CEGEP JOHN ABBOTT COLLEGE

INTRODUCTION TO ALGEBRA

(MATHEMATICS 201-007-50/∞)

Answer all questions to four (4) decimal places (except where this is an obviously insane request).

One mark questions

1. Does $x = 5$ satisfy $3x + 7 > x^2$?
2. Do $x = 6$ and $y = 9$ satisfy $3x - 2y = 36$?
3. Calculate:

   (a) $\dfrac{\frac{5}{8}}{\frac{10}{3}}$ (b) $\dfrac{5}{7} - \dfrac{2}{21}$

   (c) 38^0 (d) $\sqrt{121}$

Two mark questions

4. Combine and simplify:

   (a) $(12x^3)(4x^7)$ (b) $\left(4x^{-1}\right)^{-2}$ (c) $\dfrac{12x^8}{(2x)^2}$

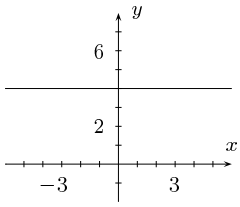
   (d) $(7x^4 - 9x^9 + 2x - 11) + (3x^4 + 17x^3 + 4x^2)$

   (e) $(12x - 18) - (x^2 + 20)$ (f) $(3x^2)(4x^3 - 2x + 1)$

   (g) $(x - 5)(x - 4)$
5. Combine and simplify:

   (a) $(x^2 + x + 1)^2$ (b) $\sqrt{8x}\sqrt{2x}$

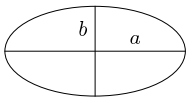
   (c) $2\sqrt{3} + \sqrt{75}$ (d) $(2 + \sqrt{3})(2 + \sqrt{3})$
6. Rationalize the denominator of $\dfrac{3}{2 - \sqrt{3}}$.
7. Sketch the graph of $y = 4x - 5$
8. What is the slope of the line through $(3, 5)$ and $(8, 20)$?
9. What is the slope of the line $y = -7x + 13$?
10. What is the slope of this line?



11. What is the equation of the line through $(2, 4)$ with slope 6?
12. Find the equation of the line though $(4, 0)$ and $(6, -2)$.
13. Quickly sketch the graphs of $x + y = 5$ and $3x - y = 7$. Where do they cross?
14. Solve for x and y:

$$\begin{array}{rcrcr} 3x & + & 2y & = & 26 \\ x & - & 4y & = & 4 \end{array}$$

15. Shady enjoys soccer and his team is pretty good—last season they won 7 more games than they lost. There were a total of 23 games; none were ties. How many games did his team win?
16. The formula for the area of an ellipse is πab. If the a is 12 cm and the b is 10 cm, find the area of the ellipse.



17. Bob is a computer freak and ends up with a lot of disks of "important" stuff. In fact, he has 39 of the small floppies and 26 of the large floppies. Find the ratio of small to large floppies.

Three mark questions

18. Combine and simplify:

   (a) $\left(\dfrac{x^2 - 9}{4x + 8}\right)\left(\dfrac{x^2 + 2x}{x^2 + 2x - 3}\right)$ (b) $\dfrac{\left(\dfrac{3x}{x - 4}\right)}{\left(\dfrac{5}{x^2 - 4x}\right)}$

   (c) $\left(\dfrac{3}{4x - 8} - \dfrac{1}{x^2 - 4}\right)$
19. Divide: $\dfrac{12x^2 - 9x}{3x}$.
20. Divide by long division: $\dfrac{2x^3 - 5x^2 + 7x - 9}{x^2 - 4x}$
21. Factor as much as possible:

   (a) $12x^3 - 19x^2 + 13$ (b) $3x^3 - 3x$

   (c) $7x^2 + 8x + 1$ (d) $xy - 4x + 5y - 20$
22. Solve for x:

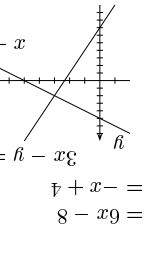
   (a) $6x - 22 = 2(x + 5)$ (b) $5 - (x + 2) = 12 - x$

   (c) $x^2 - 9x + 18 = 0$ (d) $2 + \dfrac{x}{x - 3} = 6$ (e) $5x^2 - 4x + 1 = 0$

   (f) $x^2 = 8x + 3$ (g) $x(x - 3) = x^2 - 6$

ANSWERS

1. No.
2. No.
3. (a) $\dfrac{3}{16}$ (b) $\dfrac{13}{21}$ (c) 1 (d) 11
4. (a) $48x^{10}$ (b) $\dfrac{x^2}{16}$ (c) $3x^6$ (d) $10x^4 + 8x^3 + 4x^2 + 2x - 11$ (e) $-x^2 + 12x - 35$ (f) $12x^5 - 6x^3 + 3x^2$ (g) $x^2 + x - 20$
5. (a) $x^4 + 2x^3 + 3x^2 + 2x + 1$ (b) $4x$ (c) $7\sqrt{3}$ (d) $7 + 4\sqrt{3}$
6. $3(2 + \sqrt{3})$
7.



$y = 4x - 5$

x-intercept: $\left(\frac{5}{4}, 0\right)$

y-intercept: $(0, -5)$

Slope: 4

8. 3.
9. -7
10. 0
11. $y = 6x - 8$
12. $y = -x + 4$
13.

The lines cross at the point $(3, 2)$

14. $x = 8$, $y = 1$
15. Shady's team won 15 games.
16. $120\pi \approx 376.99111$
17. The ratio of small floppies to large floppies is 3-to-2.
18. (a) $\dfrac{x(x - 3)}{4(x - 1)}$, (b) $\dfrac{3x^2}{5}$, (c) $\dfrac{4(x - 2)(x + 2)}{3x + 2}$
19. $4x - 3$
20. $2x + 3$, with remainder $19x - 9$.
21. (a) Does not factor. (b) $3x(x - 1)(x + 1)$ (c) $(7x + 1)(x + 1)$ (d) $(x - 5)(y - 4)$
22. (a) $x = 8$ (b) No solution. (c) $x = 3, 6$ (d) $x = 4$ (e) No solution. (f) $x = 4 \pm \sqrt{19} \approx 8.3588, -0.3588$. (g) $x = 3$.