Algebra Skills Review

The following is a sample of problems that you are assumed to know from your algebra classes and will be expected to use in this course.

1. Determine whether each of the following statements is true or false.

T F	$3(x - 17) = 3x - 17$	
T F	$\left(\dfrac{a}{b}\right)^2 = \dfrac{a^2}{b^2}$	
T F	$\sqrt{\dfrac{a}{b}} = \dfrac{\sqrt{a}}{\sqrt{b}}$	
T F	$\dfrac{a + b}{c} = \dfrac{a}{c} + \dfrac{b}{c}$	
T F	$\dfrac{a}{b + c} = \dfrac{a}{b} + \dfrac{a}{c}$	
T F	$\sqrt{4x} = 2\sqrt{x}$	
T F	$x^a x^b = x^{ab}$	
T F	$x^a x^b = x^{a+b}$	
T F	$x^2 - 9 = (x + 3)(x - 3)$	
T F	$(x - 2)^3 = x^3 - 6x^2 + 12x - 8$	
T F	$|x + y| = |x| + |y|$	
T F	$|xy| = |x| \cdot |y|$	
T F	$2^{3x} = 6^x$	

T F	$(x - 5) = -(5 - x)$
T F	$\dfrac{1}{a} + \dfrac{1}{b} = \dfrac{a + b}{ab}$
T F	$\dfrac{\frac{a}{b}}{c} = \dfrac{a}{bc}$
T F	$\dfrac{a}{\frac{b}{c}} = \dfrac{ac}{b}$
T F	$\sqrt{3x} = 9\sqrt{x}$
T F	$\sqrt{x^2 + 4} = x + 2$
T F	$(x + 3)^2 = x^2 + 9$
T F	$\dfrac{\frac{a}{b}}{\frac{c}{d}} = \dfrac{a}{c} \cdot \dfrac{b}{d}$
T F	$\dfrac{a}{c} + \dfrac{b}{d} = \dfrac{a + b}{c + d}$
T F	$3.07 \times 10^4 = 30,700$
T F	$3.07 \times 10^{-4} = .000307$
T F	$3^0 = 0$
T F	$\dfrac{a^{-p}}{b^{-q}} = \dfrac{b^q}{a^p}$

2. Compute the value of $\dfrac{\sqrt{6}\sqrt{2}}{\sqrt{3}}$ exactly.

3. Expand $(x + a)^2$ and $(x - \sqrt{2})(y + \sqrt{3})$.

4. Factor the polynomials $9x^2 - 1$ and $x^2 - 7x + 6$.

5. Completely factor the polynomial $x^4 - 7x^2 + 6$.

6. Simplify $5^{(1-2x)}(5^x)^2$ as much as possible.

7. Simplify $\dfrac{2m}{m^2 + 3m + 2} - \dfrac{2}{m + 2}$ as much as possible.

8. Simplify $\dfrac{\sqrt[3]{27x^5y^{12}}}{\sqrt[4]{x^3}}$ so that x and y each occur only once.

9. Simplify $\dfrac{2}{m + 2} - \dfrac{2}{m - 2}$ as much as possible.

10. Simplify $\dfrac{a^2b^3a^{-3}}{b^{-2}}$ so that a and b each occur only once.

11. Simplify $\dfrac{(x^2 - 16)(x^2 + 9)}{(x - 3)(x + 4)}$ as much as possible.

12. Solve $p = \dfrac{2}{3}q + 6$ for q.

13. Solve $2A + B = 6 - \dfrac{3}{5}B$ for B.

14. Find the solution set of the equations $x^2 + 3x - 5 = 0$ and $x^2 + 3x + 5 = 0$.

15. Find the solution set of the equations $x^2 - 6x = -5$.

16. Find the solution set of the equation $x^4 - 7x^2 = -6$.

17. Find the solution set of the inequality $2x - 7 \le 13 - 3x$.

18. Find the solution set of the equation $\sqrt{x + 11} + x = 1$.

19. Find the solution set of the equation $3x + 2 \le 20 + 4x$.

20. Solve the equation $\dfrac{x}{x + 3} = 7$ for x.

21. Solve the equation $\dfrac{2}{x} - \dfrac{1}{x + 3} = 1$ for x.

22. Solve the following systems for x and y.

$$
\begin{array}{ll}
(a) \quad
\begin{aligned}
x + y &= -2 \\
y - 3x &= -6
\end{aligned}
& \qquad
(b) \quad
\begin{aligned}
3x - 2y &= 0 \\
y - 2x &= -1
\end{aligned}
\end{array}
$$

Algebra Skills Review Answers

1. From top to bottom in the first column: F, T, T, T, F, T, F, T, T, T, F, T, F.
   From top to bottom in the second column: T, T, T, T, F, F, F, F, F, T, T, F, T.

2. 2

3. $x^2 + 2ax + a^2$ and $xy + \sqrt{3}x - \sqrt{2}y - \sqrt{6}$.

4. $(3x + 1)(3x - 1)$ and $(x - 6)(x - 1)$

5. $(x^2 - 6)(x^2 - 1) = (x - \sqrt{6})(x + \sqrt{6})(x - 1)(x + 1)$

6. 5

7. $\dfrac{-2}{(m + 2)(m + 1)}$

8. $3y^4 x^{\frac{11}{12}}$

9. $\dfrac{-8}{m^2 - 4}$

10. $\dfrac{b^5}{a}$

11. $\dfrac{(x - 4)(x^2 + 9)}{(x - 3)}$

12. $q = \frac{3}{2}p - 9$

13. $B = \dfrac{-5A + 15}{4}$

14. $x = \dfrac{-3 \pm \sqrt{29}}{2}$ and no solution

15. $x = 1$ and $x = 5$

16. $x = \pm\sqrt{6}$ or $x = \pm 1$

17. $x \leq 4$

18. $x = -2$ (Note that $x = 5$ is not a solution.)

19. $x \geq -18$

20. $x = -\dfrac{7}{2}$

21. $x = -1 \pm \sqrt{7}$

22. $x = 1$, $y = -3$ and $x = 2$, $y = 3$