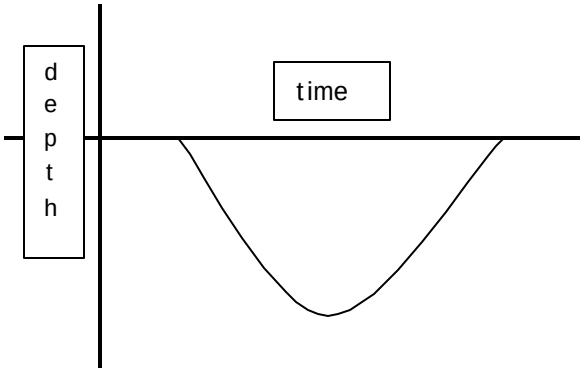
an exercise on reading graphs (Beth Long)

1. Mortimer Mole starts digging a U - shaped tunnel under the ground in the early morning. The tunnel's depth D (in feet) at time t (# hours after midnight) is given by a parabolic function D = D(t) which is drawn below. Match the questions about the tunnel with the correct feature on the graph.

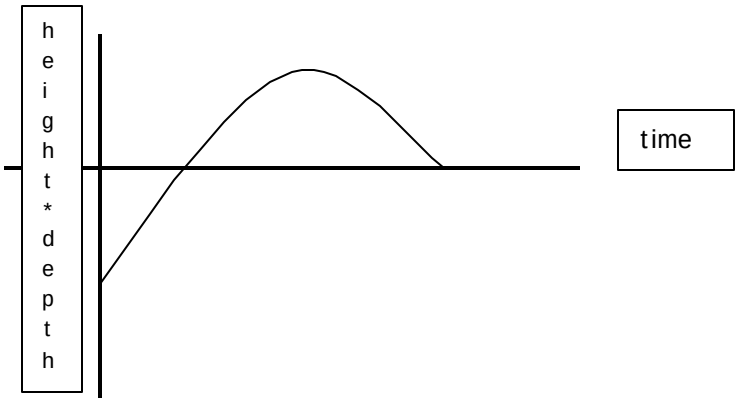


_____a. When did Mortimer finish his tunnel?
_____b. How deep did the tunnel go?
_____c. How long was Mortimer underground?
_____d. When did Mortimer start his tunnel?
_____e. When did Mortimer reach his maximum depth undergound?

i. x-coordinate of the vertex
ii. y-coordinate of the vertex
iii. smaller of the two x-intercepts
iv. larger of the two x-intercepts
v. difference of the two x-intercepts

Answers to #1
a. iv; b. ii; c. v; d. iii; e. i

2. A missile is shot from a submarine that is under water. The missile's path is parabolic and its depth/height (in m) at time t (in seconds) is given by the parabolic function y = H(t) whose graph is drawn below. Match the questions about the missile with the correct feature on the graph. Points along the x-axis correspond to a depth/height of zero - these are points along the water's surface.



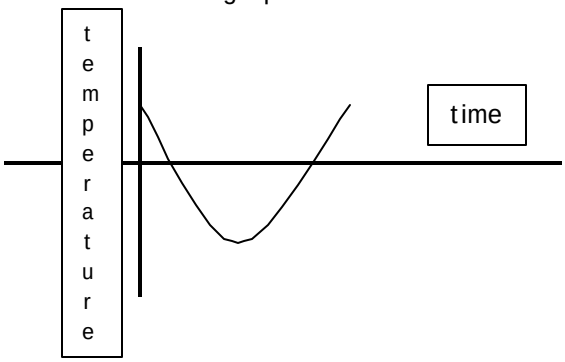
_____a. How high did the missile go?
_____b. How far under water was the missile when it was shot?
_____c. When did the missile first break the water's surface?
_____d. When did the missile reach its maximum height?
_____e. How long was the missile in the air?
_____f. When did the missile re-enter the water?

i. x-coordinate of the vertex
ii. y-coordinate of the vertex
iii. smaller of the two x-intercepts
iv. larger of the two x-intercepts
v. difference of the two x-intercepts
vi. y-intercept

3. The cost per item C (in dollars) to manufacture x whachapatoochies is given by the formula $C = 14 + 3x + 30x^2$. (Just consider $x \geq 0$.)

a. Compute the discriminant of this quadratic function. Will the graph of C have any x-intercepts?
b. What would it mean if the graph of C ever touched the x-axis? Why wouldn't this make sense in this application?
c. What would it mean if the graph of C ever fell below the x-axis? Why wouldn't this make sense in this application?

4. The temperature T (in ^{o}C) of a gas at time t (minutes) is given by a parabolic function whose graph is drawn below. Match the question about the gas' temperature with the appropriate feature of the graph.



_____a. When was the temperature 0 ^{o}C ?
_____b. What was the lowest temperature reached by the gas?
_____c. When was the temperature above 0 ^{o}C ?
_____d. What was the initial temperature?
_____e. When was the temperature at its lowest?
_____f. When was the temperature below 0 ^{o}C ?
_____g. How long was the temperature below 0 ^{o}C ?

i. x-coordinate of the vertex
ii. y-coordinate of the vertex
iii. x-intercepts
iv. x-values for which the graph lies above the x-axis
v. difference of the two x-intercepts
vi. y-intercept
vii. x-values for which the graph lies below the x-axis