## Math 5b, homework 3.

1. Find the value and indicate which of these expressions are 'powers of a number,' and which are 'numbers opposite to the power of a number'?

   Example: $3^3 = 81$ (*power of a number*), $(-3)^3 = -81$(*power of a number*);
   $$-3^3 = -81 \quad (opposit\ to\ the\ power\ of\ a\ number)$$

   | | | | | | |
   |---|---|---|---|---|---|
   | $2^5$; | $(-2)^5$; | $-2^5$; | $3^4$; | $(-3)^4$; | $-3^4$ |
   | $0.2^6$; | $(-0.2)^6$; | $-0.2^6$; | $0.05^2$; | $(-0.05)^2$; | $-0.05^2$ |
   | $10^7$; | $(-10)^7$ ; | $-10^7$; | $0.1^3$; | $(-0.1)^3$; | $-0.1^3$ |

2. Express the following numbers as power:
   
   $128$;    $-128$;    $0.0016$;    $-0.0016$;    $0.0009$;    $-0.0009$

3. Write as a power:
   
   Example:
   $$\frac{1}{2} = 2^{-1}; \qquad \frac{1}{4} = \frac{1}{2^2} = 2^{-2}$$
   $$\frac{1}{3}; \qquad \frac{1}{25}; \qquad \frac{1}{27}; \qquad \frac{1}{125};$$

4. Without doing calculations, prove that the following inequalities hold:
   
   Example:
   $$39^2 < 2000: \quad 39 < 40, \quad 39^2 < 40^2 = 1600; \ 1600 < 2000.$$
   $$a.\ 29^2 < 1000; \quad b.\ 48^2 < 3000; \quad c.\ 42^2 > 1500; \quad d.\ 67^2 > 3500$$

5. Evaluate:
   
   $a.\ \left(4\frac{1}{6} \cdot 3\right) : \left(7 \cdot \frac{5}{21}\right) - 1\frac{3}{4} \cdot 4 \quad \left(answer: \frac{1}{2}\right);$
   
   $b.\ \left(4\frac{2}{5} + 3\frac{4}{5}\right) - \left(12 - 8\frac{1}{5}\right) \quad \left(answer: 4\frac{2}{5}\right)$

6. Evaluate (use the properties of exponents):
   $$\frac{3^{10} \cdot (3^2)^4}{(3^5)^3 \cdot 3}$$

7. (* more difficult problem)   $x$ is a natural number.
   a. Among following statements 3 are true and 2 are false.
   b. $2 \cdot x$ is greater than 70
   c. $x$ is less than 100
   d. $3 \cdot x$ is greater than 25
   e. $x$ is not less than 10
   f. $x$ is greater than 5

      What is $x$ ?

8. A bag containing 4 apples and 10 plums weighs 600 g, and a bag containing 2 apples and 10 plums weighs 400 g. How much does an apple weigh and how much does a plum weigh?

9. On a picture on the right there is a surface of a cub.  What do you think about the color of bottom side of this cub?
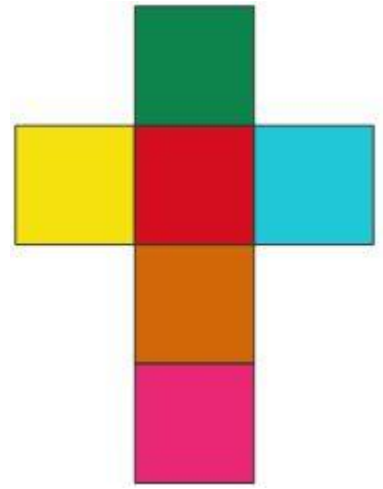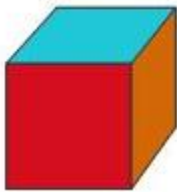
If you turn this cube ones following the arrow, what color of the upper side will be?
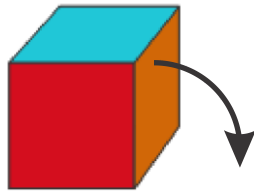
If you turn this cube one more time following the second arrow, what color of the upper side will be?