Integrated Math 2

ES 6: Practice Test

Name: key Date: Per:

Essential Skill Concept Category
ES 6: Solving Quadratic Equations
ES 5: Quadratic Functions

Show ALL your work. **Be sure to circle/box your answers or write your final answers in the answer spaces**. Explanations must logical and easy to understand; your thinking needs to be clearly expressed on the paper. Round your answers to the nearest tenth, unless otherwise specified.

$y = a(x-p)(x-q)$

1. Circle the equation that is written in intercept form. Convert it to standard form.

$y = 3x^2 + 4x - 1$ $y = 2(x-3)^2 + 1$ $y = -2(x-2)(x+3)$

$-2(x-2)(x+3)$

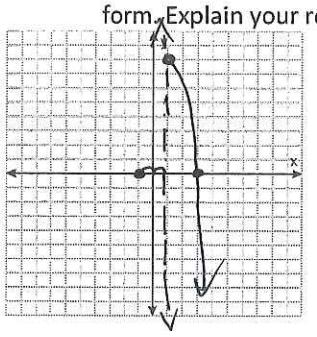
$(-2x+4)(x+3)$ * FOIL

$y = -2x^2 - 6x + 4x + 12$

combine like terms

Standard Form : $y = -2x^2 - 2x + 12$

2. Find the equation of a parabola that passes through point (3, 0) and has a vertex (1, 8). Leave your answer in intercept form. Explain your reasoning in complete sentences.



x-intercept

↳ axis of sym ⇒ $x = 1$

Intercept form $y = a(x-p)(x-q)$

p & q are x-intercepts

The axis of symmetry $x = 1$

The x intercept is 2 units to the right of the axis of symmetry

↳ There must be a second x intercept 2 units to the left of the a.o.s.

↳ (-1, 0)

2 x intercepts (-1, 0) & (3, 0)

$p = -1$

$q = 3$

$y = a(x-p)(x-q)$

$p = -1$ $x = 1$

$q = 3$ $y = 8$

Vertex (1, 8)

(x, y)

↳ point on the graph

$8 = a(1-(-1))(1-3)$ * solve for a

$8 = a(1+1)(1-3)$

$8 = a(2)(-2)$

$8 = -4a$

$\frac{8}{-4} = \frac{-4a}{-4}$

$a = -2$

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

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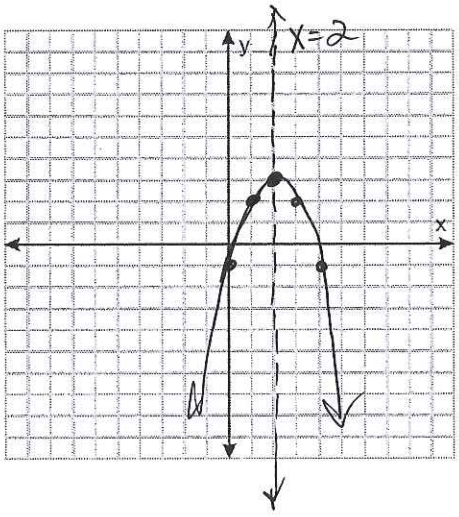
3. Identify the a, h, and k. State the vertex, axis of symmetry, and range. Graph the function below.

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

vertex form: $y = a(x-h)^2 + k$

x	$-(x-2)^2+3$	y	
1	$-(1-2)^2+3$ $-(-1)^2+3$ $-1+3=2$	2	(1, 2)
0	$-(0-2)^2+3$ $-(-2)^2+3$ $-4+3=-1$	-1	(0, -1)

Pick values close to the axis of symmetry



a = -1

h = 2

k = 3

axis of symmetry: $x = 2$

vertex: (2, 3)

range: $(-\infty, 3]$

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4. Factor the following expressions.

1. GCF
2. Diff of 2 Sq
3. Magic X
4. Bottoms up

a. $27n^2 + 138n - 144$

$3(9n^2 + 46n - 48)$

$a = 9$ Bottoms up

$b = 46$

$c = -48$

46 = b, $-8 \times +54 = ac = -432$

$9(n - \frac{8}{9})(n + \frac{54}{9})^{6}$

$3(9n - 8)(n + 6)$

b. $x^2 + 5x - 36$

$a = 1$ Magic X

5 = b, $+9 \times -4 = c = -36$

$(x + 9)(x - 4)$

a. $3(9n - 8)(n + 6)$

b. $(x + 9)(x - 4)$

5. Solve the following equations. Leave your answers in simplest radical form (NO DECIMALS OR ROUNDING)

a. $a^2 = -5a - 6$

$+5a \quad +5a + 6$

$+6$

$a^2 + 5a + 6 = 0$

Factor?

5 = b, $2 \times 3 = ac = 6$

$(a + 2)(a + 3) = 0$

$a + 2 = 0$ or $a + 3 = 0$

$-2 \ -2 \qquad -3 \ -3$

$a = -2 \qquad a = -3$

b. $9x^2 = 4 - 6x$

$-4 \quad -4 + 6x$

$+6x$

$9x^2 + 6x - 4 = 0$

Factor? $a = 9$ Bottoms up

6 = b, $-36 = ac$

Not factorable

Use quadratic Formula

$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $a = 9$, $b = 6$, $c = -4$

$= \frac{-6 \pm \sqrt{(6)^2 - 4(9)(-4)}}{2(9)} = \frac{-6 \pm \sqrt{36 - 4(9)(-4)}}{2(9)}$

$= \frac{-6 \pm \sqrt{36 - (-144)}}{2(9)} = \frac{-6 \pm \sqrt{36 + 144}}{18} = \frac{-6 \pm \sqrt{180}}{18}$

$= \frac{-6 \pm 6\sqrt{5}}{18} = \frac{6(-1 \pm \sqrt{5})}{18 \ 3}$

180 = 2 · 90 = 2 · 3 · 30 = 2 · 3 · 2 · 15 = 2 · 3 · 2 · 3 · 5

a. $a = -2$ or -3

$\{-2, -3\}$

b. $\frac{-1 \pm \sqrt{5}}{3}$ or $\frac{-6 \pm 6\sqrt{5}}{18}$

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6. Solve the equation by completing the square. Leave answer in simplest radical form.

$2n^2 + 16n + 13 = 9$
$-13 \quad -13$

* Move terms w/o variables to one side

$2n^2 + 16n = -4$ * Make $a = 0$

$2(n^2 + 8n + 16) = -4 + 2(16)$

$\left(\frac{b}{2}\right)^2 = \left(\frac{8}{2}\right)^2 = (4)^2 = 16$

$2(n+4)^2 = -4 + 32$

$\frac{2(n+4)^2}{2} = \frac{28}{2}$ * isolate $(\ )^2$

$\sqrt{(n+4)^2} = \sqrt{14}$

$n + 4 = \pm\sqrt{14}$
$-4 \quad -4$

$n = \pm\sqrt{14} - 4$

$\boxed{n = \pm\sqrt{14} - 4}$

7. The product of 2 consecutive odd numbers is 255. Set up a quadratic equation to solve for the numbers.

x = 1st number

$x+2$ = 2nd number

consecutive odd #s
ex: 3 & 5 or -7 & -5
→ 2 apart.

Product: answer to Multiplication

$(1^{st}\#)(2^{nd}\#) = 255$

$x(x+2) = 255$

$x^2 + 2x = 255$ * set = 0
$-255 \quad -255$

$x^2 + 2x - 255 = 0$ Factor?

$(x-15)(x+17) = 0$

$x - 15 = 0$ or $x + 17 = 0$

$x = 15$ $\quad x = -17$

2, -15, $+17$, -255

The 2 numbers are 15 & 17 or -17 & -15
(Must have Both pairs)