

# ASSET 2

## Elementary Algebra Review Questions

(to test out of MAT 092 and INTO MAT 120 or MAT 122)

The following are sample elementary algebra questions that should be reviewed *prior* to taking the math placement test. *They do not merely target information that is on the placement test but cover topics that are heavily emphasized in introductory algebra.* Additional review material (in the form of software tutorials) is available in the Information Commons to currently enrolled MCC students.

**NOTE:** While completion of this review material will be helpful in preparing for the math placement test the MCC math department is unable to guarantee desired placement.

As you prepare to take the math placement test keep the following points in mind:

1. At the present time, calculators are NOT allowed when taking the Asset test.
2. Since the asset test is a **timed multiple choice test**, study this material with a mind toward speed and accuracy as well as content.
3. The problems on the asset test are not graduated in difficulty therefore if you get stuck on one, go on to another problem.
4. There are a number of different forms of each asset test therefore this study guide will contain information that may not appear on your particular version of the test.
5. Questions may be worded differently than in your previous classes. Answers given here may appear in a different form than the one you reach; you need to be able to determine if the two answers are equivalent.

### Review Questions

1. Given a set of real numbers, the student will be able to identify the natural, whole, integer, rational, and irrational numbers in the set.

Given:  $\left\{ -3, 4, 0, \pi, \frac{2}{3}, \frac{-11}{5}, \sqrt{2} \right\}$

- a. Which are natural (counting) number?
- b. Which are integers?
- c. Which are irrational numbers?
- d. Which are whole numbers?
- e. Which are rational numbers?
- f. Which are real numbers?

2. The student will be able to demonstrate the ability to simplify expressions using correct order of operations.

- Simplify :  $-5^2$
- Simplify :  $(5 \times 10^{-12})(7 \times 10^{10})$
- Simplify :  $(5 \times 10^{-2}) + (7 \times 10^2)$
- Simplify :  $-6(3^2 - 4) \div 5i(2)$
- Simplify :  $2(7 - 4) + 8$
- Simplify :  $7 + [8(2 - 3^2) - 5]$
- Evaluate :  $2x^2 - 7x + 2$  when  $x = -3$
- If  $b = -3$ , then what is the value of  $5b^2 - 2b + 1$  ?
- What is the value of  $3x^2y + 2xy^2 - 5y$  if  $x = -2$  and  $y = 3$  ?
- What is the value of  $12 - \frac{2x}{y} + \frac{y}{x}$  if  $x = -2$  and  $y = 3$  ?

3. The student will be able to demonstrate the ability to simplify expressions using the rules for integral exponents. Perform the operations indicated. Express answers in simplified form with no negative exponents. Assume no variable equals zero.

- Simplify :  $7x^{-3}$
- Multiply :  $(3x^3)(7x^5)$
- Multiply :  $(5x^2)(3x^{-7})$
- Multiply :  $(12x^3)(4x^{-3})$
- Divide :  $\frac{35x^5}{10x^2}$
- Divide :  $\frac{12xy^{-2}}{8x^{-3}y^3}$
- Simplify :  $\left(\frac{3x^3y^2}{6x^2y}\right)^3$
- Simplify :  $(5)^{-3}$

4. The student will be able to demonstrate the ability to find the sum, difference, product, and quotient of polynomials.

- Combine :  $(8x - 2) + (7 - 3x)$
- Combine :  $(4 - 5x) - (3 - 2x)$
- Combine :  $(3x^2 - 5 + 2x) - [(7x^2 + 5) - (4x^2 - 5x)]$
- Subtract :  $(x^2 - 5x + 4)$  from  $(3x^2 - 2x + 7)$

- e. Multiply :  $-5x(3x^2 - 5x + 2)$   
 f. Multiply :  $(3x - 2)(5x + 7)$   
 g. Multiply :  $(2xy - 3x^2)(5xy - x^3 + 4y^2)$   
 h. Divide :  $(16x^3y^2 - 10x^2y^2 + 12xy^3) \div .2xy^2$   
 i. Divide :  $(20x^2 + 7x - 6) \div (5x - 2)$

5. The student will be able to demonstrate the ability to factor polynomials.  
 Factor each of the following:

- a.  $25x^2 - 15x + 35x^3$   
 b.  $25x^2 - 16$   
 c.  $x^2 + 9$   
 d.  $xy - y + x - 1$   
 e.  $12x^2 + 5x - 2$   
 f.  $4x^2y - 12xy + 9y$   
 g.  $12x^3y^2 + 5x^2y - 3xy^2$   
 h.  $4x^2 - 12x + 9$   
 i.  $3x^2 - 9x - yx + 3y$   
 j.  $x^3 - 5x^2 + 4x$   
 k.  $4x^2 - 16$

6. The student will be able to demonstrate the ability to reduce (simplify) rational expressions.  
 Reduce each of the following. Assume no denominator equals zero.

a.  $\frac{14x^2}{8x}$

b.  $\frac{(x-2)(3-x)}{(x-3)(x+5)}$

c.  $\frac{3x^2 - 7x + 2}{6x^2 - 5x + 1}$

7. The student will be able to demonstrate the ability to add, subtract, multiply, and divide rational expressions. Perform the operations indicated below. Assume no denominator equals zero.

a. Multiply:  $\frac{6x^2}{5x} \cdot \frac{15x}{2x^2}$

d. Divide:

$$\frac{3x^2 - 13x - 10}{2x^2 - 16x + 30} \div \frac{3x^2 + 5x + 2}{x^3 - 2x^2 - 3x}$$

b. Add:  $\frac{3x}{8} + \frac{7x}{8}$

e. Subtract:  $\frac{35x}{6y} - \frac{2x}{9y}$

c. Subtract:  $\frac{x+2}{x-3} - \frac{x+3}{x^2-7x+12}$

8. The student will be able to demonstrate the ability to simplify radical expressions. Simplify each of the following. Assume all variables are non-negative.

a.  $\sqrt{9}$

c.  $\sqrt{160}$

b.  $\sqrt{12}$

d.  $\sqrt{18x^3y^5}$

9. The student will be able to demonstrate the ability to find the product and quotient of radical expression. Assume all variables are non-negative and no denominator equals zero.

a. Multiply:  $(5\sqrt{2})(-3\sqrt{7})$

f. Multiply:  
 $(-2\sqrt{5} + \sqrt{2})(-2\sqrt{5} - \sqrt{2})$

b. Multiply:  $(-2\sqrt{5})(-3\sqrt{5})$

g. Divide:  $\frac{\sqrt{15}}{\sqrt{3}}$

c. Divide:  $\frac{\sqrt{8}}{\sqrt{2}}$

h. Multiply:  $\sqrt{3x}\sqrt{18x^3}$

d. Multiply:  $\sqrt{24xy^2}\sqrt{15x^3y^3}$

i. Divide:  $\frac{\sqrt{18x^3}}{\sqrt{3x}}$

e. Divide:  $\frac{\sqrt{8x^5yz}}{72xy^3}$

10. The student will be able to demonstrate the ability to rationalize radical expressions. Rationalize the denominator in each of the following.

a.  $\sqrt{\frac{2}{3}}$

b.  $\frac{6}{\sqrt{12}}$

11. The student will be able to demonstrate the ability to solve the following types of equations.

a.  $7 + 3x = -5$

b.  $3(x + 1) = 7(x - 2) - 3$

c.  $2x^2 - 3 = 5x$

d.  $\frac{6x}{8} - 5 = \frac{7x}{6}$

e.  $\sqrt{x - 2} + 3 = 8$

f.  $2(3x + 5) = 10$

g.  $2x^2 = 6x$

h.  $(3x - 1)(x - 2) = 8$

i.  $\frac{x}{x + 3} - \frac{1}{x - 3} = \frac{18}{x^2 - 9}$

j.  $\sqrt{5 - x} + 7 = 2$

12. The student will be able to demonstrate the ability to solve first degree one variable inequalities.

a. Solve :  $5 \geq 3x - 1$

b. Solve :  $5(2 - x) > 5x - 20$

13. Given a word problem, the student will be able to: a) define the variable; b) write an equation; and c) solve the equation.

a. Four less than the product of a number (N) and 5 is equal to 6. Write an equation that can be used to find N. Solve for N.

b. Twice a number (x) is 5 more than half the number. Write an equation that can be used to find x. Solve for x.

c. The product of six times an unknown number (Z) is reduced by 5, the result is 12 units less than twice the original number. Write an equation necessary to find the unknown number. Find the number.

d. A rectangle has a perimeter of 46 meters. The length of the rectangle is 3 meters longer than its width. What is the width of the rectangle.

e. A store bought 200 bicycles, some at \$80 each and some at \$100 each. The total cost was

\$17,000. How many bikes were purchased at each price.

- f. The selling price for a pair of shoes is \$72.80. The selling price reflects a 40% markup over the price the store had to pay for the shoes (called the cost of the shoes). What was the cost of the shoes?