Algebra Name Key Period

Simplify each rational expression

ANSWER KEY

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

Name_____ Period_____

Simplifying Rational Expressions

Simplify. ANSWER KEY

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

Name Key Period

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. ANSWER KEY

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

Name_____ Period_____

Multiplying Rational Expressions

Multiply. ANSWER KEY

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

Algebra Name_____Period____

Simplify each expression:

ANSWER KEY

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

Name Key Period

Dividing Rational Expressions

Divide. Leave the answer in factored form. ANSWER KEY

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

Name Key Period

Rational Expressions

Simplify. Leave answers in factored form. ANSWER KEY

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

Algebra Name Key Period

Adding and Subtracting Rational Expressions

ANSWER KEY

1. $\frac{6}{a}+\frac{2}{3a}$ $\frac{20}{3a}$	2. $\frac{3}{2a}-\frac{1}{2}$ $\frac{3-a}{2a}$	3. $\frac{1}{5}-\frac{2}{a}$ $\frac{a-10}{5a}$	4. $\frac{2}{ab}+\frac{5}{2a}$ $\frac{4+5b}{2ab}$
5. $\frac{2}{3a}+\frac{1}{6ab}$ $\frac{4b+1}{6ab}$	6. $\frac{1}{2a}-\frac{1}{3ab}$ $\frac{3b-2}{6ab}$	7. $\frac{2}{a}+\frac{3}{b}$ $\frac{2b+3a}{ab}$	8. $\frac{3}{a}-\frac{1}{2a^2}$ $\frac{6a-1}{2a^2}$
9. $\frac{3a}{5}-\frac{1}{a}$ $\frac{3a^2-5}{5a}$	10. $\frac{4}{a^2}-\frac{3}{2a}$ $\frac{8-3a}{2a^2}$	11. $\frac{4}{b}+\frac{5}{2a}$ $\frac{8a+5b}{2ab}$	12. $\frac{4}{a}+\frac{3}{5}$ $\frac{20+3a}{5a}$
13. $\frac{3}{a^2}-\frac{5}{2}$ $\frac{6-5a^2}{2a^2}$	14. $\frac{4}{a}-\frac{5}{b}$ $\frac{4b-5a}{ab}$	15. $\frac{1}{a}+\frac{5}{2b}$ $\frac{2b+5a}{2ab}$	16. $\frac{7}{2a}-\frac{6}{a^2}$ $\frac{7a-12}{2a^2}$

Name Key Period

Rational Expressions

Simplify each expression. ANSWER KEY

1) $\frac{5x-1}{x+8}-\frac{3x+4}{x+8}$ $\frac{2x-5}{x+8}$	2) $\frac{3x}{x^2+3x-10}-\frac{6}{x^2+3x-10}$ $\frac{3}{x+5}$	3) $\frac{x+4}{2x}-\frac{x-1}{x^2}$ $\frac{x^2+2x+2}{2x^2}$
4) $\frac{3}{x+2}+2$ $\frac{2x+7}{x+2}$	5) $\frac{4x}{2x-1}-\frac{5}{x-6}$ $\frac{4x^2-34x+5}{(2x-1)(x-6)}$	6) $\frac{x}{x^2+x-2}-\frac{1}{x+2}$ $\frac{1}{(x+2)(x-1)}$
7) $\frac{2}{x}+\frac{3}{x^2}+\frac{1}{2x}$ $\frac{5x+6}{2x^2}$	8) $\frac{3}{x-7}+\frac{5}{7-x}$ $\frac{-2}{x-7}$	9) $\frac{2}{x}+\frac{3}{x-5}$ $\frac{5(x-2)}{x(x-5)}$
10) $\frac{2}{x^2-36}-\frac{1}{x^2+6x}$ $\frac{1}{x(x-6)}$	11) $\frac{3X}{2x-6}+\frac{9}{6-2X}$ $\frac{3}{2}$	12) $\frac{5x^2}{x^2-5x-24}-\frac{40x}{x^2-5x-24}$ $\frac{5x}{(x+3)}$

Algebra Name Key Period

Adding and Subtracting Rational Expressions

ANSWER KEY

1.	$\frac{4}{x}+\frac{3}{x+2}$	$\frac{7x+8}{x(x+2)}$	**13.**	$\frac{5}{x-4}-\frac{3}{x+2}$	$\frac{2(x+11)}{(x-4)(x+2)}$
2.	$\frac{2}{x-3}+\frac{3}{x+1}$	$\frac{5x-7}{(x-3)(x+1)}$	**14.**	$\frac{2}{x}+\frac{4}{x+2}$	$\frac{2(3x+2)}{x(x+2)}$
3.	$\frac{x}{x-4}-\frac{5}{x+5}$	$\frac{x^2+20}{(x-4)(x+5)}$	**15.**	$\frac{6}{x-3}-\frac{5}{x+1}$	$\frac{x+21}{(x-3)(x+1)}$
4.	$\frac{x}{x-4}+\frac{2}{x+5}$	$\frac{x^2+7x-8}{(x-4)(x+5)}$	**16.**	$\frac{1}{x-4}+\frac{x}{x+4}$	$\frac{x^2-3x+4}{(x-4)(x+4)}$
5.	$\frac{1}{x}+\frac{3}{x+2}$	$\frac{2(2x+1)}{x(x+2)}$	**17.**	$\frac{2}{x-4}+\frac{3}{x+2}$	$\frac{5x-8}{(x-4)(x+2)}$
6.	$\frac{4}{x-3}-\frac{3}{x+1}$	$\frac{x+13}{(x-3)(x+1)}$	**18.**	$\frac{3}{x-4}-\frac{2}{x+2}$	$\frac{x+14}{(x-4)(x+2)}$
7.	$\frac{6}{x+3}-\frac{x}{x-2}$	$\frac{-x^2+3x-12}{(x+3)(x-2)}$	**19.**	$\frac{4}{x-4}-\frac{3}{x+2}$	$\frac{x+20}{(x-4)(x+2)}$
8.	$\frac{x}{x-4}-\frac{2}{x+5}$	$\frac{x^2+3x+8}{(x-4)(x+5)}$	**20.**	$\frac{4}{x}+\frac{1}{x+2}$	$\frac{5x+8}{x(x+2)}$
9.	$\frac{5}{x}+\frac{2}{x+2}$	$\frac{7x+10}{x(x+2)}$	**21.**	$\frac{4}{x+3}-\frac{x}{x-2}$	$\frac{-x^2+x-8}{(x+3)(x-2)}$
10.	$\frac{6}{x+3}+\frac{x}{x-2}$	$\frac{x^2+9x-12}{(x+3)(x-2)}$	**22.**	$\frac{4}{x-3}-\frac{2}{x+1}$	$\frac{2(x+5)}{(x-3)(x+1)}$
11.	$\frac{1}{x-4}+\frac{4}{x+2}$	$\frac{5x-14}{(x-4)(x+2)}$	**23.**	$\frac{4}{x+3}+\frac{x}{x-2}$	$\frac{x^2+7x-8}{(x+3)(x-2)}$
12.	$\frac{5}{x-3}-\frac{4}{x+1}$	$\frac{x+17}{(x-3)(x+1)}$	**24.**	$\frac{x}{x-4}-\frac{1}{x+4}$	$\frac{x^2+3x+4}{(x-4)(x+4)}$

Name Key Period

Rational Equations

Solve each equation. Check your solution. ANSWER KEY

1. $\frac{9}{x-3}=\frac{3}{x+5}$ -9	2. $\frac{3}{x+4}=\frac{7}{x}$ -7	3. $\frac{4}{x+3}=\frac{6}{x-3}$ -15
4. $\frac{5}{2x-3}=\frac{7}{3x}$ -21	5. $\frac{x}{3}=\frac{10-x}{2}$ 6	6. $\frac{3}{x+8}=\frac{3}{5(x+1)}$ ¾
7. $\frac{x-1}{15}=\frac{2}{5}$ 7	8. $\frac{x}{4x+3}=\frac{2}{5}$ -2	9. $\frac{x-8}{x+4}=\frac{1}{5}$ 11
10. $\frac{2}{x+1}=\frac{1}{x}$ 1	11. $\frac{1}{3}=\frac{-2}{3(2+x)}$ -4	12. $\frac{6}{x+2}=\frac{4}{x-4}$ 16

Name Key Period

Solving Rational Equations

Solve each equation. Check your solution. ANSWER KEY

1. $\frac{20}{x^2+x-6}+\frac{6}{x+3}=\frac{5}{x-2}$ 7	2. $\frac{4x}{3x-2}+\frac{2x}{3x+2}=2$ -2	3. $\frac{2x-5}{x-2}-2=\frac{3}{x+2}$ 1
4. $\frac{x-3}{x(x+3)}=\frac{1}{x+3}-\frac{x-5}{x(x+3)}$ 8	5. $\frac{x}{3}+\frac{x}{x+5}=\frac{-4}{x+5}$ -6, -2	6. $\frac{10}{x(x-2)}+\frac{4}{x}=\frac{5}{x-2}$ No Solution
7. $\frac{2x-3}{x-3}-2=\frac{12}{x+3}$ 5	8. $\frac{5}{2x+6}+\frac{1}{x-2}=\frac{3}{x+3}$ -8	9. $\frac{x}{x-1}-\frac{2}{x}=\frac{1}{x-1}$ 2
10. $\frac{x}{x-2}-\frac{1}{x-4}=\frac{2}{x^2-6x+8}$ 0, 5	11. $1=\frac{2x}{x-1}+\frac{x-5}{(x+1)(x-1)}$ -4	12. $\frac{1}{x^2-7x+10}+\frac{1}{x-2}=\frac{2}{x^2-7x+10}$ 6