

3.2 Multiple and Divide Rational Expressions

PRACTICE

Perform the indicated operations and reduce to lowest terms.

$$1. \frac{5b^3}{12} \cdot \frac{8}{3} = \frac{20b^3}{3}$$

$$2. \frac{9}{x-1} \div \frac{(x-8)}{7(1-x)} = \frac{9}{x-1} \cdot \frac{7(-x+1)}{x-8}$$

$$\frac{9}{x-1} \cdot \frac{-7(x-1)}{x-8} = \frac{-63}{x-8}$$

$$3. \frac{k+8}{4k+20} \cdot \frac{10k^2+50k}{5k}$$

$$\frac{k+8}{4(k+5)} \cdot \frac{10k(k+5)}{5k} = \frac{k+8}{2}$$

$$4. \frac{\frac{5x}{4}}{\frac{x}{4}} = \frac{5x}{4} \cdot \frac{4}{x} = 5$$

$$5. \frac{8(x+5)}{(x+7)(5-x)} \cdot \frac{x+7}{2} = \frac{8(x+5)}{\cancel{(x+7)}(5-x)} \cdot \frac{\cancel{x+7}}{2}$$

$$\frac{4(x+5)}{-(x-5)}$$

$$6. \frac{6b+48}{b+8} \div \frac{6b-24}{b+8}$$

$$\frac{6(b+8)}{b+8} \cdot \frac{1}{6(b-4)} = \frac{1}{b-4}$$

$$7. \frac{4n^2}{5} \div \frac{3n^3}{7} = \frac{4n^2}{5} \cdot \frac{7}{3n^3}$$

$$\frac{28}{15n}$$

$$8. \frac{\frac{x^2}{5}}{\frac{x^2}{15}} = \frac{x^2}{5} \cdot \frac{15}{x^2} = 3$$

$$9. \frac{\frac{x+2}{x}}{\frac{1}{x}} = \frac{x+2}{x} \cdot \frac{x}{1} = x+2$$

$$10. \frac{(x-5)(x+1)}{4x^3+4x^2} \cdot \frac{4x^2(3x+2)}{12x+8}$$

$$\frac{(x-5)(x+1)}{4x^2(x+1)} \cdot \frac{4x^2(3x+2)}{4(3x+2)} = \frac{x-5}{4}$$

$$11. \frac{\frac{3m^2-m}{4}}{\frac{4}{3m-1}} = \frac{3m^2-m}{4} \cdot \frac{3m-1}{4}$$

$$\frac{m(3m-1)}{4} \cdot \frac{3m-1}{4} = \frac{m^2}{4}$$

$$12. \frac{(2x-1)(x+4)}{8x^3-4x^2} \cdot \frac{2x(x+1)}{2x}$$

$$\frac{(2x-1)(x+4)}{4x^2(2x-1)} \cdot \frac{2x(x+1)}{1} = \frac{(x+4)(x+1)}{2x}$$

$$13. \frac{v^2+v-2}{v^2+9v-10} \div \frac{6v+12}{v^2+19v+90}$$

$$\frac{v^2+v-2}{v^2+9v-10} \cdot \frac{v^2+19v+90}{6v+12}$$

$$\frac{(v+2)(v-1)}{(v+10)(v-1)} \cdot \frac{(v+7)(v+10)}{6(v+2)} = \frac{v+7}{6}$$

Match the expression on the left with its simplified form on the right. That's fun!

14. $\frac{x^2 - 25}{x^2 - 3x - 10} = \frac{\cancel{(x+5)}\cancel{(x-5)}}{\cancel{(x-5)}(x+2)} = \frac{(x+5)}{(x+2)}$	B	A. $\frac{x(x-1)}{3(x+1)}$
15. $\frac{x^2 + 5x + 6}{x^2 - x - 20} \cdot \frac{x^2 + 3x - 4}{x^2 + x - 2} = \frac{\cancel{(x+2)}\cancel{(x+3)}}{\cancel{(x-5)}\cancel{(x+4)}} \cdot \frac{\cancel{(x+4)}\cancel{(x-1)}}{\cancel{(x+2)}\cancel{(x-1)}} = \frac{x+3}{x-5}$	E	B. $\frac{x+5}{x+2}$
16. $\frac{x^2 - 25}{x^2 - 16} \cdot \frac{x^2 - 4x}{2x + 10} = \frac{\cancel{(x+5)}\cancel{(x-5)}}{\cancel{(x+4)}\cancel{(x-4)}} \cdot \frac{x\cancel{(x-4)}}{2\cancel{(x+5)}} = \frac{x(x-5)}{2(x+4)}$	D	C. $\frac{12x}{x+3}$
17. $\frac{3x-6}{x^2-5x+6} = \frac{3\cancel{(x-2)}}{\cancel{(x-2)}(x-3)} = \frac{3}{x-3}$	F	D. $\frac{x(x-5)}{2(x+4)}$
18. $\frac{x^2-9}{x^2+x} \div \frac{x-3}{x^2-1} = \frac{\cancel{(x+3)}\cancel{(x-3)}}{x(x+1)} \cdot \frac{\cancel{(x+1)}(x-1)}{\cancel{x-1}} = \frac{\cancel{(x+3)}(x-1)}{x}$	H	E. $\frac{x+3}{x-5}$
19. $\frac{x^2-1}{\frac{x^2+3x+2}{x+2}} = \frac{x^2-1}{x^2+x+2} \div \frac{x^2-2x+1}{x+2} = \frac{\cancel{(x+1)}\cancel{(x-1)}}{\cancel{(x+1)}\cancel{(x+1)}} \cdot \frac{x+2}{\cancel{(x-1)}(x-1)} = \frac{1}{x-1}$	G	F. $\frac{3}{x-3}$
20. $\frac{\frac{3x^2-9x}{x-2}}{\frac{x^2-9}{4x-8}} = \frac{3x^2-9x}{x-2} \cdot \frac{4x-8}{x^2-9} = \frac{3x\cancel{(x-3)}}{\cancel{x-2}} \cdot \frac{4\cancel{(x-2)}}{\cancel{(x+3)}\cancel{(x-3)}} = \frac{12x}{x+3}$	C	G. $\frac{1}{x-1}$
21. $\frac{x^2}{x^2+2x+1} \div \frac{3x}{x^2-1} = \frac{x^{\cancel{2}}}{\cancel{(x+1)}\cancel{(x+1)}} \cdot \frac{\cancel{(x+1)}(x-1)}{3x} = \frac{x(x-1)}{3(x+1)}$	A	H. $\frac{(x+3)(x-1)}{x}$

FREE RESPONSE

22. Given the graph of the polynomial $g(x)$. **even**

a. Write a possible equation of $g(x)$.

$$g(x) = -x(x+3)^2(x-4)(x-7)^2$$

odd

b. Describe the end behavior of $g(x)$.

$$\boxed{\begin{matrix} x \rightarrow -\infty \\ g(x) = -\infty \end{matrix}}$$

$$\boxed{\begin{matrix} x \rightarrow \infty \\ g(x) = -\infty \end{matrix}}$$

