

-
1. Factor $16yx^3 - 2y$ using the GCF and then the difference of two cubes.

$$2y(8x^3 - 1)$$

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

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

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

-
2. Factor $a^3 + a^2b - 4ab^2 - 4b^3$ using grouping and then the difference of two squares.

$$\begin{array}{ll} a^2(a+b) - 4b^2(a+b) & (a+b)(a^2 - (2b)^2) \\ (a+b)(a^2 - 4b^2) & (a+b)(a-2b)(a+2b) \end{array}$$

-
3. Factor $12x^2 + 19x + 4$ using the method of your choice.

$$12x^2 + 3x + 16x + 4$$

$$AC = 48 \quad b = 19$$

$$3x(4x+1) + 4(4x+1)$$

$$2 \cdot 2 \cdot 3 \cdot 2 \cdot 2$$

$$(3x+4)(4x+1)$$

$$1 \cdot 48$$

$$2 \cdot 24$$

$$\boxed{3 \cdot 16}$$

$$4 \cdot 12$$

$$6 \cdot 8$$

-
4. Factor $m^4 - m^3 + 27n^3m - 27n^3$ using grouping and then the sum of two cubes.

$$m^3(m-1) + 27n^3(m-1)$$

$$(m-1)(m^3 + (3n)^3)$$

$$(m-1)(m^3 + 27n^3)$$

$$(m-1)(m+3n)(m^2 - 3mn + (3n)^2)$$

$$(m-1)(m+3n)(m^2 - 3mn + 9n^2)$$

5. Solve each of the following using the zero-product method.

a) $x(2x-3)(x+5)=0$

$$x=0$$

$$2x-3=0$$

$$2x=3$$

$$x=\frac{3}{2}$$

$$x=-5$$

$$\{-5, 0, \frac{3}{2}\}$$

b) $4x^2+10=13x$

$$4x^2-13x+10=0$$

$$4x^2-5x-8x+10=0$$

$$x(4x-5)-2(4x-5)=0$$

$$(4x-5)(x-2)=0$$

$$4x-5=0 \quad x=2$$

$$x=\frac{5}{4}$$

$$\begin{array}{r} 40 \\ 2 \cdot 2 \cdot 2 \cdot 5 \end{array}$$

$$1 \cdot 40$$

$$2 \cdot 20$$

$$4 \cdot 10$$

$$\boxed{5 \cdot 8}$$

$$\{5, \frac{5}{4}, 2\}$$

6. Simplify each of the following. You must show your work.

a) $3\sqrt{108}$

$$3\sqrt{9 \cdot 4 \cdot 3}$$

$$\frac{3(3)(2)\sqrt{3}}{18\sqrt{3}}$$

$$\begin{array}{r} 108 \\ \diagdown \quad \diagup \\ 2 \quad 54 \\ \diagup \quad \diagdown \\ 2 \quad 27 \\ \diagup \quad \diagdown \\ 3 \quad 9 \end{array}$$

b) $4\sqrt{\frac{27}{16}}$

$$4\left(\frac{\sqrt{27}}{\sqrt{16}}\right)$$

$$4\left(\frac{\sqrt{27}}{4}\right)$$

$$\sqrt{27} = \sqrt{9 \cdot 3}$$

$$3\sqrt{3}$$

c) $\frac{3\sqrt{5}}{\sqrt{6}} \left(\frac{\sqrt{10}}{\sqrt{6}}\right)$

$$\frac{3\sqrt{30}}{\sqrt{36}}$$

$$\frac{3\sqrt{30}}{6}$$

$$\boxed{\frac{\sqrt{30}}{2}}$$

8. For each of the following find the value of the discriminant and then circle how many solutions you expect. Don't solve the quadratic equation.

a) $x^2 - 2x + 1 = 0$

$$b^2 - 4ac$$

$$(-2)^2 - 4(1)(1) = 0$$

2 solutions

1 solution

No solutions.

b) $x^2 + x + 1 = 0$

$$b^2 - 4ac =$$

$$-3$$

2 solutions

1 solution

No solutions.

7. Given the parabola $f(x) = -x^2 + 6x - 4$

a) Does the parabola open up or down?

down $-1 < 0$

b) Find the y -intercept. $f(0) = -(0)^2 + 6(0) - 4 \Rightarrow (0, -4)$

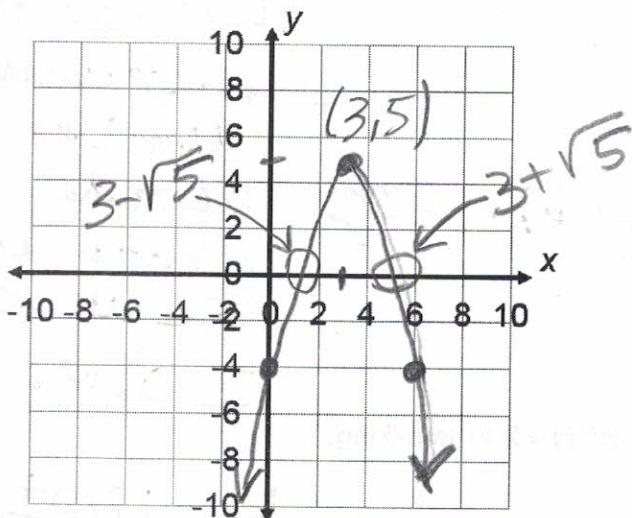
c) Find the vertex of the parabola.

$$\frac{-b}{2a} = \frac{-6}{2(-1)} = \frac{-6}{-2} = 3$$

$$(3, 5)$$

$$f(3) = -(3)^2 + 6(3) - 4 = -9 + 18 - 4 = 5$$

d) Graph the parabola.



e) Find the discriminant and discuss what it says about the number of x intercepts.

$$b^2 - 4ac = 6^2 - 4(-1)(-4)$$

$$= 36 - 16$$

$$= 20$$

two x -intercepts

f) Using the quadratic formula find any x -intercepts. Simplify your answers.

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

$$\frac{-6 \pm \sqrt{20}}{2(-1)} = \frac{-6 \pm 2\sqrt{5}}{-2} = \frac{-6}{-2} \pm \frac{2\sqrt{5}}{-2}$$

$$(3 - \sqrt{5}, 0) \quad (3 + \sqrt{5}, 0) = 3 \pm \sqrt{5}$$

8. The function $W(t) = 10t^2 - 120t + 400$ models the number of people watching a state swim meet. W stands for the number of people watching and t stands for the number of hours after 8 a.m.

- a. What does $W(0)$ tell us.

$W(0) = 400$ so 400 people are watching at 8 a.m.

- b. How many people were watching the finals at 10 p.m?

$$10 \text{ p.m.} \Rightarrow \text{Hour } 14$$

$$W(14) = 10(14)^2 - 120(14) + 400 = 680$$

680 people are watching at 10 p.m.

- c. Find the minimum number of people that will be watching and find the time this will occur.

$$\frac{-(-120)}{2(10)} = \frac{120}{20} = 6$$

$$W(6) = 10(6)^2 - 120(6) + 400$$

$$W(6) = 40$$

40 is the minimum number of people which will occur at 2 p.m.

- d. In English, answer the question that $W(t) = 200$ is asking.

$$200 = 10t^2 - 120t + 400 \rightarrow t = \frac{120 \pm \sqrt{80}}{20}$$

$$0 = 10t^2 - 120t + 200$$

$$b^2 - 4ac = (-120)^2 - 4(10)(200) \\ = 6400$$

$$t = \frac{120 \pm \sqrt{6400}}{2(10)}$$

$$\frac{200}{20} = 10 \quad \frac{40}{20} = 2$$

200 people will be watching at 10 a.m. and again at 2 p.m.