Example 1

1. Compare the surface area to the volume of a cylindrical submersible that has a diameter of d and a height of d.

2. Compare the surface area to the volume of a cylindrical submersible that has a diameter of d and a height of $2d$.

Example 2

Simplify each rational expression.

3. $\frac{2x + 8}{x^2 - 16}$

4. $\frac{1 + x}{x^2 + x}$

5. $\frac{3x^2y^3}{6xy^2}$

6. $\frac{d^2 - 7d}{14 - 2d}$

7. $\frac{x^2 + 7x + 10}{x^2 - 4}$

8. $\frac{y^2 - 16}{y^2 - 7y + 12}$

9. $\frac{x^2 - 6xy + 5y^2}{x^2 - y^2}$

10. $\frac{x^2 - 12x - 28}{x^2 - 14x}$

Example 3

Multiply. Write the answer in simplest form.

11. $\frac{2x + 4y}{10x} \cdot \frac{15x^2}{x + 2y}$

12. $\frac{x^2 + 6x}{3x^2 + 6x - 24} \cdot \frac{x^2 + 2x - 8}{x + 6}$

13. $\frac{x^2 - 5x + 4}{x^2 + 3x - 28} \cdot \frac{x^2 + 2x - 3}{x^2 + 10x + 21}$

14. $\frac{x^2 + 2x + 1}{x^2 - 1} \cdot \frac{x^2 + 3x + 2}{x^2 + 4x + 4}$

Example 4

Divide. Write the answer in simplest form.

15. $\frac{2x - 10}{3x - 21} \div \frac{x - 5}{4x - 28}$

16. $\frac{x^2 - 9x + 14}{x^3 + 2x^2} \div \frac{x - 2}{x + 2}$

17. $\frac{x^2 + 10x + 16}{x^2 - 6x - 16} \div \frac{x + 8}{x^2 - 64}$

18. $\frac{5y}{2x^2} \div \frac{5y^2}{8x^2}$

19. $\frac{6x^2 - 32x + 10}{3x^2 - 15x} \div \frac{3x^2 + 11x - 4}{2x^2 - 32}$

20. $\frac{7x^4}{24y^5} \div \frac{21x}{12y^4}$