

Simplify each rational expression

1. $\frac{4x-20}{4}$	2. $\frac{3x-12}{x-4}$	3. $\frac{x^2-1}{x+1}$
4. $\frac{6x-24}{x-4}$	5. $\frac{x-4}{4x-16}$	6. $\frac{2-4x}{2}$
7. $\frac{x^2+2x}{x+2}$	8. $\frac{3x-12}{15}$	9. $\frac{x-9}{9x-81}$
10. $\frac{x^2-3x}{2x-6}$	11. $\frac{20+4x}{x+5}$	12. $\frac{5x-25x^2}{5x}$
13. $\frac{x^2-4}{x+2}$	14. $\frac{6x}{18x^2-12x}$	15. $\frac{3x-15}{x^2-25}$
16. $\frac{3x^2-9x}{x-3}$	17. $\frac{4x-8}{8}$	18. $\frac{5x-25}{10}$
19. $\frac{2x^2+4x}{2x}$	20. $\frac{3x-9x^2}{3x}$	21. $\frac{4x-8}{8}$

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Simplifying Rational Expressions

Simplify.

1. $\frac{(x+3)(x+4)}{(x+3)(x+2)}$	2. $\frac{x^2+4x}{x^2-16}$	3. $\frac{x^2+2x-8}{x-2}$
4. $\frac{(x+3)}{(x^2-x-12)}$	5. $\frac{(x+3)(x-1)}{x(x+3)}$	6. $\frac{15x^2+24x}{3x^2}$
7. $\frac{x^2+4x}{x^2+2x-8}$	8. $\frac{10x^5}{2x^3+2x^2}$	9. $\frac{3x+9}{x^2-9}$
10. $\frac{x^2-2x-8}{x^2-9x+20}$	11. $\frac{2x}{x^2+5x}$	12. $\frac{x-3}{x^2-2x-3}$
13. $\frac{x^2+5x+4}{x^2-4x-5}$	14. $\frac{3x+3}{x^2-1}$	15. $\frac{2x^2-98}{8x-56}$
16. $\frac{x^2+6x+8}{6x+24}$	17. $\frac{x^2+7x+6}{x^2+5y-6}$	18. $\frac{2x-5}{6x-15}$

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Simplifying Rational Expressions

Simplify. One student should work the problems in the first column. The second student works the problems in the last column. Answers should match for every problem number. Show your work on a separate piece of paper.

	Student A	ANSWER	Student B	
1.	$\frac{4x-12}{x^2+3x-18}$		$\frac{4x+36}{x^2+15x+54}$	1.
2.	$\frac{5x+25}{x^2+10x+25}$		$\frac{5x-15}{x^2+2x-15}$	2.
3.	$\frac{3x-18}{x^2-5x-6}$		$\frac{3x-24}{x^2-7x-8}$	3.
4.	$\frac{2x+8}{x^2-16}$		$\frac{2x+6}{x^2-x-12}$	4.
5.	$\frac{3x-12}{x^2-x-12}$		$\frac{3x+21}{x^2+10x+21}$	5.
6.	$\frac{2x+16}{x^2+3x-40}$		$\frac{2x-10}{x^2-10x+25}$	6.
7.	$\frac{x^2+x-6}{x^2-2x-15}$		$\frac{x^2+5x-14}{x^2+2x-35}$	7.
8.	$\frac{x^2+2x-8}{x^2+x-6}$		$\frac{x^2-2x-24}{x^2-3x-18}$	8.
9.	$\frac{x^2-10x+16}{x^2-6x-16}$		$\frac{x^2+6x-16}{x^2+10x+16}$	9.
10.	$\frac{x^2+2x-3}{x^2+4x+3}$		$\frac{x^2-2x+1}{x^2-1}$	10.
11.	$\frac{x^2+10x+24}{x^2+4x-12}$		$\frac{x^2+8x+16}{x^2+2x-8}$	11.
12.	$\frac{x^2-4}{x^2+4x+4}$		$\frac{x^2-11x+18}{x^2-7x-18}$	12.
13.	$\frac{x^2-7x+12}{x^2-6x+8}$		$\frac{x^2+7x-30}{x^2+8x-20}$	13.
14.	$\frac{x^2-2x-3}{x^2-x-6}$		$\frac{x^2+8x+7}{x^2+9x+14}$	14.
15.	$\frac{x^2+x-20}{x^2-8x+16}$		$\frac{x^2-4x-45}{x^2-13x+36}$	15.

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Multiplying Rational Expressions

Multiply.

1. $\frac{6x}{5y} \cdot \frac{y^2}{3x}$	2. $\frac{5x}{3y^2} \cdot \frac{6y^2}{x^2}$	3. $\frac{4x}{3y} \cdot \frac{3}{8xy}$
4. $\frac{16x^2}{5} \cdot \frac{-15}{4y^2}$	5. $\frac{9x}{7y} \cdot \frac{14xy}{3x}$	6. $\frac{5xy}{x} \cdot \frac{x^2}{3y}$
7. $\frac{20y}{12y^2} \cdot \frac{-3x^2}{4}$	8. $\frac{12x}{5x^2} \cdot \frac{x^2}{6x^2}$	9. $\frac{6x^2}{25} \cdot \frac{10}{9xy^2}$
10. $\frac{9}{14x} \cdot \frac{7x^2}{3}$	11. $\frac{4x^2}{7} \cdot \frac{21}{2x^3}$	12. $\frac{-4x}{9y} \cdot \frac{18y^2}{3x}$
13. $\frac{11x}{20} \cdot \frac{4x^2}{22x^2}$	14. $\frac{9x}{6} \cdot \frac{-2}{x^3}$	15. $\frac{7xy}{5} \cdot \frac{35x^2}{14xy}$
16. $\frac{5xy}{13x^2} \cdot \frac{26xy^2}{15xy}$	17. $\frac{4x}{15y} \cdot \frac{3x^2}{28xy}$	18. $\frac{6x}{21} \cdot \frac{14y^2}{24xy}$

Simplify each expression:

1. $\frac{x^2 - 25}{x^2 - 7x} \cdot \frac{x^2 + 3x}{x^2 - 2x - 15}$	2. $\frac{x^2 - 1}{4} \cdot \frac{12}{x - 1}$	3. $\frac{x^2 - 1}{12} \cdot \frac{6}{x - 1}$	4. $\frac{2x + 1}{8x - 4} \cdot \frac{4x - 2}{4x^2 + 4x + 1}$
5. $\frac{x^2 + x - 6}{x^2 - 4x - 21} \cdot \frac{x^2 - 8x + 7}{x^2 - x - 2}$	6. $\frac{x - 2}{8x} \cdot \frac{-8x - 16}{x^2 - 4}$	7. $\frac{3x - 9}{x - 3} \cdot \frac{x + 2}{3x + 12}$	8. $\frac{3}{x - 2} \cdot \frac{x^2 - 4}{12}$
9. $\frac{x^2 - x - 6}{14} \cdot \frac{7}{x - 3}$	10. $\frac{x^2 + 7x + 10}{x - 6} \cdot \frac{x^2 - 36}{x + 5}$	11. $\frac{x^3 - 4x}{x^2 + 7x + 10} \cdot \frac{x^2 - 25}{x^2 - 2x}$	12. $\frac{3x}{4x - 8} \cdot \frac{2x^2 - 4x}{9x}$
13. $\frac{x^2 - x - 6}{x^2 - 3x - 10} \cdot \frac{x^2 - x - 20}{x^2 + 5x + 4}$	14. $\frac{x^2 + 2x}{36} \cdot \frac{9}{x + 2}$	15. $\frac{x^2 - 1}{x^2 + 4x + 3} \cdot \frac{x^2 + x - 6}{x^2 + x - 2}$	16. $\frac{x^2 - 2x}{4} \cdot \frac{2}{x - 2}$
17. $\frac{4x + 12}{x^2 + 11x + 30} \cdot \frac{4x^2 + 20x}{x^3 - 4x^2 - 21x}$	18. $\frac{x^3 + 2x^2 - 15x}{x^2 + 5x} \cdot \frac{x^2 - 3x}{x^2 - 6x + 9}$	19. $\frac{x^3 + x^2 - 12x}{x^2 + 4x} \cdot \frac{x^2 + 2x - 80}{x^2 - 11x + 24}$	20. $\frac{x^2 + 11x + 24}{x^2 + x} \cdot \frac{4x^2 + 20x}{x^2 + 13x + 40}$

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Dividing Rational Expressions

Divide. Leave the answer in factored form.

1. $\frac{6x-12}{8x+32} \div \frac{18x-36}{10x+40}$	2. $\frac{9x^2}{x^2+12x+36} \div \frac{12x}{x^2+6x}$	3. $\frac{5x^2}{x^3-2x^2} \div \frac{x^2-16}{x^2-x-12}$
4. $\frac{x^2-9}{x^2-3x} \div \frac{x^2+9x+18}{x}$	5. $\frac{x+7}{x^2-9} \div \frac{x^2+9x+14}{3x^2-9x}$	6. $\frac{x^2-9}{x^2+5x+6} \div \frac{3-x}{x+2}$
7. $\frac{x^2+8x}{12x-8} \div \frac{x^2+6x-16}{3x^2-2x}$	8. $\frac{2x^2-4x+2}{3x^2-13x-30} \div \frac{x-1}{3x^2-12x-36}$	9. $\frac{x^2-9x-10}{x^2+x-6} \div \frac{x^2-1}{x^2-4}$
10. $\frac{x^2+2x-15}{x^2-4x-45} \div \frac{x^2+x-12}{x^2-5x-36}$	11. $\frac{2x^2-5x-12}{4x^2+8x+3} \div \frac{x^2-16}{2x^2+7x+3}$	12. $\frac{x^2+3x-40}{x^2+2x-35} \div \frac{x^2+2x-48}{x^2+3x-18}$

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Rational Expressions

Simplify. Leave answers in factored form.

1. $\frac{x^2+3x+2}{x-2} \cdot \frac{x^2-4}{x+1}$	2. $\frac{1}{x^2-4} \div \frac{x^2+6x+9}{x^2+x-6}$	3. $\frac{x^2+7x+12}{x^2+3x} \div \frac{x^2-16}{x^2}$
4. $\frac{x^2-5x-14}{x^2-3x+2} \cdot \frac{x^2-4}{x^2-14x+49}$	5. $\frac{x^2-x}{x} \cdot \frac{x}{x^2-1}$	6. $\frac{x^2-8x+12}{x^2-16} \div \frac{x^2-4x+4}{4x+16}$
7. $\frac{x^2+5x+6}{x-3} \cdot \frac{x^2-2x-3}{x^2+3x+2}$	8. $\frac{2x^2-8}{3x+4} \cdot \frac{3x^2-17x-28}{4x^2+12x+8}$	9. $\frac{x^2+4x-12}{x^3-4x} \div \frac{3x-6}{x^2+x-2}$
10. $(x^2-1) \cdot \frac{6}{2x^2+4x+2}$	11. $\frac{x^2-6x-16}{x^2-16x+64} \div \frac{x^2+5x+6}{x-8}$	12. $\frac{x^2-3x}{2x^2-13x+6} \div \frac{x^3+4x}{x^2-12x+36}$

Adding and Subtracting Rational Expressions

1. $\frac{6}{a} + \frac{2}{3a}$	2. $\frac{3}{2a} - \frac{1}{2}$	3. $\frac{1}{5} - \frac{2}{a}$	4. $\frac{2}{ab} + \frac{5}{2a}$
5. $\frac{2}{3a} + \frac{1}{6ab}$	6. $\frac{1}{2a} - \frac{1}{3ab}$	7. $\frac{2}{a} + \frac{3}{b}$	8. $\frac{3}{a} - \frac{1}{2a^2}$
9. $\frac{3a}{5} - \frac{1}{a}$	10. $\frac{4}{a^2} - \frac{3}{2a}$	11. $\frac{4}{b} + \frac{5}{2a}$	12. $\frac{4}{a} + \frac{3}{5}$
13. $\frac{3}{a^2} - \frac{5}{2}$	14. $\frac{4}{a} - \frac{5}{b}$	15. $\frac{1}{a} + \frac{5}{2b}$	16. $\frac{7}{2a} - \frac{6}{a^2}$

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Rational Expressions

Simplify each expression.

1) $\frac{5x-1}{x+8} - \frac{3x+4}{x+8}$

2) $\frac{3x}{x^2+3x-10} - \frac{6}{x^2+3x-10}$

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

4) $\frac{3}{x+2} + 2$

5) $\frac{4x}{2x-1} - \frac{5}{x-6}$

6) $\frac{x}{x^2+x-2} - \frac{1}{x+2}$

7) $\frac{2}{x} + \frac{3}{x^2} + \frac{1}{2x}$

8) $\frac{3}{x-7} + \frac{5}{7-x}$

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

10) $\frac{2}{x^2-36} - \frac{1}{x^2+6x}$

11) $\frac{3X}{2x-6} + \frac{9}{6-2X}$

12) $\frac{5x^2}{x^2-5x-24} - \frac{40x}{x^2-5x-24}$

Adding and Subtracting Rational Expressions

1. $\frac{4}{x} + \frac{3}{x+2}$

13. $\frac{5}{x-4} - \frac{3}{x+2}$

2. $\frac{2}{x-3} + \frac{3}{x+1}$

14. $\frac{2}{x} + \frac{4}{x+2}$

3. $\frac{x}{x-4} - \frac{5}{x+5}$

15. $\frac{6}{x-3} - \frac{5}{x+1}$

4. $\frac{x}{x-4} + \frac{2}{x+5}$

16. $\frac{1}{x-4} + \frac{x}{x+4}$

5. $\frac{1}{x} + \frac{3}{x+2}$

17. $\frac{2}{x-4} + \frac{3}{x+2}$

6. $\frac{4}{x-3} - \frac{3}{x+1}$

18. $\frac{3}{x-4} - \frac{2}{x+2}$

7. $\frac{6}{x+3} - \frac{x}{x-2}$

19. $\frac{4}{x-4} - \frac{3}{x+2}$

8. $\frac{x}{x-4} - \frac{2}{x+5}$

20. $\frac{4}{x} + \frac{1}{x+2}$

9. $\frac{5}{x} + \frac{2}{x+2}$

21. $\frac{4}{x+3} - \frac{x}{x-2}$

10. $\frac{6}{x+3} + \frac{x}{x-2}$

22. $\frac{4}{x-3} - \frac{2}{x+1}$

11. $\frac{1}{x-4} + \frac{4}{x+2}$

23. $\frac{4}{x+3} + \frac{x}{x-2}$

12. $\frac{5}{x-3} - \frac{4}{x+1}$

24. $\frac{x}{x-4} - \frac{1}{x+4}$

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Rational Equations

Solve each equation. Check your solution.

1. $\frac{9}{x-3} = \frac{3}{x+5}$	2. $\frac{3}{x+4} = \frac{7}{x}$	3. $\frac{4}{x+3} = \frac{6}{x-3}$
4. $\frac{5}{2x-3} = \frac{7}{3x}$	5. $\frac{x}{3} = \frac{10-x}{2}$	6. $\frac{3}{x+8} = \frac{3}{5(x+1)}$
7. $\frac{x-1}{15} = \frac{2}{5}$	8. $\frac{x}{4x+3} = \frac{2}{5}$	9. $\frac{x-8}{x+4} = \frac{1}{5}$
10. $\frac{2}{x+1} = \frac{1}{x}$	11. $\frac{1}{3} = \frac{-2}{3(2+x)}$	12. $\frac{6}{x+2} = \frac{4}{x-4}$

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Solving Rational Equations

Solve each equation. Check your solution.

1. $\frac{20}{x^2+x-6} + \frac{6}{x+3} = \frac{5}{x-2}$	2. $\frac{4x}{3x-2} + \frac{2x}{3x+2} = 2$	3. $\frac{2x-5}{x-2} - 2 = \frac{3}{x+2}$
4. $\frac{x-3}{x(x+3)} = \frac{1}{x+3} - \frac{x-5}{x(x+3)}$	5. $\frac{x}{3} + \frac{x}{x+5} = \frac{-4}{x+5}$	6. $\frac{10}{x(x-2)} + \frac{4}{x} = \frac{5}{x-2}$
7. $\frac{2x-3}{x-3} - 2 = \frac{12}{x+3}$	8. $\frac{5}{2x+6} + \frac{1}{x-2} = \frac{3}{x+3}$	9. $\frac{x}{x-1} - \frac{2}{x} = \frac{1}{x-1}$
10. $\frac{x}{x-2} - \frac{1}{x-4} = \frac{2}{x^2-6x+8}$	11. $1 = \frac{2x}{x-1} + \frac{x-5}{(x+1)(x-1)}$	12. $\frac{1}{x^2-7x+10} + \frac{1}{x-2} = \frac{2}{x^2-7x+10}$