

Topic Test

Rational Expressions Topic Test - Theta Division
 (for students who have NOT had more math than Algebra I, Algebra II, and Geometry)

NO CALCULATORS

NOTE: ASSUME NON-ZERO DENOMINATORS FOR EACH PROBLEM
 UNLESS AN INDIVIDUAL PROBLEM INDICATES OTHERWISE

1. $2 - \frac{x}{y} =$

- A) $\frac{2-x}{y}$ B) $\frac{2-y}{x}$ C) $\frac{2y-x}{y}$ D) $\frac{2x-y}{y}$ E) none of these

2. $8\frac{1}{2} - 2\frac{1}{3} =$

- A) $4\frac{1}{6}$ B) $6\frac{1}{6}$ C) $\frac{119}{6}$ D) $\frac{51}{14}$ E) none of these

3. $\left(1 + \frac{1}{2}\right)\left(2 + \frac{1}{2}\right) =$

- A) 4 B) $\frac{15}{4}$ C) $\frac{5}{2}$ D) $\frac{7}{2}$ E) none of these

4. $\frac{x^2 - 9}{3a - ax} =$

- A) $\frac{x-3}{a}$ B) $\frac{x+3}{a}$ C) $\frac{x-3}{a}$ D) $\frac{3-x}{a}$ E) none of these

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5. $\frac{\frac{a}{b} + 1}{\frac{a}{b} - 1} =$

- A) 1 B) -1 C) $\frac{a+b}{a-b}$ D) $\frac{a-b}{a+b}$ E) none of these

6. $\frac{\frac{x-8}{8} - 1}{\frac{8}{x} - 1} =$

- A) 8 B) -8 C) $8-x$ D) x E) none of these

7. $\frac{x^2 - 2x - 99}{x^2 - 81} =$

- A) $\frac{x-11}{x-9}$ B) $\frac{-2x-99}{-81}$ C) $\frac{11}{9}$ D) $\frac{x+11}{x+9}$ E) none of these

8. Simplify the following expression to a single fraction reduced to lowest terms.

$$\left(x + 3 - \frac{12x + 26}{x + 4}\right) + \left(1 - \frac{11x + 26}{(x + 4)^2}\right)$$

- A) $\frac{x^2 + 8x + 16}{x^2 - x - 20}$ B) $\frac{x^2 - 3x - 28}{x - 5}$ C) $\frac{x^2 - 5x - 14}{x - 5}$
D) $\frac{(x-7)(x-5)(x+2)^2}{(x+4)^3}$ E) $\frac{x^2 - 12x + 35}{x^2 + 8x + 16}$

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9. Solve for x:

$$\frac{64^{x-1}}{4^{x-1}} = 256^{2x}$$

- A) -3 B) $-\frac{1}{3}$ C) $\frac{1}{3}$ D) 3 E) none of these

10. Find the range of the function $f(x) = \frac{|x|}{x}$

- A) $\{-1 \leq y \leq 1\}$ B) $\{1\}$ C) $\{0\}$ D) $\{-1, 1\}$ E) $\{\text{all reals}\}$

11. Find the remainder in the following division: $\frac{4x^3 - 5x^2 + 3x + 2}{x + 1}$

- A) 10 B) -10 C) 0 D) -4 E) 4

12. Which of the following are NOT solutions to $\left(\frac{2x^2 + 7x + 6}{x^2 - 2x - 8}\right)\left(\frac{8 + 10x - 3x^2}{6x^2 + 13x + 6}\right) = 0$

- A) 4 B) -2 C) $-\frac{3}{2}$ D) all of choices A, B, and C E) none of choices A, B, and C

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13. Solve for x over the complex numbers: $\frac{1 - \frac{8}{x^3}}{\frac{2}{x} - 1} = 0$

- A) $1 \pm i\sqrt{3}$ B) $0, 1 \pm i\sqrt{3}$ C) $2, 1 \pm i\sqrt{3}$ D) $-1 \pm i\sqrt{3}$ E) $2, -1 \pm i\sqrt{3}$

14. In this problem, eliminate values of x which make the problem undefined.
Find the smallest rational root of the following:

$$\frac{6x^4 + 11x^3 - 41x^2 - 26x + 60}{2x + 3} = 0$$

- A) $-1 - \sqrt{5}$ B) $-\frac{5}{3}$ C) $-\frac{3}{2}$ D) $\frac{3}{2}$ E) $\frac{5}{3}$

15. Solve the following for x in terms of a : $\frac{2x - a}{6x - a} = \frac{x + 3a}{3x + 2a}$

- A) $\frac{5a}{18}$ B) $\frac{a}{16}$ C) $\frac{16}{a}$ D) $\frac{18}{a}$ E) $\frac{a}{18}$

16. Simplify to a single, reduced fraction: $\frac{1 + (w + 1)^{-1}}{1 + 3(w - 1)^{-1}}$

- A) $w^2 - 1$ B) $\frac{w - 1}{w + 1}$ C) -1 D) $\frac{1}{w^2 - 1}$ E) $\frac{w + 1}{w - 1}$

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17. Express the following complex fraction as a rational expression in lowest terms:

$$\frac{9x^2 - 4y^2}{\frac{x-y}{y-2x} - 1}$$

- A) $2y^2 - xy - 6x^2$ B) $2y^2 + 7xy + 6x^2$ C) $6x^2 + xy - 4y^2$
D) $\frac{3x+2y}{y-2x}$ E) $\frac{3x+2y}{2x-y}$

18. Combine to a single reduced fraction:

$$\frac{10x+13}{3x^2-x-10} + \frac{5x+7}{3x^2+14x+15}$$

- A) $\frac{x+1}{(x-2)(x+3)}$ B) $\frac{5(x-1)}{(x-2)(x+3)}$ C) $\frac{15x^2+23x+25}{(3x+5)(x-2)(x+3)}$
D) $\frac{5(1-x)}{(x-2)(x+3)}$ E) $\frac{-5(x+1)}{(2-x)(3+x)}$

19. Solve for a: $c = \sqrt[3]{\frac{3b}{4\pi a}}$ (assume a, b, c ≠ 0)

- A) $\frac{3\pi}{4bc^3}$ B) $\frac{4\pi c^3}{3b}$ C) $\frac{3bc^3}{4\pi}$ D) $\frac{3b}{4\pi c^3}$ E) none of these

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20. Excluding the values of $x = -3$ and $x = -7$, how do the graphs of

$$f(x) = \frac{2x^2 - 3x + 2}{x + 3} \text{ and } g(x) = \frac{2x^2 + 13x + 22}{x + 7} \text{ compare?}$$

- A) $g(x)$ is 4 units above $f(x)$ B) $g(x)$ is 4 units below $f(x)$ C) $g(x)$ is 4 units right of $f(x)$
D) $g(x)$ is 4 units left of $f(x)$ E) none of the above