

A.A.8: Analyze and solve verbal problems that involve quadratic equations.

1. 060608a, P.I. A.A.8

What is the length of one side of the square whose perimeter has the same numerical value as its area?

[A] 5 [B] 3 [C] 4 [D] 6

2. 080817ia, P.I. A.A.8

A rectangle has an area of 24 square units. The width is 5 units less than the length. What is the length, in units, of the rectangle?

[A] 3 [B] 19 [C] 8 [D] 6

3. 080035a, P.I. A.A.8

Jack is building a rectangular dog pen that he wishes to enclose. The width of the pen is 2 yards less than the length. If the area of the dog pen is 15 square yards, how many yards of fencing would he need to completely enclose the pen?

4. 060035a, P.I. A.A.8

The area of the rectangular playground enclosure at South School is 500 square meters. The length of the playground is 5 meters longer than the width. Find the dimensions of the playground, in meters.
[Only an algebraic solution will be accepted.]

5. 010233a, P.I. A.A.8

Javon's homework is to determine the dimensions of his rectangular backyard. He knows that the length is 10 feet more than the width, and the total area is 144 square feet. Write an equation that Javon could use to solve this problem. Then find the dimensions, in feet, of his backyard.

6. 060837ia, P.I. A.A.8

A contractor needs 54 square feet of brick to construct a rectangular walkway. The length of the walkway is 15 feet more than the width. Write an equation that could be used to determine the dimensions of the walkway. Solve this equation to find the length and width, in feet, of the walkway.

7. 080232a, P.I. A.A.8

A rectangular park is three blocks longer than it is wide. The area of the park is 40 square blocks. If w represents the width, write an equation in terms of w for the area of the park. Find the length and the width of the park.

8. 080431b, P.I. A.A.8

A rectangular piece of cardboard is to be formed into an uncovered box. The piece of cardboard is 2 centimeters longer than it is wide. A square that measures 3 centimeters on a side is cut from each corner. When the sides are turned up to form the box, its volume is 765 cubic centimeters. Find the dimensions, in centimeters, of the original piece of cardboard.

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[1] C _____

[2] C _____

[4] 16 and appropriate work is shown, such as $W(W + 2) = 15$.

[3] Appropriate work is shown, but one computational error is made.

or [3] $L = 5$, $W = 3$, and the perimeter = 16, but no work is shown.

[2] Appropriate work is shown, but more than one computational error is made.

or [2] $L = 5$, $W = 3$, and appropriate work is shown, but the perimeter is not found.

or [2] The length and width are incorrect, but the perimeter is computed appropriately.

[1] Length and width are appropriately defined in terms of a single variable.

or [1] 16 but no work is shown.

[0] $L = 5$ and $W = 3$ but no work is shown, and the perimeter is not found.

or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an

[3] obviously incorrect procedure. _____

[4] Width = 20 and length = 25 and an appropriate algebraic equation is shown, such as $x^2 + 5x - 500 = 0$.

[3] A correct quadratic equation is shown, but one error is made.

or [3] A correct quadratic equation is shown, but solved for only one dimension.

[2] An appropriate solution is shown, but the student fails to reject the negative root and finds two sets of dimensions.

or [2] The quadratic equation $(5x)(x) = 500$ is solved appropriately for both dimensions, $x = 10$ and $5x = 50$.

[1] The student writes only the correct quadratic equation or only the equation $x(x + 5) = 500$ or fails to solve the equation correctly.

or [1] The student writes a linear equation from $x(x + 5) = 500$, such as $2x + 5x = 500$, but solves that equation appropriately.

or [1] A correct equation is shown for the perimeter and solved appropriately.

or [1] $(5x)(x) = 500$ is solved correctly for only one dimension.

or [1] 20 and 25 but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[4] incorrect procedure. _____

- [4] $x(x + 10) = 144$ or an equivalent equation and $8 = \text{width}$ and $18 = \text{length}$, and appropriate work is shown.
- [3] Appropriate work is shown, but one computational error is made.
- or [3] A correct equation is used and a correct solution is found, but only one dimension is identified.
- [2] An appropriate solution is found to an incorrect equation of equal difficulty.
- or [2] A correct equation set equal to zero is shown, with no further work or incorrect work.
- [1] A conceptual error is made, such as writing the equation $2x + 2(x + 10) = 144$, but the dimensions are found appropriately.
- or [1] $x(x + 10) = 144$ and $8 = \text{width}$ and $18 = \text{length}$, but no work is shown.
- [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
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- [4] An appropriate equation is written, $\text{width}=3$, $\text{length}=18$, and appropriate work is shown.
- [3] Appropriate work is shown, but one computational or factoring error is made.
- or [3] Appropriate work is shown, but the length and width are not labeled or are labeled incorrectly.
- or [3] Appropriate work is shown to find either the length or the width of the walkway, but no further correct work is shown.
- [2] Appropriate work is shown, but two computational or factoring errors are made.
- or [2] Appropriate work is shown, but one conceptual error is made.
- or [2] An appropriate quadratic equation in standard form (set equal to zero) is written, but no further correct work is shown.
- [1] Appropriate work is shown, but one conceptual error and one computational or factoring error are made.
- or [1] An appropriate equation is written, but no further correct work is shown.
- or [1] $\text{Width} = 3$ and $\text{length} = 18$, but no work is shown.
- [0] $\text{Width} = 3$ or $\text{length} = 18$, but no work is shown.
- or [0] 3 and 18 , but no work is shown.
- or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
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- [4] $w(w + 3) = 40$, width = 5, and length = 8, and appropriate work is shown.
- [3] $w(w + 3) = 40$ and appropriate work is shown, but one computational error is made in finding the length and width.
- or [3] $w(w + 3) = 40$ and appropriate work is shown, but only the width is found.
- [2] $w(w + 3) = 40$ and appropriate work is shown, but the length and width are not identified.
- or [2] $w(w + 3) = 40$ and appropriate work is shown, but more than one computational error is made in finding the length and width.
- or [2] An incorrect equation of equal difficulty is solved appropriately for the length and width.
- [1] $w(w + 3) = 40$, but no further correct work is shown.
- or [1] Appropriate work is shown, but one conceptual error is made, such as solving the equation $2w + 2w + 6 = 40$.
- or [1] $w(w + 3) = 40$, width = 5, and length = 8, but no work is shown.
- [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
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- [4] 21 by 23, and appropriate work is shown, such as solving the equation $765 = 3(x - 4)(x - 6)$.
- [3] Appropriate work is shown, but one computational error is made.
- or [3] Appropriate work is shown, but only one dimension is found.
- [2] Appropriate work is shown, but two or more computational errors are made.
- or [2] Appropriate work is shown, but one conceptual error is made.
- or [2] An incorrect equation of equal difficulty is solved appropriately, and appropriate dimensions are found.
- or [2] A correct quadratic equation is written in standard form, but no further correct work is shown.
- [1] Appropriate work is shown, but one conceptual error and one computational error are made.
- or [1] An incorrect equation of equal difficulty is written, and one computational error is made, but appropriate dimensions are found.
- or [1] An incorrect equation of equal difficulty is solved appropriately, but one computational error is made when finding the length.
- or [1] 21 by 23, but no work is shown.
- [0] 21 or 23, but no work is shown.
- or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
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