

Quiz 6, Math 1060-003

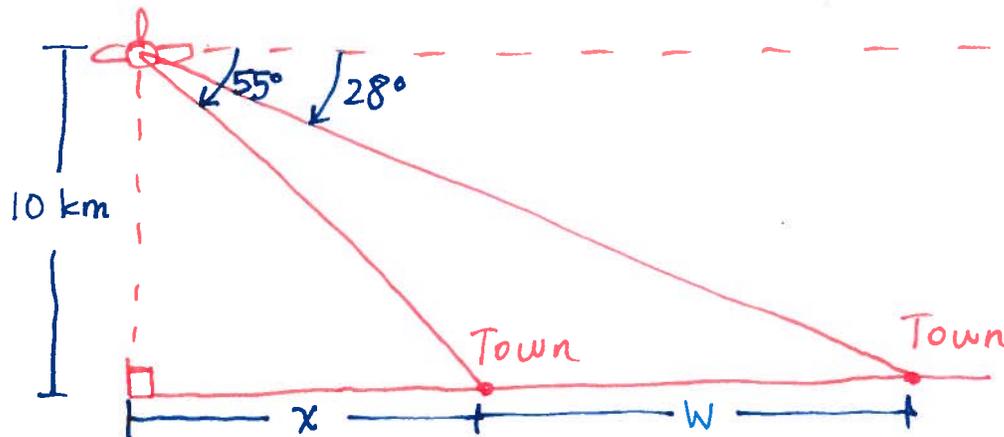
October 11, 2013

You have 15 minutes to complete this quiz. No calculators, notes, books, etc. are allowed. Show your work, and place your final answer in the boxes provided.

Name: Answer Key uNID: _____

1. A passenger in an airplane at an altitude of 10 km sees two towns directly to the east of the plane. The angles of depression to the towns are 28° and 55° . (Assume for simplicity that there is no curvature of the Earth.)

a) (4 points) Draw a clear figure depicting the (i) airplane, (ii) two cities, (iii) horizontal (e.g. with a solid line for the ground and a dashed line for the horizontal of the airplane), (iv) angles, and (v) unknown quantities. (Hint: There are *two* unknown quantities; they are both distances.)



b) (2 points) Write two equations involving trigonometric functions that you would use to find the distance between the two cities. You **do not** need to solve the equations.

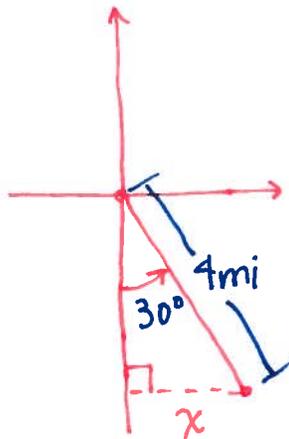
$$\sin(90^\circ - 55^\circ) = \frac{x}{10 \text{ km}}$$

$$\sin(90^\circ - 28^\circ) = \frac{x + W}{10 \text{ km}}$$

2. Suppose you leave your house on a brisk walk with a bearing of S 30° E.

a) (1 point) After walking 4 miles with this bearing, how many miles east are you from your house?

b) (1 point) You now turn around and walk back to your house. What is your bearing?



$$\begin{aligned} \text{a) } \sin 30^\circ &= \frac{x}{4\text{mi}} \\ \frac{1}{2} &= \frac{x}{4\text{mi}} \\ x &= 2\text{mi} \end{aligned}$$

b) See page 3

2 miles east

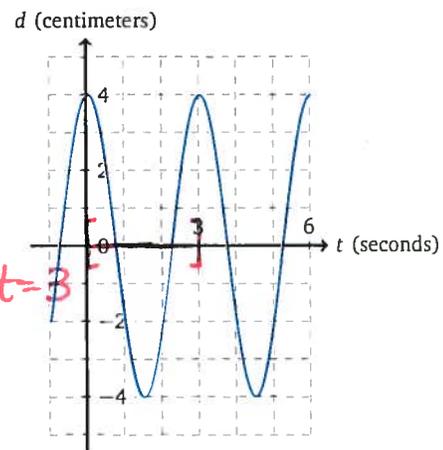
Bearing = N 30° W

3. The graph below shows the displacement of an object in simple harmonic motion. (Note: Use the correct units for your answers to (a) and (b).)

a) (1 point) What is the amplitude?

b) (1 point) What is the period?

c) (1 point) Is the equation of motion of the form $d = a \sin \omega t$ or $d = a \cos \omega t$?



b) One cycle between $t=0 + t=3$

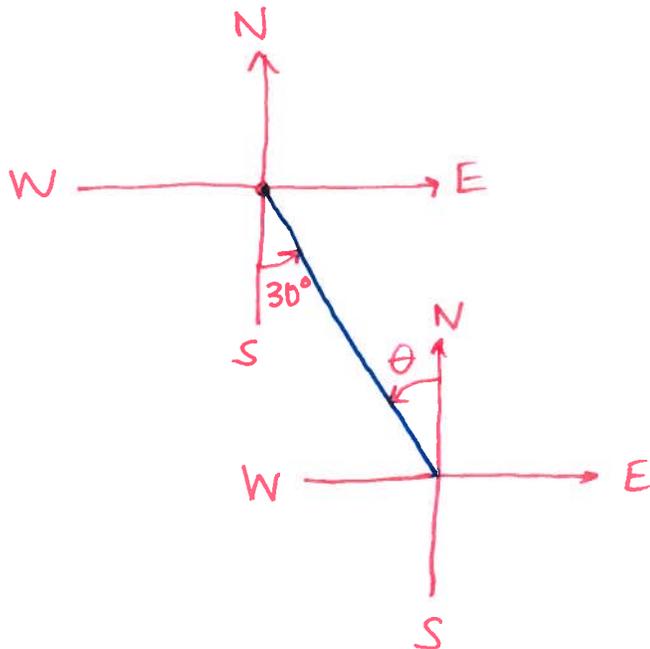
$$\rightarrow \text{Period} = 3 - 0 = 3$$

a) Max value = 4cm
Min value = -4cm \rightarrow Amplitude = 4cm

c) Cycle starts at maximum
 $\rightarrow \cos$

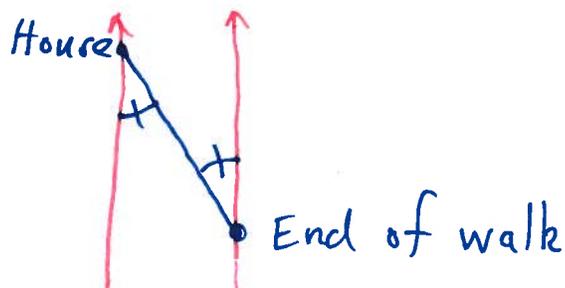
3.
a) 4cm
b) 3seconds
c) $d = a \cos \omega t$

2) b) Draw the cardinal directions at the house + at the location at the end of the walk:



For part (b), your bearing (as you are walking back to your house) = θ .

From geometry (line intersecting two parallel lines):



The two angles indicated above are congruent $\rightarrow \theta = 30^\circ$

\rightarrow Bearing = $\boxed{N 30^\circ W}$