

## ANSWERS TO TRIGONOMETRY PART I [1.5]

(1) Period is  $2\pi$ ; Amplitude is 1; Average Value is 0

(2)  $y = A \sin(Bx + C) + D$  Notice that there is a “+” sign before the  $C$ .

$$y = A \sin\left(B\left(x + \frac{C}{B}\right)\right) + D$$

$D$  gives the vertical shift. If  $D > 0$ , then the midline of this graph shifts upward  $D$  units from the  $x$ -axis.

If  $D < 0$ , then the midline shifts downward  $D$  units from the  $x$ -axis.

Also,  $D$  is the average value -- the equation of the midline is:  $y = D$ .

$A$  gives the maximum distance the graph ever reaches above or below its midline.

$|A|$  is the amplitude.

The period of this sine function is  $\frac{2\pi}{B}$ . This *formula-for-the-period* will also work for the cosine, secant and cosecant functions. The *formula-for-the-period* of the tangent and the cotangent functions is  $\frac{\pi}{B}$ . In general: PERIOD = (STANDARD PERIOD OF THE GIVEN FUNCTION) /  $B$ .

$\frac{C}{B}$  gives the horizontal shift. If  $\frac{C}{B} > 0$ , then the graph shifts  $\frac{C}{B}$  units to the left of the  $y$  axis.

If  $\frac{C}{B} < 0$ , then the graph shifts  $\frac{C}{B}$  units to the right of the  $y$  axis

(3<sub>1</sub>)  $T(t) = 37 \sin\left[\frac{2\pi}{365}\left(t - \frac{317.2945}{\pi}\right)\right] + 25$

(A) Period: 365                      Amplitude: 37                      Average Value: 25

(B) One cycle begins at the point (101, 25) and ends at the point (466, 25). The middle point is (233, 25), the first quarter point is (167, 62) and the third quarter point is (400, -12). The  $t$ -coordinate of the points listed above are rounded to the nearest whole number.

(3<sub>2</sub>) (A)  $R = 0.85 \sin\left(\frac{\pi}{3}t\right)$

(B) One cycle begins at the point (0, 0) and ends at the point (6, 0). The middle point is (3, 0), the first quarter point is (1.5, 0.85) and the third quarter point is (4.5, -0.85).

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(4) (A)  $-\frac{\sqrt{2}}{2}$  (B)  $-\frac{1}{\sqrt{3}}$  (C) NO SOLUTION

(5)  $\sin(A) = -\frac{3}{5}$  (B)  $\sin(2A) = \frac{24}{25}$

(6)  $\left\{\frac{\pi}{12}, \frac{\pi}{4}\right\}$

(7) (A) 0 (B)  $-\frac{\pi}{6}$

(8) (A)  $\frac{1}{\sqrt{x^2+1}}$  (B)  $x$