

A2.A.16: Multiplication and Division of Rationals 2: Perform arithmetic operations with rational expressions and rename to lowest terms

1 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) $\frac{1}{11 - x}$

2 Express in simplest form: $\frac{36 - x^2}{x^2 + 8x + 12} \div \frac{x^2 - 6x}{x - 2}$

3 Express in simplest form:
 $\frac{4x^2 - 100}{x^2 + x - 6} \div \frac{20 - 4x}{2x^2 - 9x + 10}$

4 Perform the indicated operation and express in
simplest form: $\frac{x^2 - 3x}{2x^2 + x - 6} \div \frac{x^2 - 5x + 6}{x^2 - 4}$

5 Express in simplest form:
 $\frac{2x - 8}{x^2 + x - 12} \div \frac{20 - 5x}{2x^2 - 5x - 3}$

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

7 Express in simplest form: $\frac{y^4 - 1}{2y} \div \frac{y^3 + y}{y^2}$

8 Express in simplest form: $\frac{1 - x^2}{6x + 6} \div \frac{x^4 - 1}{6x^2 + 6}$

9 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.

10 Express in simplest form:
 $\frac{64 - \cos^2 x}{\cos^2 x + 8 \cos x} \div \frac{2 \cos x - 16}{8 \cos x}$

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

- 12 Express in simplest form:

$$\frac{x^2 + 2x}{x^2 + 2x - 15} \cdot \frac{2x - 6}{4} \div \frac{x^2 + x - 2}{x^2 + 4x - 5}$$

- 13 Perform the indicated operations and express in

lowest terms: $\frac{x^2 - 9}{2x + 4} \cdot \frac{x^2 + 7x + 10}{x^2 - 3x - 18} \div \frac{x^2 + 2x - 15}{2x^2 - 12x}$

- 14 Express in simplest form:

$$\frac{x^2 - x - 56}{x^2 - 4} \cdot \frac{x^2 + x - 2}{8x - x^2} \div \frac{x^2 + 6x - 7}{x^2 + 2x - 8}$$

- 15 Express in simplest form:

$$\frac{x^2 - 16}{2x^2 + 4x} \cdot \frac{x^2 + 9x + 14}{x^2 + 2x - 8} \div \frac{x^2 + 3x - 28}{16x - 8x^2}$$

- 16 Express in simplest form:

$$\frac{4x + 8}{x + 1} \cdot \frac{2 - x}{3x - 15} \div \frac{x^2 - 4}{2x^2 - 8x - 10}$$

- 17 Perform the indicated operations and simplify:

$$\frac{x^2 + 4xy + 3y^2}{x^2 - y^2} \cdot \frac{x^2 + xy}{x - y} \div \frac{x^2 + 3xy}{(x - y)^2}$$

- 18 Perform the indicated operations and simplify completely:

$$\frac{x^3 - 3x^2 + 6x - 18}{x^2 - 4x} \cdot \frac{2x - 4}{x^4 - 3x^3} \div \frac{x^2 + 2x - 8}{16 - x^2}$$

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Answer Section

1 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

2 ANS:

$$-\frac{(x - 2)}{x(x + 2)}$$

REF: 010339siii

3 ANS:

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

REF: 080238siii

4 ANS:

$$\frac{x}{2x - 3}$$

REF: 018537siii

5 ANS:

$$-\frac{2(2x + 1)}{5(x + 4)}$$

REF: 019938siii

6 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

7 ANS:

$$\frac{y^2 - 1}{2}$$

REF: 069440siii

8 ANS:

$$-\frac{1}{x + 1}$$

REF: 069540siii

9 ANS:

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

REF: 060727b

10 ANS:

-4

REF: 080139siii

11 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

12 ANS:

$$\frac{x}{2}$$

REF: 019636siii

13 ANS:

 x

REF: 089939siii

14 ANS:

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

REF: 060237siii

15 ANS:

-4

REF: 010438siii

16 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

17 ANS:

 $x+y$

REF: 089037siii

18 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