The answer to each question is in parenthesis at the beginning of each solution.

1)   (43) $\dfrac{7^6}{7^4} - \dfrac{7^5}{7^4} + \dfrac{7^4}{7^4} = 49 - 7 + 1 = 43.$

2)   (12) $x^2 - y^2 = (x+y)(x-y).$ $48 = (x+y)4$; $x+y = 12.$

3)   (c or 2:1)   Let AB = 1 then BD = $\sqrt{2}$ by the Pythagorean Theorem. $(\sqrt{2})^2 = 2$ and $1^2 = 1.$ The ratio of the areas is 2:1 .

4)   (5 or 5ft.)   35 x 5 = 25 x 7.   (5 x 7) x 5 = (5 x 5) x 7.

5)   (20%)   Let x = percent increase (decrease).

   $\dfrac{3}{2}(100-x) = 1 (100+x)$; $150 - \dfrac{3}{2} x = 100 + x$; $\dfrac{5}{2} x = 50$;   x = 20.

6) $(\dfrac{1}{3} + \dfrac{1}{9} + \dfrac{1}{27} + \dfrac{1}{81} + \dfrac{1}{162})$ Continuing from 4 unit fractions, $\dfrac{1}{2} = \dfrac{1}{3} + \dfrac{1}{9} + \dfrac{1}{27} + (\dfrac{1}{27} \cdot \dfrac{1}{2}) =$

$\dfrac{1}{3} + \dfrac{1}{9} + \dfrac{1}{27} + \dfrac{1}{27}(\dfrac{1}{3} + \dfrac{1}{6}) = \dfrac{1}{3} + \dfrac{1}{9} + \dfrac{1}{27} + \dfrac{1}{81} + \dfrac{1}{162}$.