Math 1300 − Intermediate Algebra   Name:_____

Final Exam Review   *Revised Fall 2010*

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 <u>completely</u>.

(1) $27a^2b^3 - 18ab^2$ (2) $x^2 - 2x - 15$
(3) $x(a-b) + 8(a-b)$ (4) $a^2 + 81b^2$
(5) $x^2 + 6xy + 9y^2$ (6) $6x^2 + 4xy - 2x$
(7) $1 - 25x^2$ (8) $5x^2 - 6x - 8$
(9) $mx + my - nx - ny$ (10) $8x^3 - 32x$
(11) $-x^2 + 7x - 10$ (12) $4x^2 + 11x - 3$
(13) $x^2 + 3x + 7$ (14) $6x^2 + 17x - 14$

2. Factor completely. One of the factors is:
(1) $-14x^3y + 7x^2y - 35xy$ (2) $y^2 + 9y + 18$

3. Write each fraction in <u>lowest terms</u>.

(1) $\dfrac{4xy + 2x}{2xy^2}$ (2) $\dfrac{21mn^3}{35m^2n}$ (3) $\dfrac{m-n}{n-m}$

(4) $\dfrac{3a + 21}{a^2 + 8a + 7}$ (5) $\dfrac{a^2 + b^2}{a + b}$ (6) $\dfrac{x^2 + 2x + 1}{x^2 - x - 2}$

4. Perform the indicated operations and simplify.

(1) $\dfrac{4x^2}{15z} \cdot \dfrac{25y^2z}{6x}$ (2) $\dfrac{x^2 + 3x + 2}{3x + 9} \cdot \dfrac{x+3}{x^2 - 4}$ (3) $\dfrac{3x}{x^2 - x} \div \dfrac{x^2}{2x - 2}$

(4) $\dfrac{2x + 9}{x^2 - 49} - \dfrac{x+2}{x^2 - 49}$ (5) $\dfrac{2}{x+1} + \dfrac{x+3}{x^2 + x}$ (6) $2t + \dfrac{7}{3t}$

(7) $\dfrac{3}{x-3} - \dfrac{2}{x+4} + \dfrac{3x-2}{x^2 + x - 12}$ (8) $\dfrac{a^2 - 4}{a^2 + 4a + 3} \div \dfrac{2a - 4}{a+1}$

5. Simplify each complex fraction.

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

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

6. Solve each equation.

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

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

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

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

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

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

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

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

(9) $\dfrac{3}{x+3} - 2 = \dfrac{-x}{x+3}$

(10) $3x^2 - 5x = 2$

(11) $\dfrac{x+1}{x} = \dfrac{10}{3}$

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

(13) Solve the equation and find the sum of the solutions. $3(x+2)(x-1) = 0$

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

7. Simplify. Assume all variables represent postive numbers.

(1) $\sqrt{49}$

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

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

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

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

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

(7) $\sqrt[3]{-8}$

Perform the operation and simplify.

(8) $(2x + \sqrt{5})(2x - \sqrt{5})$

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

(10) $5\sqrt{2}(\sqrt{6} - \sqrt{8})$

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

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

Rationalize the denominator

(13) $\dfrac{3}{\sqrt{7}}$

(14) $\dfrac{-5\sqrt{2}}{\sqrt{11}}$

(15) $\dfrac{3}{\sqrt{7}-4}$

8. Find the distance between the given points.

(1) $(5,9)$ and $(8,13)$

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

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

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

(2) $27^{-\frac{2}{3}}$

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

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

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

10. Rewrite with rational exponents.

(1) $\sqrt{2+5y}$

(2) $\dfrac{1}{\sqrt[3]{4x}}$

11. Find the domain and range of each relation.

(1) $\{(-7,8),\ (0,0),\ (2,4)\}$

(2) $\{(0,-2),\ (1,-2),\ (5,-2)\}$

12. Find $f(-1)$, $f(0)$, and $f(2)$ for each function.

(1) $f(x)=3x-2$

(2) $f(x)=3-4x^2$

(3) $f(x)=\sqrt{2x+3}$

13. Find the slope of each line through the given points.
(1) $(1,3)$ and $(5,-13)$

(2) $(1,3)$ and $(1,2)$

(3) $(0,-2)$ and $(5,-1)$

(4) $(1,3)$ and $(5,3)$

14. Graph each line.

(1) $y=-\dfrac{3}{5}x+3$

(2) $y=-\dfrac{1}{4}x+1$

(3) $y=-2$

(4) $y=\dfrac{1}{3}x$

15. Write equations of the lines passing through given points.

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

(2) $(7,8)$ and $(6,5)$

16. Find equations of the described lines.

(1) Slope 3; through $(1, 2)$

(2) Slope $\dfrac{1}{2}$; through $(-6, 2)$

(3) Slope -2; through $(1, -3)$

(4) Parallel to $y = 3x - 4$; through $(1, 5)$

(5) Perpendicular to $2x - 3y = 1$; through $(-4, 8)$

17. Does the line $3x - 2y = 11$ pass through the point $(3, -1)$?

18. (1) Given that $f(3) = -5$, write the corresponding ordered pair.
(2) Given that $g(-6) = 12$, write the corresponding ordered pair.

19. 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) The product of two consecutive positive integers is 182. Find their sum.

(6) 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?

(7) Find the length of the diagonal of a 3 inch by 4 inch rectangle.

(8) Find the length of the hypotenuse of the right triangle with legs 5 ft and 12 ft.

ANSWERS

1. (1) $9ab^2(3ab - 2)$ (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) $(5x + 4)(x - 2)$
(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) $-7xy$ (2) $y + 6$

3. (1) $\dfrac{2y + 1}{y^2}$ (2) $\dfrac{3n^2}{5m}$ (3) -1
(4) $\dfrac{3}{a + 1}$ (5) In lowest terms   (6) $\dfrac{x + 1}{x - 2}$

4. (1) $\dfrac{10xy^2}{9}$ (2) $\dfrac{x + 1}{3x - 6}$ (3) $\dfrac{6}{x^2}$ (4) $\dfrac{1}{x - 7}$ (5) $\dfrac{3}{x}$
(6) $\dfrac{6t^2 + 7}{3t}$ (7) $\dfrac{4}{x - 3}$ (8) $\dfrac{a + 2}{2(a + 3)}$

5. (1) $\dfrac{6m^2}{n}$ (2) $\dfrac{b + 3}{2}$

6. (1) $x = -1 \pm \sqrt{5}$ (2) $x = 0, \ x = \dfrac{11}{3}$ (3) $x = 6$
(4) $x = -6, \ x = 6$ (5) $x = 4$ (6) $x = \dfrac{1}{2}$
(7) $x = 12$ (8) No solution   (9) No solution
(10) $x = 2, \ x = -\dfrac{1}{3}$ (11) $x = \dfrac{3}{7}$ (12) $x = 4$
(13) -1 (14) -9

7. (1) 7 (2) $\dfrac{9}{10}$ (3) 4 (4) $5x^2y$
(5) Not a real number   (6) $10x^3y^2\sqrt{2xy}$ (7) -2
(8) $4x^2 - 5$ (9) 5 (10) $10\sqrt{3} - 20$
(11) $4\sqrt{3}$ (12) $3\sqrt{2x} - x\sqrt{2x}$
(13) $\dfrac{3\sqrt{7}}{7}$ (14) $\dfrac{-5\sqrt{22}}{11}$ (15) $\dfrac{-\sqrt{7} - 4}{3}$

8. (1) 5 (2) $2\sqrt{17}$

9. (1) 5 (2) $\dfrac{1}{9}$ (3) $x^{\frac{11}{10}}$ (4) $3x^2y$ (5) $\dfrac{1}{3x}$

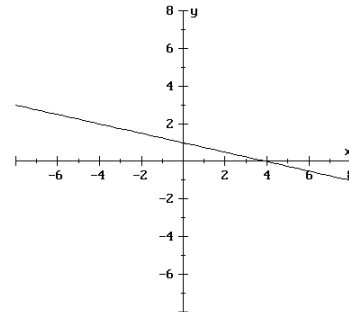**10.** (1) $(2 + 5y)^{\frac{1}{2}}$ (2) $(4x)^{-\frac{1}{3}}$
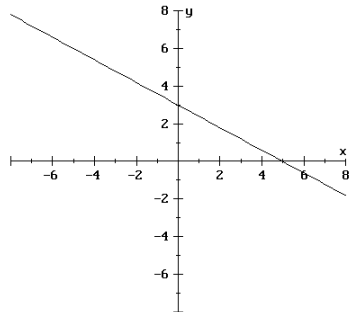
11. (1) Domain: $\{-7, 0, 2\}$, Range: $\{0, 4, 8\}$
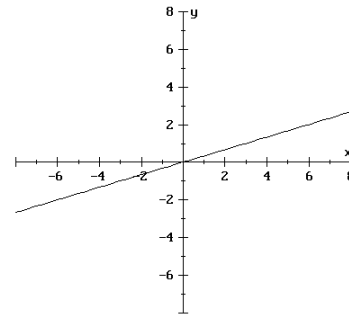
(2) Domain: $\{0, 1, 5\}$, Range: $\{-2\}$

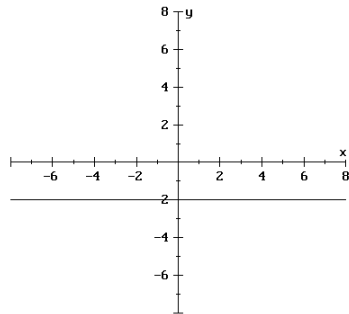**12.** (1) $-5, -2, 4$ (2) $-1, 3, -13$ (3) $1, \sqrt{3}, \sqrt{7}$

13. (1) -4 (2) Undefined   (3) $\dfrac{1}{2}$ (4) 0

14. (1)   (2)

(3)   (4)

15. (1) $y = -\dfrac{1}{3}x$ (2) $y = 3x - 13$

16. (1) $y = 3x - 1$ (2) $y = \dfrac{1}{2}x + 5$

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

(5) $y = -\dfrac{3}{2}x + 2$

17. Yes

18. (1) $(3, -5)$ (2) $(-6, 12)$

19. (1) 4 (2) 225 miles   (3) 20 teachers

(4) $L = 13$ yds, $W = 9$ yds   (5) 27 (6) 9 in.

(7) 5 inches   (8) 13 ft.