

# Exponents & Radicals



This sheet is designed as a review aid. If you have not previously studied this concept or after reviewing the contents you still don't pass you should enroll in the appropriate math class.

This review covers the basics in working with exponents and radicals. For the most part, success in working with exponents and radicals is remembering the following basic rules:

1.  $x^m x^n = x^{m+n}$
2.  $\frac{x^m}{x^n} = x^{m-n}$
3.  $(x^m)^n = x^{mn}$
4.  $(xy)^m = x^m y^m$
5.  $(a \div b)^m = a^m \div b^m$  or  $\left(\frac{a}{b}\right)^m = \frac{a^m}{b^m}$
6.  $x^0 = 1$
7.  $b^{-n} = \frac{1}{b^n}$
8.  $b^{1/n} = \sqrt[n]{b}$
9. Given that n is an even integer,  $(-b)^n = (-1 \times b)^n = (-1)^n b^n$
10.  $b^{m/n} = b^{(1/n)m} = (\sqrt[n]{b})^m = \sqrt[n]{b^m}$
11. If  $m = n$  then  $b^{m/n} = b^1 = b$

It is also important to remember some of the basic rules and properties of math such as the distributive property.

Given these rules, here are some practice problems similar to what you might see on the test:

1. What is the value of  $\sqrt{3x^2 + 4y^2}$  when  $x=5$  and  $y=5$ ?  
Insert the values for  $x$  and  $y$  and use the distributive property:  
$$\sqrt{3(5^2) + 4(5^2)} = \sqrt{(3 + 4)(5^2)}$$
  
The square root of  $5^2$  is 5 so the 5 can be pulled out from under the square root symbol:  
$$5\sqrt{3 + 4} = 5\sqrt{7}$$
 This is the answer
2. If  $5 - \sqrt{1 + 3x}$  then  $x =$  what number?  
$$5 - 5 = 0 \text{ and } \sqrt{25} = 5 \text{ so } 1 + 3x = 25$$
  
$$1 + 3x = 25$$
  
Solve for  $x$ : 
$$3x = 24$$
  
$$x = 8$$

3.  $\sqrt[3]{120}$

Begin by factoring 120:  $120 = 3 \times 5 \times 2 \times 2 \times 2 = 3 \times 5 \times 2^3$

$2^3$  can be moved outside of the cube root symbol:  $2^3\sqrt[3]{3 \times 5} = 2\sqrt[3]{15}$

4. For all  $x \neq 1$ , solve for  $(2x - 3)^2(2x - 3)^{-2}$

Factor out the exponents & reduce:

$$(2x - 3)(2x - 3)\left(\frac{1}{2x - 3}\right)\left(\frac{1}{2x - 3}\right) = \frac{(2x - 3)(2x - 3)}{(2x - 3)(2x - 3)} = 1$$