10.4 Modeling with Quadratics

NOTES

ALGEBRA

Write your questions here!

EX1: Mr. Kelly stands on a roof and throws a stapler in the air. The height of the stapler as a function of time (in seconds) is modeled by the equation:

VERY ROUGH SKETCH:
(Label axes)

CALCULATOR TIPS

1) Anything you want to find is in the CALC menu.
2) You may have to change your window to see the graph.
3) Follow directions on the screen and make sure you go left (not right) when it says left!

So.... what's it all mean?

1) When will the ball hit the ground?

2) What is the maximum height of the ball? How long after it is thrown will it take to reach that height?

3) How high of the ground is Mr. Kelly when he throws the ball?

4) How long till the ball is 10 feet off the ground?

Ex 2: Mr. Bean decides to produce his own Algebra Books. He knows that each book is cheaper, the more he produces. But he also know that costs will eventually go up if he makes too many books, due to the costs of storage of the overstock. He quickly determines that the cost is function as a function of units produced is modeled by:

a) How many books does he need to produce to minimize his cost?

b) What is his minimized cost?

c) What are his starting costs?

d) How many books does he need to produce for costs to be $50?

Ex 3: The fish population in Mr. Brust's aquarium as a function of the water's temperature (in degrees Celsius) is modeled by:

a) At what temperature(s) will there be no fish?

b) What is the maximum number of fish that could be in Mr. Brust's tank? What would the temperature be?

c) What's something that doesn't make sense in this model? Why?

SUMMARY:

Now, summarize your notes here!

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PRACTICE

Directions: Use the given information to answer the questions. Whenever needed round to the HUNDREDTHS place. Sketch the situation.
Mr. Kelly is building a pen for his dog Tasker in his backyard. The area (in square feet) of the enclosure as a function of one side of the pen is modeled by: $A(x) = 40x - x^2$. 1) What is the maximum area of Tasker's pen? 2) What is the length of one side to achieve the maximum area? 3) At what length would the pen have no area?
The number of bacteria in refrigerated food as a function of the temperature of the food in Celsius is modeled by the function: $B(t) = 20t^2 - 20t + 120$. 4) How many bacteria were there in the food when the temperature was 10 degrees Celsius?

5) At what temperature will there be no bacteria in the food?

6) What is the minimum amount of bacteria that will be in the food?

7) What is the temperature that the minimum amount of bacteria will occur?

8) At what temperature will there be 200 bacteria present in the food?

Mr. Brust throws his manpri's out the window in frustration. The height (in feet) of the manpris as a function of time (in seconds) is modeled by the function: $h(t) = -16t^2 + 64t + 190$

9) How long will it take Mr. Brust's manpri's to reach their maximum height?

10) What is the maximum height the manpris will reach?

11) What is the height that Mr. Brust was at when he threw his manpris?

12) When will the manpris hit the ground?

13) How long will it take for the manpris to be 200 feet off the ground

Mr. Bean gives up making Algebra books and decides instead to focus on manufacturing buzzers to shock you while driving. He calculates that the cost to manufacture these buzzers (in $) as a function of the number of buzzers sold can be modeled by $C(b) = 0.45b^2 - 36b + 1000$.

14) How much cost does Mr. Bean start with before he produces even one buzzer?

15) How many buzzers does he need to produce if he wants to have his costs be $2000?

16) What is the minimum cost of production?

17) How many buzzers would he need to produce to keep his costs at a minimum?

Solve the equation.	**Solve the inequality.**	**Solve for y.**
18) –(8 +7x) – 8(1 + x) = 74	19) $-5(1-2n) \geq -17+8n$	20) 2x + 3y = 12

Use the piecewise function to evaluate the following.	**Factor**
21) $f(x) = \begin{cases} 4x^2-1, & x \leq -2 \\ -x, & x > -2 \end{cases}$ a) $f(0) =$ b) $f(-2) =$ c) $f(-3) =$ d) $f(2) =$	22) $6x^2+17x+12$

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WRAP UP

Mr. Brust gets the ball and shoots to win the game at the buzzer….and he air balls it! He goes home so disgruntled that he stays up and tries to figure out what went wrong. He determines that the height of the basketball (in feet) as a function of the time (in seconds) can be modeled by: $h(t) = -16t^2 + 32t + 7$

1) What was the maximum height that the basketball reached?

2) How long did it take for the basketball to reach its maximum?

3) How long will it take for the ball to reach the ground?

4) What was the height of the basketball when it was initially released?

Mr. Brust is so distraught over missing the big shot that he scours the KMC looking to find the best shooting coach possible. Sadly, Mr. Bean is the only willing to work with him. Mr. Bean teaches Mr. Brust to shoot his free throws underhanded. He claims that the greatest shooter in history shot his free throws underhanded so it will work much better.

Bean determines that the height of the basketball (in feet) as a function of time (in seconds) can be modeled by:

$$h(t) = -16t^2 + 40t + 2$$

5) Compare the initial height of the two methods of shooting. Why is there a difference?

6) What's the maximum height of Mr. Bean's underhanded method? How does that compare to Mr. Brust's original method?

7) Which method takes the ball longer to reach the ground again? How much longer is it?

8) Are the balls ever at the same height? What height is it? How long does it take to get there?

EXIT TICKET –

Using complete sentences describe the role the vertex plays in modeling with quadratics.