QUADRATIC FUNCTION APPLICATION WORKSHEET

1.   When the square of a certain number is diminished by 9 times the number the result is 36. Find the number.

2.   A certain number added to its square is 30. Find the number.

3.   The ages of three family children can be expressed as consecutive integers. The square of the age of the youngest child is 4 more than eight times the age of the oldest child. Find the ages of the three children.

4.   The altitude of a triangle is 5 less than its base. The area of the triangle is 42 square inches. Find its base and altitude.

5.   If the measure of one side of a square is increased by 2 centimeters and the measure of the adjacent side is decreased by 2 centimeters, the area of the resulting rectangle is 32 square centimeters. Find the measure of one side of the square.

6.   Joe's rectangular garden is 6 meters long and 4 meters wide. He wishes to double the area of his garden by increasing its length and width by the same amount. Find the number of meters by which each dimension must be increased.

7.   The length of a rectangle is 7 units more than its width. If the width is doubled and the length is increased by 2, the area is increased by 42 square units. Find the dimensions of the original rectangle.

Using the graph at the right, it shows the height h in feet of a small rocket t **seconds** after it is launched. The path of the rocket is given by the equation:
$h = -16t^2 + 128t$.
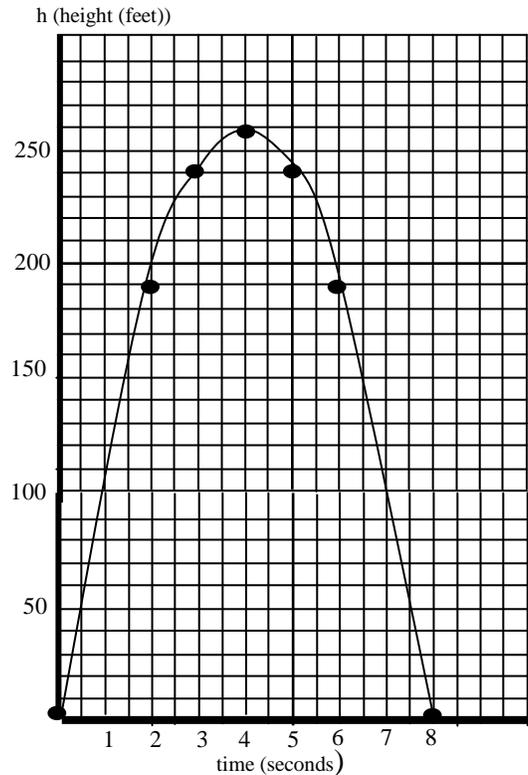
8. How long is the rocket in the air? _____

9. What is the greatest height the rocket reaches? _____

10. About how high is the rocket after 1 second? _____

11. After 2 seconds,

    a. about how high is the rocket? _____

    b. is the rocket going up or going down? _____

12. After 6 seconds,

    a. about how high is the rocket? _____

    b. is the rocket going up or going down? _____

h (height (feet))

time (seconds)

13. Do you think the rocket is traveling faster from 0 to 1 second or from 3 to 4 seconds? Explain your answer.

14. Using the equation, find the **exact** value of the height of the rocket at 2 seconds. _____

height (meters)

15. A ball is thrown in the air. The path of the ball is represented by the equation **$h = -t^2 + 8t$**. Graph the equation over the interval **$0 \le t \le 8$** on the accompanying grid.
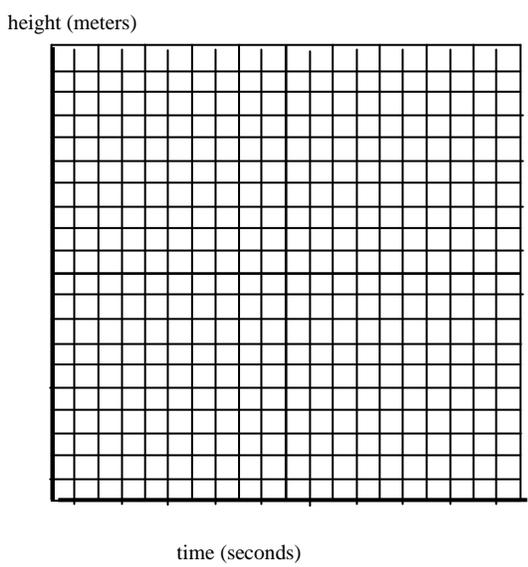
    What is the maximum height of the ball? _____

    How long is the ball above 7 meter? _____

time (seconds)

16. The population (in thousands) for Beta City, t years after January 1, 2005 is modeled by the quadratic function $P(t) = 0.7t^2 + 12t + 200$. How long will it take Beta City's population to reach 350 thousand? (Use technology)

17. A rocket carrying fireworks is launched from a hill 80 feet above a lake. The rocket will fall into lake after exploding at its maximum height. The rocket's height above the surface of the lake is given by $h = -16t^2 + 64t + 80$.

    a.   What is the height of the rocket after 1.5 second?

    b.   What is the maximum height reached by the rocket?

    c.   How long will it take for the rocket to hit 128 feet?

    d.   After how many seconds after it is launched will the rocket hit the lake?

Fitting Quadratic Models to Data:

Find the quadratic model $P(t) = P_0 + bt + at^2$ (with $t = 0$ for the earliest year given in the data) that best fits the population census data in Problems 18-19.

In each case, find the quadratic model using QUADREG on the graphing calculator, and use the model to predict the population in the year 2007. Analyze the accuracy of each model by reporting the R^2 value and assessing it.

18. Nevada

t (years)	1970	1980	1990	2000	2004
P (thous)	489	801	1,202	1,998	2,315

19. U.S.

t (years)	1970	1980	1990	2000	2004
P (millions)	203	227	249	281	294