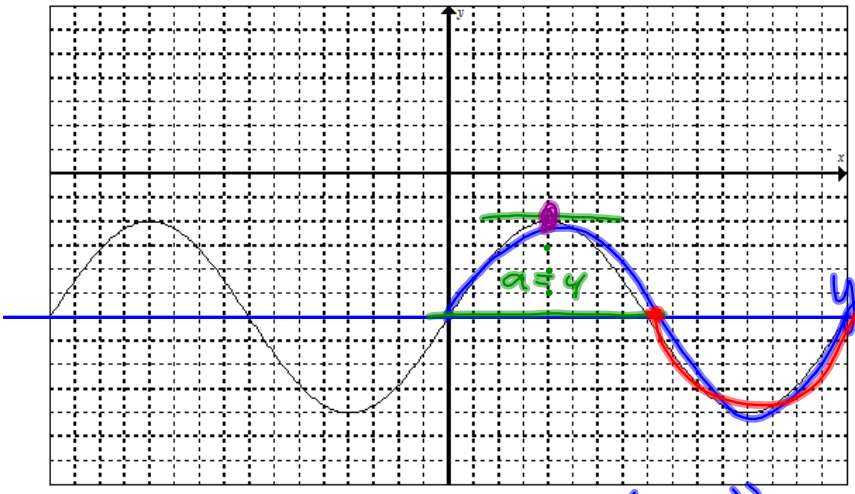
$T(6) = 23\sin(30(-3)) + 9$

$= 23\sin(-90°) + 9$

$= -14$

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.***



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

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

$y = -6 \quad = \frac{360}{240}$

$15° \times 16 = 240 \quad = \frac{3}{2}$ or 1.5

$y = a\sin(k(x-d)) + c$

$= 4\sin(1.5(x-0)) - 6$

$= 4\sin(1.5x) - 6$

$y = 4\cos(1.5(x-60°)) - 6$

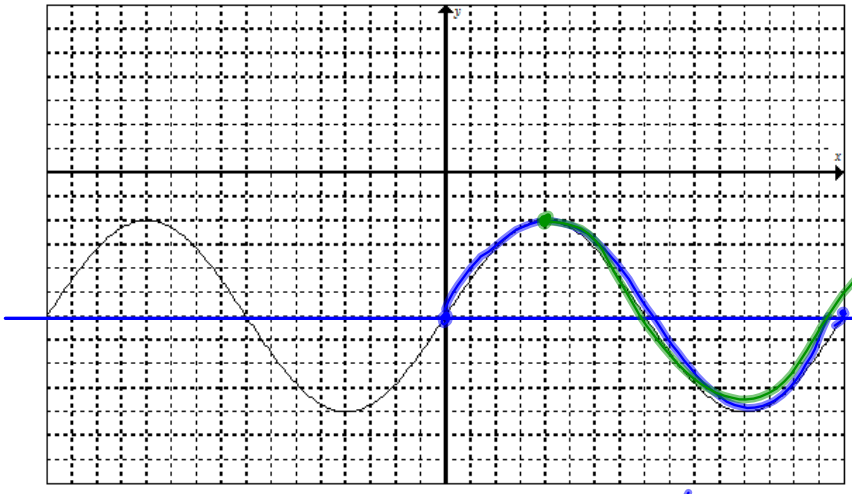
b) ***Each space*** *on this graph is equal to one unit on the y axis and* ***30° on the x- axis.***

(on next slide)

$y = -4\sin(1.5(x-120°)) - 6$

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.***



16×30
$480°$

$k = \frac{360}{480}$
$= \frac{3}{4}$
$= 0.75$

$y = -6$

$y = 4\sin(0.75(x - 0)) - 6$

$y = 4\cos(0.75(x - 120°)) - 6$

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

(x, y)

$\therefore x^2+y^2=r^2$

$(-6)^2+1^2=r^2$

$36+1=r^2$

$r=\sqrt{37}$

$\sin\theta=\frac{y}{r}=\frac{1}{\sqrt{37}}$ $\cos\theta=\frac{x}{r}=\frac{-6}{\sqrt{37}}$ $\tan\theta=\frac{y}{x}=\frac{1}{-6}$

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

$y=2 \quad r=3$

$x^2+y^2=r^2$

$x^2+2^2=3^2$

$x^2=9-4$

$x=\pm\sqrt{5}$

if $x=\sqrt{5}$

$\cos\theta=\frac{\sqrt{5}}{3}$

$\tan\theta=\frac{2}{\sqrt{5}}$

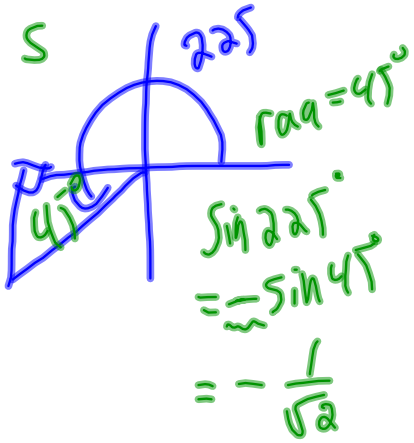
if $x=-\sqrt{5}$

$\cos\theta=\frac{-\sqrt{5}}{3}$

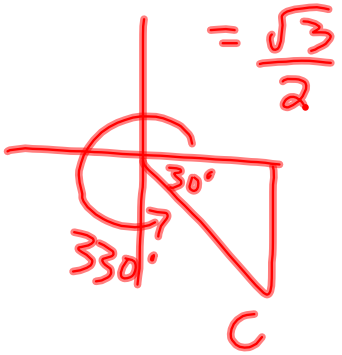
$\tan\theta=-\frac{2}{\sqrt{5}}$

7. Evaluate (use exact values)

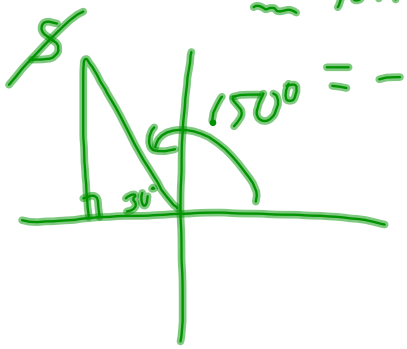
a) sin225° b) cos330° c) tan150°



$\sin 225^\circ = -\sin 45^\circ = -\frac{1}{\sqrt{2}}$



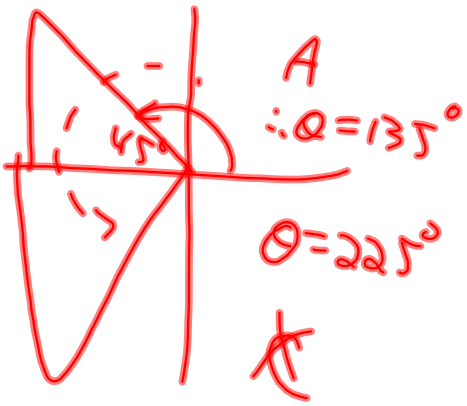
$= +\cos 30^\circ = \frac{\sqrt{3}}{2}$



$= -\tan 30^\circ = -\frac{1}{\sqrt{3}}$

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

$\theta = 45^\circ$ (RAA)

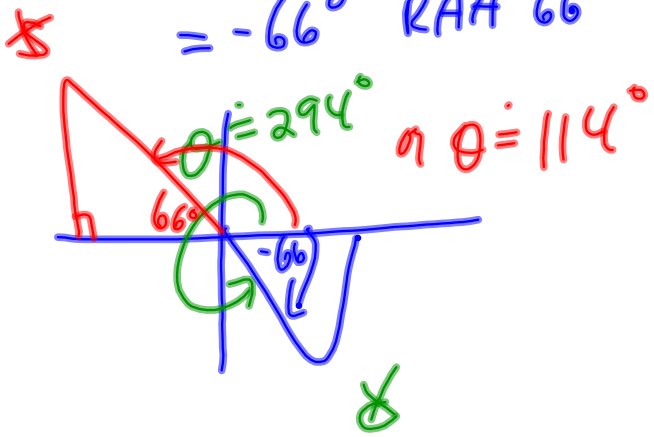


10. If $\tan\theta = -2.246$, determine θ.

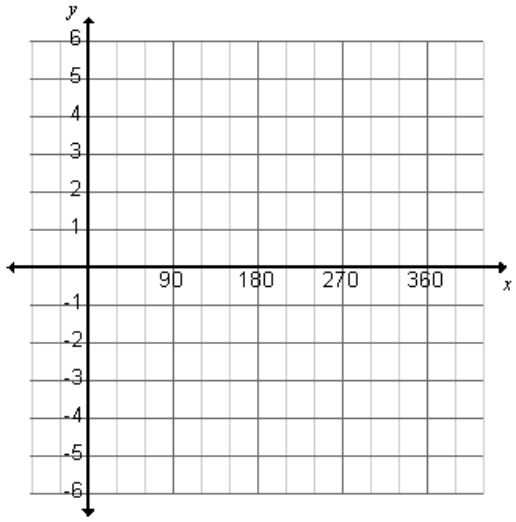
$\theta = \tan^{-1}(-2.246)$

$\doteq -65.9$

$= -66^\circ$ RAA 66°



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



Key Properties

Domain: _____

Maximum Value: _____

Minimum Value: _____

Range: _____

x-intercepts: _____

Amplitude: _____

Period: _____

Increasing Intervals: _____

Decreasing Intervals: _____