

# Mathematics Placement Exam

## Sample Problems and General Information

The Math Placement Exam (MPE), or COMPASS test, is a computerized exam produced by the American College Testing (ACT) company. The exam usually takes about one hour to complete if trying to place into Calculus 1, or about 30 minutes otherwise. The MPE is an adaptive test; this means that the skill level of the questions vary depending on whether the previous questions are answered correctly or not.

The questions on the Math Placement Exam cover the following skill levels:

- Arithmetic
- Elementary Algebra
- Intermediate Algebra
- College Algebra
- Trigonometry

The sample questions that follow include 12 problems from each skill level. If you can correctly answer 70% of the problems in a skill level, then your preparation in that skill level is probably adequate. *Please be aware that on an actual exam, you may not see 12 questions from each skill level, due to the adaptive nature of the exam.*

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Enrollment in the following UW courses requires placement as indicated:

<b>Course</b>	<b>MPE Level</b>
Math 0900 <i>Pre-Algebra</i> (non-credit)	0
Math 0921 <i>Basics of Algebra</i> (non-credit)	1
Math 0925 <i>Algebra Review</i> (non-credit)	2
Math 1000 <i>Problem Solving</i>	2
Math 1400 <i>College Algebra</i>	3
Math 1450 <i>Algebra &amp; Trigonometry</i>	3
Math 1050 <i>Finite Math</i>	4
Math 1405 <i>Trigonometry</i>	4
Math 2350 <i>Business Calculus</i>	4
Math 2200 <i>Calculus I</i>	5
Biol 1010	2
Chem 1000 and 1020	3
Phys 1050 and 1090	3
Stat 2000 and 2050 and 2070	4

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The exam is given every Monday afternoon during the Fall & Spring semesters (except holidays). Extra exams are given at the beginning of each semester and during the summer. No registration is necessary, but you must bring a photo I.D. and \$15.00. Almost any calculator is allowed (exceptions are the TI-92 and TI-Voyager, but the TI-89 is OK).

For more information, either go to <http://math.uwyo.edu/CAMP/prereq.html> or contact David Anton (Ross Hall 030 / 307-766-6577 / [danton@uwyo.edu](mailto:danton@uwyo.edu))

**MATH PLACEMENT EXAM - COMPASS**  
**Sample Problems**

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*NUMERICAL SKILLS*

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1.  $8 - (5 - 11) =$

- a. 24                      b. 2                      c. 14                      d. -8                      e. 5

2.  $5.2 - 3.6 =$

- a. 5.56                      b. 5.236                      c. 5.04                      d. 5.164                      e. 1.6

3.  $\frac{3}{5} + \frac{1}{4} =$

- a.  $\frac{4}{9}$                       b.  $\frac{17}{20}$                       c.  $\frac{7}{20}$                       d.  $\frac{7}{10}$                       e.  $\frac{1}{2}$

4.  $\frac{|-6| + |8|}{|-2|} =$

- a. -1                      b. 1                      c. 2                      d. 7                      e. 10

5.  $6 - \frac{2}{3} =$

- a.  $\frac{20}{3}$                       b.  $5\frac{2}{3}$                       c.  $\frac{16}{3}$                       d.  $\frac{31}{6}$                       e.  $4\frac{2}{3}$

6. At noon the temperature was  $60^{\circ}\text{F}$ . A cold front passed and the temperature dropped  $17^{\circ}$  in two hours. The temperature at 2 P.M. was

- a.  $53^{\circ}$                       b.  $37^{\circ}$                       c.  $43^{\circ}$                       d.  $26^{\circ}$                       e.  $77^{\circ}$

7.  $(-2) \times 5 + (-8 \div 4) + 15 =$

- a. 17                      b. -27                      c. 23                      d. 3                      e. 1

8. If the fractions  $\frac{10}{4}$ ,  $\frac{16}{32}$ ,  $\frac{4}{5}$ , and  $\frac{28}{7}$  are all changed to decimal equivalents, and the sum of the first two numbers is then subtracted from the sum of the last 2 numbers, what is the result?

- a. 0.45                      b. 1.8                      c. 2.7                      d. 4.05                      e. 7.8

9.  $1.1 + 5.3 - 4.8 =$

- a. 1.8                      b. 9.0                      c. 1.6                      d. 11.2                      e. -9

10. What is 10% of 30% of 20,000?

- a. 400                      b. 600                      c. 2,000                      d. 4,000                      e. 6,000

11. A product that was originally priced at \$2,000 had its price increased on June 1 by 5%. On December 1 the price was increased by 5% of the new June price. By how many dollars did the price increase on December 1?

- a. \$5.00                      b. \$10.05                      c. \$100.00                      d. \$105.00                      e. \$200.00

12. A jar filled with water weighs 10 pounds. After  $\frac{1}{2}$  of the water is poured out, the jar and the remaining water together weigh 5.5 pounds. What is the weight, in pounds, of the jar?

- a. 0.5                      b. 1.0                      c. 2.0                      d. 2.25                      e. 2.75

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*ELEMENTARY ALGEBRA*

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1.  $\frac{73.5 - 4.2}{.3} =$

- a. 25.9                      b. 23.1                      c. 259                      d. 59.5                      e. 231

2.  $(2 + \sqrt{3})(1 - \sqrt{3}) =$

- a.  $\sqrt{3} - 1$                       b.  $1 - \sqrt{3}$                       c.  $-1 - \sqrt{3}$                       d.  $2 + 5\sqrt{3}$                       e.  $5 + 3\sqrt{3}$

3.  $\sqrt[3]{\frac{27}{125}} =$

a.  $\frac{9}{41}$

b.  $\frac{3}{5}$

c.  $\frac{3}{7}$

d.  $\frac{9}{5}$

e.  $\frac{3}{25}$

4.  $2\sqrt{72} - 4\sqrt{2} + \sqrt{18} =$

a.  $8\sqrt{2} - 2\sqrt{3}$

b.  $9\sqrt{2} - \sqrt{32}$

c.  $5\sqrt{2}$

d.  $8\sqrt{2} + 4\sqrt{3}$

e.  $11\sqrt{2}$

5.  $\frac{10x^2 + 5x}{5x} =$

a.  $2x + 5x$

b.  $10x^2 + 1$

c.  $2x + 1$

d.  $2x^2 + 5$

e.  $10x + 1$

6.  $2x^2 - 11x + 15 =$

a.  $(2x - 3)(x - 5)$    b.  $(x - 5)(x - 3)$    c.  $(x + 3)(2x + 5)$

d.  $(2x - 5)(x + 3)$    e.  $(2x - 5)(x - 3)$

7. If  $4 \times 10^K = .0004$  then  $K =$

a.  $-2$

b.  $5$

c.  $3$

d.  $-5$

e.  $-4$

8. If  $x = -4$ , then  $2x^2 - 3x - 5 =$

a.  $-25$

b.  $39$

c.  $49$

d.  $13$

e.  $-15$

9.  $\frac{(3x^{-3}y^2)^2}{xy^3} =$

a.  $\frac{9y}{x^4}$

b.  $\frac{3y}{x^2}$

c.  $\frac{9x^5}{y}$

d.  $9x^2y$

e.  $\frac{9y}{x^7}$

10. If  $x = -1$  and  $y = -3$  then  $y + xy + 4 =$
- a. 10                      b. 4                      c.  $-1$                       d.  $-2$                       e.  $-3$
11. Which of the following expressions represents the result of decreasing a number  $x$  by 9 and then multiplying that new number by 5?
- a.  $5(9) - x$               b.  $5x - 9$               c.  $9 - 5x$               d.  $5(9 - x)$               e.  $5(x - 9)$
12. If  $2x - 3 = 5$ , then  $x =$
- a.  $\frac{5 - 3}{2}$               b.  $\frac{5 + 3}{2}$               c.  $\frac{5}{2} - 3$               d.  $\frac{5}{2} + 3$               e.  $2(5 + 3)$

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*INTERMEDIATE ALGEBRA*

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1.  $(3.5) \times 10^{-3} \times 2 \times 10^4 =$
- a.  $4 \times 10^{-12}$               b.  $7 \times 10^{-12}$               c.  $6 \times 10$               d.  $7 \times 10^{-1}$               e.  $7 \times 10$
2. If  $|2x - 3| \leq 5$  then
- a.  $-2 \leq x \leq 8$     b.  $1 \leq x \leq 4$     c.  $-2 \leq x \leq 4$
- d.  $-1 \leq x \leq 4$     e.  $-2 \leq x \leq 2$
3. Given  $3x - 5 = 2y$  and  $y = 1 - z$ , then  $x =$
- a.  $2 - \frac{z}{3}$               b.  $\frac{7}{3} - \frac{z}{3}$               c.  $2 + \frac{z}{3}$               d.  $\frac{7}{3} - \frac{2}{3}z$               e.  $7 + \frac{2}{3}z$
4.  $32x^3 - 8x^2 - 40x =$
- a.  $8x^2(4x + 4)$               b.  $8x(4x^2 - x + 5)$     c.  $8(x^3 - x^2 - 5)$
- d.  $8x(4x^2 - x - 5)$     e.  $8x(4x^2 + x - 5)$
5. What is the distance between  $(2, -3)$  and  $(1, 2)$ ?
- a.  $\sqrt{24}$               b.  $\sqrt{26}$               c.  $\sqrt{34}$               d.  $\sqrt{2}$               e.  $\sqrt{10}$

6. If  $\frac{10}{\sqrt{x^2 + 25}} = 2$  then  $x =$
- a. 0                      b. 5                      c.  $-5$                       d. 3                      e. 4
7. In a group of 40,000 people chosen for a survey, 25% were from the northeast and 15% of those were from Vermont. How many were from Vermont?
- a. 6,000                      b. 150                      c. 10,000                      d. 1500                      e. 600
8. Given  $a = 2$  and  $b = -3$ ,  $2a + 3ab - b^2 =$
- a. 31                      b. 5                      c.  $-23$                       d. 13                      e.  $-6$
9. If  $3x - 2y = 12$ , the slope of the line is
- a.  $\frac{2}{3}$                       b. 4                      c. 6                      d.  $\frac{3}{2}$                       e.  $-\frac{3}{2}$
10. If  $3^x = \frac{1}{9}$ , then  $x =$
- a. 2                      b.  $-1$                       c. 1.5                      d. .5                      e.  $-2$
11. If, for all  $a$  and  $k$ ,  $x + a - k = 0$ , then  $x =$
- a. 0                      b.  $-a - k$                       c.  $a - k$                       d.  $a + k$                       e.  $k - a$
12. In the standard coordinate plane, what is the distance between the points with  $(x, y)$  coordinates  $(5, 0)$  and  $(0, \sqrt{5})$ ?
- a.  $\sqrt{5}$                       b.  $5 - \sqrt{5}$                       c.  $\sqrt{30}$                       d.  $5 + \sqrt{5}$                       e.  $5\sqrt{5}$

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*COLLEGE ALGEBRA*

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1. If  $i = \sqrt{-1}$ , then  $(3 - 2i)(5 + i) =$
- a.  $13 - 7i$                       b.  $13 - 13i$                       c.  $17 + 7i$                       d.  $15 + 2i$                       e.  $17 - 7i$

2.  $\log_5 125 =$
- a. 25                      b. 2                      c. 4                      d. 3                      e. -3
3. If the point  $(2, 4)$  lies on the graph of  $f$  then the graph of  $f^{-1}$  must contain
- a.  $(-2, -4)$               b.  $(2, \frac{1}{4})$               c.  $(\frac{1}{2}, \frac{1}{4})$               d.  $(4, 2)$               e.  $(4, \frac{1}{2})$
4. If  $f(x) = kx^2 - 3$  and  $f(2) = 5$  then  $f(-1) =$
- a.  $\frac{1}{2}$                       b. -5                      c. -1                      d. -4                      e. -2
5. If  $9! = N \cdot 6!$ , then  $N =$
- a. 7                      b. 504                      c. 56                      d. 72                      e. 8
6. If  $a \circ b$  is defined to be  $2a - 3b$  and  $5 \circ x = 1$ , then  $x =$
- a. 2                      b. -1                      c. 3                      d. 6                      e. -2
7. If  $f(x) = 5 - 2x$  and  $g(x) = x + 1$  then  $f(g(3)) =$
- a. -1                      b. 4                      c. 1                      d. -3                      e. 2
8. The first three terms of an arithmetic sequence are 3, 4.5, 6. The next term should be
- a. 9                      b. 8                      c. 7.5                      d. 12                      e. 10
9. Given  $A = \begin{bmatrix} 1 & 0 \\ 2 & -4 \end{bmatrix}$  and  $B = \begin{bmatrix} -2 & 1 \\ 1 & 1 \end{bmatrix}$  then  $3A + 2B =$
- a.  $\begin{bmatrix} -1 & 0 \\ 8 & 10 \end{bmatrix}$     b.  $\begin{bmatrix} -12 & 0 \\ 12 & -24 \end{bmatrix}$     c.  $\begin{bmatrix} -1 & 2 \\ 8 & -10 \end{bmatrix}$     d.  $\begin{bmatrix} 5 & 2 \\ 4 & -10 \end{bmatrix}$     e.  $\begin{bmatrix} -1 & 0 \\ 12 & -24 \end{bmatrix}$

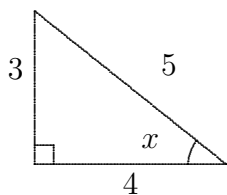
10. If  $V = \pi r^2 h$  and  $r = 5$ ,  $V = 75\pi$ , then  $h =$
- a. 1                      b. 3                      c. 2                      d. 5                      e. 4
11. If the operation  $@$  is defined by  $x@y = (x + y)(x - y)$ , what is the value of  $5@3$ ?
- a. -16                      b. 2                      c. 8                      d. 15                      e. 16
12. If  $f(x) = x^2 + 3$  and  $g(x) = x^3 - 1$ , then  $f(g(2)) = ?$
- a. 7                      b. 14                      c. 52                      d. 84                      e. 342

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*TRIGONOMETRY*

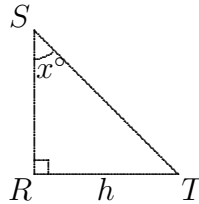
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1. A right triangle has one leg of length 5 and the hypotenuse has length 13. The other leg has length
- a. 17                      b. 8                      c. 18                      d. 12                      e. 10
2. Given the triangle below,  $\sin x =$



- a.  $\frac{3}{4}$                       b.  $\frac{3}{5}$                       c.  $\frac{4}{5}$                       d.  $\frac{5}{3}$                       e.  $\frac{5}{4}$
3. If  $\cos x = 1/2$  and  $0 < x < \pi/2$ , then  $\sin x =$
- a.  $\frac{1}{3}$                       b.  $\frac{2}{3}$                       c. 2                      d.  $\frac{3}{4}$                       e.  $\frac{\sqrt{3}}{2}$
4. The period of  $\sin(\pi x)$  is
- a.  $2\pi$                       b.  $\frac{1}{2}$                       c.  $\frac{\pi}{2}$                       d. 2                      e. 4

5. If  $\cos \theta = \frac{4}{5}$  and  $\sin \theta = \frac{3}{5}$ , then  $\cos(2\theta) =$
- a.  $\frac{1}{5}$                       b.  $\frac{3}{25}$                       c.  $\frac{7}{25}$                       d.  $\frac{8}{5}$                       e.  $\frac{2}{3}$
6. The ratio of the length of a diagonal of a square to the perimeter of the square is
- a.  $\frac{1}{4}$                       b.  $\frac{1}{2}$                       c.  $\frac{\sqrt{2}}{4}$                       d.  $\frac{\sqrt{2}}{2}$                       e.  $\frac{\sqrt{2}}{3}$
7. If the angle of inclination of a line is  $\frac{\pi}{3}$ , the slope of the line is
- a.  $\frac{1}{2}$                       b.  $\frac{3}{4}$                       c.  $\frac{2}{\sqrt{3}}$                       d.  $\sqrt{3}$                       e.  $\frac{1}{\sqrt{3}}$
8. If  $\tan \theta = 0$  and  $-\frac{\pi}{2} \leq \theta \leq \frac{\pi}{2}$  then  $\sec \theta =$
- a. 1                      b.  $\frac{1}{2}$                       c.  $\sqrt{3}$                       d.  $\frac{3}{4}$                       e.  $\frac{\sqrt{3}}{2}$
9. The ratio of the circumference of a circle to the radius is
- a.  $\frac{\pi}{2}$                       b.  $\pi$                       c.  $\frac{\pi}{4}$                       d.  $2\pi$                       e.  $\frac{3\pi}{4}$



10. In the right triangle, what is the length of  $\overline{RS}$ ?
- a.  $h \csc x$                       b.  $h \cot x$                       c.  $h \sec x$                       d.  $h \sin x$                       e.  $h \tan x$
11. What are the rectangular coordinates of the point with polar coordinates  $(2, -60^\circ)$
- a.  $(1, -\sqrt{3})$                       b.  $(2, -\frac{\sqrt{3}}{2})$                       c.  $(2, -\frac{1}{2})$                       d.  $(\sqrt{3}, -1)$                       e.  $(\sqrt{3}, -\frac{1}{2})$

12. Nadine places a 16-foot ladder against the side of her house so that the ladder makes a  $60^\circ$  angle with the ground. How high on the house, in feet, does the top of the ladder reach?

a. 8

b.  $8\sqrt{2}$

c.  $8\sqrt{3}$

d. 16

e.  $16\sqrt{3}$

## ANSWER KEY

### NUMERICAL SKILLS

1. **C** 14      2. **E** 1.6      3. **B**  $\frac{17}{20}$       4. **D** 7      5. **C**  $\frac{16}{3}$   
6. **C**  $43^\circ$       7. **D** 3      8. **B** 1.8      9. **C** 1.6      10. **B** 600  
11. **D** \$105.00      12. **B** 1.0

### ELEMENTARY ALGEBRA

1. **E** 231      2. **C**  $-1 - \sqrt{3}$       3. **B**  $\frac{3}{5}$       4. **E**  $11\sqrt{2}$       5. **C**  $2x + 1$   
6. **E**  $(2x - 5)(x - 3)$       7. **E** -4      8. **B** 39      9. **E**  $\frac{9y}{x^7}$       10. **B** 4  
11. **E**  $5(x - 9)$       12. **B**  $\frac{5 + 3}{2}$

### INTERMEDIATE ALGEBRA

1. **E**  $7 \times 10$       2. **D**  $-1 \leq x \leq 4$       3. **D**  $\frac{7}{3} - \frac{2}{3}z$       4. **D**  $8x(4x^2 - x - 5)$       5. **B**  $\sqrt{26}$   
6. **A** 0      7. **D** 1500      8. **C** -23      9. **D**  $\frac{3}{2}$       10. **E** -2  
11. **E**  $k - a$       12. **C**  $\sqrt{30}$

### COLLEGE ALGEBRA

1. **E**  $17 - 7i$       2. **D** 3      3. **D** (4, 2)      4. **C** -1      5. **B** 504  
6. **C** 3      7. **D** -3      8. **C** 7.5      9. **C**  $\begin{bmatrix} -1 & 2 \\ 8 & -10 \end{bmatrix}$       10. **B** 3  
11. **E** 16      12. **C** 52

*TRIGONOMETRY*

1. **D** 12      2. **B**  $\frac{3}{5}$       3. **E**  $\frac{\sqrt{3}}{2}$       4. **D** 2      5. **C**  $\frac{7}{25}$
6. **C**  $\frac{\sqrt{2}}{4}$       7. **D**  $\sqrt{3}$       8. **A** 1      9. **D**  $2\pi$       10. **B**  $h \cot x$
11. **A**  $(1, -\sqrt{3})$       12. **C**  $8\sqrt{3}$