



## What You Should Know To Place Into MTH 176

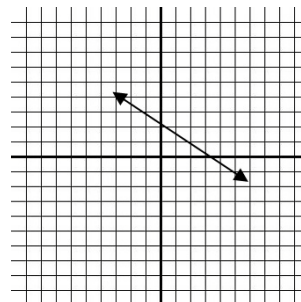
**Introduction:** This document is intended to help you prepare to take the COMPASS test and place into MTH 176: College Algebra. If you wish to place into MTH 176, you should be able to complete most of the following problems correctly. The answers to the following questions can be found at the bottom of the last page of this document. It is strongly advised that you DO NOT take the math COMPASS test on the same day as orientation. It is further advised that you do not take the math portion of the COMPASS test on the same day that you take the reading or writing portions of the COMPASS test.

Studying for the COMPASS math test before you take it will help you insure that you are placed into a course that is at the right level for you.

### 1) You should know how to write equations of lines.

Example problems:

- What is the equation of the line shown here?
- What is the equation of the line through (0,2) but perpendicular to the line  $y = 2x - 4$ ?



### 2) You should know how to perform operations with polynomials.

Example problems:

Simplify each expression

- $(x^2 - 3) - (4x^2 + 2x - 5)$
- $2(x - 1)(x + 5)$
- $(x + 3)(x^2 - 4x + 5)$
- $(x^2 - 4x + 5) \div (x - 2)$

### 3) You should know how to factor polynomials.

Example problems:

Factor each

- $x^2 + 8x - 9$
- $15x^4 + 65x^3 - 50x^2$
- $50x^3 - 18x$



**4) You should know how to solve quadratic equations.**

Example problems:

Solve each equation

a)  $x^2 + 6x = 16$

b)  $2x^2 + 11x + 12 = 0$

**5) You should know how to simplify radicals.**

Example problems:

Simplify each expression

a)  $\sqrt[3]{27}$

b)  $\sqrt{27} + 2\sqrt{75}$

c)  $\frac{\sqrt{8}}{3} + \frac{\sqrt{18}}{6}$

**6) You should know the Laws of Exponents and Properties of Logarithms.**

Example problems:

Simplify

a)  $8x^6 \div 6x^2$

b)  $8^{4/3}$

c)  $3^{-2}$

d)  $\log_2 8 =$

Solve for x

e)  $2^x = 32$

f)  $9^x = 27$

Solve for y, in terms of x

g)  $4^x = 8^y$

Write as a single simplified logarithm

h)  $\log x + 2 \log y$

**7) You should know function notation, composition of functions and operations with functions.**

Example problems:



- a) If  $f(x) = x^2 - 2$  and  $g(x) = x^3 - 8$ , then  $\frac{f(1)}{g(1)} =$
- b) If  $f(x) = 2x + 3$ , then  $f(a+2) =$
- c) If  $f(x) = 2x + 3$  and  $g(x) = 3x - 4$ , then  $f(g(3)) =$
- d) If  $f(x) = x^2 + 3$  and  $g(x) = x - 4$ , then  $f(g(x)) =$
- e) If  $f(x) = x^2 + 3$  and  $g(x) = x - 4$ , then  $f(x) \cdot g(x) =$
- f) If  $f(x) = cx - 10$  and  $f(3) = 2$ , then  $f(5) =$
- g) If  $f(-2) = 12$ , then  $f^{-1}(12) =$

**8) You should know how to perform operations with Complex Numbers.**

Example problems:

Simplify

- a)  $(3 + 4i)(5 - 2i)$       b)  $(2 + 3i)^2$       c)  $i^{48}$

**9) You should know how to perform operations with Rational Expressions.**

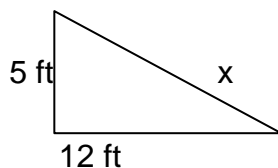
Example problems:

Simplify

- a)  $\frac{1}{x} + \frac{2}{x-2}$       b)  $\frac{2x^5}{x^2-9} \cdot \frac{x+3}{8x}$       c)  $\frac{2}{\frac{a+b}{5}}$

**10) You should know the Pythagorean Theorem and be able to apply it.**

Example problems:



- a) What is the length  $x$ ?

- b) If a 20 foot ladder is leaning against a wall, and its base is 5 feet from the bottom of the wall, how high up the wall does the ladder reach?



**11) You should know how to translate applications to equations.**

Example problem:

a) Let  $x$  equal the number described and write an equation:

If the reciprocal of a number is added to the opposite of the same number, the sum is  $k$ .

**Answers to example problems:**

1a)  $y = -\frac{2}{3}x + 2$       1b)  $y = -\frac{1}{2}x + 2$

2a)  $-3x^2 - 2x + 2$       2b)  $2x^2 + 8x - 10$       2c)  $x^3 - x^2 - 7x + 15$       2d)  $x - 2 + \frac{1}{x-2}$

3a)  $(x + 9)(x - 1)$       3b)  $5x^2(3x - 2)(x + 5)$       3c)  $2x(5x - 3)(5x + 3)$

4a)  $x = 2, -8$       4b)  $x = -\frac{3}{2}, -4$

5a) 3      5b)  $13\sqrt{3}$       5c)  $\frac{7\sqrt{2}}{6}$

6a)  $\frac{4}{3}x^4$       6b) 16      6c)  $\frac{1}{9}$       6d) 3      6e)  $x = 5$       6f)  $x = \frac{3}{2}$

6g)  $y = \frac{2}{3}x$       6h)  $\log(xy^2)$

7a)  $\frac{1}{7}$       7b)  $2a + 7$       7c) 13      7d)  $x^2 - 8x + 19$

7e)  $x^3 - 4x^2 + 3x - 12$       7f) 10      7g) -2

8a)  $23 + 14i$       8b)  $-5 + 12i$       8c) 1

9a)  $\frac{x^4}{4(x-3)}$       9b)  $\frac{3x-2}{x(x-2)}$       9c)  $\frac{10}{a+b}$

10a) 13 ft      10b)  $5\sqrt{15}$  ft or 19.4 ft

11a)  $-x + \frac{1}{x} = k$