Writing Solutions

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Lebanon Valley College

Fall 2010

Problem 1

Solve $x^2 + x - 2 = 0$.

Sample Problems

Problem 1

Solve $x^2 + x - 2 = 0$.

Problem 2

Suppose you know that the equation $ax^2 + bx + c = 0$ has exactly two solutions $x = r, s$. Explain how you can use that knowledge to find the line of symmetry of the graph $y = ax^2 + bx + c$.

Think it through, Problem 1

Method 1: Factoring

$$0 = x^2 + x - 2$$

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$0 = x^2 + x - 2 = (x+2)(x-1)$

Think it through, Problem 1

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$0 = x^2 + x - 2 = (x + 2)(x - 1)$
so $x = -2$ or $x = 1$

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Method 2: Quadratic Formula

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Think it through, Problem 1

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$0 = x^2 + x - 2 = (x+2)(x-1)$
so $x = -2$ or $x = 1$

Method 2: Quadratic Formula

$$
\begin{aligned}
x &= \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \\
&= \frac{-1 \pm \sqrt{1^2 - 4(1)(-2)}}{2(1)}
\end{aligned}
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Think it through, Problem 1

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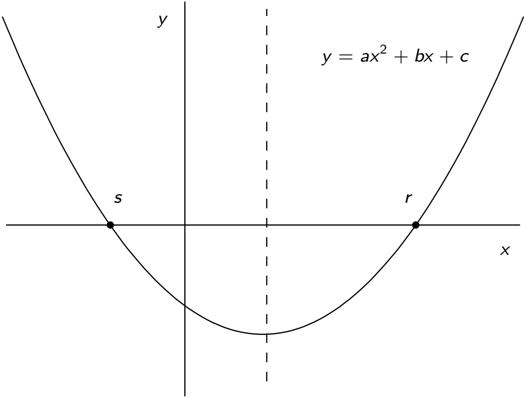
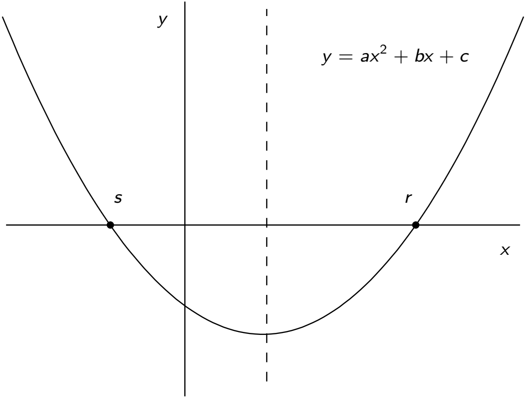
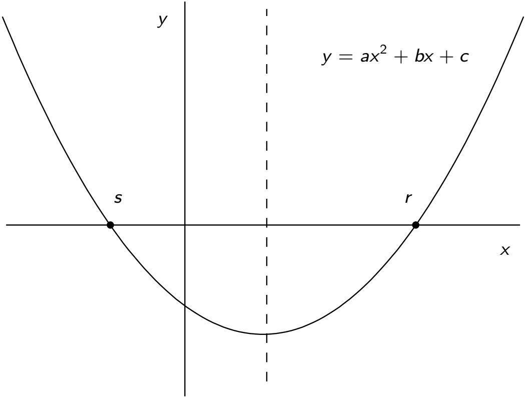
Think it through, Problem 2



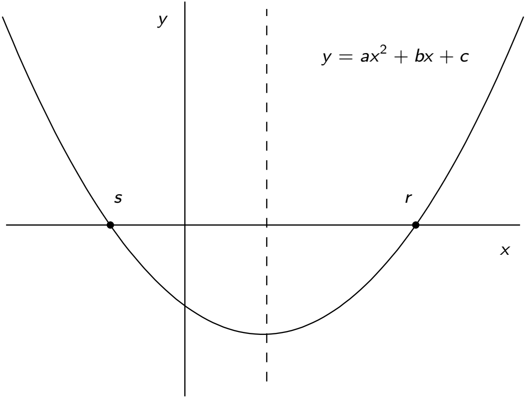


The solutions to $ax^2 + bx + c = 0$ are the x-intercepts of the graph.



The solutions to $ax^2 + bx + c = 0$ are the x-intercepts of the graph. The line of symmetry is half-way between the intercepts.

Think it through, Problem 2



The solutions to $ax^2 + bx + c = 0$ are the x-intercepts of the graph. The line of symmetry is half-way between the intercepts.

$$x = (r + s)/2$$

Problem 1 write-up, try #1

Problem 1

$$x = -2, 1$$

Problem 1 write-up, try #1

Problem 1

$$x = -2, 1$$

Bad: answer is correct , but no explanation. No credit.

Problem 1 write-up, try #2

Problem 1

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$$x = -2, 1$$

Better: shows steps, but avoids English. Partial credit.

Problem 1 write-up, try #3

Problem 1

Since $x^2 + x - 2 = (x + 2)(x - 1)$, we see the solutions are $x = -2, 1$.

Problem 1 write-up, try #3

Problem 1

Since $x^2 + x - 2 = (x+2)(x-1)$, we see the solutions are $x = -2, 1$.

Good: Solves the problem, and the idea is crystal clear. Full credit.

Problem 1 write-up, try #3, alternative

Problem 2

We use the quadratic formula.

$$\begin{aligned} x &= \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \\ &= \frac{-1 \pm \sqrt{1^2 - 4(1)(-2)}}{2(1)} \\ &= \frac{-1 \pm \sqrt{9}}{2} \\ &= \frac{-1 \pm 3}{2} \\ &= -2, 1 \end{aligned}$$

$$x = -2, 1$$

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$$x = -2, 1$$

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Problem 2 write-up, try #1

Problem 2

$$x = (r + s)/2$$

Problem 2 write-up, try #1

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$$x = (r + s)/2$$

Bad: Not responsive to the question. No credit.

Problem 2 write-up, try#2

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The line is half-way between, $x = (r + s)/2$.

Problem 2 write-up, try#2

Problem 2

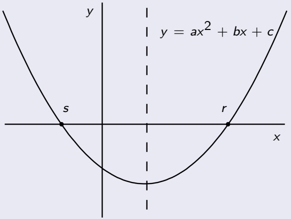
The line is half-way between, $x = (r + s)/2$.

Better: there is an attempt to express the idea. Partial credit.

Problem 2 write-up, try #3

Problem 2

The solutions $x = r, s$ to the equation $ax^2 + bx + c = 0$ are the x-intercepts of a parabola $y = ax^2 + bx + c$. The two x-intercepts are mirror reflections of one another across the line of symmetry, so the line of symmetry is half-way between them (see figure below). The half-way point along the x-axis between r and s is their average $(r + s)/2$, so the equation for the vertical line of symmetry is $x = (r + s)/2$.



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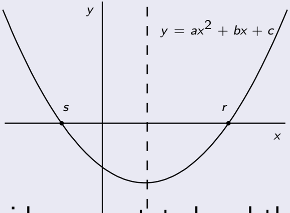

Good: The important ideas are stated and the logical flow is clear. Full credit.

Writing Style Recommendations

Do

- use complete sentences

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- write "I did this" or "I did that", etc.

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- use the word "it"