

**Andrews University**  
**Mathematics Placement Exam (MPE)**  
**Self-test (sample questions)**  
**Answers are on the back page.**

The following is not meant to be an exhaustive review. It is meant to give you an idea of what to expect on the MPE and may be used as an informal guide for further review.

The sections on this self-test correspond to the sections in the MPE.

- Each section on the MPE has 10 multiple-choice questions.
- The entire test has a time limit of 1 hour.
- No calculators are allowed.

You can escape the non-credit review courses by doing well on the first three sections, but all sections will count. To qualify to take Calculus or General Physics, you should do well on all five sections.

**Resources for review:**

- Textbooks & videos: Basic Mathematics, Elementary & Intermediate Algebra, and College Algebra textbooks are on reserve at the Circulation Desk in the James White library. Also, the Media Center on the upper floor of the library has many videos and high school textbooks.
- Try these web sites for math review:  
<http://www.khanacademy.org> (short videos on many topics)  
<http://www.wtamu.edu/academic/anns/mps/math/mathlab/>  
<http://www.uiowa.edu/~examserv/mathmatters/index.html>  
<http://www.algebrahelp.com>  
<http://www.purplemath.com/index.htm> (Try the “How do you really do this stuff?” link)  
<http://www.math.com>  
<http://www.sosmath.com/index.html>

**SECTION 1 - Arithmetic**

1.  $\frac{5}{7} + \frac{3}{4} = \underline{\hspace{2cm}}$

2.  $5\frac{1}{3} - 3\frac{1}{5} = \underline{\hspace{2cm}}$

3.  $7.11 - 4.326 = \underline{\hspace{2cm}}$

4.  $0.41 \times 0.72 = \underline{\hspace{2cm}}$

5. A merchant marks up an item that he purchased at wholesale for \$6.00 by 35%. What is the selling price?

## SECTION 2 - Algebra I

1. If  $\frac{3}{x} = \frac{4}{7}$ , then  $x =$  \_\_\_\_\_.
2. Factor:  $x^2 - 5x + 6$
3. Solve for  $x$ :  $7 < 3x + 4$
4.  $t^{-5} \times t^8 =$  \_\_\_\_\_
5. If  $|(x - 4)| = 2$ , what are the possible values for  $x$ ?

## SECTION 3 - Algebra II

1. Factor completely:  $16y^4 - 81$
2. Solve for  $x$ :  $x^2 + 2x + 4 = 0$
3. Simplify:  $\frac{x^2 - 36}{4x + 8} \div \frac{x + 6}{3x + 6}$
4. Solve for  $x$ :  $\sqrt{x + 6} - 4 = 12$
5. Find a pair  $(x, y)$  of numbers on the graph of  $3x - 5y = 7$ .

## SECTION 4 - Precalculus I

1. Let  $f(x) = \frac{x^2 - 3}{2x}$ . Then  $f(-2) = \underline{\hspace{2cm}}$ .
2. The domain of  $g(x) = \frac{3}{\sqrt{x-7}}$  is  $\underline{\hspace{2cm}}$ .
3. The line  $3x - 2y + 7 = 0$  is perpendicular to the line  $6x + Ay - 4 = 0$ . Find  $A$ .
4. Is the function  $f(x) = 3(x - 5)^2$  increasing or decreasing at  $x = 2$ ?
5. A mechanic is working on a car with a 10 liter cooling system. The cooling system is full of a mixture of 80% water and 20% antifreeze. He wants to drain out part of the mixture and add pure antifreeze to obtain a 50% antifreeze mixture. What is the minimum amount he needs to drain from the radiator and replace with pure antifreeze?

## SECTION 5 - Precalculus II

1.  $x = \log_7(1/49)$ . Find  $x$ .
2. Solve the system of equations:
$$\begin{aligned}x + 3y &= 7 \\4x + 2y &= -2\end{aligned}$$
3. Simplify: 
$$\frac{\sec \beta - \cos \beta}{\sin^2 \beta}$$
4. a.  $\pi/6$  radians =  $\underline{\hspace{2cm}}$  degrees  
b.  $\sin(\pi/6) = \underline{\hspace{2cm}}$
5. Find a number  $x$  with  $\pi/2 < x < 3\pi/2$ , such that  $\tan x = 1$ .

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**Answers to Self-test Questions**

**SECTION 1 – Arithmetic**

1.  $\frac{41}{28}$     2.  $\frac{32}{15}$  or  $2\frac{2}{15}$     3. 2.784    4. 0.2952    5. \$8.10

**SECTION 2 – Algebra I**

1.  $\frac{21}{4}$     2.  $(x-2)(x-3)$     3.  $x > 1$     4.  $i^3$     5. 6, 2

**SECTION 3 – Algebra II**

1.  $(2y-3)(2y+3)(4y^2+9)$     2.  $-1 + i\sqrt{3}, -1 - i\sqrt{3}$     3.  $3(x-6)/4$     4. 250  
5.  $(0, -7/5)$  or any other pair of numbers which when substituted makes the equation true.

**SECTION 4 – Precalculus I**

1.  $-1/4$     2. The set of all  $x > 7$     3.  $A = 9$     4. decreasing    5. 3.75 liters

**SECTION 5 – Precalculus II**

1.  $-2$     2.  $x = -2, y = 3$     3.  $1/\cos \beta$     4. a. 30 degrees; b.  $1/2$     5.  $x = 5\pi/4$

If you missed any questions in section 1, you should review Arithmetic.

If you missed very many questions in sections 2 and 3 you should review Algebra.

To be ready to take Calculus or General Physics you should do very well on all sections. You may wish to review Precalculus.

The terms and symbols used in any section that is important for your purposes should be familiar to you. If they are not, you should do some serious review.