

PLACEMENT TEST PREPARATION GUIDE

MATHEMATICS



Taking Your Placement Tests

Are you prepared?

English and math assessment is mandatory for all new students. Taking time to work through this *Placement Test Preparation Guide* will help you

- **be ready to take your math placement test and**
- **be accurately assessed**

resulting in **proper placement in courses that match your skill level.**

ACCUPLACER[®] Mathematics Test

To prepare for the ACCUPLACER[®] math placement test, begin by reviewing the material in this packet. You will find descriptions of the ACCUPLACER[®] math tests, resources, problems with completely worked solutions, and problems for you to work and turn in at the Testing Center of your choice.

ACCUPLACER[®]'s online, adaptive format chooses test questions based on your responses to each question you have already answered. As you work through the test, questions increase or decrease in difficulty depending on your answers. ACCUPLACER[®] tests are untimed, so you can work at a comfortable pace. It is important to give yourself enough time to do your best and complete the test because your results are the key factor in determining the course you will take. You will receive a score report with course placement immediately after you take the test.

Calculators are built into the ACCUPLACER[®] math placement tests, but are only available to use for math questions in which calculation skills are not being assessed. Availability of a handheld calculator to use throughout the test is considered a special accommodation. If you feel you need a special accommodation while testing, you will need to schedule an appointment with an Access advisor. The Access advisor will need documentation, such as a high school IEP, confirming your need for testing accommodations.

If a calculator could be a useful tool, but does not give away a correct answer, the calculator icon will appear in the top right corner of the screen. When you click the icon, the calculator will pop up on the screen. You can move around the calculator, and clicking the "X" in the top right corner will make it disappear.

There are three ACCUPLACER[®] math tests: Arithmetic, Elementary Algebra, and College-Level Math. You will begin with a set of 12 Elementary Algebra questions. Based on your performance in Elementary Algebra, you may be given a set of 17 Arithmetic or 20 College-Level Mathematics questions to answer. The topics included in each test are listed below.

Elementary Algebra

1. Numbers and quantities: Topics include integers and rational numbers, computation with integers and negative rationals, absolute value, and ordering.
2. Algebraic expressions: Topics include evaluation of simple formulas and expressions, adding and subtracting monomials and polynomials, multiplying and dividing monomials and polynomials, evaluating positive rational roots and exponents, simplifying algebraic fractions, and factoring.
3. Problem solving: Topics include translating written phrases into algebraic expressions, solving linear equations and inequalities, quadratic equations (by factoring), and verbal problems presented in an algebraic context.

Arithmetic

1. Operations with whole numbers and fractions: Topics include addition, subtraction, multiplication, division, recognizing equivalent fractions and mixed numbers, and estimating.
2. Operations with decimals and percents: Topics include addition, subtraction, multiplication, and division with decimals; percent problems; recognition of decimals; percent equivalencies; and estimating.
3. Applications and problem solving: Topics include rate, percent and measurement problems; simple geometry problems; and distribution of a quantity into its fractional parts.

College-Level Math

1. Algebraic operations: Topics include simplifying rational algebraic expressions, factoring and expanding polynomials, and manipulating roots and exponents.
2. Solutions of equations and inequalities: Topics include solving linear and quadratic equations and inequalities, systems of equations and other algebraic equations.
3. Coordinate geometry: Topics include plane geometry, the coordinate plane, straight lines, conics, sets of points in the plane, and algebraic function graphs.
4. Functions: Topics include polynomial, algebraic, exponential, and logarithmic functions.
5. Trigonometry: Topics include trigonometric functions.
6. Applications and other topics: Topics include complex numbers, series and sequences, determinants, permutations and combinations, factorials, and word problems.

Resources

You can find links to both the ACCUPLACER® Free Sample Questions and the free Study App for your computer, smartphone, or tablet at <https://accuplacer.collegeboard.org/students>.



You can access hundreds of questions to familiarize yourself with the ACCUPLACER® basic content and experience by using the free Study App. Both the "Sample Test" and "Learn as You Go" Study App features provide hundreds of questions, feedback, and explanations of correct and incorrect answers.

You may also reference these online math resources for additional explanation and practice.

www.patrickjmt.com

www.khanacademy.org

www.hippocampus.org

www.purplemath.com

Once you have completed the Math Placement Test Preparation, you may test at any of the Tri-C testing centers.

Brunswick University Center	BUC 214	216-987-3877
Corporate College West	CCW 221	216-987-5888
Eastern Campus	ESS 1108	216-987-2256
Metropolitan Campus	MSS 103	216-987-4311
Western Campus	WTLC GT 115	216-987-5256
Westshore Campus	SHCS 130A	216-987-3888

Problem #1 (Elementary Algebra)

What is the value of the expression $2x^2 + 3xy - 4y^2$ when $x = 2$ and $y = -4$

- A. -80
- B. -32
- C. 32
- D. 80

Solution

Evaluate a Polynomial in Several Variables

1. Substitute the given value for each variable
2. Perform the resulting computation using the order of operations and rules for signed numbers

When $x = 2$ and $y = -4$, we have

$$\begin{aligned} & 2(2)^2 + 3(2)(-4) - 4(-4)^2 \\ &= 2(4) + 3(2)(-4) - 4(16) \\ &= 8 - 24 - 64 \\ &= -80 \end{aligned}$$

Simplify exponents
Multiply
Combine terms using addition/subtraction

Thus, our answer is A. -80

Problem #2 (Arithmetic)

All of the following are ways to write 25 percent of N EXCEPT

- A. $(0.25)N$
- B. $\frac{25}{100}N$
- C. $\frac{1}{4}N$
- D. $25N$

Solution

We are looking for the expression that is not equivalent to “25 percent of N.” Note: the word “of” in this context indicates the operation of multiplication

- A. Since 0.25 is the decimal form of 25%, $(0.25)N$ is equivalent to “25% of N.”
- B. Since $\frac{25}{100}$ is the fractional form of 25%, $\frac{25}{100}N$ is equivalent to “25% of N.”
- C. Since $\frac{1}{4}$ is the simplified fractional form of 25%, $\frac{1}{4}N$ is equivalent to “25% of N.”
- D. Since 25 is not equal to 25%, $25N$ is not equivalent to “25% of N.”

Thus, our answer is D. $25N$

Problem #3 (Elementary Algebra)

For what values of x is the value of $x^2 - 6x - 7$ negative?

- A. $-1 < x < 7$
- B. $x < -1$ or $x > 7$
- C. $x = -1$ or $x = 7$
- D. $-1 < x < 7$
- E. For no real numbers x

Solution

To find the values for which $x^2 - 6x - 7$ is negative, we must solve the inequality $x^2 - 6x - 7 < 0$.

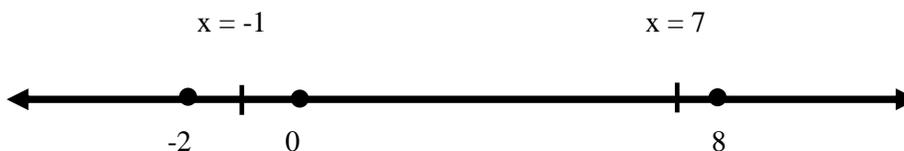
We will use the following steps

1. Solve the associated quadratic equation by factoring to find boundary points*
2. Use the boundary points to divide the number line into intervals
3. Choose a test point from each interval to test if the interval is a solution

Step 1. The associated quadratic equation for the inequality $x^2 - 6x - 7 < 0$ is $x^2 - 6x - 7 = 0$.

$x^2 - 6x - 7 = 0$	Factoring
$(x + 1)(x - 7) = 0$	Set each factor equal to zero
$x - 7 = 0$ and $x + 1 = 0$	Solve the equations
$x = \{-1, 7\}$	These are our two boundary points

Step 2.



Step 3.

We have three intervals to test. We will use the points $x = -2$, 0 and 8 to see if they are solutions.

If $x = -2$ $(-2)^2 - 6(-2) - 7 = 4 + 12 - 7 = 9$
 $9 < 0$ is false! This means the interval containing $x = -2$ is not a solution.

If $x = 0$ $0^2 - 6(0) - 7 = -7$
 $-7 < 0$ is true! This means the interval containing $x = 0$ is a solution.

If $x = 8$ $8^2 - 6(8) - 7 = 64 - 48 - 7$
 $9 < 0$ is false! This means the interval containing $x = 8$ is not a solution.

Thus, our answer is D. $-1 < x < 7$

* You could also use the quadratic formula to solve the equation instead of factoring

Problem #4 (Elementary Algebra)

An apartment building contains 12 units consisting of one- and two-bedroom apartments that rent for \$360 and \$450 per month, respectively. When all units are rented, the total monthly rental is \$4,950. What is the number of two-bedroom apartments?

- A. 3
- B. 4
- C. 5
- D. 6
- E. 7

Solution

Let x = number of one-bedroom apartments

Let y = number of two bedroom apartments

We know (1) the total number of apartments is 12, and (2) the total monthly rental is \$4,950, where one-bedrooms rent for \$360 and two-bedrooms rent for \$450.

Thus, we may write the following system of equations

(1)	$x + y = 12$	The total number of rooms
(2)	$360x + 450y = 4,950$	Total monthly rent

This gives us a system of equations. We will solve this by using substitution, and solve for x in equation (1).

$x = 12 - y$	substituting into equation (2)
$360(12 - y) + 450y = 4,950$	Distributing
$4,320 - 360y + 450y = 4,950$	Combining like terms
$4,320 + 90y = 4,950$	Subtracting 4,320 from both sides of the equation
$90y = 630$	Dividing by 90 on both sides of the equation
$y = 7$	Substituting back in (1)

$$x = 12 - 7 = 5$$

$x = 5$ one-bedroom apartments

$y = 7$ two-bedroom apartments

Thus, our answer is E. 7

For more practice, use a search engine like Google to enter topics and find more examples, or instructional videos. For example, after reviewing the first four examples, you may wish to find more information on evaluating polynomials, order of operations, operations with signed numbers, percent of a number problems, inequalities or systems of equations. You may also try using YouTube to find videos with instruction and worked problems.

Problem #5 (Arithmetic)

$$3\frac{1}{3} - 2\frac{2}{5} =$$

- A. $\frac{1}{15}$
- B. $\frac{14}{15}$
- C. $1\frac{1}{15}$
- D. $1\frac{1}{2}$

Solution

We will find the difference of mixed numbers by first converting the mixed numbers to improper fractions. Then we will find the difference, then convert back to a mixed number.

To convert to an improper fraction, we multiply the denominator times the whole number plus the numerator. This result is then placed over the denominator.

$$3\frac{1}{3} - 2\frac{2}{5} \qquad \text{Converting to improper fractions}$$

$$\frac{10}{3} - \frac{12}{5} \qquad \text{Change denominators to LCD of 15}$$

$$\frac{50}{15} - \frac{36}{15} = \frac{14}{15} \qquad \text{Subtract the numerators}$$

Thus, our answer is B. $\frac{14}{15}$

Don't forget about the free APPUPLACER® Study App. Get the app on your computer, phone or tablet to access additional problems, worked solutions, practices tests, and the "Learn as You Go" feature. Go to accuplacer.collegeboard.org/store to order the APPUPLACER® Study App.

Problem #6 (College-Level Math)

The graph of which of the following equations is a straight line parallel to the graph of $y = 2x$

- A. $4x - y = 4$
- B. $2x - 2y = 2$
- C. $2x - y = 4$
- D. $2x + y = 2$
- E. $x - 2y = 4$

Solution

Parallel lines must have the same slope. We want to be parallel to $y = 2x$. Since $y = 2x$ is in slope-intercept form ($y = mx + b$), we see that the slope is equal to 2. Therefore, we need to find the equation that has a slope of 2. We can do this by solving all of the equations for y i.e. put them into slope intercept form. By doing this, we will be able to see the slope of each line. The line we are looking for will have a slope of 2.

Solving each equation for y , and comparing to $y = mx + b$, we obtain

A.
$$\begin{array}{r} 4x - y = 4 \\ \underline{-4x} \quad \underline{-4x} \\ -y = -4x + 4 \\ -1 \quad -1 \\ y = 4x - 4, \text{ so } m = 4 \end{array}$$

B.
$$\begin{array}{r} 2x - 2y = 2 \\ \underline{-2x} \quad \underline{-2x} \\ -2y = -2x + 2 \\ -2 \quad -2 \\ y = x - 2, \text{ so } m = 1 \end{array}$$

C.
$$\begin{array}{r} 2x - y = 4 \\ \underline{-2x} \quad \underline{-2x} \\ -y = -2x + 4 \\ -1 \quad -1 \\ y = 2x - 4, \text{ so } m = 2 \end{array}$$

D.
$$\begin{array}{r} 2x + y = 2 \\ \underline{-2x} \quad \underline{-2x} \\ y = -2x + 2 \\ y = -2x + 2, m = -2 \end{array}$$

E.
$$\begin{array}{r} x - 2y = 4 \\ \underline{-x} \quad \underline{-x} \\ -2y = -x + 4 \\ -2 \quad -2 \\ y = \frac{1}{2}x - 2, \text{ so } m = \frac{1}{2} \end{array}$$

Thus, our answer is C. $y = 2x - 4$, $m = 2$

Work out the following sample questions and return this packet to an Assessment Center before taking the placement tests.



Mathematics Sample Questions

Work out these sample questions and return them to an Assessment Center before taking the placement tests.

(1) $-3(5 - 6) - 4(2 - 3) =$

- A. -7
- B. -1
- C. 1
- D. 7

(2) If $2x - 3(x+4) = -5$, then $x =$

- A. -17
- B. -7
- C. 7
- D. 17

(3) $20 - \frac{4}{5}x \geq 16$

Which of the following inequalities is equivalent to the inequality shown above?

- A. $x \leq 5$
- B. $x \geq 5$
- C. $x \leq \frac{65}{2}$
- D. $x \geq \frac{65}{2}$

(4) For which of the following equations are $x = 5$ and $x = -5$ both solutions?

- A. $x^2 + 25 = 0$
- B. $x^2 - 25 = 0$
- C. $x^2 + 10x - 25 = 0$
- D. $x^2 - 5x - 25 = 0$

(5) Which of the following is a factor of both $x^2 - x - 6$ and $x^2 - 5x + 6$?

- A. $x - 3$
- B. $x - 2$
- C. $x + 2$
- D. $x + 3$

(6) An equation of the line that contains the origin and the point (1, 2) is

A. $y = 2x$

B. $2y = x$

C. $y = x - 1$

D. $y = 2x + 1$

E. $\frac{y}{2} = x - 1$

(7) $5y(2y - 3) + (2y - 3) =$

A. $(5y + 1)(2y + 3)$

B. $(5y + 1)(2y - 3)$

C. $(5y - 1)(2y + 3)$

D. $(5y - 1)(2y - 3)$

E. $10y(2y - 3)$

(8) A soccer team played 160 games and won 65 percent of them.
How many games did the team win?

A. 94

B. 104

C. 114

D. 124

(9) 32 is 40% of what number?

A. 12.8

B. 128

C. 80

D. 800

(10) $2\frac{1}{2} + 4\frac{2}{3} =$

A. $6\frac{1}{6}$

B. $6\frac{5}{6}$

C. $7\frac{1}{6}$

D. $7\frac{5}{6}$