Quadratic Word Problems Worksheet

Name: _____ Class: _____ Date: _____

Solve the following quadratic word problems. Show all your work and provide the final answer in simplest form.

Open Ended Questions

1. A ball is thrown upward with an initial velocity of 20 m/s. The height of the ball (in meters) after t seconds is given by the equation $h = -5t^2 + 20t$. When will the ball hit the ground?

2. A rectangular garden has an area of 60 square meters. The length of the garden is 2 meters more than its width. Find the dimensions of the garden.

3. The product of two consecutive integers is 56. Find the integers.

4. A small company finds that its profit P (in dollars) is given by the equation $P = -2x^2 + 40x - 150$, where x is the number of units sold. How many units should the company sell to maximize its profit?

5. A car travels at a speed of 60 km/h. It takes the car 2 hours more to travel a certain distance than it would take to travel the same distance at 80 km/h. Find the distance.

6. A farmer wants to build a rectangular pen with one side against a barn, using 60 meters of fencing for the other three sides. What dimensions will maximize the area of the pen?

Multiple Choice Questions

1. A ball is thrown upwards with an initial velocity of 20 m/s from a height of 2 meters. The height of the ball (h) at any time (t) is given by the equation ..... When will the ball hit the ground?
a) 4.12 seconds
b) 3.5 seconds
c) 2.8 seconds
d) 5 seconds

2. A farmer wants to create a rectangular garden with an area of 300 square meters. The length of the garden is 5 meters more than its width. What are the dimensions of the garden?
a) Width: 15 meters, Length: 20 meters
b) Width: 10 meters, Length: 15 meters
c) Width: 20 meters, Length: 25 meters
d) Width: 12 meters, Length: 17 meters

3. The product of two consecutive integers is 182. What are the integers?
a) 13 and 14
b) 12 and 13
c) 14 and 15
d) 11 and 12

4. A rectangular swimming pool is 2 meters longer than it is wide. If the area of the pool is 80 square meters, what are its dimensions?
a) Width: 8 meters, Length: 10 meters
b) Width: 7 meters, Length: 9 meters
c) Width: 9 meters, Length: 11 meters
d) Width: 6 meters, Length: 8 meters

5. The sum of the squares of two consecutive even numbers is 340. What are the numbers?
a) 12 and 14
b) 10 and 12
c) 14 and 16
d) 8 and 10

6. A piece of wire is bent to form a rectangle. The length of the rectangle is 3 times its width. If the area of the rectangle is 75 square centimeters, what are the dimensions of the rectangle?
a) Width: 5 cm, Length: 15 cm

b) Width: 4 cm, Length: 12 cm
c) Width: 6 cm, Length: 18 cm
d) Width: 3 cm, Length: 9 cm

Quadratic Word Problems Worksheet - Answers

Name: _____ Class: _____ Date: _____

Solve the following quadratic word problems. Show all your work and provide the final answer in simplest form.

Open Ended Questions

1. A ball is thrown upward with an initial velocity of 20 m/s. The height of the ball (in meters) after t seconds is given by the equation . When will the ball hit the ground?

To find when the ball will hit the ground, we set :
$$-5t^2 + 20t = 0$$
Factor out :
$$-5t(t - 4) = 0$$
Set each factor to zero:
$$-5t = 0$$
$$t - 4 = 0$$
Thus, or .
Since is the starting point, the ball will hit the ground at seconds.

2. A rectangular garden has an area of 60 square meters. The length of the garden is 2 meters more than its width. Find the dimensions of the garden.

Let the width of the garden be meters. Then the length is meters. The area of the garden is given by:
$$w(w + 2) = 60$$
Expand and rearrange the equation:
$$w^2 + 2w - 60 = 0$$
Solve the quadratic equation using the quadratic formula :
$$w = \frac{-2 \pm \sqrt{2^2 - 4 \cdot 1 \cdot (-60)}}{2 \cdot 1}$$
$$w = \frac{-2 \pm \sqrt{4 + 240}}{2}$$
$$w = \frac{-2 \pm \sqrt{244}}{2}$$
$$w = \frac{-2 \pm 2\sqrt{61}}{2}$$
$$w = -1 \pm \sqrt{61}$$
Since width cannot be negative, meters.
Thus, the dimensions of the garden are approximately meters (width) and meters (length).

3. The product of two consecutive integers is 56. Find the integers.

Let the two consecutive integers be and . Their product is given by:
\[n(n + 1) = 56 \]
Expand and rearrange the equation:
\[n^2 + n - 56 = 0 \]
Solve the quadratic equation using the quadratic formula :
\[n = \frac{-1 \pm \sqrt{1^2 - 4 \cdot 1 \cdot (-56)}}{2 \cdot 1} \]
\[n = \frac{-1 \pm \sqrt{1 + 224}}{2} \]
\[n = \frac{-1 \pm \sqrt{225}}{2} \]
\[n = \frac{-1 \pm 15}{2} \]
\[n = 7 \text{ or } n = -8 \]
Thus, the two consecutive integers are and or and .

4. A small company finds that its profit (in dollars) is given by the equation , where is the number of units sold. How many units should the company sell to maximize its profit?

To find the number of units that maximizes profit, we need to find the vertex of the parabola given by . The x-coordinate of the vertex is given by :
\[x = \frac{-40}{2(-2)} \]
\[x = \frac{-40}{-4} \]
\[x = 10 \]
Thus, the company should sell 10 units to maximize its profit.

5. A car travels at a speed of 60 km/h. It takes the car 2 hours more to travel a certain distance than it would take to travel the same distance at 80 km/h. Find the distance.

Let the distance be kilometers. The time taken to travel the distance at 60 km/h is hours, and at 80 km/h is hours. According to the problem:
\[\frac{d}{60} = \frac{d}{80} + 2 \]
To clear the fractions, multiply through by 240 (the least common multiple of 60 and 80):
\[240 \cdot \frac{d}{60} = 240 \cdot \left(\frac{d}{80} + 2 \right) \]
Simplify:
\[4d = 3d + 480 \]
Subtract from both sides:
\[d = 480 \]
Thus, the distance is 480 kilometers.

6. A farmer wants to build a rectangular pen with one side against a barn, using 60 meters of fencing for the other three sides. What dimensions will maximize the area of the pen?

Let the width of the pen be meters. Then the length (the side parallel to the barn) is meters. The area of the pen is given by:
\[A = x(60 - 2x) \]
Expand and rearrange the equation:
\[A = 60x - 2x^2 \]
To maximize the area, we need to find the vertex of the parabola given by .
The x-coordinate of the vertex is given by :
\[x = \frac{-60}{2(-2)} \]
\[x = \frac{-60}{-4} \]
\[x = 15 \]
Thus, the width of the pen is 15 meters, and the length is meters. The dimensions that maximize the area are 15 meters (width) and 30 meters (length).

Multiple Choice Questions

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b) 3.5 seconds
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