

**Math 1300 – Intermediate Algebra**  
**Final Exam Review**

Name: \_\_\_\_\_

This review is comprehensive but should not be the only material used to study for the final exam. It should not be considered a preview of the final exam. It does not substitute for studying previous tests, quizzes, homework, class notes, text discussions, etc. There may be questions on the final exam unlike questions on this review, and vice versa. No question on this review will be exactly duplicated on the final exam. This review is longer than the final exam. You may obtain help working the review sheet in the Math Lab located in 925-N.

1. Factor each expression completely.

(1)  $27a^2b^3c - 18ab^2c^2$

(3)  $x(a - b) + 8(a - b)$

(5)  $x^2 + 6xy + 9y^2$

(7)  $1 - 25x^2$

(9)  $mx + my - nx - ny$

(11)  $-x^2 + 7x - 10$

(13)  $x^2 + 3x + 7$

(2)  $x^2 - 2x - 15$

(4)  $a^2 + 81b^2$

(6)  $6x^2 + 4xy - 2x$

(8)  $8x^2 - 26x + 15$

(10)  $8x^3 - 32x$

(12)  $4x^2 + 11x - 3$

(14)  $6x^2 + 17x - 14$

2. Write each fraction in lowest terms.

(1)  $\frac{4xy + 2x}{2xy^2}$

(2)  $\frac{21mn^3}{35m^2n}$

(3)  $\frac{m - n}{n - m}$

(4)  $\frac{3a + 21}{a^2 + 8a + 7}$

(5)  $\frac{a^2 + b^2}{a + b}$

(6)  $\frac{5x + 5y - 4(x + y)}{x^2 + xy}$

3. Perform the indicated operations and simplify.

(1)  $\frac{4x^2}{15z} \cdot \frac{25y^2z}{6x}$

(2)  $\frac{x^2 + 3x + 2}{3x + 9} \cdot \frac{x + 3}{x^2 - 4}$

(3)  $\frac{3x}{x^2 - x} \div \frac{x^2}{2x - 2}$

(4)  $\frac{2x + 9}{x^2 - 49} - \frac{x + 2}{x^2 - 49}$

(5)  $\frac{2}{x + 1} + \frac{x + 3}{x^2 + x}$

(6)  $2t + \frac{7}{3t}$

(7)  $\frac{3}{x - 3} - \frac{2}{x + 4} + \frac{3x - 2}{x^2 + x - 12}$

(8)  $\frac{a^2 - 9}{a^2 + 5a + 6} \cdot \frac{a^2 - 4}{a^2 + 4a + 3} \div \frac{2a - 4}{a + 1}$

4. Simplify each complex fraction.

(1)  $\frac{\frac{3m}{7}}{\frac{n}{14m}}$

(2)  $\frac{\frac{b}{3} + 1}{\frac{2}{3}}$

5. Solve each equation.

(1)  $x^2 = 4 - 2x$

(2)  $3x^2 - 11x = 0$

(3)  $\frac{2}{3} = \frac{4}{x}$

(4)  $x^2 - 36 = 0$

(5)  $\sqrt{x+5} = x - 1$

(6)  $2(x+2) - 3(2x-1) = 5$

(7)  $\frac{8}{x+3} - \frac{4}{x-2} = \frac{x+8}{x^2+x-6}$

(8)  $\sqrt{x+5} = 0$

(9)  $3(x+2)(x-1) = 0$

(10)  $\sqrt{x+12} = x$

(11)  $\frac{3}{x+3} - 2 = \frac{-x}{x+3}$

(12)  $\frac{x+1}{x} = \frac{10}{3}$

(13)  $3x^2 - 5x = 2$

(14) Solve the equation for  $x$ :  $\frac{13x}{6} - \frac{1}{2} = \frac{5x}{3}$ . What is the value of  $x - 10$ ?

6. Express each phrase as a ratio in lowest terms with units of measure canceled.

(1) 4 inches to 3 feet

(2) 1 pound to 8 ounces

(3) 3 quarters to 3 dollars

(4) 3 days to 2 weeks

7. Perform the indicated operations and simplify. Assume all variables represent positive numbers. (In problems 6 and 13 you must rationalize the denominator.)

(1)  $\sqrt{49}$

(2)  $\sqrt{\frac{81}{100}}$

(3)  $\sqrt[3]{64}$

(4)  $\sqrt{25x^4y^2}$

(5)  $(2x + \sqrt{5})(2x - \sqrt{5})$

(6)  $\frac{3}{\sqrt{7}}$

(7)  $\sqrt{9+16}$

(8)  $5\sqrt{2}(\sqrt{6} - \sqrt{8})$

(9)  $\sqrt{200x^7y^5}$

(10)  $\sqrt{27} + \sqrt{75} - \sqrt{48}$

(11)  $\sqrt[5]{-1}$

(12)  $x\sqrt{32x} - \sqrt{50x^3} + \sqrt{18x}$

(13)  $\frac{x + \sqrt{2}}{\sqrt{2}}$

(14)  $\sqrt[4]{-1}$

8. Simplify as much as possible making all exponents positive. Assume all variables represent positive numbers.

(1)  $125^{\frac{1}{3}}$

(2)  $16^{-\frac{3}{2}}$

(3)  $x^{\frac{3}{5}} \cdot x^{\frac{1}{2}}$

(4)  $(9x^4y^2)^{\frac{1}{2}}$

(5)  $(27x^3)^{-\frac{1}{3}}$

9. (1) Change  $\sqrt{2 + 5y}$  to an exponential expression.

- (2) Change  $\frac{1}{\sqrt[3]{4x}}$  to an exponential expression.

10. Graph each equation on a rectangular coordinate system.

(1)  $3x + 5y = 15$

(2)  $\frac{x}{2} + 2y = 2$

(3)  $y = -2$

(4)  $x = 3y$

11. Find the slope of the line that passes through each pair of points.

(1)  $(3, -1), (-6, 2)$

(2)  $(0, 8), (-5, 0)$

- (3) Are these two lines either parallel or perpendicular?

12. Find the slope of the line determined by each equation.

(1)  $3x = 4y - 2$

(2)  $y = -4$

(3)  $x = 6$

13. Find the distance between the two points  $P$  and  $Q$ .

(1)  $P(5, 9), Q(8, 13)$

(2)  $P(3, 6), Q(1, -2)$

14. Does the point  $(3, -1)$  fall on the line with equation  $3x - 2y = 11$ ?

15. Find the  $x$ - and  $y$ -intercepts of the following lines.

(1)  $2x - 4y = 8$

(2)  $3x + 2y = 4$

16. Find the midpoint of the line segment joining each pair of points.

(1)  $(8, -5), (2, 3)$

(2)  $(0, 4), (0, -5)$

17. Use the graphing method to solve the following systems of equations.

$$(1) \begin{cases} x + y = 1 \\ x - y = -5 \end{cases}$$

$$(2) \begin{cases} \frac{x}{2} - y = 3 \\ -2x + 4y = 8 \end{cases}$$

Use the substitution method to solve the following systems of equations.

$$(3) \begin{cases} y = 2x + 1 \\ 4x - 3y = -5 \end{cases}$$

$$(4) \begin{cases} 3x - y = 7 \\ 2x + 3y = 1 \end{cases}$$

Use the addition method to solve the following systems of equations.

$$(5) \begin{cases} 4x = 3(4 - y) \\ 2y = 4(3 - x) \end{cases}$$

$$(6) \begin{cases} 2x + 5y = -2 \\ 4x + 3y = 10 \end{cases}$$

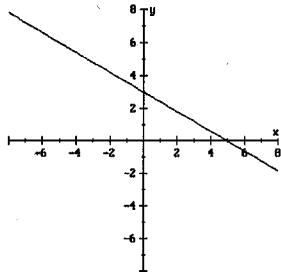
18. For each stated problem, write symbols for the variable or variables, translate the words into an equation or equations, and then solve the problem.

- (1) If an even number is squared, the result is four more than three times the number. What is the number?
- (2) A truck can go 180 miles on 12 gallons of gas. How far can the truck go on 15 gallons?
- (3) A school board has determined that there should be 3 teachers for every 45 students. How many teachers are needed for an enrollment of 300 students?
- (4) The singles court in tennis is four yards longer than it is wide. If its perimeter is 44 yards, then what are the length and the width?
- (5) Josh opened a parking meter and removed 30 coins consisting of dimes and nickels. If the value of these coins is \$2.30, then how many of each type does he have?
- (6) The product of two consecutive positive odd numbers is 143. Find the numbers.
- (7) A number is 4 less than a second number. Four times the first number is 6 more than twice the second number. Find the numbers.
- (8) The length of a rectangle is one inch less than twice the width. The area is 45 square inches. What is the length of the rectangle?
- (9) Find the length of the longest straight line that can be drawn in a 3 inch by 4 inch rectangle?
- (10) Jill walked diagonally across a rectangular field that measured 1000 feet by 2400 feet. Determine how far she walked.

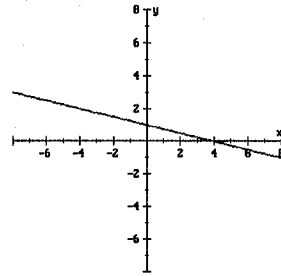
## ANSWERS

1. (1)  $9ab^2c(3ab - 2c)$  (2)  $(x - 5)(x + 3)$   
(3)  $(a - b)(x + 8)$  (4) Prime  
(5)  $(x + 3y)^2$  (6)  $2x(3x + 2y - 1)$   
(7)  $(1 - 5x)(1 + 5x)$  (8)  $(4x - 3)(2x - 5)$   
(9)  $(x + y)(m - n)$  (10)  $8x(x + 2)(x - 2)$   
(11)  $-(x - 5)(x - 2)$  (12)  $(4x - 1)(x + 3)$   
(13) Prime (14)  $(3x - 2)(2x + 7)$
2. (1)  $\frac{2y + 1}{y^2}$  (2)  $\frac{3n^2}{5m}$  (3)  $-1$   
(4)  $\frac{3}{a + 1}$  (5) In lowest terms (6)  $\frac{1}{x}$
3. (1)  $\frac{10xy^2}{9}$  (2)  $\frac{x + 1}{3x - 6}$  (3)  $\frac{6}{x^2}$  (4)  $\frac{1}{x - 7}$  (5)  $\frac{3}{x}$   
(6)  $\frac{6t^2 + 7}{3t}$  (7)  $\frac{4}{x - 3}$  (8)  $\frac{a - 3}{2a + 6}$
4. (1)  $\frac{6m^2}{n}$  (2)  $\frac{b + 3}{2}$
5. (1)  $x = -1 \pm \sqrt{5}$  (2)  $x = 0, x = \frac{11}{3}$  (3)  $x = 6$   
(4)  $x = -6, x = 6$  (5)  $x = 4$  (6)  $x = \frac{1}{2}$   
(7)  $x = 12$  (8) No solution (9)  $x = -2, x = 1$   
(10)  $x = 4$  (11) No solution (12)  $x = \frac{3}{7}$   
(13)  $x = 2, x = -\frac{1}{3}$  (14)  $-9$
6. (1)  $\frac{1}{9}$  (2) 2 (3)  $\frac{1}{4}$  (4)  $\frac{3}{14}$
7. (1) 7 (2)  $\frac{9}{10}$  (3) 4  
(4)  $5x^2y$  (5)  $4x^2 - 5$  (6)  $\frac{3\sqrt{7}}{7}$   
(7) 5 (8)  $10\sqrt{3} - 20$  (9)  $10x^3y^2\sqrt{2xy}$   
(10)  $4\sqrt{3}$  (11)  $-1$  (12)  $3\sqrt{2x} - x\sqrt{2x}$   
(13)  $\frac{x\sqrt{2} + 2}{2}$  (14) not a real number
8. (1) 5 (2)  $\frac{1}{64}$  (3)  $x^{\frac{11}{10}}$  (4)  $3x^2y$  (5)  $\frac{1}{3x}$
9. (1)  $(2 + 5y)^{\frac{1}{2}}$  (2)  $(4x)^{-\frac{1}{3}}$

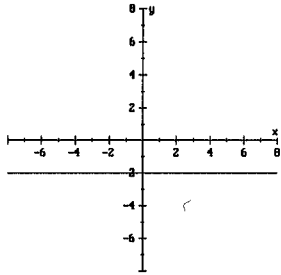
10. (1)



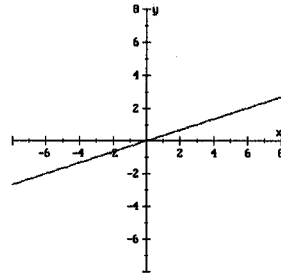
(2)



(3)



(4)



11. (1)  $-\frac{1}{3}$

(2)  $\frac{8}{5}$

(3) Neither parallel nor perpendicular

12. (1)  $\frac{3}{4}$

(2) 0

(3) Undefined

13. (1) 5

(2)  $2\sqrt{17}$

14. Yes

15. (1) the  $x$ -intercept =  $(4, 0)$ , the  $y$ -intercept =  $(0, -2)$

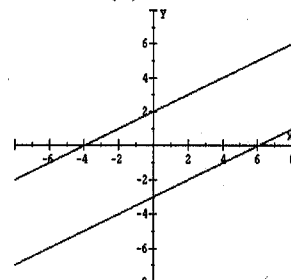
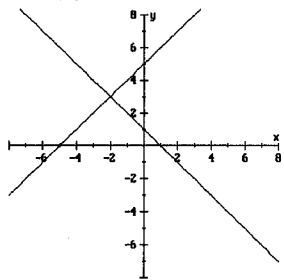
(2) the  $x$ -intercept =  $(\frac{4}{3}, 0)$ , the  $y$ -intercept =  $(0, 2)$

16. (1)  $(5, -1)$

(2)  $(0, -\frac{1}{2})$

17. (1)  $x = -2, y = 3$

(2) No Solution



(3)  $x = 1, y = 3$

(4)  $x = 2, y = -1$

(5)  $x = 3, y = 0$

(6)  $x = 4, y = -2$

18. (1) 4

(2) 225 miles

(3) 20 teachers

(4)  $L = 13$  yds,  $W = 9$  yds

(5) 16 dimes, 14 nickels

(6) 11 and 13

(7) 7 and 11

(8) 9 in.

(9) 5 inches

(10) 2600 ft.