

SM3 3.1: Rational Operations

For problems 1-6, simplify each rational expression. State any restrictions on x .

1) $\frac{35x}{7x}$

2) $\frac{3x + 12}{2x + 8}$

3) $\frac{x^2 + 7x}{x}$

4) $\frac{18x^4 - 6x^2 + 9x}{3x}$

5) $\frac{8 + 2x}{2x^2 + 10x + 8}$

6) $\frac{2x^3 + 13x^2 - 7x}{x^2 + 7x}$

7) Show that $\frac{x^3 - 6x^2 - 7x}{x^2 + 4x + 3}$ is equivalent to $\frac{x^2 - 7x}{x + 3}$ for most values of x . State which values of x cause the expressions be not equivalent.

8) What is the simplest rational expression that represents the depth of a pond that is $\frac{3x^2 - 8x}{5x}$ meters deep?

9) What is the simplest rational expression that represent the diameter of a circle that has a radius of $\frac{4x - 8}{3x - 6}$ centimeters?

10) What are the simplest rational expressions that can be used to represent the length and width, in inches, of a rectangle with sides that are $\frac{x^2 - x - 6}{x + 2}$, $\frac{x^2 + x - 20}{2x + 10}$, $\frac{6x^2 - 96}{48 + 12x}$, and $\frac{2x - 6}{2}$ inches ?

For problems 21-25, simplify the expression and state any restrictions on x .

11) $\frac{3}{x} \cdot \frac{5x}{6x^2 + 9}$

12) $\frac{x}{x-3} \cdot \frac{2x+7}{x+1}$

13) $\frac{x^2 + 3x}{x-4} \cdot \frac{x^2 + 1}{x^2}$

14) $\frac{x}{12} \cdot \frac{8+4x}{5x}$

15) $\frac{2x+6}{x-6} \cdot \frac{x^2 - 4x - 12}{30 + 4x - 2x^2}$

16) For what values of x is $\frac{2x-8}{x^2+7x+10}$ an invalid expression?

17) Show that the rational expression $\frac{5x+5}{x} \cdot \frac{x^3+3x^2}{x^2-1} \cdot \frac{x-1}{5x}$ is equivalent to the rational expression $x + 3$. State any restrictions on x .

18) What simplified rational expression represents the area of a rectangle with a width of $\frac{x}{2}$ inches and a length of $\frac{2x+1}{x-5}$ inches? State any restrictions on x .

For problems 31-34, simplify the expression and state any restrictions on x .

19) $\frac{2x}{7} \div \frac{1}{x}$

20) $\frac{3}{5x} \div \frac{5}{x}$

21) $\frac{8x+3}{5} \div \frac{x}{9}$

22) $\frac{2x-4}{x+1} \div \frac{x}{x+2}$

23) Show that the expression $\frac{x^2-2x-15}{2x^2-8x} \cdot \frac{32-2x^2}{x^2-13x+40} \div \frac{x+4}{8x-x^2}$ is equivalent to the expression $x+3$. State any restrictions on x .