

Montgomery College  
**Department of Mathematics**  
Rockville Campus

**MA091 ICL**  
**PREPARATION AND REVIEW FOR EXAM 1**  
Spring 2009

**Part I: STUDY QUESTIONS**

1. What is the best way to **begin** the solution to  $\frac{x}{3} + 4 = \frac{12}{5}$  ?
2. A student was given the equation  $3x - 4(2x - 5) = 12$ .  
His first step was to write  $3x - 8x - 5 = 12$ , which is incorrect.  
Where is the mistake?
3. What does it mean to *solve* an equation?
4. What is the first step in simplifying each of the following expressions?
  - (a)  $7 - (x + 5)$
  - (b)  $7 - 2(x + 5)$
  - (c)  $(7 - 2)(x + 5)$
5. On the first lesson there is a video that describes a step-by-step system for solving a simple equation. List the steps.
6. When do you multiply exponents, and when do you add them? Give examples.
7. Are the expressions  $7x^{-2}$  and  $(7x)^{-2}$  the same? Simplify each.
8. How can you tell if an expression is a *polynomial* or not?  
How do you know how many *terms* a polynomial has?  
How do you determine the *degree* of a polynomial?
9. Which of the following pairs are **like** terms?
  - (a)  $-12x$  and  $-12y$
  - (b)  $8x^2$  and  $98x^2$
  - (c)  $x^2$  and  $x^3$
  - (d)  $5x^2y$  and  $-2x^2y$

## Answers to Part I

1. Multiply both sides of the equation by 15, which is the common denominator of the fractions. This will give an equivalent equation that has no fractions.
2. The -4 distributes over both of the terms that follow in parentheses. The correct statement is  $3x - 8x + 20 = 12$ .
3. To solve an equation you must find all values of the variable that make the equation true. That is, that makes the two sides of the equation equal. For example, in the equation  $3x - 1 = x + 3$  we see that  $x = 2$  is a solution because when substituted in to both sides we get  $5 = 5$ . In this case  $x = 2$  is the only solution.
4. (a) Subtract each of the numbers  $x$  and 5; that is,  $7 - (x + 5)$  simplifies to  $7 - x - 5$ .  
(b) Distribute the -2 over the numbers in parentheses; i.e.,  $7 - 2(x + 5)$  can be written  $7 - 2x - 10$ .  
(c) Subtract the 2 from the 7.  $(7 - 2)(x + 5)$  becomes  $5(x + 5)$ .
5. (1) Clear the equation of fractions, if any, by multiplying by the lowest common denominator.  
(2) Remove parentheses, if any, by using the distributive property.  
(3) Use addition and subtraction (never multiplication or division) to combine like terms and isolate the unknown term on one side of the equation.  
(4) Divide by the coefficient of the unknown to complete the solution.  
(5) **Check** the solution by substituting it in the original equation.
6. When raising numbers to a power, you multiply the exponents. Example:  
 $(x^2)^5 = x^{10}$   
When multiplying the same base, the exponents are added. Example:  
 $x^2 \cdot x^5 = x^7$
7. They're **not** the same.  $7x^{-2} = \frac{7}{x^2}$ . However,  $(7x)^{-2} = \frac{1}{(7x)^2} = \frac{1}{49x^2}$ .
8. Since all of the polynomials we study have only one variable, each term in a polynomial is either a constant or a multiple of the variable raised to a *positive* power. Terms are separated one from the next by a + or - sign. The degree of a polynomial that we study in this course is determined by the largest exponent that appears in the expression.
9. Pairs (b) and (d) are examples of like terms; pairs (a) and (c) are examples of unlike terms.

## Part II: PRACTICE PROBLEMS

1. (Lesson 1)

(a) Solve for  $a$ :  $5 + 5a = 2(2a + 5)$       (b) Solve for  $x$ :  $6 - 2(3x - 1) = 2$

(c) Solve for  $y$ :  $\frac{1}{4}y - \frac{5}{8} = \frac{3}{8}$       (d) Solve for  $p$ :  $14p = 23p - 17 - 10$

(e) Solve for  $x$ :  $2(x - 3) + x = 3x + 5$       (f) Solve for  $r$ :  $0.7r + 6.1 = 2.6$

2. (Lesson 2) Solve each inequality for the variable.

(a)  $2x - 6 < 3x + 5$       (b)  $5(y + 4) > 8(y - 2)$

(c)  $66 \geq -3(5x - 7)$

3. (Lesson 4) Simplify: (a)  $(-5a^4b^{12})(-7ab^8)$       (b)  $-2(5x^3y^{15})(-6x^5y^5)$

4. (Lesson 5) Simplify: (a)  $-6a^2b^0$       (b)  $\frac{-3xy^7z^3}{15y^5z}$

5. (Lesson 6) Simplify: (a)  $3y(-2y^4)^3$       (b)  $\left(\frac{-5c^3}{ab^5}\right)^2$

6. (Lesson 7) Simplify each expression below and write all your answers using **positive exponents only**:

(a)  $x^{-7}$       (b)  $-2x^{-5}$

(c)  $x^{-8}x^3$       (d)  $\frac{x^{-2}}{x^{-10}}$

(e)  $(-3x^{-5})^2$       (f)  $(x^3y^{-4})^{-2}$

(g)  $\frac{-3x^5}{x^{12}}$       (h)  $(-5x^3)(2y^{-4})^2$

7. (Lesson 8)

(a) Write  $1.245 \times 10^{-6}$  in decimal notation

(b) Write 31,500,000 in scientific notation

(c) Multiply and write your answer in scientific notation:  $(2.4 \times 10^5)(3.67 \times 10^{-9})$

8. (Lesson 10)

(a) The expression  $7 - x^3 + 8x^4$  is a \_\_\_\_\_ of degree \_\_\_\_\_.  
(monomial, binomial, or trinomial)

(b) Write an example of a third-degree binomial: \_\_\_\_\_

(c) Combine like terms and arrange the terms of your answer in descending order:  
 $x^2 - 3x^3 + 8 - x - 4x^2 + 5x^3 - x$

9. (Lesson 11) Add or subtract the polynomials as indicated:

(a)  $(2x - x^2 - 8) + (4x^2 - 3x - 7)$

(b)  $(8x - 5y + 3) - (7 - 4x - y)$

10. (Lesson 12) Find each product:

- (a)  $5x(2x^2 + 8x - 1)$       (b)  $-x^2(x^3 - x + 3)$       (c)  $2x^3(x^2 - 9)$   
(d)  $(3x - 1)(2x^2 + x - 4)$       (e)  $(x - 9)(x + 3)$       (f)  $(2x + 1)(3x + 8)$   
(g)  $(2x - 3y)(4x + 5y)$       (h)  $(8 - 3x)(4 + 3x)$

11. (Lesson 13) Find each product and simplify:

- (a)  $(2x - 9)(2x + 9)$       (b)  $(4x + 1)^2$       (c)  $(7 - 2y)^2$

**Answers to Part II**

1. (a)  $a = 5$       (b)  $x = 1$       (c)  $y = 4$       (d)  $p = 3$   
(e) No solution      (f)  $r = -5$
2. (a)  $x > -11$       (b)  $y < 12$       (c)  $x \geq -3$
3. (a)  $35a^5b^{20}$       (b)  $60x^8y^{20}$
4. (a)  $-6a^2$       (b)  $\frac{-xy^2z^2}{5}$
5. (a)  $-24y^{13}$       (b)  $\frac{25c^6}{a^2b^{10}}$
6. (a)  $\frac{1}{x^7}$       (b)  $\frac{-2}{x^5}$       (c)  $\frac{1}{x^5}$       (d)  $x^8$   
(e)  $\frac{9}{x^{10}}$       (f)  $\frac{y^8}{x^6}$       (g)  $-\frac{3}{x^7}$       (h)  $-\frac{20x^3}{y^8}$
7. (a) 0.000001245      (b)  $3.15 \times 10^7$       (c)  $8.808 \times 10^{-4}$
8. (a) trinomial, degree 4      (b)  $x^3 + 5x$  is one example      (c)  $2x^3 - 3x^2 - 2x + 8$
9. (a)  $3x^2 - x - 15$       (b)  $12x - 4y - 4$
10. (a)  $10x^3 + 40x^2 - 5x$       (b)  $-x^5 + x^3 - 3x^2$       (c)  $2x^5 - 18x^3$   
(d)  $6x^3 + x^2 - 13x + 4$       (e)  $x^2 - 6x - 27$       (f)  $6x^2 + 19x + 8$   
(g)  $8x^2 - 2xy - 15y^2$       (h)  $32 + 12x - 9x^2$
11. (a)  $4x^2 - 81$       (b)  $16x^2 + 8x + 1$       (c)  $4y^2 - 28y + 49$