Patterning - Spring
Quiz 7 Revision Version

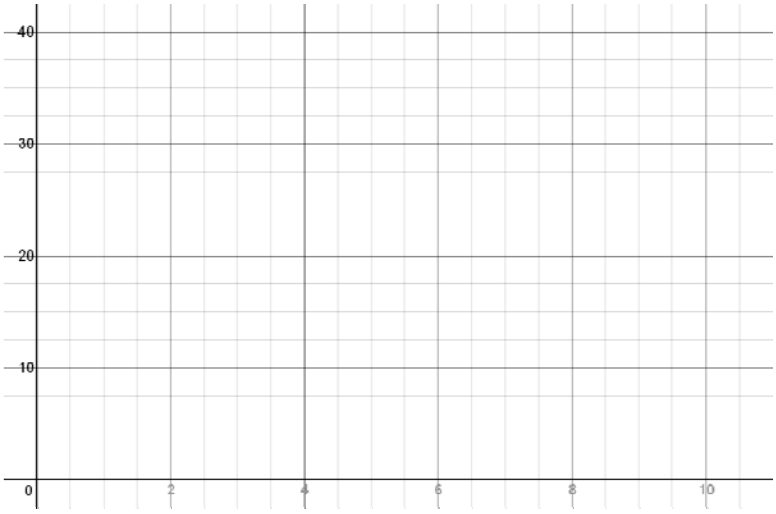
Name:_____

****Due Monday June 2 with individual Quiz Revision Discussions between 1 – 3 pm in Sem 2 A2105****

1. At $t = 0$ minutes, you are at the very **bottom** of a ferris wheel. The function $h(t)$ gives your height (in meters) above the ground t minutes after you were at the bottom: $h(t) = -15\cos\left(\frac{2\pi}{8}t\right) + 20$.

a) Determine each of the following quantities and briefly explain your reasoning:
- The diameter of the ferris wheel
- The time for one full revolution
- Your minimum and maximum height above the ground.

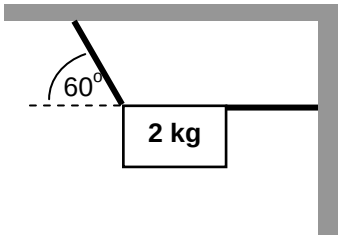
b) Carefully draw a graph of height vs. time on the provided axes.



c) Evaluate $h(4)$. What does this quantity mean? Make sense of this answer given your answers to a) and b).

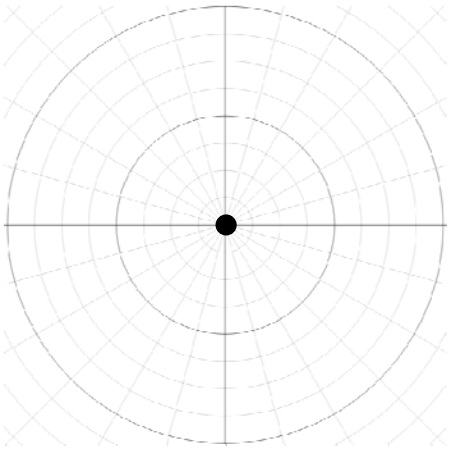
d) When is the first time after $t = 0$ that you are at a height of 25 meters? The second time? Make sense of these answers given your graph.

2. A 2 kg block is held by two ropes as shown.



a) Determine the magnitude of the tension in the horizontal rope by doing the following:

- On the grid lines provided, carefully draw a free-body force diagram showing all the forces acting on the block. The dot represents the block. Give each force a useful label. Draw the directions of the forces as carefully as possible (using the grid lines and/or your protractor).
- Decomposing each vector into its x- and y-component using trigonometry as needed.
- Using Newton's Second Law and your free-body force diagram to write down an equation for the force and acceleration components in each direction making sure that the signs on each force and acceleration component in each equation clearly indicates the direction of the force and/or acceleration, and explaining why the acceleration is zero in this case;
- Doing algebra on the 2 equations you obtain from Newton's Second Law (one equation for each direction), showing/explaining clearly all the algebra moves you make to answer the question.



b) Without doing any calculations, and just using your free body diagram and protractor and ruler as needed, rank the magnitude of the forces acting on the block in order from smallest to largest. Take advantage of (and explain that you used) the fact that in equilibrium, the sum of the force vectors acting on an object adds up to zero. Briefly explain your reasoning.