Name: _____

Date: _____

K (30%)	A (30%)	T (20%)	C (20%)
/20	/20	/13	/13

MHF4U Quiz 6A: Chapter 6 **Total Mark: /66**

Full Answer: Label and draw each required graph. Show all calculations and write conclusion sentences**.**

1. Convert the following from radians to degrees. **[K – 2]**

a) $\frac{\pi}{6}$ rad

b) 3.3 rad

2. Convert the following from degrees to radians. **[K – 2]**

a) $66°$

b) $337°$

3. Draw the special triangles and use them to find the exact value of each of the following. **[K – 4]**

a) $\cos 30°$

b) $\cot\frac{3\pi}{4}$

4. Determine the exact value for each of the following. Show all of your work. **[K – 6]**

a) $\csc\frac{4\pi}{3}$

b) $\sec\frac{11\pi}{6}$

Draw the angle of $\theta_1 = \frac{4\pi}{3}$

Draw the angle of $\theta_2 = \frac{11\pi}{6}$

5. Circle the function that has the shortest period? **[A – 1]**

$y = 3\sin(1.6x) - 22$ $y = 9\cos(3x) - 5$

$y = 7\sin(4x) + 31$ $y = 8\cos(\pi x) + 24$

6. Explain what similarities and differences there are between $f(x) = \sec\theta$ and $g(x) = \csc\theta$ (Include at least two characteristics). **[C – 4]**

7. A mill wheel is spinning through water. Part of the wheel is in the water and part of the wheel is out of the water. A scientist watches a red nail as it spins on the wheel. The height of the nail from the water's surface is given by the function $h(t) = -6\sin\left(\frac{\pi}{6}(t-6)\right) + 5.5$, where t is time in seconds and h(t) is the height above or below the water in metres. **[A – 12]**

a) Complete the table below.

Maximum Height	Amplitude	Equation of the Axis	Period

b) Between what two times is the nail under the water during the first revolution?

c) What is the instantaneous rate of change of the function at $t = 6\ s$? What does the instantaneous rate of change represent in this situation?

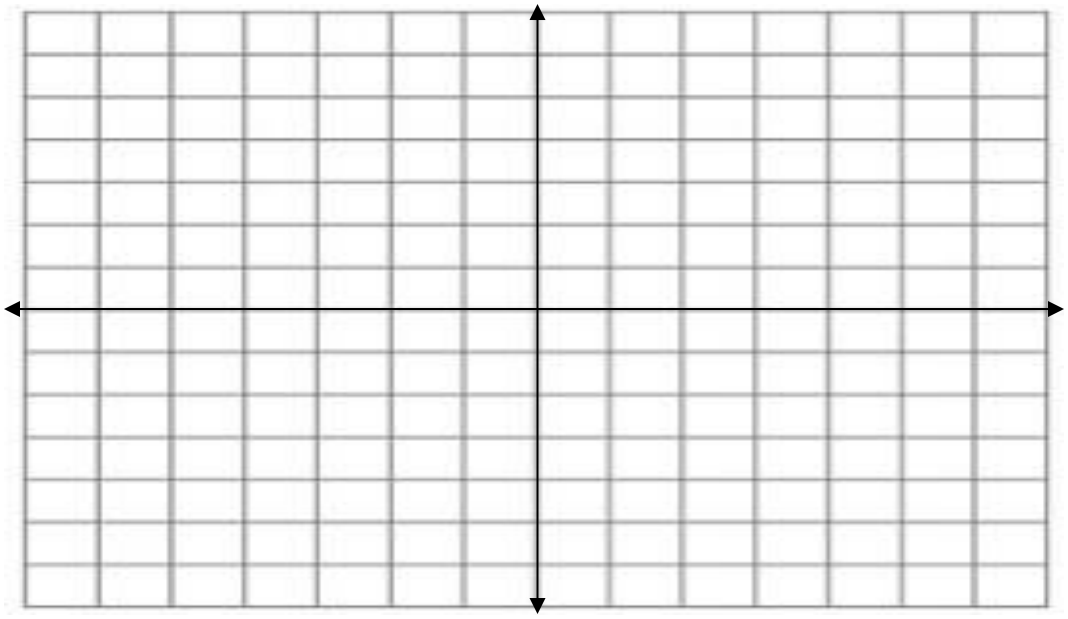
8. Complete the table below. **[K – 6]**

Original Function	Image Function	Mapping
$y = \cos\theta$	$y = 6\cos(5\theta + \pi) - 4$	$(\theta, y) \rightarrow (\quad , \quad)$
$y = \sin\theta$		$(\theta, y) \rightarrow (5\theta + 6\,, -8y + 21)$
$y = \tan\theta$	$y = -4\tan\left(\frac{1}{5}\left(\theta - \frac{\pi}{3}\right)\right) + 2$	$(\theta, y) \rightarrow (\quad , \quad)$

9. Consider the function $f(x) = \tan x$. **[T – 7, C – 3]**

a) Fill in the table for the quadrant angles and sketch f(x) over the interval $-\pi \leq x \leq 2\pi$.

x	$f(x)$



b) Complete the table below with the general equations of the given characteristics for f(x).

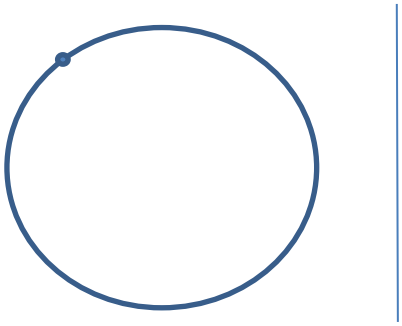
x-intercepts	Locations of the Vertical Asymptotes	Intervals when $f(x) < 0$	Intervals of Increase/Decrease

10. A car drives around a circular track with a diameter of 300 m. A large crowd watches from the stands located 16 m east of the track. The car is initially at a distance of 200 m away from the stands along the northern side of the track. The car moves around the track counter-clockwise in a time of 15 s.

[T – 6, C – 4]

a) Create a sinusoidal model of the distance of the car from the stands as a function of time. Show your work.

Diagram:



b) A person is standing at the very center of the circular track looking at the car. If the car moves $30\ m$ around the track, how much, in degrees, does the person need to turn their head to continue looking at the car?

11. The temperature of the water being pumped into a pool is controlled so that it alternates between hot and cold in order to moderate the overall temperature of the pool. A computer is set to observe the temperature of the water being pumped into the pool and takes measurements. It is found that the function $f(t) = 16\cos\left(\frac{\pi}{60}t\right) + 26$ models the temperature of the water in degrees Celsius [℃], as a function of the time t, measured in seconds $[s]$. **[A – 7, C – 2]**

a) Complete the table below.

Maximum Temperature	Minimum Temperature	Period

b) What are the first three times that the temperature of the water being pumped into the pool is 10℃?