$\qquad$ Class: $\qquad$ Date: $\qquad$

## Alg 2 Topic 2 Practice

$\qquad$ 1. Use the vertex form to write the equation of the parabola.

a. $\quad y=3(x-2)^{2}+2$
b. $y=3(x-2)^{2}-2$
c. $y=3(x+2)^{2}+2$
d. $y=(x+2)^{2}+2$
2. Suppose a parabola has vertex $(-8,-7)$ and also passes through the point $(-7,-4)$. Write the equation of the parabola in vertex form.
a. $\quad y=(x+8)^{2}-7$
b. $\quad y=3(x-8)^{2}-7$
c. $\quad y=3(x+8)^{2}-7$
d. $y=3(x+8)^{2}+7$
3. The function $h$ is a quadratic function whose graph is a translation 7 units left and 9 units up of the parent function $f(x)=x^{2}$. What is the equation of $h$ in vertex form and in the form $y=a x^{2}+b x+c$ ?
a. $y=(x-7)^{2}+9 ; y=x^{2}-14 x+58$
b. $y=(x-7)^{2}+9 ; y=x^{2}-14 x+49$
c. $y=(x+7)^{2}+9 ; y=x^{2}+14 x+58$
d. $y=(x+7)^{2}+9 ; \quad y=x^{2}+14 x+49$
4. What steps transform the graph of $y=x^{2}$ to $y=-(x+3)^{2}+5$ ?
a. translate 3 units to the right, translate down 5 units
b. translate 3 units to the left, translate up 5 units
c. reflect across the x -axis, translate 3 units to the left, translate up 5 units
d. reflect across the $x$-axis, translate 3 units to the right, translate down 5 units
5. Identify the maximum or minimum value and the domain and range of the graph of the function $y=2(x+2)^{2}-3$.
a. minimum value: 3
domain: all real numbers $\geq 3$
range: all real numbers
b. maximum value: -3
domain: all real numbers $\leq-3$
range: all real numbers
c. maximum value: 3
domain: all real numbers
range: all real numbers $\leq 3$
d. minimum value: -3
domain: all real numbers
range: all real numbers $\geq-3$
6. Identify the vertex and the axis of symmetry of the graph of the function $y=2(x+2)^{2}-4$.
a. vertex: $(-2,4)$;
axis of symmetry: $x=-2$
b. vertex: $(2,-4)$;
axis of symmetry: $x=2$
c. vertex: $(-2,-4)$;
axis of symmetry: $x=-2$
d. vertex: $(2,4)$;
axis of symmetry: $x=2$
What are the vertex and the axis of symmetry of the equation?
7. $y=-2 x^{2}+8 x-20$
a. vertex: $(-2,12)$
axis of symmetry: $y=-2$
c. vertex: $(-2,-12)$
axis of symmetry: $x=-2$
b. vertex: $(2,-12)$
axis of symmetry: $x=2$
d. vertex: $(2,-12)$
axis of symmetry: $x=-12$

## What is the expression in factored form?

8. $x^{2}-6 x+8$
a. $\quad(x+4)(x+2)$
b. $(x-2)(x-4)$
c. $(x-4)(x+2)$
d. $(x-2)(x+4)$

What is the expression in factored form?
9. $9 x^{2}-12 x+4$
a. $(-3 x-2)^{2}$
b. $(-3 x+2)(3 x-2)$
c. $(3 x-2)^{2}$
d. $(3 x+2)^{2}$
10. $x^{2}-64$
a. $(-x+8)(x-8)$
b. $\quad(x+8)(-x-8)$
c. $(x+8)(x-8)$
d. $(x-8)^{2}$
11. What is an equation of a parabola with $x$-intercepts at $(2,0)$ and $(-7,0)$ and which passes through the point $(1$, 32)?
a. $y=-4(x-2)(x+7)$
b. $y=(x+2)(x-7)$
c. $y=-4(x+2)(x-7)$
d. $y=(x-2)(x+7)$
12. What are the interval(s) on which the function $y=x^{2}-2 x-48$ is positive?
a. $\quad x<6$ and $x>8$
b. $-6<x<8$
c. $\quad x>8$ and $x<-6$
d. $6<x<8$

Simplify the expression.
13. $(3+i)-(2-2 i)$
a. $1+3 i$
b. $5-i$
c. $4 i$
d. $-1-3 i$
14. $(4-i)(2+5 i)$
a. $2(4+9 i)$
b. $(13+18 i)$
c. $3+18 i$
d. $(8+18 i)$
15. $\frac{-2-3 i}{6 i}$
a. $\frac{1}{2}-\frac{1}{3} i$
b. $\frac{1}{2}+\frac{1}{3} i$
c. $-\frac{1}{2}+\frac{1}{3} i$
d. $-\frac{1}{2}+\frac{1}{3} i$

## What pair of factors should be used to find the complex solutions for $\boldsymbol{x}$ ?

16. $16 x^{2}+4=0$
a. $\quad(4 x+2 i)(4 x+2 i)$
b. $(2 x+4)(2 x+4)$
c. $(4 x+2 i)(4 x-2 i)$
d. $(2 x-4 i)(2 x+4 i)$

Simplify the number using the imaginary unit $i$.
17. $\sqrt{-360}$
a. $6 \sqrt{-10}$
b. $6 i \sqrt{10}$
c. $i \sqrt{360}$
d. $-6 \sqrt{10}$

What is the solution of each equation?
18. $3 x^{2}=21$
a. $\sqrt{7}$
b. $\sqrt{7},-\sqrt{7}$
c. $\frac{-\sqrt{21}}{3}, \frac{\sqrt{21}}{3}$
d. $-\sqrt{7}, \sqrt{21}$

What value completes the square for the expression?
19. $x^{2}-18 x$
a. 9
b. -9
c. 81
d. -81

Use the Quadratic Formula to solve the equation.
20. $-x^{2}+6 x-5=0$
a. $-5,-1$
b. 1,5
c. $-5,11$
d. 2,10
21. $2 x^{2}+x-4=0$
a. $-\frac{1}{2} \pm \frac{\sqrt{33}}{4}$
b. $-4 \pm \frac{\sqrt{66}}{4}$
c. $-\frac{1}{4} \pm \frac{\sqrt{33}}{4}$
d. $-\frac{1}{2} \pm \frac{\sqrt{33}}{2}$

Use graphing to find the solutions to the system of equations.
22. $\left\{\begin{array}{c}y=-x^{2}-4 x+1 \\ y=-x-3\end{array}\right.$
a.

$(4,1)$
$(-1,-4)$
c.

$(1,4)$
$(-4,-1)$
b.

$(-4,1)$
$(1,-4)$
d.

$(1,4)$
$(-4,-1)$
23. Which system of inequalities is graphed below?

a. $\left\{\begin{array}{c}y>x^{2}+7 x-8 \\ y<x+7\end{array}\right.$
b. $\left\{\begin{array}{c}y<x^{2}+7 x-8 \\ y>x+7\end{array}\right.$
c. $\left\{\begin{array}{l}y>x^{2}-7 x-8 \\ y<-x+7\end{array}\right.$
d. $\left\{\begin{array}{l}y<x^{2}-7 x-8 \\ y>-x+7\end{array}\right.$
24. What is the solution of $5 x^{2}+6 x-23=-6 x-9$ ? Use a linear-quadratic system and the intersection feature of a graphing calculator to solve.
a. $\quad x \approx-4.00$ and $x \approx 1.60$
b. $\quad x \approx-1.67$ and $x \approx 1.67$
c. $\quad x \approx-3.26$ and $x \approx 0.86$
d. $\quad x \approx-0.86$ and $x \approx 3.26$

## Alg 2 Topic 2 Practice Answer Section

1. ANS: C PTS: 1 DIF: L2

REF: 2-1 Vertex Form of a Quadratic Function
OBJ: 2-1.1 Create quadratic functions in vertex form to represent relationships between variables as shown in
their graphs. NAT: HSA.CED.A.1| HSF.IF.B. $4 \mid$ HSF.IF.B. $6 \mid$ HSF.IF.C. $7 \mid$ HSF.BF.B. 3
TOP: 2-1 Example 4 Write an Equation of a Parabola Given the Graph
KEY: parabola | equation of a parabola | vertex form
2. ANS: C PTS: 1 DIF: L3

REF: 2-1 Vertex Form of a Quadratic Function
OBJ: 2-1.1 Create quadratic functions in vertex form to represent relationships between variables as shown in their graphs. NAT: HSA.CED.A.1| HSF.IF.B. $4 \mid$ HSF.IF.B.6| HSF.IF.C.7| HSF.BF.B. 3
TOP: 2-1 Example 3 Write an Equation of a Parabola
KEY: parabola | vertex form | quadratic function | equation
3. ANS: C PTS: 1 DIF: L3

REF: 2-1 Vertex Form of a Quadratic Function
OBJ: 2-1.1 Create quadratic functions in vertex form to represent relationships between variables as shown in their graphs. NAT: HSA.CED.A.1| HSF.IF.B.4| HSF.IF.B.6| HSF.IF.C.7| HSF.BF.B. 3
TOP: 2-1 Example 5 Write an Equation of a Transformed Function
KEY: parabola | equation of a parabola | transformation
4. ANS: C PTS: 1 DIF: L3

REF: 2-1 Vertex Form of a Quadratic Function
OBJ: 2-1.2 Graph functions on coordinate axes using their key features.
NAT: HSA.CED.A.1| HSF.IF.B.4| HSF.IF.B.6| HSF.IF.C.7| HSF.BF.B. 3
TOP: 2-1 Example 1 Transform a Quadratic Function
KEY: parabola | vertex of a parabola | y-intercept
5. ANS: D PTS: 1 DIF: L3

REF: 2-1 Vertex Form of a Quadratic Function
OBJ: 2-1.3 Interpret key features of the graph of a quadratic function.
NAT: HSA.CED.A.1| HSF.IF.B.4| HSF.IF.B.6| HSF.IF.C.7| HSF.BF.B. 3
TOP: 2-1 Example 2 Determine Key Features of a Quadratic Function
KEY: parabola | vertex form $\mid$ minimum value $\mid$ maximum value
6. ANS: C PTS: 1 DIF: L3

REF: 2-1 Vertex Form of a Quadratic Function
OBJ: 2-1.3 Interpret key features of the graph of a quadratic function.
NAT: HSA.CED.A.1| HSF.IF.B.4| HSF.IF.B.6| HSF.IF.C.7| HSF.BF.B. 3
TOP: 2-1 Example 2 Determine Key Features of a Quadratic Function
KEY: parabola | vertex form | vertex of a parabola |axis of symmetry
7. ANS: B PTS: 1 DIF: L3

REF: 2-2 Standard Form of a Quadratic Function
OBJ: 2-2.2 Identify key features of quadratic functions and graph a quadratic function written in standard
form.
NAT: HSA.CED.A.2| HSF.IF.B.4| HSF.IF.B.6| HSF.IF.C.7| HSF.IF.C.8| HSF.IF.C.9| HSF.BF.A. 1
TOP: 2-2 Example 1 Find the Vertex of a Quadratic Function in Standard Form
KEY: standard form | vertex of a parabola | axis of symmetry
8. ANS: B PTS: 1 DIF: L2

REF: 2-3 Factored Form of a Quadratic Function
OBJ: 2-3.1 Write a quadratic equation in factored form and use it to identify the zeros of the function it defines. NAT: HSA.SSE.A. 2
TOP: 2-3 Example 1 Factor a Quadratic Expression KEY: factoring | quadratic expression
9. ANS: C PTS: 1 DIF: L3

REF: 2-3 Factored Form of a Quadratic Function
OBJ: 2-3.1 Write a quadratic equation in factored form and use it to identify the zeros of the function it defines. NAT: HSA.SSE.A. 2
TOP: 2-3 Example 1 Factor a Quadratic Expression KEY: factoring | perfect square trinomial
10. ANS: C PTS: 1 DIF: L2

REF: 2-3 Factored Form of a Quadratic Function
OBJ: 2-3.1 Write a quadratic equation in factored form and use it to identify the zeros of the function it defines. NAT: HSA.SSE.A. 2
TOP: 2-3 Example 1 Factor a Quadratic Expression KEY: difference of two squares | factoring
11. ANS: A PTS: $1 \quad$ DIF: L3

REF: 2-3 Factored Form of a Quadratic Function
OBJ: 2-3.1 Write a quadratic equation in factored form and use it to identify the zeros of the function it defines. NAT: HSA.SSE.A. 2
TOP: 2-3 Example 6 Write the Equation of a Parabola in Factored Form
KEY: factoring | factored form
12. ANS: C PTS: 1 DIF: L2

REF: 2-3 Factored Form of a Quadratic Function
OBJ: 2-3.2 Determine the intervals over which a quadratic function is positive or negative.
NAT: HSA.SSE.A. 2
TOP: 2-3 Example 5 Determine Positive or Negative Intervals
KEY: intervals
13. ANS: A PTS: 1 DIF: L3

REF: 2-4 Complex Numbers and Operations
OBJ: 2-4.1 Add, subtract, and multiply complex numbers using the properties of operations and the relation
$\mathrm{i}^{\wedge} 2=-1 . \quad$ NAT: HSN.CN.A.1| HSN.CN.A.2| HSN.CN.C.7| HSN.CN.C. 8
TOP: 2-4 Example 2 Add and Subtract Complex Numbers KEY: complex number
14. ANS: B PTS: 1 DIF: L3

REF: 2-4 Complex Numbers and Operations
OBJ: 2-4.1 Add, subtract, and multiply complex numbers using the properties of operations and the relation
$\mathrm{i}^{\wedge} 2=-1 . \quad$ NAT: HSN.CN.A.1|HSN.CN.A.2| HSN.CN.C.7| HSN.CN.C. 8
TOP: 2-4 Example 3 Multiply Complex Numbers KEY: complex number
15. ANS: C PTS: 1 DIF: L2

REF: 2-4 Complex Numbers and Operations
OBJ: 2-4.1 Add, subtract, and multiply complex numbers using the properties of operations and the relation
$\mathrm{i}^{\wedge} 2=-1 . \quad$ NAT: HSN.CN.A.1|HSN.CN.A.2| HSN.CN.C.7| HSN.CN.C. 8
TOP: 2-4 Example 4 Simplify a Quotient with Complex Numbers
KEY: complex number | complex conjugates
16. ANS: C PTS: 1 DIF: L2

REF: 2-4 Complex Numbers and Operations
OBJ: 2-4.2 Use complex numbers to represent numbers that are not on the real number line.
NAT: HSN.CN.A.1|HSN.CN.A.2| HSN.CN.C.7| HSN.CN.C. 8
TOP: 2-4 Example 6 Solve a Quadratic Equation With Complex Solutions
KEY: complex conjugates
17. ANS: B PTS: 1 DIF: L2

REF: 2-4 Complex Numbers and Operations
OBJ: 2-4.2 Use complex numbers to represent numbers that are not on the real number line.
NAT: HSN.CN.A.1|HSN.CN.A.2| HSN.CN.C.7| HSN.CN.C. 8
TOP: 2-4 Example 1 Solve a Quadratic Equation Using Square Roots
KEY: imaginary number |imaginary unit
18. ANS: B PTS: 1 DIF: L2 REF: 2-5 Completing the Square

OBJ: 2-5.1 Transform a quadratic equation into the form $(\mathrm{x}-\mathrm{p})^{\wedge} 2=\mathrm{q}$ by completing the square.
NAT: HSA.REI.B.4.b
TOP: 2-5 Example 1 Use Square Roots to Solve Quadratic Equations
19. ANS: C PTS: 1 DIF: L2 REF: 2-5 Completing the Square

OBJ: 2-5.1 Transform a quadratic equation into the form $(\mathrm{x}-\mathrm{p})^{\wedge} 2=\mathrm{q}$ by completing the square.
NAT: HSA.REI.B.4.b
TOP: 2-5 Example 2 Understand the Process of Completing the Square
KEY: completing the square
20. ANS: B PTS: 1 DIF: L2 REF: 2-6 The Quadratic Formula

OBJ: 2-6.1 Use the Quadratic Formula to solve quadratic equations that have complex solutions.
NAT: HSA.REI.B.4.b TOP: 2-6 Example 1 Solve Quadratic Equations
KEY: Quadratic Formula
21. ANS: C PTS: 1 DIF: L3 REF: 2-6 The Quadratic Formula

OBJ: 2-6.1 Use the Quadratic Formula to solve quadratic equations that have complex solutions.
NAT: HSA.REI.B.4.b TOP: 2-6 Example 1 Solve Quadratic Equations
KEY: Quadratic Formula
22. ANS: B PTS: 1 DIF: L2 REF: 2-7 Linear-Quadratic Systems

OBJ: 2-7.2 Solve a linear-quadratic system using graphing and explain why the points of intersection are the solutions. NAT: HSA.CED.A.3| HSA.REI.C. 7
TOP: 2-7 Example 1 Determine the Number of Solutions
23. ANS: C PTS: 1 DIF: L3 REF: 2-7 Linear-Quadratic Systems

OBJ: 2-7.2 Solve a linear-quadratic system using graphing and explain why the points of intersection are the solutions. NAT: HSA.CED.A.3| HSA.REI.C. 7
TOP: 2-7 Example 4 Solve a Linear-Quadratic System of Inequalities
KEY: linear-quadratic system of inequalities
24. ANS: C PTS: 1 DIF: L3 REF: 2-7 Linear-Quadratic Systems

OBJ: 2-7.2 Solve a linear-quadratic system using graphing and explain why the points of intersection are the solutions. NAT: HSA.CED.A.3| HSA.REI.C. 7
TOP: 2-7 Example 5 Using a System to Solve an Equation
KEY: linear-quadratic system | graphing calculator | intersection

