

Placement Guide for Math 137: College Algebra

What is Math 137? Math 137 is a course in algebra and functions that builds on the material from Intermediate Algebra. It is the prerequisite for Math 130 (Calculus for Biological Sciences, Social Sciences and Business I) and Math 138 (Precalculus – College Algebra and Trigonometry).

Who should take Math 137? Math 137 is designed to serve three categories of students:

1. Those needing a course in College Algebra for transfer
2. Those needing the prerequisite for Math 130
3. Those needing the prerequisite for Math 138 to complete the prerequisite sequence for Math 150

Am I ready for Math 137? What are my options?

On the next page you will find some problems to help you assess your readiness for Math 137. Depending on your comfort level with these problems, you have three options:

- **Enroll in Math 137:** Choose this option if you can confidently solve most of these problems.
- **Enroll in Math 137 along with Math 137C, a 2-unit Support Course:** Choose this option if *some* of these problems are unfamiliar or would be difficult to complete, or if you could generally use review on most of these topics.
- **Enroll in Math 107 (Intermediate Algebra) or Math 87 (Intermediate Algebra refresher, a 1-unit self-paced online course):** Choose this option if *most* of these problems are unfamiliar to you or you feel uncomfortable with most of these skills.

Note: In Fall 2020, there is an option to take Math 137 and Math 138 simultaneously. Math 138 is the second semester of pre-calculus (focusing largely on trigonometry) that is the prerequisite for Math 150 (calculus for STEM majors). If you feel well-prepared for Math 137 *and* your academic requirements will require you to take Math 138 *and* you would like to get a semester ahead in meeting your math requirements *and* you feel you can handle 9 units of math in one semester, then you should consider this option. Contact the instructor Elizabeth Chisholm, eechisholm@pipeline.sbcc.edu, for more information or to request an Add Code.

This option will not be available in Spring 2021.

Problems to help you assess your readiness for Math 137

Note: You do not necessarily need to try to work through all these problems to completion. It may be enough to read through the problems and their solutions to get a feel for whether you are ready for Math 137.

None of these problems require a calculator and you may be required to demonstrate these skills without use of a calculator.

1. Expand $(2x + 5)^2$, using the fact that $(a + b)^2 = a^2 + 2ab + b^2$

2. Factor $8x^3 + 27$, using the fact that $a^3 + b^3 = (a + b)(a^2 - ab + b^2)$

3. Add and simplify if possible: $\frac{6}{x^2 + 4x + 3} + \frac{7}{x^2 + 5x + 6}$

4. Simplify the complex fraction $\frac{\frac{4}{y} - 1}{\frac{1}{y} - \frac{4}{y^2}}$

5. Simplify $3\sqrt{5} - 2\sqrt{20}$

6. Simplify $\sqrt[3]{\frac{x^6}{125y^3}}$.

7. Solve the equation.

(a) $\frac{36}{x^2 - 9} = \frac{2x}{x + 3} - 1$ (b) $3 = \sqrt{2x - 5}$ (c) $2^x = 10$ (d) $\log_6(x + 5) = 2$

8. Solve the inequality $1 - 2(x + 3) - x < 1 - x$. Write your answer using interval notation.

9. Graph the linear function $y = -2x + 3$

10. Find an equation of the line that passes through the points $(1, 5)$ and $(-3, 7)$.

11. The Fahrenheit and Celsius scales are related by the equation $F = \frac{9}{5}C + 32$,

where C represents temperature in Celsius degrees and F represents temperature in Fahrenheit degrees.

(a) Determine the Fahrenheit temperature corresponding to the Celsius temperature $C = 25^\circ$.

(b) Determine the Celsius temperature corresponding to the Fahrenheit temperature $F = 68^\circ$.

12. Solve the linear system $\begin{cases} x - 3y = -2 \\ 5x + 3y = 17 \end{cases}$

13. For the function defined by $f(x) = 2x + 5$:

(a) Evaluate $f(4)$ (b) Find the value of x for which $f(x) = 11$

Solutions

$$1. (2x+5)^2 = (2x)^2 + 2 \cdot 2x \cdot 5 + 5^2 = \boxed{4x^2 + 20x + 25}$$

$$2. 8x^3 + 27 = (2x)^3 + (3)^3 = (2x+3)((2x)^2 - 2x \cdot 3 + 3^2) = \boxed{(2x+3)(4x^2 - 6x + 9)}$$

$$\begin{aligned} 3. \frac{6}{x^2+4x+3} + \frac{7}{x^2+5x+6} &= \frac{6}{(x+3)(x+1)} + \frac{7}{(x+3)(x+2)} \\ &= \frac{6}{(x+3)(x+1)} \cdot \frac{x+2}{x+2} + \frac{7}{(x+3)(x+2)} \cdot \frac{x+1}{x+1} \\ &= \frac{6(x+2) + 7(x+1)}{(x+3)(x+1)(x+2)} \\ &= \frac{6x+12+7x+7}{(x+3)(x+1)(x+2)} \\ &= \boxed{\frac{13x+19}{(x+3)(x+1)(x+2)}} \end{aligned}$$

$$4. \frac{\frac{4}{y}-1}{\frac{1}{y}-\frac{4}{y^2}} = \frac{y^2\left(\frac{4}{y}-1\right)}{y^2\left(\frac{1}{y}-\frac{4}{y^2}\right)} = \frac{4y-y^2}{y-4} = \frac{y(4-y)}{y-4} = \frac{-y(y-4)}{y-4} = \boxed{-y}$$

$$5. 3\sqrt{5} - 2\sqrt{20} = 3\sqrt{5} - 2\sqrt{4 \cdot 5} = 3\sqrt{5} - 2\sqrt{4}\sqrt{5} = 3\sqrt{5} - 2 \cdot 2\sqrt{5} = 3\sqrt{5} - 4\sqrt{5} = \boxed{-\sqrt{5}}$$

$$6. \sqrt[3]{\frac{x^6}{125y^3}} = \boxed{\frac{x^2}{5y}}$$

7.

(a)

$$\begin{aligned} \frac{36}{x^2-9} &= \frac{2x}{x+3} - 1 \\ (x+3)(x-3) \frac{36}{(x+3)(x-3)} &= (x+3)(x-3) \left[\frac{2x}{x+3} - 1 \right] \\ 36 &= 2x(x-3) - 1(x+3)(x-3) \\ 36 &= 2x(x-3) - (x^2-9) \\ 36 &= 2x^2 - 6x - x^2 + 9 \\ x^2 - 6x - 27 &= 0 \\ (x-9)(x+3) &= 0 \rightarrow x=9, x=-3 \end{aligned}$$

(b) $3 = \sqrt{2x-5}$

$$3^2 = (\sqrt{2x-5})^2$$

$$9 = 2x - 5$$

$$14 = 2x$$

$$\boxed{x=7}$$

But $x = -3$ doesn't satisfy original equation (division by 0), so answer is $\boxed{x=9}$

(c) $2^x = 10$

$$\log(2^x) = \log 10$$

$$x \log 2 = 1$$

$$\boxed{x = \frac{1}{\log 2}}$$

(d) $\log_6(x + 5) = 2$

$$6^2 = x + 5$$

$$36 = x + 5$$

$$\boxed{x = 31}$$

8. $1 - 2(x + 3) - x < 1 - x$

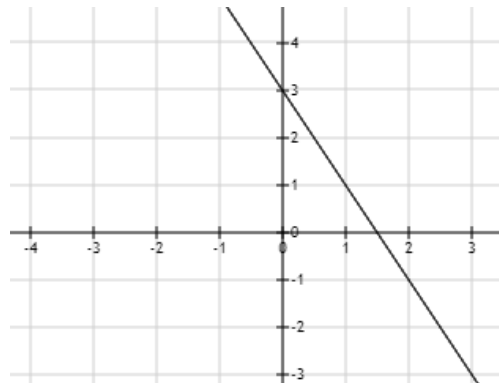
$$1 - 2x - 6 - x < 1 - x$$

$$-5 - 3x < 1 - x$$

$$-2x < 6$$

$$x > -3 \text{ @ } \boxed{(-3, \infty)}$$

9. To graph this line, plot the y -intercept $(0, 3)$ and then use the slope $-2 = \frac{-2}{1}$ to plot several more points by moving down 2/right 1 or up 2/left 1.



10. The slope is $m = \frac{7-5}{-3-1} = \frac{2}{-4} = -\frac{1}{2}$. Now use the point-slope formula $y - y_1 = m(x - x_1)$ with

$(x_1, y_1) = (1, 5)$ to get $y - 5 = -\frac{1}{2}(x - 1)$. This is an acceptable form to leave the answer, or we can

solve for y and write the equation in slope-intercept form: $\boxed{y = -\frac{1}{2}x + \frac{11}{2}}$

11. (a) Substitute $C = 25$ into the equation and find F :

$$F = \frac{9}{5}(25) + 32 = 9 \cdot 5 + 32 = 45 + 32 = 77 \rightarrow \boxed{F = 77^\circ}$$

(b) Substitute $F = 68$ into the equation and solve for C :

$$68 = \frac{9}{5}C + 32$$

$$5(68) = 5\left(\frac{9}{5}C + 32\right)$$

$$340 = 9C + 160$$

$$180 = 9C$$

$$C = 20 \rightarrow \boxed{C = 20^\circ}$$

12. One way to solve this is with the Substitution Method. Solve the first equation for x in terms of y , which gives $x = 3y - 2$, and substitute this expression for x in the second equation:

$$5(3y - 2) + 3y = 17$$

$$15y - 10 + 3y = 17$$

$$18y = 27$$

$$y = \frac{27}{18} = \frac{3}{2}$$

$$\text{Now plug } y = \frac{3}{2} \text{ into } x = 3y - 2 \text{ to get } x = 3\left(\frac{3}{2}\right) - 2 = \frac{9}{2} - 2 = \frac{9}{2} - \frac{4}{2} = \frac{5}{2}.$$

As an ordered pair, the final answer is $\boxed{\left(\frac{5}{2}, \frac{3}{2}\right)}$

13. (a) $f(4) = 2(4) + 5 = 8 + 5 = \boxed{13}$

(b) Solve $2x + 5 = 11$ for x to get $\boxed{x = 3}$

After reading through the solutions, which of the following most closely describes you?

A. I am quite comfortable with all or almost all of these skills.

B. I am comfortable with a lot of these skills but some of the problems would be difficult for me to complete. I could use review on a lot of these topics.

C. I am uncomfortable or unfamiliar with a lot of these skills.

If you chose **A** then you should **Enroll in Math 137**

If you chose **B** then you should **Enroll in Math 137 along with Math 137C, a 2-unit Support Course**. To enroll in this course, you must *first* enroll in a section of Math 137C, then enroll in the corresponding Math 137.

If you chose **C** then you should **Enroll in Math 107 or below**. See the Placement Guide for Math 107: <http://sbcc.edu/assessmentcenter//files/107placementguide.pdf>

Note if you chose A: In Fall 2020, there is an option to take Math 137 and Math 138 simultaneously. Math 138 is the second semester of pre-calculus (focusing largely on trigonometry) that is the prerequisite for Math 150 (calculus for STEM majors). If you feel well-prepared for Math 137 *and* your academic requirements will require you to take Math 138 *and* you would like to get a semester ahead in meeting your math requirements *and* you feel you can handle 9 units of math in one semester, then you should consider this option. Contact the instructor Elizabeth Chisholm, eechisholm@pipeline.sbcc.edu, for more information or to request an Add Code.

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