Worksheet

08/08/2020

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Problem quickname: 9004

1)

Quick: 9004

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

a) Function: $x^2 - 2x + 4$
Complete the square: $x^2 - 2x + 1 - 1 + 4$
Form square: $(x-1)^2 - 1 + 4$
Convert to vertex form: $(x-1)^2 + 3$
Vertex: $(1|3)$

b) Function: $x^2 - 16x + 70$
Complete the square: $x^2 - 16x + 64 - 64 + 70$
Form square: $(x-8)^2 - 64 + 70$
Convert to vertex form: $(x-8)^2 + 6$
Vertex: $(8|6)$

c) Function: $x^2 - 8x + 19$
Complete the square: $x^2 - 8x + 16 - 16 + 19$
Form square: $(x-4)^2 - 16 + 19$
Convert to vertex form: $(x-4)^2 + 3$
Vertex: $(4|3)$

d) Function: $x^2 - 6x + 1$
Complete the square: $x^2 - 6x + 9 - 9 + 1$
Form square: $(x-3)^2 - 9 + 1$
Convert to vertex form: $(x-3)^2 - 8$
Vertex: $(3|-8)$

e) Function: $x^2 - 2x$
Complete the square: $x^2 - 2x + 1 - 1$
Form square: $(x-1)^2 - 1$
Convert to vertex form: $(x-1)^2 - 1$
Vertex: $(1|-1)$

f) Function: $x^2 - 8x + 20$
Complete the square: $x^2 - 8x + 16 - 16 + 20$
Form square: $(x-4)^2 - 16 + 20$
Convert to vertex form: $(x-4)^2 + 4$
Vertex: $(4|4)$

2)

Quick: 9004

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

a) Function: $x^2 + 4x - 3$
Complete the square: $x^2 + 4x + 4 - 4 - 3$
Form square: $(x + 2)^2 - 4 - 3$
Convert to vertex form: $(x + 2)^2 - 7$
Vertex: $(-2| - 7)$

b) Function: $x^2 - 2x - 1$
Complete the square: $x^2 - 2x + 1 - 1 - 1$
Form square: $(x - 1)^2 - 1 - 1$
Convert to vertex form: $(x - 1)^2 - 2$
Vertex: $(1| - 2)$

c) Function: $x^2 + 16x + 57$
Complete the square: $x^2 + 16x + 64 - 64 + 57$
Form square: $(x + 8)^2 - 64 + 57$
Convert to vertex form: $(x + 8)^2 - 7$
Vertex: $(-8| - 7)$

3)

Quick: 9004

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

a) Function: $2x^2 + 24x + 78$
Factor out the leading coefficient 2: $2(x^2 + 12x) + 78$
Complete the square: $2(x^2 + 12x + 36 - 36) + 78$
Form square: $2((x + 6)^2 - 36) + 78$
Multiply out: $2(x + 6)^2 - 72 + 78$
Convert to vertex form: $2(x + 6)^2 + 6$
Vertex: $(-6|6)$

b) Function: $9x^2 + 72x + 141$
Factor out the leading coefficient 9: $9(x^2 + 8x) + 141$
Complete the square: $9(x^2 + 8x + 16 - 16) + 141$
Form square: $9((x + 4)^2 - 16) + 141$
Multiply out: $9(x + 4)^2 - 144 + 141$
Convert to vertex form: $9(x + 4)^2 - 3$
Vertex: $(-4| - 3)$

c) Function: $10x^2 + 140x + 485$
Factor out the leading coefficient 10: $10(x^2 + 14x) + 485$
Complete the square: $10(x^2 + 14x + 49 - 49) + 485$
Form square: $10((x + 7)^2 - 49) + 485$
Multiply out: $10(x + 7)^2 - 490 + 485$
Convert to vertex form: $10(x + 7)^2 - 5$
Vertex: $(-7| - 5)$

d) Function: $5x^2 - 80x + 313$
Factor out the leading coefficient 5: $5(x^2 - 16x) + 313$
Complete the square: $5(x^2 - 16x + 64 - 64) + 313$
Form square: $5((x - 8)^2 - 64) + 313$
Multiply out: $5(x - 8)^2 - 320 + 313$
Convert to vertex form: $5(x - 8)^2 - 7$
Vertex: $(8| - 7)$

e) Function: $4x^2 + 72x + 326$
Factor out the leading coefficient 4: $4(x^2 + 18x) + 326$
Complete the square: $4(x^2 + 18x + 81 - 81) + 326$
Form square: $4((x + 9)^2 - 81) + 326$
Multiply out: $4(x + 9)^2 - 324 + 326$
Convert to vertex form: $4(x + 9)^2 + 2$
Vertex: $(-9|2)$

f) Function: $10x^2 - 80x + 154$
Factor out the leading coefficient 10: $10(x^2 - 8x) + 154$
Complete the square: $10(x^2 - 8x + 16 - 16) + 154$
Form square: $10((x - 4)^2 - 16) + 154$
Multiply out: $10(x - 4)^2 - 160 + 154$
Convert to vertex form: $10(x - 4)^2 - 6$
Vertex: $(4| - 6)$

4)

Quick: 9004

Determine the vertex of the quadratic function.

a) Function: $10x^2 - 120x + 352$
Factor out the leading coefficient 10: $10(x^2 - 12x) + 352$
Complete the square: $10(x^2 - 12x + 36 - 36) + 352$
Form square: $10((x - 6)^2 - 36) + 352$
Multiply out: $10(x - 6)^2 - 360 + 352$
Convert to vertex form: $10(x - 6)^2 - 8$
Vertex: $(6| - 8)$

b)	Function:	$6x^2 + 96x + 376$
	Factor out the leading coefficient 6:	$6(x^2 + 16x) + 376$
	Complete the square:	$6(x^2 + 16x + 64 - 64) + 376$
	Form square:	$6((x + 8)^2 - 64) + 376$
	Multiply out:	$6(x + 8)^2 - 384 + 376$
	Convert to vertex form:	$6(x + 8)^2 - 8$
	Vertex:	$(-8\|-8)$
c)	Function:	$8x^2 + 144x + 642$
	Factor out the leading coefficient 8:	$8(x^2 + 18x) + 642$
	Complete the square:	$8(x^2 + 18x + 81 - 81) + 642$
	Form square:	$8((x + 9)^2 - 81) + 642$
	Multiply out:	$8(x + 9)^2 - 648 + 642$
	Convert to vertex form:	$8(x + 9)^2 - 6$
	Vertex:	$(-9\|-6)$
d)	Function:	$9x^2 + 90x + 216$
	Factor out the leading coefficient 9:	$9(x^2 + 10x) + 216$
	Complete the square:	$9(x^2 + 10x + 25 - 25) + 216$
	Form square:	$9((x + 5)^2 - 25) + 216$
	Multiply out:	$9(x + 5)^2 - 225 + 216$
	Convert to vertex form:	$9(x + 5)^2 - 9$
	Vertex:	$(-5\|-9)$
e)	Function:	$7x^2 - 140x + 710$
	Factor out the leading coefficient 7:	$7(x^2 - 20x) + 710$
	Complete the square:	$7(x^2 - 20x + 100 - 100) + 710$
	Form square:	$7((x - 10)^2 - 100) + 710$
	Multiply out:	$7(x - 10)^2 - 700 + 710$
	Convert to vertex form:	$7(x - 10)^2 + 10$
	Vertex:	$(10\|10)$
f)	Function:	$7x^2 + 42x + 70$
	Factor out the leading coefficient 7:	$7(x^2 + 6x) + 70$
	Complete the square:	$7(x^2 + 6x + 9 - 9) + 70$
	Form square:	$7((x + 3)^2 - 9) + 70$
	Multiply out:	$7(x + 3)^2 - 63 + 70$
	Convert to vertex form:	$7(x + 3)^2 + 7$
	Vertex:	$(-3\|7)$

Good Luck!