Quadratics

MCR 3U

1. Simplify the following radicals.

a) $\sqrt{125}$　　b) $\sqrt{720}$　　c) $\dfrac{4\sqrt{2}}{\sqrt{8}}$　　d) $2\sqrt{7}\times 3\sqrt{1}\times\sqrt{7}$　　e) $\dfrac{-12+\sqrt{48}}{4}$　　f) $3\sqrt{2}\left(2\sqrt{6}+\sqrt{10}\right)$

g) $\left(2\sqrt{2}-\sqrt{5}\right)^2$　　h) $\dfrac{2\sqrt{5}}{5\sqrt{2}}$　　i) $\dfrac{3}{\sqrt{5}-1}$　　j) $\sqrt[3]{72}$　　k) $2\left(\sqrt[3]{128}\right)-\sqrt[3]{2}$　　l) $\dfrac{30\sqrt{3}+9\sqrt{6}}{6}$

2. Express $5\sqrt{14}$ as an entire radical.

3. Use completing the square to find the max or min value of the function and the value of x when it occurs. No decimals.

a) $y = x^2 +12x - 7$　　b) $y = 3x^2 +12x +2$　　c) $y = -2x^2 +3x - 2$　　d) $y = -\dfrac{3}{2}x^2 -\dfrac{1}{6}x +\dfrac{7}{9}$

4. Solve. (Choose an appropriate/efficient method). Exact answers only.

a) $9x^2 -3x -2 = 0$　　　　b) $6x^2 +12 = 0$　　　　c) $-8x = 4x^2 -1$

d) $x^2 -3x +17 = 0$　　　　e) $-(x-1)^2 = -9$　　　　f) $2x^2 +20x = -50$

5. **How many** zeros do these quadratics have? DO NOT SOLVE!

a) $y = x^2 +9x +20$　　　　b) $y = x^2 -6x +13$　　　　c) $2x^2 -6x = -\dfrac{18}{4}$

6. Graph using the indicated method. Show work as dictated by the method.

a) $y = 2x^2 -4x +1$　(by partial factoring)

b) $y = -3(x+1)^2 +6$　(using vertex form)

c) $y = x^2 -4$　(by factoring)

7. Find the equation of the axis of symmetry of $y = 6x^2 +13x +6$

8. Putting it together. Given $y = -3x^2 -24x +32$, find the vertex and the x-intercepts (if any exist). Exact answers only. Extend your understanding by finding the vertex in a variety of ways.

Answers:

1. a) $5\sqrt{5}$　　b) $12\sqrt{5}$　　c) 2　　d) 42　　e) $-3+\sqrt{3}$　　f) $8\sqrt{3}+6\sqrt{5}$　　g) $13-4\sqrt{10}$　　h) $\dfrac{\sqrt{10}}{5}$

i) $\dfrac{3\sqrt{5}+3}{4}$　　j) $2\sqrt[3]{9}$　　k) $7\sqrt[3]{2}$　　l) $\dfrac{10\sqrt{3}+3\sqrt{6}}{2}$　　**2.** $\sqrt{350}$　　**3.** a) min is - 43 when x = - 6

b) min is 38 when x = 2 　c) max is $-\dfrac{7}{8}$ when x = $\dfrac{3}{4}$　　d) min value is $\dfrac{169}{216}$ when x = $-\dfrac{1}{18}$

4. a) $x = -\dfrac{1}{3},\dfrac{2}{3}$　　b) no real roots　　c) $x = \dfrac{-2+\sqrt{5}}{2},\dfrac{-2-\sqrt{5}}{2}$　　d) no real roots　e) $x = -2,4$

f) $x = -5$　　**5.** a) 2　b) 0　c) 1　　**6.** a) points (0,1) and (2,1), vertex (1,-1)

b) vertex (-1, 6), other points (0,3),(-2,3),(1,-6),(-3,-6)　　c) zeros (2,0) and (-2,0), vertex (0,-4)

7. $x = -\dfrac{13}{12}$　　**8.** vertex (-4,80)　x-intercepts: $\dfrac{-12-4\sqrt{15}}{3}$ and $\dfrac{-12+4\sqrt{15}}{3}$