

A.APR.D.7: Multiplication and Division of Rationals 1

- 1 What is the product of $\frac{x^2 - 1}{x + 1}$ and $\frac{x + 3}{3x - 3}$ expressed in simplest form?
- 1) x
 - 2) $\frac{x}{3}$
 - 3) $x + 3$
 - 4) $\frac{x + 3}{3}$

- 2 What is the product of $\frac{4x}{x - 1}$ and $\frac{x^2 - 1}{3x + 3}$ expressed in simplest form?
- 1) $\frac{4x}{3}$
 - 2) $\frac{4x^2}{3}$
 - 3) $\frac{4x^2}{3(x + 1)}$
 - 4) $\frac{4(x + 1)}{3}$

- 3 Express the product of $\frac{x + 2}{2}$ and $\frac{4x + 20}{x^2 + 6x + 8}$ in simplest form.

- 4 If the length of a rectangular garden is represented by $\frac{x^2 + 2x}{x^2 + 2x - 15}$ and its width is represented by $\frac{2x - 6}{2x + 4}$, which expression represents the area of the garden?
- 1) x
 - 2) $x + 5$
 - 3) $\frac{x^2 + 2x}{2(x + 5)}$
 - 4) $\frac{x}{x + 5}$

- 5 What is the quotient of $\frac{x}{x + 4}$ divided by $\frac{2x}{x^2 - 16}$?
- 1) $\frac{2}{x - 4}$
 - 2) $\frac{2x^2}{x - 4}$
 - 3) $\frac{2x^2}{x^2 - 16}$
 - 4) $\frac{x - 4}{2}$

- 6 The expression $\frac{x^2 + 9x - 22}{x^2 - 121} \div (2 - x)$ is equivalent to
- 1) $x - 11$
 - 2) $\frac{1}{x - 11}$
 - 3) $11 - x$
 - 4) $\frac{1}{11 - x}$

7 Perform the indicated operation and express the result in simplest terms: $\frac{x}{x+3} \div \frac{3x}{x^2-9}$

8 Express in simplest form: $\frac{8x}{x^2-16} \div \frac{2x}{x+4}$

9 Perform the indicated operation and simplify:
 $\frac{3x+6}{4x+12} \div \frac{x^2-4}{x+3}$

10 Express in simplest form:
 $\frac{x^2+9x+14}{x^2-49} \div \frac{3x+6}{x^2+x-56}$

11 Express $\frac{3x^2+9x}{x^2+5x+6} \div \frac{x^2-9}{x^2-x-6}$ in simplest form.

12 Express in simplest form: $\frac{x^2+5x+6}{x^2-x-20} \div \frac{x^2+x-6}{2x-10}$

13 Perform the indicated operations and express in simplest form: $\frac{3x^2+12x-15}{x^2+2x-15} \div \frac{3x^2-3x}{3x-x^2}$

14 Express in simplest form: $\frac{2x^2-8x-42}{6x^2} \div \frac{x^2-9}{x^2-3x}$

15 Express $\frac{35x^2+2x-1}{15x+3} \div \frac{2-98x^2}{6+42x}$ in simplest form.

16 If $f(x) = \frac{3x^2-27}{18x+30}$ and $g(x) = \frac{x^2-7x+12}{3x^2-7x-20}$, find $f(x) \div g(x)$ for all values of x for which the expression is defined and express your answer in simplest form.

17 Perform the indicated operations and express the result in simplest form:
 $\left(\frac{10x^2y}{x^2+xy}\right) \cdot \left(\frac{(x+y)^2}{2x}\right) \div \left(\frac{x^2-y^2}{5y^2}\right)$

18 Perform the indicated operations and simplify completely: $\frac{x^2-9}{x^2-5x} \cdot \frac{5x-x^2}{x^2-x-12} \div \frac{x-4}{x^2-8x+16}$

19 Express in simplest form:
 $\frac{4x+8}{x+1} \cdot \frac{2-x}{3x-15} \div \frac{x^2-4}{2x^2-8x-10}$

20 Perform the indicated operations and simplify completely:
 $\frac{x^3-3x^2+6x-18}{x^2-4x} \cdot \frac{2x-4}{x^4-3x^3} \div \frac{x^2+2x-8}{16-x^2}$

A.APR.D.7: Multiplication and Division of Rationals 1 Answer Section

1 ANS: 4

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

REF: 060815ia

2 ANS: 1

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

REF: 080826ia

3 ANS:

$$\frac{x + 2}{2} \times \frac{4(x + 5)}{(x + 4)(x + 2)} = \frac{2(x + 5)}{x + 4}$$

REF: 081232ia

4 ANS: 4

$$\frac{x(x + 2)}{(x + 5)(x - 3)} \times \frac{2(x - 3)}{2(x + 2)} = \frac{x}{x + 5}$$

REF: 080117b

5 ANS: 4

$$\frac{x}{x + 4} \div \frac{2x}{x^2 - 16} = \frac{x}{x + 4} \cdot \frac{x^2 - 16}{2x} = \frac{1}{x + 4} \cdot \frac{(x + 4)(x - 4)}{2} = \frac{x - 4}{2}$$

REF: 081130ia

6 ANS: 4

$$\frac{x^2 + 9x - 22}{x^2 - 121} \div (2 - x) = \frac{(x + 11)(x - 2)}{(x + 11)(x - 11)} \cdot \frac{-1}{x - 2} = \frac{-1}{x - 11}$$

REF: 011423a2

7 ANS:

$$\frac{x - 3}{3} \cdot \frac{x}{x + 3} \times \frac{x^2 - 9}{3x} = \frac{1}{x + 3} \times \frac{(x + 3)(x - 3)}{3} = \frac{x - 3}{3}$$

REF: 080022a

8 ANS:

$$\frac{4}{x - 4} \cdot \frac{8x}{x^2 - 16} \div \frac{2x}{x + 4} = \frac{8x}{(x + 4)(x - 4)} \cdot \frac{x + 4}{2x} = \frac{4}{x - 4}$$

REF: 010935a

9 ANS:

$$\frac{3}{4x-8} \cdot \frac{3x+6}{4x+12} \div \frac{x^2-4}{x+3} = \frac{3(x+2)}{4(x+3)} \cdot \frac{x+3}{(x+2)(x-2)} = \frac{3}{4(x-2)}$$

REF: 010935ia

10 ANS:

$$\frac{x^2+9x+14}{x^2-49} \div \frac{3x+6}{x^2+x-56} = \frac{(x+7)(x+2)}{(x+7)(x-7)} \cdot \frac{(x+8)(x-7)}{3(x+2)} = \frac{x+8}{3}$$

REF: 061037ia

11 ANS:

$$\frac{3x(x+3)}{(x+3)(x+2)} \times \frac{(x-3)(x+2)}{(x+3)(x-3)} = \frac{3x}{x+3}$$

REF: 081338ia

12 ANS:

$$\frac{x^2+5x+6}{x^2-x-20} \div \frac{x^2+x-6}{2x-10} = \frac{(x+3)(x+2)}{(x-5)(x+4)} \cdot \frac{2(x-5)}{(x+3)(x-2)} = \frac{2(x+2)}{(x+4)(x-2)}$$

REF: 061638ia

13 ANS:

$$-1. \frac{3x^2+12x-15}{x^2+2x-15} \div \frac{3x^2-3x}{3x-x^2} = \frac{3(x^2+4x-5)}{(x+5)(x-3)} \times \frac{x(3-x)}{3x(x-1)} = \frac{(x+5)(x-1)}{(x+5)(x-3)} \times \frac{(3-x)}{(x-1)} = \frac{3-x}{x-3} = -1$$

REF: 010928b

14 ANS:

$$\frac{x-7}{3x} \cdot \frac{2x^2-8x-42}{6x^2} \div \frac{x^2-9}{x^2-3x} = \frac{2(x^2-4x-21)}{6x^2} \cdot \frac{x(x-3)}{(x+3)(x-3)} = \frac{(x-7)(x+3)}{3x} \cdot \frac{1}{x+3} = \frac{x-7}{3x}$$

REF: 080937ia

15 ANS:

$$-1. \frac{(7x-1)(5x+1)}{3(5x+1)} \cdot \frac{6(1+7x)}{2(1-49x^2)} = \frac{(7x-1)(1+7x)}{(1-7x)(1+7x)} = -1$$

REF: 061028b

16 ANS:

$$\frac{x+3}{2} \cdot \frac{3x^2-27}{18x+30} \div \frac{x^2-7x+12}{3x^2-7x-20} = \frac{3(x^2-9)}{6(3x+5)} \cdot \frac{3x^2-7x-20}{x^2-7x+12} = \frac{(x+3)(x-3)}{2(3x+5)} \cdot \frac{(3x+5)(x-4)}{(x-4)(x-3)} = \frac{x+3}{2}$$

REF: 060727b

17 ANS:

$$\left(\frac{10x^2y}{x^2+xy}\right) \cdot \left(\frac{(x+y)^2}{2x}\right) \div \left(\frac{x^2-y^2}{5y^2}\right) = \left(\frac{10x^2y}{x(x+y)}\right) \cdot \left(\frac{(x+y)^2}{2x}\right) \cdot \left(\frac{5y^2}{(x+y)(x-y)}\right) = \frac{25y^3}{x-y}$$

REF: 011539ia

18 ANS:

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

REF: 010733b

19 ANS:

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

REF: 010434b

20 ANS:

$$\frac{-2(x^2+6)}{x^4} \cdot \frac{x^2(x-3)+6(x-3)}{x^2-4x} \cdot \frac{2x-4}{x^4-3x^3} \div \frac{x^2+2x-8}{16-x^2}$$

$$\frac{(x^2+6)(x-3)}{x(x-4)} \cdot \frac{2(x-2)}{x^3(x-3)} \cdot \frac{(4+x)(4-x)}{(x+4)(x-2)}$$

$$\frac{-2(x^2+6)}{x^4}$$

REF: 011239a2