

Name: \_\_\_\_\_ Date: \_\_\_\_\_

#75 Applications in vertex form

Remember to indicate which point(s) you need in order to answer each question. Then, answer the question.

1. A flea's jump can be modeled by the function  $h(d) = -0.073d(d-33)$  where  $d$  is the horizontal distance in centimeters and  $h$  is the corresponding height in centimeters.

a) How far can a flea jump? *I need the x-int.*  
 $d=0$   $d-33=0$   
 $d=33$   
The flea can jump up to 33 cm

b) Mr. Magoo started a flea circus and set up a high bar jump that is 15 centimeters off the ground. Can the flea make it over the high bar? Explain.  
*I need the y part of vertex*  
 $\frac{0+33}{2} = 16.5$  *a.o.s.  $\rightarrow x=16.5$*   
 $f(16.5) = -0.073(16.5)(16.5-33)$   
 $f(16.5) = -0.073(16.5)(-16.5)$   
 $f(16.5) = 19.87425$   
yes. The flea can jump up over the 15cm high bar because its max height when jumping is approx. 19.87cm

c) How long is the flea in the air?  
*Cannot be determined because time is not a variable in this problem. We do not have enough info. to determine*

2. A wolf leaps out of the bushes and takes a hunter by surprise. Its trajectory can be mapped by the equation  $h(d) = -\frac{1}{5}(d-1)(d-11)$ , where  $h$  (height) and  $d$  (distance) are measured in feet.

a) How high did the wolf jump? *I need y-part of vertex. I want to answer b first for the x-int*  
 $\frac{1+11}{2} \rightarrow \frac{12}{2} \rightarrow 6$  *a.o.s.  $\rightarrow x=6$*   
 $h(6) = -\frac{1}{5}(6-1)(6-11)$   
 $h(6) = -\frac{1}{5}(5)(-5)$   $h(6) = 5$   
The wolf jumped 5 feet high

b) If the hunter was originally 20 feet from the bushes, how far is he from the wolf after it lands?  
*Need x-int*  $d-1=0$   $d-11=0$   
 $d=1$   $d=11$   $20-11=9$   
The hunter was 9 ft away from the wolf after it landed

3. A rock is thrown from the top of a tall building. The distance, in feet, between the rock and the ground  $t$  seconds after it is thrown is given by  $h(t) = -16(5t-26)(5t+23)$ .

a) How tall was the building that the rock was thrown off? *I need the y-int*  
 $h(0) = -16(5(0)-26)(5(0)+23)$   
 $h(0) = -16(-26)(23)$   $h(0) = 9568$  ft  
The building was 9568 ft tall

b) When did the rock hit the ground? *I need x-int*  
 $5t-26=0$   $5t+23=0$   
 $5t=26$   $5t=-23$   
 $t = \frac{26}{5}$  or  $5.2$  *can't have negative time*  
It took 5.2 seconds for the rock to hit the ground

c) When did the rock reach its highest point? *I need x part of vertex*  
 $(\frac{26}{5} - \frac{23}{5}) \cdot \frac{1}{2}$   
 $\frac{3}{5} \cdot \frac{1}{2} \rightarrow \frac{3}{10}$   
It took .3 of a second for the rock to reach its highest point