Name: _____

Math 1030-06
Spring 2007

Diagnostic Test
Math 1010 is a prerequisite for Math 1030. This means that you should have a working knowledge of intermediate algebra. This diagnostic test covers some of this background material. You should give yourself this test and then check your answers with the solution sheet handed out in class on Thursday.

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1. Three kinds of apples are all mixed up in a basket. How many apples must you draw (without looking) from the basket to be sure of getting at least two apples of the same kind?

2. There are 150 people in a class. If 80% of them are registered, how many are **not** registered?

3. Express "three-fifths" as a fraction, a decimal, and as a percentage.

4. Evaluate each of the following with $a = 4$, $b = \frac{2}{5}$, and $c = -6$:

   (a) $a \times (b + c) =$

   (b) $a \times b + c \times \frac{a}{b} - c =$

   (c) $5b - 3c^2 =$

5. Evaluate the following expressions on your calculator:

   (a) $(250/(34+56)) \times 27 =$

   (b) $23 \times \frac{5}{7} + 6.3 \times (4^5) =$

   (c) $3\sqrt{32} - \sqrt{15} =$

6. Simplify the following expressions:

   (a) $\frac{x^5 x^2}{x^{-3}}$

   (b) $(x^{-2}y^3)^2$

   (c) $(x^{-5}y^4)^2(x^0y^{-2})^2$

7. If there are 0.82 US dollars in one Canadian dollar, which is smaller: one US dollar or one Canadian dollar, eh?

8. One number is six times a second number. Find the numbers if their difference is 102.

9. If you drive at an average speed of 65 miles per hour, how long will it take you to drive 530 miles? If you can bike a distance of 45 miles in three hours and 15 minutes, what is your average biking speed in miles per hour?

10. The length of a rectangle is 14 inches more than its width. If the area is 72 square inches, find the length and width of the rectangle.

11. Suppose that three-quarters of the freshmen live in a dorm. If two-thirds of the freshmen dorm residents are women, what percentage of the freshman class are women who live in the dorm?

12. Solve for x in the following equations:

    (a) $3x - 5 = 9 + 7x$

    (b) $x^2 - 5 = 31$

    (c) $x^2 - x - 12 = 0$

(d) $\frac{x-3}{5} = \frac{x}{2}$

(e) $|x + 3| = 10$

13. Solve for x and y such that x and y satisfy the equations: $3x - 2y = 5$ and $x + y = 7$.

14. Graph the line $5x - 2y = 6$. What is the y-intercept?

15. A warehouse may contain bicycles, tricycles, and cars. Altogether there are 18 wheels in the warehouse. How many bicycles, tricycles, and cars are there? Give as many answers as possible.

16. The playground drawn below is in the shape of a rectangle with a semi-circle attached as shown. Suppose that the longer side of the rectangle is twice the length of the shorter side and that the radius of the semi-circle is 12 feet. What is the perimeter and the area of the playground?

17. Suppose that the ratio of undergraduate students to graduate students in an institution is 18:7. What percentage of the student body are graduate students?

18. Suppose that your annual tuition as a freshman was \$1,856. Each year tuition has increased by 5%. Now you are in your senior year. What is your annual tuition this year?

19. The company you work for was doing poorly two years ago and as a result everyone took a 10% pay cut for the last year. The company is doing better now and the CEO is just promised to raise everyones salary 10% for the next year. Does this mean that your salary next year will be the same as it was two years ago? Explain.

20. Determine any errors made in the work shown below. Then explain the mistake(s) made.

(a)

$$\begin{aligned} \frac{3(-5)+x(3)}{3} &= 1 \quad \Rightarrow \quad \text{“cancel 3”} \\ -5+3x &= 1 \quad \Rightarrow \quad \text{“add +5 to both sides”} \\ 3x &= 6 \quad \Rightarrow \quad \text{“subtract 3 from both sides”} \\ x &= 3 \end{aligned}$$

(b)

$$\begin{aligned} 2\left(\frac{x+3}{5}\right) &= x \quad \Rightarrow \quad \text{“add } -3 \text{ to both sides”} \\ \frac{2(x)}{5} &= x+(-3) \quad \Rightarrow \quad \text{“multiply by 5”} \\ 2x &= 5x-15 \quad \Rightarrow \quad \text{“subtract 2”} \\ x &= 5x-17 \quad \Rightarrow \quad \text{“subtract } 5x\text{”} \\ -4x &= -17 \quad \Rightarrow \quad \text{“subtract } -4\text{”} \\ x &= -21 \end{aligned}$$

(c)

$$5(x^2y^3) = 5x^2 5y^3 = 25x^2y^3.$$