NO CALCULATORS PERMITTED

1) Fully simplify the following radical expressions. Be sure that all answers have rationalized denominators (no square roots). **[1, 2, 2 Marks]**
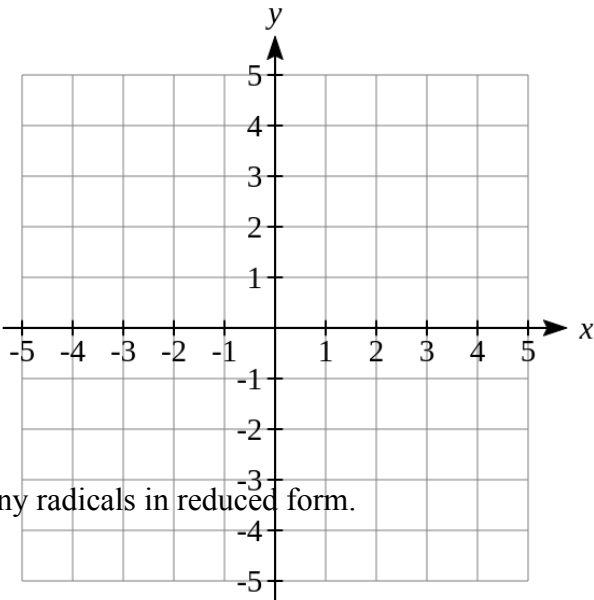
a) $\sqrt{150}$

b) $-\sqrt{32}(\sqrt{12} - 2)$

c) $(\sqrt{15} - 3\sqrt{3})(2\sqrt{2} - \sqrt{27})$

2) Solve the equation $15x^2 + 6 = 23x$ **[3 Marks]**

3) Consider the function $f(x) = \frac{1}{2}x^2 + \frac{1}{2}x - 3$. **[3,2,1,1,2 Marks]**
a) Determine the vertex of the function and write the equation in vertex form.
Work, and answers must use fractions to receive full credit.

b) Graph $y = f(x)$ on the grid provided.
c) Domain:_____
d) Range:_____

e) Determine the exact values of the zeros (x-intercepts). Write any radicals in reduced form.

4) Determine the value of k such that $g(x) = 3x + k$ intersects the quadratic function $f(x) = 2x^2 - 5x + 3$ as a tangent. **[3 Marks]**

5) Last year, talent show tickets were sold for $10 each and 600 people attended. SA estimates that each $0.50 increase in ticket price would decrease attendance by 20 people. What ticket price would produce the greatest revenue? **[5 Marks]**

6) A larger number is two more than the smaller one. Twice the larger number is one more than the square of the smaller number. Find the two numbers. **[5 Marks]**