Name: / 40

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[2] 1.   Determine two co-terminal angles with the given θ. Round to 3 decimal places if necessary.
  [1] a.   324°   [1] b.   0.123

[2] 2.   Determine the quadrant in which θ lies for the following.
  [1] a. $\sec\theta < 0, \tan\theta > 0$ [1] b. $\sin\theta > 0, \csc\theta < 0$

[2] 3.   Determine the coordinates of the point at the given distance from the origin in the stated quadrant, if
        θ is its position angle.
  [1] a.   15, quadrant II, $\cos\theta = -\dfrac{4}{5}$ [1] b. $6x$, quadrant III, $\tan\theta = 1$

[2] 4.   For an arc with a radius of 1 cm and sector area of $\dfrac{\pi}{5}$ cm^2, determine the arc length of the sector.

[3] 5. Find all θ, $0 \le \theta < 2\pi$ for $\cos \theta = -\frac{1}{\sqrt{3}}$. Round to 3 decimal places if necessary.

[3] 6. Find all θ, $0° \le \theta \le 360°$ for $-\tan \theta + 2 = \tan \theta$. Round to 1 decimal place if necessary.

[4] 7. Determine the exact value of the following trigonometric functions.

[2] a. $\sin \frac{5\pi}{4}$ [2] b. $\tan \frac{17\pi}{3}$

[4] 8. Find the values of $\sin \theta$, $\cos \theta$, and $\cot \theta$ if θ is an angle in standard position whose terminal side is the graph $7x - y = 0, x \le 0$. Exact answers only.

[8] 9. For a cosine function where a maximum value of 4 occurs at $x = \frac{\pi}{4}$ and the next minimum value of -2 occurs at $x = \frac{3\pi}{4}$
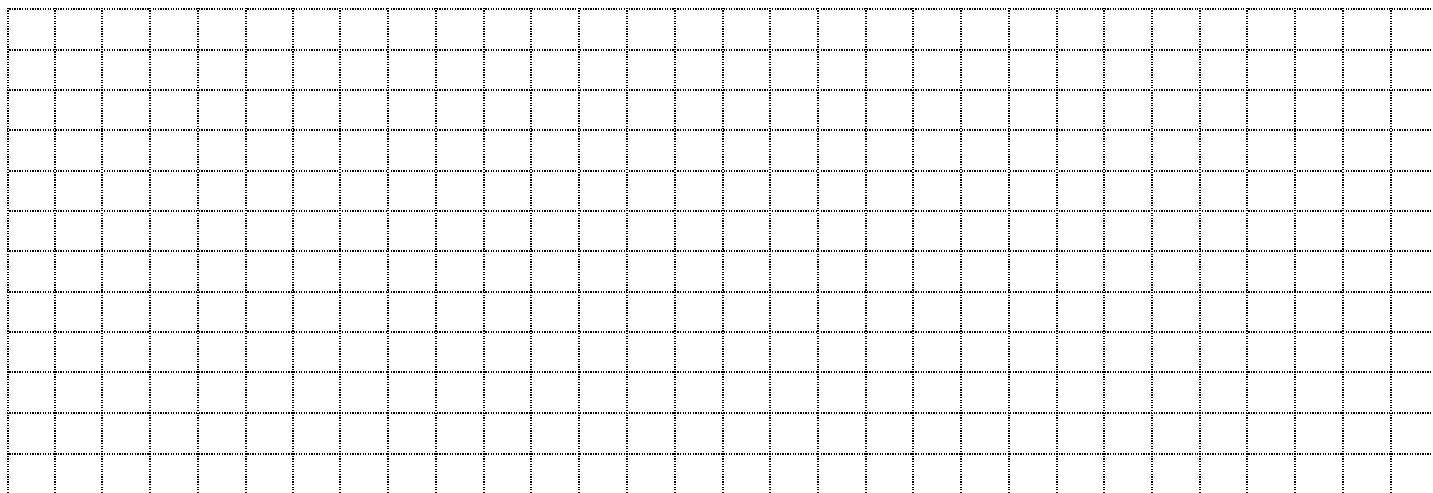
[1] a.   Determine the period.   [1] b.   Determine the amplitude.

[1] c.   Determine the phase shift.   [1] d.   Determine the vertical displacement.

[2] e.   Graph 2 periods of the function that is described above. Include all appropriate labels.

[2] f.   Write an equation in the form $y = a \sin b(x - c) + d$ for the least non-negative real number c, with $a > 0$ and $b > 0$ for the graph above.

[10] 10. Mr. Kwan's alertness level throughout the day can be modeled using a sinusoidal function. He has a maximum alertness level of 90% at 8:00 am and a minimal alertness level of 20% at 11:30 am.

[4] a.   Write a sinusoidal function that describes Mr. Kwan's alertness level starting at 8:00 am.

[1] b.   Determine Mr. Kwan's alertness level at 7:00 am (assuming he is awake!). Round to the nearest percent.

[3] c.   Determine the amount of time Mr. Kwan's alertness level is above 70% during the school day from 8:00 am to 4:00 pm. Round to the nearest minute.

[2] d.   During the school day, at what time(s) will Mr. Kwan's alertness level be at 50%. Round to the nearest minute.