

Name: Key Date: _____ Hour: _____

Algebra 2
Practice Test – Sections 5.3 and 5.5 – 5.7

Factor each expression completely.

<p>1. $7k^2 + 9k$</p> <p>$k(7k+9)$</p> <p>2. $5p^2 - p - 18$</p> <p>$5p^2 - 10p + 9p - 18$</p> <p>$5p(p-2) + 9(p-2)$</p> <p>$(p-2)(5p+9)$</p> <p style="text-align: right;">$18(5) = 90$ $10 \cdot 9$</p>	<p>3. $x^2 - 16x + 63$</p> <p>$(x-9)(x-7)$</p> <p>4. $2b^2 + 17b + 21$</p> <p>$2b^2 + 14b + 3b + 21$</p> <p>$2b(b+7) + 3(b+7)$</p> <p>$(b+7)(2b+3)$</p> <p style="text-align: right;">$21(2) = 42$ $3 \cdot 14$</p>
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Solve each equation **by factoring**.

<p>5. $6x^2 - 2x = 0$</p> <p>$2x(3x-1) = 0$</p> <p>$2x = 0$ $3x-1 = 0$</p> <p>$x = 0$ $3x = 1$</p> <p> $x = 1/3$</p>	<p style="text-align: right;">2-15 5-6 3-10</p> <p>6. $x^2 + x - 30 = 0$</p> <p>$(x-5)(x+6) = 0$</p> <p>$x-5 = 0$ $x+6 = 0$</p> <p>$x = 5$ $x = -6$</p>
<p>7. $25x^2 - 16 = 0$</p> <p>$(5x+4)(5x-4) = 0$</p> <p>$5x+4 = 0$ $5x-4 = 0$</p> <p>$5x = -4$ $x = 4/5$</p> <p>$x = -4/5$</p>	<p>8. $x^2 - 9x + 8 = 0$</p> <p>$(x-1)(x-8) = 0$</p> <p>$x-1 = 0$ $x-8 = 0$</p> <p>$x = 1$ $x = 8$</p>

Solve each equation **by using the Square Root Property**.

<p>9. $x^2 - 18x + 81 = 49$</p> $\sqrt{(x-9)^2} = \sqrt{49}$ $x-9 = \pm 7$ $x = 9 \pm 7$ <p style="text-align: center;">$x = 16, 2$</p>	<p>10. $36x^2 + 12x + 1 = 18$</p> $\sqrt{(6x+1)^2} = \sqrt{18}$ $6x+1 = \pm 3\sqrt{2}$ $6x = -1 \pm 3\sqrt{2}$ <p style="text-align: center;">$x = \frac{-1 \pm 3\sqrt{2}}{6}$</p>
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Find the **c-value** that would make each quadratic function a Perfect Square Trinomial. Then **write the Perfect Square Trinomial**.

<p>11. $x^2 - 14x + c$</p> <p style="text-align: right;">$-\frac{14}{2} = -7$ $(-7)^2 = 49$</p> <p>$c = 49$</p> <p style="text-align: center;">$(x-7)^2$</p>	<p>12. $x^2 - 9x + c$</p> <p style="text-align: right;">$-\frac{9}{2}, \frac{81}{4}$</p> <p>$c = 81/4$</p> <p style="text-align: center;">$(x - 9/2)^2$</p>
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Solve each equation **by Completing The Square**.

<p>13. $x^2 - 13x + 36 = 0$</p> $x^2 - 13x + \frac{169}{4} = -36 + \frac{169}{4}$ $\sqrt{(x - 13/2)^2} = \sqrt{\frac{25}{4}}$ $x - 13/2 = \pm 5/2$ <p style="text-align: center;">$x = 13/2 \pm 5/2$ $x = 9, 4$</p>	<p>14. $x^2 - 4x - 13 = 0$</p> $x^2 - 4x + 4 = 13 + 4$ $\sqrt{(x-2)^2} = \sqrt{18}$ $x-2 = \pm 3\sqrt{2}$ <p style="text-align: center;">$x = 2 \pm 3\sqrt{2}$</p>
<p>15. $x^2 - 2x + 4 = 0$</p> $x^2 - 2x + 1 = -4 + 1$ $\sqrt{(x-1)^2} = \sqrt{-3}$ $x-1 = \pm i\sqrt{3}$ <p style="text-align: center;">$x = 1 \pm i\sqrt{3}$</p>	<p>16. $x^2 - x = 3$</p> $x^2 - x + 1/4 = 3 + 1/4$ $\sqrt{(x-1/2)^2} = \sqrt{13/4}$ $x-1/2 = \pm \sqrt{13/4}$ $x-1/2 = \pm \sqrt{13}/2$ $x = 1/2 \pm \sqrt{13}/2$ <p style="text-align: center;">$x = 3, -1$</p>

$-\frac{13}{2}$
 $\frac{169}{4}$
 $-\frac{36}{1} = -\frac{144}{4}$

Calculate the **discriminant value** and then determine **the number and type of roots**.

<p>17. $x^2 - 8x + 16 = 0$</p> $b^2 - 4ac = 64 - 4(1)(16) = 0$ <p>Discriminant = <u>0</u> Number of roots = <u>1</u> Type: <u>Rational</u></p>	<p>18. $20x^2 + 7x = 3 \rightarrow 20x^2 + 7x - 3 = 0$</p> $b^2 - 4ac = 49 - 4(20)(-3) = 289$ <p>Discriminant = <u>289</u> Number of roots = <u>2</u> Type: <u>Rational</u></p>
<p>19. $5x^2 - x - 1 = 0$</p> $b^2 - 4ac = (-1)^2 - 4(5)(-1) = 1 + 20 = 21$ <p>Discriminant = <u>21</u> Number of roots = <u>2</u> Type: <u>IRRATIONAL</u></p>	<p>20. $2x^2 - 3x = -2 \rightarrow 2x^2 - 3x + 2 = 0$</p> $b^2 - 4ac = 9 - 4(2)(2) = -7$ <p>Discriminant = <u>-7</u> Number of roots = <u>2</u> Type: <u>Complex</u></p>

Solve each equation **by using the Quadratic Formula**.

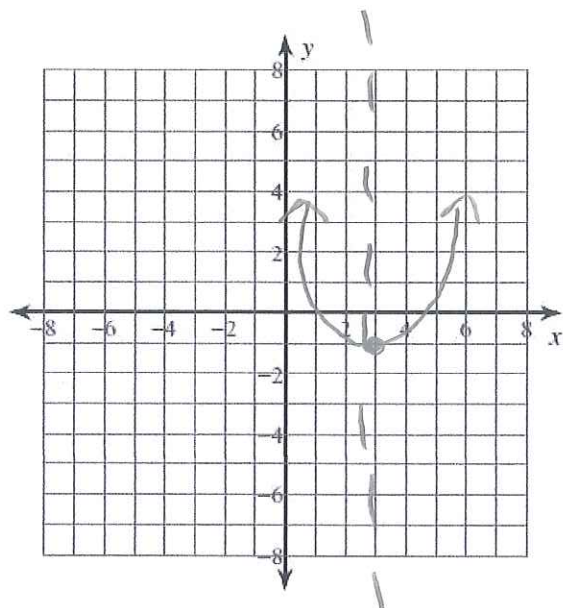
<p>21. $3x^2 + 8x = 3 \rightarrow 3x^2 + 8x - 3 = 0$</p> $X = \frac{-8 \pm \sqrt{64 - 4(3)(-3)}}{2(3)}$ $X = \frac{-8 \pm \sqrt{100}}{6} = \frac{-8 \pm 10}{6}$ <p>$X = \frac{-8+10}{6} = \frac{2}{6} = \frac{1}{3}$ $X = \frac{-8-10}{6} = \frac{-18}{6} = -3$</p>	<p>22. $x^2 - 6x + 3 = 0$</p> $X = \frac{6 \pm \sqrt{36 - 4(1)(3)}}{2(1)}$ $X = \frac{6 \pm \sqrt{24}}{2} = \frac{6 \pm 2\sqrt{6}}{2}$ <p>$X = \frac{3 \pm \sqrt{6}}{1}$</p>
<p>23. $x^2 - 14x + 53 = 0$</p> $X = \frac{14 \pm \sqrt{196 - 4(1)(53)}}{2(1)}$ $X = \frac{14 \pm \sqrt{-16}}{2} = \frac{14 \pm 4i}{2}$ <p>$X = 7 \pm 2i$</p>	<p>24. $8x - 1 = 4x^2 \rightarrow 0 = 4x^2 - 8x + 1$</p> $X = \frac{8 \pm \sqrt{64 - 4(4)(1)}}{2(4)}$ $X = \frac{8 \pm \sqrt{48}}{8} = \frac{8 \pm 4\sqrt{3}}{8}$ <p>$X = 1 \pm \frac{\sqrt{3}}{2}$</p>

For each of the following functions, label the **vertex**, **axis of symmetry**, the **direction in which the graph opens**, and **how it compares to the parent function $y = x^2$** . Then **sketch the graph**.

25. $y = (x - 3)^2 - 1$

Vertex = (3, -1) AOS = $x = 3$

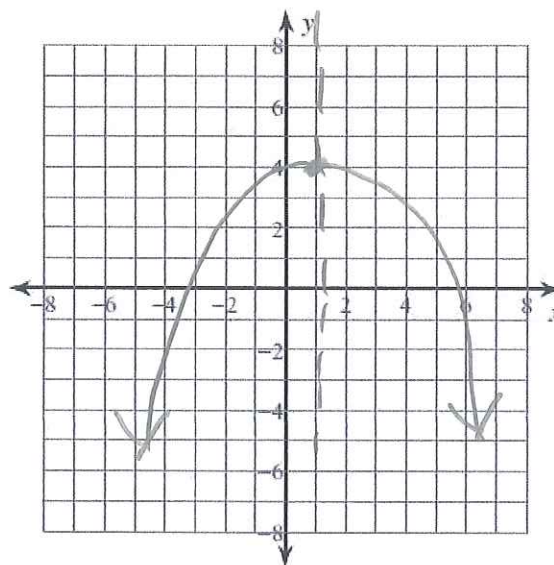
Direction opens up
same as the parent function.



26. $y = -\frac{1}{4}(x - 1)^2 + 4$

Vertex = (1, 4) AOS = $x = 1$

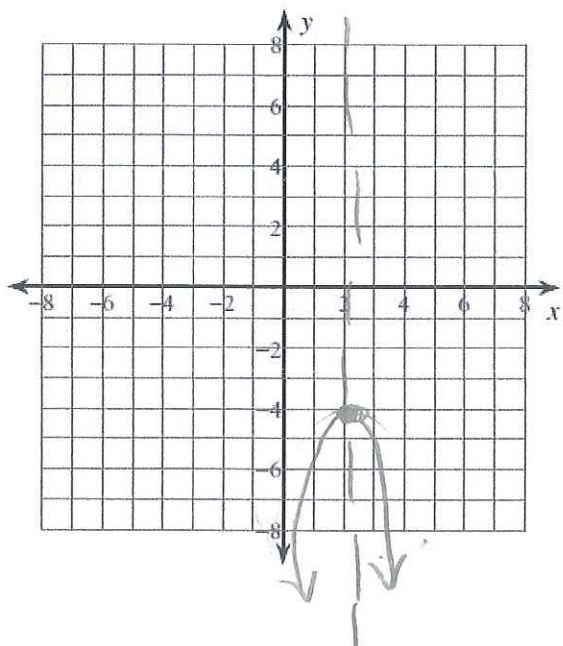
Direction opens down
wider than the parent function.



27. $y = -3(x - 2)^2 - 4$

Vertex = (2, -4) AOS = $x = 2$

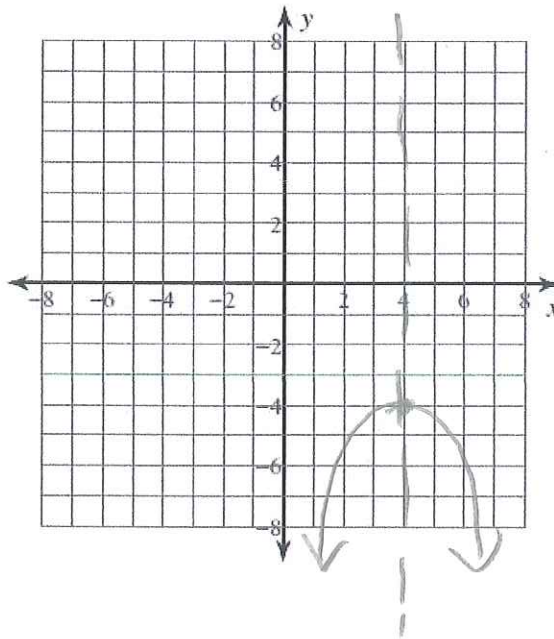
Direction opens down
narrower than the parent function.



28. $y = -(x - 4)^2 - 4$

Vertex = (4, -4) AOS = $x = 4$

Direction opens down
same as the parent function.



Write each quadratic function in vertex form.

29. $y = x^2 + 6x + 2$

$$y = (x^2 + 6x + 9) + 2 - 9$$

$$y = (x+3)^2 - 7$$

30. $y = -3x^2 + 24x$

$$y = -3(x^2 - 8x + 16) - 16(-3)$$

$$y = -3(x-4)^2 + 48$$

31. $y = -2x^2 - 16x - 32$

$$y = -2(x^2 + 8x + 16) - 32 - 16(-2)$$

$$y = -2(x+4)^2$$

32. If the vertex is (1, 3) and a point on the function is (-2, -15)

$$y = a(x-1)^2 + 3$$

$$-15 = a(-2-1)^2 + 3$$

$$-15 = 9a + 3$$

$$-18 = 9a$$

$$-2 = a$$

$$y = -2(x-1)^2 + 3$$

33. If the vertex is (-3, -1) and x-intercept is 6.

(6, 0)

$$y = a(x+3)^2 - 1$$

$$0 = a(6+3)^2 - 1$$

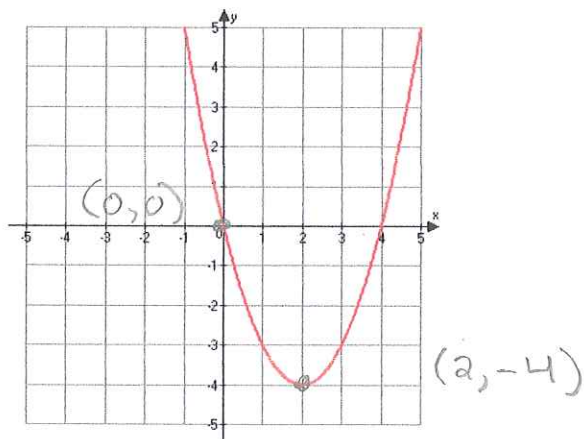
$$0 = 81a - 1$$

$$1 = 81a$$

$$\frac{1}{81} = a$$

$$y = \frac{1}{81}(x+3)^2 - 1$$

34.



$$y = a(x-2)^2 - 4$$

$$0 = a(0-2)^2 - 4$$

$$0 = 4a - 4$$

$$4 = 4a$$

$$1 = a$$

$$y = (x-2)^2 - 4$$