SOLVING QUADRATIC WORD PROBLEMS WITH MULTI-PARTS

EXAMPLE

A water balloon is catapulted into the air so that its height *h*, in *metres*, after *t seconds* is $h = -4.9t^2 + 27t + 2.4$

a) How high is the balloon after 1 *second*?

b) For how long is the balloon more than 30 *m* high?

c) What is the maximum height of the balloon?

d) When will the balloon burst as it hits the ground?

SOLVING QUADRATIC WORD PROBLEMS
– A RANDOM MIX –

EXAMPLE

Nancy walks 15 *m* diagonally across a rectangular field. She then returns to her starting position along the outside of the field. The total distance she walks is 36 *m*. What are the dimensions of the field?

ADDITIONAL QUESTIONS

1. A rectangular picture frame measures 20 *cm* by 30 *cm*. A matte is made of uniform width to go inside the frame and make a nice border for the picture. The area of the matte is to be equal to the area of the picture. What is the width of the matte?

2. Farmer Tom wants to fence in a rectangular area that has one side bordered by a stream. If he has 80 *m* of fence, what are the dimensions and the maximum area he can enclose?

3. Jason jumped off of a cliff into the ocean in Acapulco while vacationing with some friends. His height could be modeled by the equation $h = -16t^2 + 16t + 480$, where *t* is the time in *seconds* and *h* is the height in *feet*.
   a) How long did it take for Jason to reach his maximum height?
   b) What was the highest point that Jason reached?
   c) After how many *seconds*, did Jason hit the water?

4. A sporting goods store sells 90 ski jackets in a season for $200 each. They determined that each $10 decrease in the price would result in five more jackets being sold. Find the number of jackets sold and the selling price to give revenues of $17 600 from sales of ski jackets.

5. Mr. Jackson had a rectangular shaped garden where the length was 2 *m* less than twice the width. If the area of the garden was 420 *square metres*, find the dimensions of the garden.

6. The hypotenuse in a right triangle is 13 *cm*. Of the other two sides, one is 7 *cm* longer than the other. Determine the lengths of those two sides.

7. While playing catch with his grandson yesterday Tim threw a ball as hard as possible into the air. The height, *h* in *feet* of the ball was given by $h = -16t^2 + 64t + 8$ where *t* is in *seconds*.
   a) How long did it take for the ball to reach his grandson's glove if he caught it at a height of 3 *ft*?
   b) What is the maximum height of the ball?

ANSWERS

1. 3.49 *cm*
2. 20 *m* x 40 *m*, A = 800 m^2
3. a) 0.5 *sec* b) 484 *ft* c) 6 *sec*
4. $160 or $220
5. 15 *m* x 28 *m*
6. 5 *cm*, 12 *cm*
7. a) 4.08 *sec* b) 72 *ft*

REVIEW

1. Solve the following quadratic equations by factoring.
   a) $2x^2 - 5x = 0$ b) $x^2 + 13x - 30 = 0$ c) $8x^2 - 2x - 3 = 0$ d) $x^2 - 81 = 0$

2. Without solving, determine how many solutions/roots/zeros each quadratic equation has.
   a) $x^2 + 14x + 49 = 0$ b) $-2x^2 - 11 = 0$ c) $x^2 - 7x - 10 = 0$

3. Solve using the quadratic formula. Express all final answers as integers or fractions in lowest terms. Round all answers involving radicals to two decimal places.
   a) $-3x^2 - 12x + 5 = 0$ b) $3x^2 + 2x + 1 = 0$ c) $4x^2 + 12x = -9$

4. A rectangular field is to be enclosed by 400 *m* of fence. What is the maximum area? What dimensions will give the maximum area?

5. Last year, talent show tickets were sold for $11 each and 400 *people* attended. It has been determined that an increase of $1 in ticket price would cause a decrease in attendance of 20 *people*. What ticket price would maximize revenue?

6. The sum of the squares of two consecutive even integers is 452. Find the integers.

7. The width of a rectangle is 2 *m* less than the length. The area is 48 m^2. Find the dimensions.

8. One side of a right triangle is 2 *cm* shorter than the hypotenuse and 7 *cm* longer than the third side. Find the lengths of the sides of the triangle.

9. A uniform border on a framed photograph has the same area as the photograph. What are the outside dimensions of the border if the dimensions of the photograph are 25 *cm* by 20 *cm*?

10. A sheet of cardboard 10 *inches* by 12 *inches* will be made into a box by cutting equal-sized squares from each corner and folding up the four edges. If the area of the base is to be 80 *square inches*, then what size square should be cut from each corner?

11. A football is punted into the air. Its height *h*, in metres, after *t* seconds is given by the equation $h = -4.9t^2 + 24.5t + 1$.
    a) How high is the ball after 1 *second*?
    b) Find the maximum height of the ball to one decimal place.
    c) When does the ball reach its maximum height?
    d) When does the ball hit the ground?

ANSWERS

1. a) $x = 0$ or $x = -5$
2. a) 1 solution
3. a) $x = -4.38$ or $x = 0.38$
4. 10000 m^2, 100 *m* by 100 *m*
8. 8 *cm*, 15 *cm*, 17 *cm*
10. c) 2.5 *sec*

1. b) $x = 2$ or $x = -15$
2. b) No solution
3. b) No solution
5. $15.50
9. 34.2 *cm* by 29.2 *cm*
10. D) 5.04 *sec*

1. c) $x = -1/2$, $x = 3/4$
2. c) Two solutions
3. c) $x = 1.5$
6. 14 & 16 or -14 and -16
10. a) 20.6 *m*

1. d) $x = 9$ or $x = -9$
7. 6 *m* by 8 *m*
10. b) 31.6 *m*