Simplify each algebraic fraction. State the excluded values of the variables.

1. $\dfrac{12x^{16}y^9}{8x^5y^{11}}$

2. $\dfrac{m^2 + 9m + 18}{m^2 - 6m - 27}$

3. $\dfrac{3b^2 + 23b + 14}{b^2 + 2b - 35}$

4. $\dfrac{x^2 - 25}{x^2 - 13x + 40}$

Find each product in simplest form.

5. $\dfrac{3x^2 + 14x + 15}{x^2 + 2x - 3} \cdot \dfrac{x - 1}{3x^2 - 10x - 25}$

6. $\dfrac{x^2 + 8x + 16}{x^2 - 4x - 12} \cdot \dfrac{x^2 - x - 30}{2x^2 + 11x + 12}$

Find each quotient in simplest form.

7. $\dfrac{2y^3}{x + 1} \div \dfrac{8y}{x^2 - 1}$

8. $\dfrac{p^2 - p - 6}{p^2 + p - 2} \div \dfrac{p^2 + p - 12}{p^2 + 3p - 4}$

Find each quotient.

9. $x + 4 \overline{)6x^2 + 31x + 28}$

10. $2m + 3 \overline{)2m^2 + 13m + 18}$

Find each sum or difference. Express each result in simplest form.

11. $\dfrac{x}{x^2 - y^2} + \dfrac{y}{x^2 - y^2}$

12. $\dfrac{3n + 5}{n - 7} - \dfrac{2n - 6}{n - 7}$

13. $\dfrac{n + 5}{2n + 4} + \dfrac{n - 6}{3n + 6}$

14. $\dfrac{2x + 3y}{x^2 - 2xy + y^2} - \dfrac{3}{x - y}$

Simplify.

15. $5 + \dfrac{2x - y}{2x + y}$

16. $\dfrac{x + 2 - \dfrac{2x}{x + 2}}{x + \dfrac{4}{x + 2}}$

17. $\dfrac{x - 2 - \dfrac{1}{x - 2}}{x - 3}$

Solve each equation.

18. $x - \dfrac{9}{x - 2} = \dfrac{x - 3}{2 - x}$

19. $\dfrac{x + 5}{x} + \dfrac{x - 2}{x} = 7$

20. $\dfrac{y}{y + 4} - \dfrac{y}{y - 4} = \dfrac{-48}{y^2 - 16}$

21. $\dfrac{y^2 - 5y + 4}{2y^2 + 4y - 6} + \dfrac{1}{y + 3} = 0$

~~Also [page 508 (2-4)]~~

① $(4a^2b^2c^2 - 8a^3b^2c + 6abc^2) \div (2ab)$

② ~~Sara weighs 106 lb and Don weighs 156 lb. If Don sits 6 ft from the seesaw support, how far from the support must Sara sit to balance the seesaw.~~