* Quadratics *

Regents Exam Questions
CC.A.SSE.2: Factoring Polynomials
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Name: Key

CC.A.SSE.2 Factoring Polynomials: Use the structure of an expression to identify ways to rewrite it. For example, see x4–y4 as (x2)2–(y2)2, thus recognizing it as a difference of

1 Four expressions are shown below.

✓ I $2(2x^2-2x-60)$ $4x^2-4x-120$
✓ II $4(x^2-x-30)$ $4x^2-4x-120$
III $4(x+6)(x-5)$ $4(x^2+x-30) \rightarrow 4x^2+4x-120$
✓ IV $4x(x-1)-120$ $4x^2-4x-120$

The expression $4x^2-4x-120$ is equivalent to
1) I and II, only
2) II and IV, only
3) I, II, and IV
4) II, III, and IV

2 When factored completely, x^3-13x^2-30x is
1) $x(x+3)(x-10)$
2) $x(x-3)(x-10)$
3) $x(x+2)(x-15)$
4) $x(x-2)(x+15)$

$x(x^2-13x-30)$
$x(x-15)(x+2)$

3 Which expression is equivalent to x^4-12x^2+36?
1) $(x^2-6)(x^2-6)$
2) $(x^2+6)(x^2+6)$
3) $(6-x^2)(6+x^2)$
4) $(x^2+6)(x^2-6)$

$(x^2-6)(x^2-6)$

4 Factor: $16a^4+8a^2b^2+b^4$

$(4a^2+b^2)(4a^2+b^2)$

5 Factor: $9x^4-12x^3+4x^2$

$x^2(9x^2-12x+4)$ $\times 9$
$x^2(3x-2)(3x-2)$

$9x^2-12x+36$
$\frac{(9x-6)}{3}\frac{(9x-6)}{3}$
$(3x-2)(3x-2)$

6 Factor: $x^4+\frac{x^2}{2}+\frac{1}{16}$

$\left(x^2+\frac{1}{4}\right)\left(x^2+\frac{1}{4}\right)$

7 Factor the expression x^4+6x^2-7 completely.

$(x^2+7)(x^2-1)$
$\boxed{(x^2+7)(x+1)(x-1)}$

Regents Exam Questions
CC.A.SSE.3: Vertex Form of a Quadratic
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CC.A.SSE.3: Vertex Form of a Quadratic: Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines.

1 In the function $f(x) = (x-2)^2 + 4$, the minimum value occurs when x is
1) -2
2) 2
3) -4
4) 4

2 If Lylah completes the square for $f(x) = x^2 - 12x + 7$ in order to find the minimum, she must write $f(x)$ in the general form $f(x) = (x-a)^2 + b$. What is the value of a for $f(x)$?
1) 6
2) -6
3) 12
4) -12

$x^2 - 12x + \cancel{7} = 0$
$\quad -7 \quad -7$

$x^2 - 12x + 36 = -7 + 36$
$(x-6)^2 = 29$

$(x-6)^2 - 29 = 0$

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CC.A.SSE.3: Solving Quadratics: Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.

1 Keith determines the zeros of the function $f(x)$ to be −6 and 5. What could be Keith's function?
1) $f(x) = (x+5)(x+6)$
2) $f(x) = (x+5)(x-6)$
3) $f(x) = (x-5)(x+6)$
4) $f(x) = (x-5)(x-6)$

2 Which equation has the same solutions as $2x^2 + x - 3 = 0$
1) $(2x-1)(x+3) = 0$
2) $(2x+1)(x-3) = 0$
3) $(2x-3)(x+1) = 0$
4) $(2x+3)(x-1) = 0$

3 The zeros of the function $f(x) = 2x^2 - 4x - 6$ are
1) 3 and −1
2) 3 and 1
3) −3 and 1
4) −3 and −1

4 The zeros of the function $f(x) = 3x^2 - 3x - 6$ are
1) −1 and −2
2) 1 and −2
3) 1 and 2
4) −1 and 2

5 Solve $8m^2 + 20m = 12$ for m by factoring.

$-12 \quad -12$

$8m^2+20m-12=0$

$\overset{\times 2}{4(2m^2+5m-3)}$

$4(2m^2+5m-6)$

$4\frac{(2m+6)}{2}(2m-1)$

$\boxed{4(m+3)(2m-1)}$

6 In the equation $x^2 + 10x + 24 = (x+a)(x+b)$, b is an integer. Find algebraically *all* possible values of b.

$(x+6)(x+4)=0$

$\boxed{a=6 \quad b=4}$ or $\boxed{a=4 \quad b=6}$

Algebra I Practice CC.A.SSE.3: Vertex Form of a Quadratic
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CCSS.A.SSE.3: Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. b. Complete the square in a quadratic expression to reveal the maximum and minimum value of the function it defines.

1. Write in standard form (for a parabola):
$y = x^2 + 12x - 2$

$36+2 = x^2+12x+36$
$38 = (x+6)^2$
$(x+6)^2 - 38$

[A] $y = (x+6)^2 + 142$
[B] $y = (x+6)^2 - 34$
[C] $y = (x+6)^2 - 38$
[D] $y = (x+6)^2 + 34$

2. Write in standard form (for a parabola):
$y = x^2 - 8x + 1$

$16-1 = x^2-8x+16$
$15 = (x-4)^2$
$(x-4)^2 - 15$

[A] $y = (x-4)^2 - 15$
[B] $y = (x-4)^2 + 17$
[C] $y = (x-4)^2 - 17$
[D] $y = (x-4)^2 + 65$

3. Write in standard form (for a parabola):
$y = x^2 + 14x - 4$

$49+4 = x^2+14x+49$
$53 = (x+7)^2$
$(x+7)^2 - 53$

[A] $y = (x+7)^2 + 192$
[B] $y = (x+7)^2 - 45$
[C] $y = (x+7)^2 - 53$
[D] $y = (x+7)^2 + 45$

4. Write in standard form (for a parabola):
$y = x^2 + 10x + 6$

$25-6 = x^2+10x+25$
$19 = (x+5)^2$
$(x+5)^2 - 19$

[A] $y = (x+5)^2 + 106$
[B] $y = (x+5)^2 + 31$
[C] $y = (x+5)^2 - 31$
[D] $y = (x+5)^2 - 19$

5. Write in standard form (for a parabola):
$y = x^2 + 14x + 2$

$49-2 = x^2+14x+49$
$47 = (x+7)^2$
$(x+7)^2 - 49$

[A] $y = (x+7)^2 - 47$
[B] $y = (x+7)^2 - 51$
[C] $y = (x+7)^2 + 198$
[D] $y = (x+7)^2 + 51$

6. Write in standard form (for a parabola):
$y = x^2 + 8x + 4$

$16-4 = x^2+8x+16$
$12 = (x+4)^2$
$(x+4)^2 - 12$

[A] $y = (x+4)^2 + 68$
[B] $y = (x+4)^2 - 20$
[C] $y = (x+4)^2 + 20$
[D] $y = (x+4)^2 - 12$

7. Which is the vertex form of this equation?
$y = -x^2 + 5x - 1$

$6.25+1 = x^2+5x+6.25$
$7.25 = (x+2.5)^2$
$(x+2.5)^2 - 7.25$
$(x+\frac{5}{2})^2 - \frac{29}{4}$

[A] $y = \left(x - \frac{5}{2}\right)^2 + \frac{21}{4}$
[B] $y = -\left(x - \frac{5}{2}\right)^2 - \frac{29}{4}$
[C] $y = -\left(x - \frac{5}{2}\right)^2 + \frac{21}{4}$
[D] $y = -\left(x + \frac{5}{2}\right)^2 - \frac{29}{4}$

8. The daily profit of a custom T-shirt shop can be modeled by $P(n) = -n^2 + 60n - 400$, where n is the number of T-shirts produced each day and $P(n)$ is the profit made on that number. Rewrite this function in vertex form and determine the maximum daily profit.

$0\ P(n) = -n^2 + 60n - 400$
$+400 \quad\quad +400$
$-900 + 400 = -1(n^2 - 60n + 900)$
$-500 = -1(n-30)^2$
$P(n) = -1(n-30)^2 + 500$