Instructions: Show all work. Use exact answers unless specifically asked to round. Reduce as much as possible. Be sure to answer all parts of each question.

1. Factor completely.
   a. $9q^2 - 64$

   $$(3q - 8)(3q + 8)$$

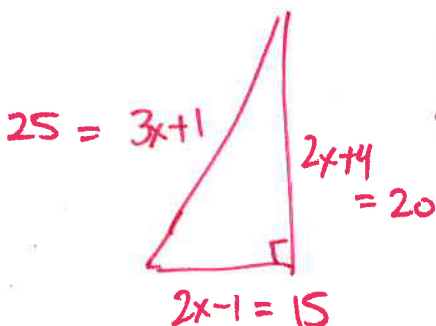   b. $4a^2 - 36a + 81$

   $$(2a - 9)^2$$

   c. $8b^3 - 64d^6$

   $$(2b - 4d^2)(4b^2 + 8bd^2 + 16d^4)$$

   d. $16h^4 - 81$

   $$(4h^2 - 9)(4h^2 + 9) = (2h - 3)(2h + 3)(4h^2 + 9)$$

2. If two legs of a right triangle can be given by $a = 2x - 1$, $b = 2x + 4$, and the hypotenuse is given by $c = 3x + 1$. Find the length of the sides of the triangle.

$25 = 3x + 1$

$2x + 4 = 20$

$2x - 1 = 15$

$$(2x-1)^2 + (2x+4)^2 = (3x+1)^2$$
$$4x^2 - 4x + 1 + 4x^2 + 16x + 16 = 9x^2 + 6x + 1$$
$$8x^2 + 12x + 16 = 9x^2 + 6x$$
$$0 = x^2 - 6x - 16$$
$$(x - 8)(x + 2) = 0$$
$$x = 8 \quad \cancel{x = -2}$$

the sides are 15, 20, 25