

Worksheet

08/08/2020

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Problem quickname: 9004

1)

Determine the vertex of the quadratic function. In order to do this, complete the square.

Quick:
9004

- a) Function: $x^2 + 8x + 7$
 Complete the square: $x^2 + 8x + 16 - 16 + 7$
 Form square: $(x + 4)^2 - 16 + 7$
 Convert to vertex form: $(x + 4)^2 - 9$
 Vertex: $(-4 | -9)$
- b) Function: $x^2 + 18x + 89$
 Complete the square: $x^2 + 18x + 81 - 81 + 89$
 Form square: $(x + 9)^2 - 81 + 89$
 Convert to vertex form: $(x + 9)^2 + 8$
 Vertex: $(-9 | 8)$
- c) Function: $x^2 + 2x - 3$
 Complete the square: $x^2 + 2x + 1 - 1 - 3$
 Form square: $(x + 1)^2 - 1 - 3$
 Convert to vertex form: $(x + 1)^2 - 4$
 Vertex: $(-1 | -4)$

2)

Determine the vertex of the quadratic function. In order to do this, complete the square.

Quick:
9004

- a) Function: $5x^2 - 80x + 312$
 Factor out the leading coefficient 5: $5(x^2 - 16x) + 312$
 Complete the square: $5(x^2 - 16x + 64 - 64) + 312$
 Form square: $5((x - 8)^2 - 64) + 312$
 Multiply out: $5(x - 8)^2 - 320 + 312$
 Convert to vertex form: $5(x - 8)^2 - 8$
 Vertex: $(8 | -8)$
- b) Function: $9x^2 + 108x + 320$
 Factor out the leading coefficient 9: $9(x^2 + 12x) + 320$
 Complete the square: $9(x^2 + 12x + 36 - 36) + 320$
 Form square: $9((x + 6)^2 - 36) + 320$
 Multiply out: $9(x + 6)^2 - 324 + 320$
 Convert to vertex form: $9(x + 6)^2 - 4$
 Vertex: $(-6 | -4)$

- c) Function: $7x^2 - 126x + 574$
 Factor out the leading coefficient 7: $7(x^2 - 18x) + 574$
 Complete the square: $7(x^2 - 18x + 81 - 81) + 574$
 Form square: $7((x - 9)^2 - 81) + 574$
 Multiply out: $7(x - 9)^2 - 567 + 574$
 Convert to vertex form: $7(x - 9)^2 + 7$
 Vertex: $(9|7)$
- d) Function: $2x^2 + 32x + 118$
 Factor out the leading coefficient 2: $2(x^2 + 16x) + 118$
 Complete the square: $2(x^2 + 16x + 64 - 64) + 118$
 Form square: $2((x + 8)^2 - 64) + 118$
 Multiply out: $2(x + 8)^2 - 128 + 118$
 Convert to vertex form: $2(x + 8)^2 - 10$
 Vertex: $(-8|-10)$
- e) Function: $8x^2 + 16x + 6$
 Factor out the leading coefficient 8: $8(x^2 + 2x) + 6$
 Complete the square: $8(x^2 + 2x + 1 - 1) + 6$
 Form square: $8((x + 1)^2 - 1) + 6$
 Multiply out: $8(x + 1)^2 - 8 + 6$
 Convert to vertex form: $8(x + 1)^2 - 2$
 Vertex: $(-1|-2)$
- f) Function: $5x^2 + 40x + 89$
 Factor out the leading coefficient 5: $5(x^2 + 8x) + 89$
 Complete the square: $5(x^2 + 8x + 16 - 16) + 89$
 Form square: $5((x + 4)^2 - 16) + 89$
 Multiply out: $5(x + 4)^2 - 80 + 89$
 Convert to vertex form: $5(x + 4)^2 + 9$
 Vertex: $(-4|9)$

3)

Determine the vertex of the quadratic function.

- a) Function: $7x^2 + 84x + 248$
 Factor out the leading coefficient 7: $7(x^2 + 12x) + 248$
 Complete the square: $7(x^2 + 12x + 36 - 36) + 248$
 Form square: $7((x + 6)^2 - 36) + 248$
 Multiply out: $7(x + 6)^2 - 252 + 248$
 Convert to vertex form: $7(x + 6)^2 - 4$
 Vertex: $(-6|-4)$

Quick:
9004

- b) Function: $2x^2 + 16x + 34$
 Factor out the leading coefficient 2: $2(x^2 + 8x) + 34$
 Complete the square: $2(x^2 + 8x + 16 - 16) + 34$
 Form square: $2((x + 4)^2 - 16) + 34$
 Multiply out: $2(x + 4)^2 - 32 + 34$
 Convert to vertex form: $2(x + 4)^2 + 2$
 Vertex: $(-4|2)$
- c) Function: $5x^2 + 60x + 178$
 Factor out the leading coefficient 5: $5(x^2 + 12x) + 178$
 Complete the square: $5(x^2 + 12x + 36 - 36) + 178$
 Form square: $5((x + 6)^2 - 36) + 178$
 Multiply out: $5(x + 6)^2 - 180 + 178$
 Convert to vertex form: $5(x + 6)^2 - 2$
 Vertex: $(-6|-2)$
- d) Function: $8x^2 + 80x + 199$
 Factor out the leading coefficient 8: $8(x^2 + 10x) + 199$
 Complete the square: $8(x^2 + 10x + 25 - 25) + 199$
 Form square: $8((x + 5)^2 - 25) + 199$
 Multiply out: $8(x + 5)^2 - 200 + 199$
 Convert to vertex form: $8(x + 5)^2 - 1$
 Vertex: $(-5|-1)$
- e) Function: $7x^2 + 42x + 71$
 Factor out the leading coefficient 7: $7(x^2 + 6x) + 71$
 Complete the square: $7(x^2 + 6x + 9 - 9) + 71$
 Form square: $7((x + 3)^2 - 9) + 71$
 Multiply out: $7(x + 3)^2 - 63 + 71$
 Convert to vertex form: $7(x + 3)^2 + 8$
 Vertex: $(-3|8)$
- f) Function: $9x^2 + 72x + 147$
 Factor out the leading coefficient 9: $9(x^2 + 8x) + 147$
 Complete the square: $9(x^2 + 8x + 16 - 16) + 147$
 Form square: $9((x + 4)^2 - 16) + 147$
 Multiply out: $9(x + 4)^2 - 144 + 147$
 Convert to vertex form: $9(x + 4)^2 + 3$
 Vertex: $(-4|3)$

4)

Determine the vertex of the quadratic function. In order to do this, complete the square.

- a) Function: $x^2 - 10x + 18$, Vertex: $(5|-7)$
 b) Function: $x^2 - 4x - 2$, Vertex: $(2|-6)$
 c) Function: $x^2 + 18x + 83$, Vertex: $(-9|2)$
 d) Function: $x^2 + 14x + 41$, Vertex: $(-7|-8)$

Quick:
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e) Function: $x^2 - 6x + 15$, Vertex: (3|6)

f) Function: $x^2 + 20x + 108$, Vertex: (-10|8)

Good Luck!