What to Expect on the Placement Exam

The ACCUPLACER placement exam is an adaptive test created by the College Board Educational Testing Service. This document was created to give prospective CLC student and other interested parties an overview of how the placement exam works and the types of questions one might expect to see on it.

General Information:
- The exam is computerized and is not timed.
- Questions are presented in a multiple-choice format. No partial credit is awarded.
- Scratch paper is provided.
- Handheld calculators are not allowed. The testing software provides a pop-up calculator for use on some questions.
- There is a limit to the number of times a student may take the placement exam.

CLC Mathematics department wants each student to do as well as possible on the placement exam and makes the following recommendations:

- Prepare for the exam. Don’t take it cold. Studying for the exam may decrease the number of math classes you are required to take. Free practice questions/answers are available online at the Accuplacer website, located at https://accuplacer.collegeboard.org/students. Other review materials are available at the Math Center. (847) 543-2449
- Take the exam when you are rested and refreshed.
- Allow plenty of time for testing so that you can relax and fully concentrate on what you are doing.
- Triple-check answers before moving on to the next question. The computer only knows if your answer is right or wrong. It cannot tell the difference between a careless mistake, a minor error, or a major error.
- Stay calm if you don’t know the answer to a question. Remember that the placement test is adaptive and is used to test many levels of mathematics. It increases or decreases the level of the questions based on your previous answers.

A student desiring to place into Basic Algebra (MTH 102) will typically be asked questions at the arithmetic and algebra/pre-algebra level. If a student performs well at these levels the test may branch to algebra problems to determine whether higher level placement is appropriate.

NOTE: The examples provided below are not intended to be a complete list of problem types. The examples are simply illustrations of problem types.

1. The student must be able to demonstrate sense of order relationships and the relative size of signed numbers. The student must be able to order rational numbers from least to greatest.

   Example: Order the following numbers from lowest to highest.
   
   0.8  -3/4  -0.342  0.79  7/8  -1

2. The student must be able to identify place values. The student must be able to translate numbers to and from numeral form and written form.

   Example: Give the numeral form of “twenty thousand forty and six thousandths.”
3. The student must be able to round numbers to a given place value. The student must be able to use rounding to estimate sums, differences, products, and quotients.

Example: Round the number 29,697.18235 to the nearest ten, nearest thousand, and nearest hundredth

4. The student must be able to demonstrate the ability to evaluate algebraic expressions.

Examples:
   a. Evaluate \(3x^2 + 2x - 7\) when \(x = 2\).
   b. If \(N = -1.4\), evaluate \(N^2 - N\).

5. The student must be able to use the order of operations to simplify an expression involving signed numbers or decimals.

Examples: Simplify the following by performing the indicated operations.
   a. \(-5 [7 - (3 - 1)]\)
   b. \((3000 - 200) \div 2 + 3^2\)
   c. \(2(-3)^2 + 5[-3^2 - (-5)]\)
   d. \((-3)(-4) + (-5)(2)\)

6. The student must understand scientific notation and solve problems involving scientific notation.

Example: Order the following numbers from lowest to highest.

\[6.17 \times 10^{-3} \quad 4.3 \times 10^4 \quad 6.23 \times 10^{-3} \quad 5.02 \times 10^{-5} \quad 4.19 \times 10^4\]

7. The student must be able to demonstrate the ability to write fractions in lowest terms and to perform basic arithmetic operations with fractions.

Examples: Simplify the following by performing the indicated operations and writing the answer in lowest terms.
   a. \(\frac{4}{3} - \frac{1}{2}\)
   b. \(\frac{2 + 3}{2 - 6}\)
   c. \(\frac{2}{5} \div \frac{7}{18}\)

8. The student must be able to demonstrate the ability to solve problems and convert measurements within the metric system, within the US system, and between the US and metric systems.

Examples:
   a. How many square feet are in a square yard?
   b. How many centigrams are in 57 milligrams?
   c. Using the conversion factor 1 inch = 2.54 centimeters, convert 19.304 centimeters to inches.

9. The student must be able to determine the perimeter and area of basic geometric figures.

Examples:
   a. A circle has a radius of 1.3 inches. Calculate the area and circumference of the circle.
   b. A triangle has a base of 5 feet and a height of 5/8 feet. What is its area?
10. The student must be able to demonstrate the ability to convert between decimals, fractions, and percentages.

   **Example:** Convert $2 \frac{2}{5}$ to decimal form and to percent form.

11. The student must be able to calculate the mean, median, and mode of a data set.

   **Example:** Consider the data set 6, 9, 11, 18, 27, 31. Find the mean, median, and mode of this data set.

12. The student must be able to demonstrate the ability to simplify and combine like terms in algebraic expressions.

   **Example:** Simplify $8 + 5.7x + x^2 - 3.9x - 7x + 9.97x^2 - 2.005$

13. The student must be able to demonstrate the ability to solve problems involving ratio, proportion, and percent.

   **Examples:**
   a. Juan spent six hours driving yesterday. What fraction of the day did Juan spend driving?
   b. Grandma’s muffin recipe uses $1 \frac{3}{4}$ cups of flour to make 12 muffins. How much flour is in one muffin?
   c. The ratio of copper to zinc in a certain alloy is 5 to 3. If 40 grams of copper are used, how many grams of zinc are needed to make this alloy?
   d. 73 is 20% of what number?
   e. What percent of 50 is 23?
   f. To celebrate its 28th anniversary, Kim’s Department Store is having a 28% off sale. The sale price of a pair of leather sandals is $14.56. What was the original price?
   g. A sofa is advertised to be on sale at 20% off its regular price of $340.00. Find the sale price.

14. The student must be able to solve simple algebra equations using the addition and multiplication properties.

   **Examples:** Solve the following equations for $x$.
   a. $6 - x = 12$
   b. $\frac{x}{3} = \frac{4}{7}$
   c. $3x + 7 = -6$

15. The student must be able to demonstrate the ability to solve basic story problems.

   **Examples:**
   a. A square has an area of 16 square meters. What is the length of one of its sides?
   b. Write the following English sentence as an algebraic equation, “Six more than half a number is the same as five less than the number.”
What to Expect on the Placement Exam

Placement into:
MTH 102 or MTH 105
Solutions

1. The student must be able to demonstrate sense of order relationships and the relative size of signed numbers. The student must be able to order rational numbers from least to greatest.

Example: Order the following numbers from lowest to highest.

| 0.8 | -3/4 | -0.342 | 0.79 | 7/8 | -1 |

Answer: -1, -3/4, -0.342, 0.79, 0.8, 7/8

2. The student must be able to identify place values. The student must be able to translate numbers to and from numeral form and written form.

Example: Give the numeral form of “twenty thousand forty and six thousandths.”

Answer: 20,040.006

3. The student must be able to round numbers to a given place value. The student must be able to use rounding to estimate sums, differences, products, and quotients.

Example: Round the number 29,697.18235 to the nearest ten, nearest thousand, and nearest hundredth

Answers: Nearest ten: 29,700 Nearest thousand: 30,000 Nearest hundredth: 29,697.18

4. The student must be able to demonstrate the ability to evaluate algebraic expressions.

Examples:

a. Evaluate $3x^2 + 2x - 7$ when $x = 2$.

Answers: $3(2)^2 + 2(2) - 7 = 9$

b. If $N = -1.4$, evaluate $N^2 - N$.

Answers: $(-1.4)^2 - (-1.4) = 3.36$

d. Simplify $(-3)(-4) + (-5)(2)$

Answers: $(-3)(-4) + (-5)(2) = 12 + (-10) = 2$

5. The student must be able to use the order of operations to simplify an expression involving signed numbers or decimals.

Examples:

a. Simplify $-5 [7 - (3 - 1)]$


b. Simplify $2(-3)^2 + 5[-3^2 -(-5)]$

Answers: $2(-3)^2 + 5[-3^2 - (-5)] = 2(9) + 5[-9 + 5] = 18 + 5[-4] = -2$

c. Simplify $(3000 - 200) ÷ 2 + 3^2$

Answers: $(3000 - 200) ÷ 2 + 3^2 = 2800 ÷ 2 + 9 = 1400 + 9 = 1409$

d. Simplify $(-3)(-4) + (-5)(2)$

Answers: $(-3)(-4) + (-5)(2) = 12 + (-10) = 2$
6. The student must be understand scientific notation and solve problems involving scientific notation.

Example: Order the following numbers from lowest to highest.

\[ 6.17 \times 10^{-3} \quad 4.3 \times 10^{4} \quad 6.23 \times 10^{-3} \quad 5.02 \times 10^{-5} \quad 4.19 \times 10^{4} \]

Answer: \[ 5.02 \times 10^{-5} \quad 6.17 \times 10^{-3} \quad 6.23 \times 10^{-3} \quad 4.19 \times 10^{4} \quad 4.3 \times 10^{4} \]

7. The student must be able to demonstrate the ability to write fractions in lowest terms and to perform basic arithmetic operations with fractions.

Examples:

a. \[ \frac{4}{3} - \frac{2}{1} \]

Answers:

\[ \frac{4}{3} - \frac{2}{1} = \frac{13}{3} - \frac{5}{2} = \frac{26}{6} - \frac{15}{6} = \frac{11}{6} = \frac{5}{6} \]

b. \[ \frac{2+3}{2-6} \]

\[ \frac{2+3}{2-6} = \frac{5}{-4} = -\frac{1}{4} \]

c. \[ \frac{2\frac{4}{5} + \frac{7}{18}}{} \]

\[ \frac{2\frac{4}{5} + \frac{7}{18}}{} = \frac{14}{5} \cdot \frac{18}{7} = \frac{2}{5} \cdot \frac{18}{5} = \frac{36}{25} = \frac{7}{1\frac{1}{5}} \]

8. The student must be able to demonstrate the ability to solve problems and convert measurements within the metric system, within the US system, and between the US and metric systems.

Examples:

a. How many square feet are in a square yard?

Answer: 3 feet x 3 feet = 9 square feet

b. How many centigrams are in 57 milligrams?

Answer: \[ \frac{57 \text{ milligrams}}{1} \times \frac{1 \text{ centigram}}{10 \text{ milligrams}} = 5.7 \text{ milligrams} \]

c. Using the conversion factor 1 inch = 2.54 centimeters, convert 19.304 centimeters to inches.

Answer: \[ \frac{19.304 \text{ centimeters}}{1} \times \frac{1 \text{ inch}}{2.54 \text{ centimeters}} = 7.6 \text{ inches} \]

9. The student must be able to determine the perimeter and area of basic geometric figures.

Examples:

a. A circle has a radius of 1.3 inches. Calculate the area and circumference of the circle.

Answer: \[ A = \pi r^2 = \pi (1.3)^2 = 1.69 \pi \approx 5.3 \text{ square inches} \]

\[ C = 2\pi r = 2\pi (1.3) = 2.6 \pi \approx 8.2 \text{ inches} \]

b. A triangle has a base of 5 feet and a height of 5/8 feet. What is its area?

Answer: \[ A = \frac{1}{2} bh = \frac{1}{2} \left( 5 \right) \left( \frac{5}{8} \right) = \frac{25}{16} = \frac{9}{16} \text{ square feet} \]
10. The student must be able to demonstrate the ability to convert between decimals, fractions, and percentages.

**Example:** Convert \( \frac{2}{5} \) to decimal form and to percent form.

**Answer:** \( \frac{2}{5} = \frac{12}{5} = 2.4 = 240\% \)

11. The student must be able to calculate the mean, median, and mode of a data set.

**Example:** Consider the data set 6, 9, 11, 18, 27, 31. Find the mean, median, and mode of this data set.

**Answer:**

- **Mean:** \( \frac{6 + 9 + 11 + 18 + 27 + 31}{6} = \frac{102}{6} = 17 \)
- **Median:** \( \frac{11 + 18}{2} = \frac{29}{2} = 14.5 \)

The mode is the value that occurs most often. Since all values occur with the same frequency, this data set has no mode.

12. The student must be able to demonstrate the ability to simplify and combine like terms in algebraic expressions.

**Example:** Simplify \( 8 + 5.7x + x^2 - 3.9x - 7x + 9.97x^2 - 2.005 \)

**Answer:** \( 10.97x^2 - 5.2x + 5.995 \)

13. The student must be able to demonstrate the ability to solve problems involving ratio, proportion, and percent.

**Examples:**

- a. Juan spent six hours driving yesterday. What fraction of the day did Juan spend driving?

  **Answer:** \( \frac{6}{24} = \frac{1}{4} \)

- b. Grandma’s muffin recipe uses \( 1\frac{3}{4} \) cups of flour to make 12 muffins. How much flour is in one muffin?

  **Answer:** \( 1\frac{3}{4} \div 12 = \frac{7}{4} \cdot \frac{1}{12} = \frac{7}{48} \) cup

- c. The ratio of copper to zinc in a certain alloy is 5 to 3. If 40 grams of copper are used, how many grams of zinc are needed to make this alloy?

  **Answer:** \( \frac{5}{3} = \frac{40}{z} \) so \( 5z = 3(40) \). This means that \( z = \frac{120}{5} = 24 \) grams

- d. 73 is 20% of what number?

  **Answer:** \( 73 = 0.2x \) so \( x = \frac{73}{0.2} = 365 \)
e. What percent of 50 is 23?

Answer: \( \frac{23}{50} = \frac{46}{100} = 46\% \)

era]f. To celebrate its 28th anniversary, Kim’s Department Store is having a 28% off sale. The sale price of a pair of leather sandals is $14.56. What was the original price?

Answer: \( 14.56 = (100\% - 28\%)x \) so \( 14.56 = 0.72x \). This gives \( x = \frac{14.56}{0.72} = $20.22 \)

g. A sofa is advertised to be on sale at 20% off its regular price of $340.00. Find the sale price.

Answer: Discount = (0.20)(340) = $68

Sale price = 340 – 68 = $272

14. The student must be able to solve simple algebra equations using the addition and multiplication properties.

Examples: Solve the following equations for \( x \).

a. \( 6 - x = 12 \)

b. \( \frac{x}{3} = \frac{4}{7} \)

c. \( 3x + 7 = -6 \)

Answers:

a. \( 6 - x = 12 \)

\(-x = 12 - 6 \)

\(-x = 6 \)

\( x = -6 \)

c. \( 3x + 7 = -6 \)

\( 3x = -6 - 7 \)

\( 3x = -13 \)

\( x = \frac{-13}{3} = \frac{-4}{3} \)

b. \( \frac{x}{2} + 6 = x - 5 \)

Answer: The formula for the area of a square is \( \text{Area} = (\text{side})^2 \).

Letting \( x \) = the length of a side, we have \( 16 = x^2 \).

So \( x = \sqrt{16} = 4 \) meters.

b. Write the following English sentence as an algebraic equation, “Six more than half a number is the same as five less than the number.”

Answer: \( \frac{x}{2} + 6 = x - 5 \)