Examinations
from previous terms

CEGEP
JOHN ABBOTT
COLLEGE

INTRODUCTION TO ALGEBRA
(MATHEMATICS 201-007-50)

Winter 2006

1. Simplify each of the following expressions as much as possible.

   a. $4(7x^2 + 3x - 5)$ b. $3^0 - 2 \cdot |3 - 5|$

2. Factor each of the following completely.

   a. $2x^2 + 8x - 42$ b. $12x^3 + 8x^2 + 3x + 2$

   c. $4x^2 - 3x - 10$

3. Find an equation of the line through $(6, -7)$ and $(9, 1)$.

4. Find an equation of the line through $(-1, 3)$ that is perpendicular to the line $y = -\frac{1}{3}x + 4$.

5. Here are the equations of two lines: $y = 6x + 7$, $y = \frac{1}{6}x + 7$. Are these lines parallel? Are these lines perpendicular?

6. Does the point $(-3, 8)$ lie on the line $5x + 3y = 9$? Explain your answer.

7. Simplify each of the following as much as possible. Leave no square under a square root. (Assume that all variables are positive.)

   a. $\sqrt{48x^2y} - \sqrt{12x^2y}$ b. $\sqrt{18ab^3}\sqrt{2a^3b}$

   c. $(7 - \sqrt{2})(2 + \sqrt{3})$ d. $(5 + 3\sqrt{2})(3 - \sqrt{2})$

8. Solve each of the following equations.

   a. $5(3 - 2x) + 4 = 3(2x + 1)$ b. $\frac{7}{3}x - \frac{1}{4} = 5$

   c. $x^2 = x + 2$ d. $5x^3 + 3x^2 - 20x - 12 = 0$

   e. $\dfrac{7}{x + 1} - \dfrac{2}{x^2 - 2x - 3} = \dfrac{1}{x - 3}$

   f. $3x^2 - 5 = 4x$ g. $7 = 2 + \sqrt{3x + 4}$

9. Divide: $(6x^3 + 7x^2 - 6x + 17) \div (2x + 5)$.

10. Simplify each of the following expressions as much as possible.

   a. $18y^{-2}(3y^{-1})^{-3}$ b. $(3x - 2)(3x + 2)$

   c. $(x^2 - 2x + 2)(x^2 + 2x + 2)$

11. Rationalize the denominator of $\dfrac{8}{3 - \sqrt{5}}$.

12. Perform the indicated operations and simplify your answer as much as possible.

   a. $\dfrac{x^2 + 7x + 6}{x^2 - 3x} \cdot \dfrac{x^2 - 9}{2x^2 + x - 1}$ b. $\dfrac{2}{x + 3} - \dfrac{2x - 7}{x^2 + 5x + 6}$

   c. $\dfrac{y - \dfrac{2}{y - 1}}{1 - \dfrac{1}{y - 1}}$

13. Sketch the graph of $7y + 4x + 12 = 0$. What is its x-intercept? What is its y-intercept?

14. Find the solution of the system: $\begin{cases} 5x - 4y = 3, \\ 3x - 2y = 7. \end{cases}$

15. Do the lines $8x + 6y = 4$ and $y = 19 - 5x$ ever meet? Explain your answer. If the lines do meet, find the point where they meet.

16. Complete the square: $x^2 - 12x + 1$.

17. Find x. Round your answer to four decimal places.
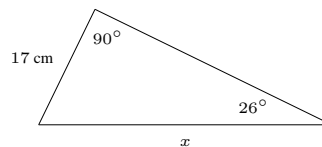
18. Anne invested $2500 in an account that pays simple interest. Two years later, she had $2575 in the account. What is the interest rate? Express your answer as a mixed fraction.

19. Find x.
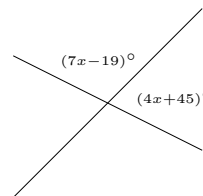
20. A poster is printed on a piece of paper that is 18 inches wide and 15 inches high. There printed area is 130 square inches, and there is a uniform margin around it (on all sides). How wide is the margin?
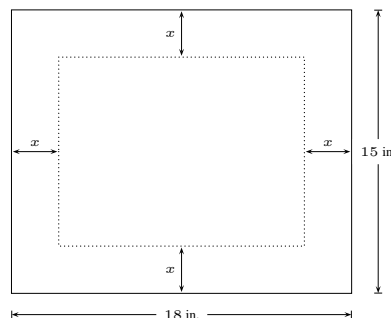
21. An 18 foot ladder is leaning against the side of a house. If the bottom of the ladder is 4 feet from house, what is the angle between the ladder and the ground? Round your answer to two decimal places.

ANSWERS

1. a. $28x^2 + 12x - 20$ b. -3
2. a. $2(x + 7)(x - 3)$ b. $(4x^2 + 1)(3x + 2)$
   c. $(4x + 5)(x - 2)$
3. $8x - 3y = 69$
4. $3x - y = -6$
5. They are neither parallel nor perpendicular.
6. Yes, because its coordinates satisfy the given equation.
7. a. $2x\sqrt{3y}$ b. $6a^2b^2$
   c. $14 + 7\sqrt{3} - 2\sqrt{2} - \sqrt{6}$ d. $9 + 4\sqrt{2}$
8. a. 1 b. $\frac{9}{4}$ c. $-1, 2$ d. $-\frac{3}{5}, \pm 2$ e. 4 f. $\frac{2}{3} \pm \frac{1}{3}\sqrt{19}$ g. 7

9. $3x^2 - 4x + 7 - \dfrac{18}{2x + 5}$
10. a. $\frac{2}{3}y$ b. $9x^2 - 4$ c. $x^4 + 4$
11. $2(3 + \sqrt{5})$
12. a. $\dfrac{(x + 6)(x + 3)}{x(2x - 1)}$ b. $\dfrac{11}{(x + 3)(x + 2)}$
   c. $y + 1$
13. The slope of the line is $-\frac{4}{7}$, its x-intercept is $(-3, 0)$ its y-intercept is $\left(0, -\frac{12}{7}\right)$. (You draw it.)
14. $x = 11, y = 13$.
15. Yes, they meet at the point $(5, -6)$.

16. $(x - 6)^2 - 35$
17. $x = 17/(\sin 26°) \approx 38.7799$
18. The interest rate is $1\frac{1}{2}$%.
19. $x = 14$
20. The margin is two and one-half inches wide.
21. The angle between the ladder and the ground is approximately $77.16°$.

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