

3.3 Add and Subtract Rational Expressions

PRACTICE

Perform the indicated operation.

$$1. \quad \frac{a+5}{10a} - \frac{2a}{10a} = \frac{a+5-2a}{10a} = \frac{-a+5}{10a}$$

$$2. \quad \frac{(p-2) \cdot 2p}{(p-2)6p+6} + \frac{2 \cdot 6(p+1)}{p-2 \cdot 6(p+1)} = \frac{2p^2 - 4p + 12p + 12}{6(p+1)(p-2)} = \frac{2p^2 + 8p + 12}{6(p+1)(p-2)}$$

6(p+1)

$$3. \quad \frac{3 \cdot 5u}{3u^3} + \frac{4}{3u} = \frac{15u + 4u^2}{3u^3}$$

$$4. \quad \frac{8}{(m+3)(m-1)} - \frac{4m+1}{(m+3)(m-1)} = \frac{8 - (4m+1)}{(m+3)(m-1)} = \frac{-4m+7}{(m+3)(m-1)}$$

$$5. \quad \frac{(x+6) \cdot 3}{(x+6)x+4} - \frac{1(x+4)}{x+6(x+4)} = \frac{3x+18 - (x+4)}{(x+4)(x+6)} = \frac{3x+18-x-4}{(x+4)(x+6)} = \frac{2x+14}{(x+4)(x+6)}$$

$$6. \quad \frac{3n}{n-2} + \frac{4(n-2)}{1(n-2)} = \frac{3n+4n-8}{n-2} = \frac{7n-8}{n-2}$$

$$7. \frac{y+1}{4y^2-9} - \frac{4(2y+3)}{2y-3} = \frac{y+1-(8y+12)}{(2y+3)(2y-3)} = \frac{y+1-8y-12}{(2y+3)(2y-3)} = \frac{-7y-11}{(2y+3)(2y-3)}$$

$$8. \frac{p+5}{p^2+5p-14} + \frac{2}{p+7} = \frac{p+5+2p-4}{(p+7)(p-2)} = \frac{3p+1}{(p+7)(p-2)}$$

$$9. \frac{m}{3m^2-12} - \frac{3m+1}{m-2} = \frac{m - [(3m+1)(3m+6)]}{3(m-2)(m+2)} = \frac{m - [9m^2 + 18m + 3m + 6]}{3(m-2)(m+2)}$$

$$= \frac{m - 9m^2 - 21m - 6}{3(m-2)(m+2)}$$

$$10. \frac{5t-1-t}{5t(t-2)^2} + \frac{4(t-2)(t-2)}{5t(t-2)(t-2)} = \frac{5t-5t^2 + (4t-8)(t-2)}{5t(t-2)(t-2)}$$

$$= \frac{5t-5t^2+4t^2-8t-8t+16}{5t(t-2)(t-2)}$$

$$= \frac{-t^2-11t+16}{5t(t-2)(t-2)}$$

$$11. \frac{(x+5)}{2x^3-12x^2-80x} - \frac{5x}{x^2-5x-50} = \frac{2x(x+4)}{2x(x-10)(x+4)(x+5)} = \frac{2x+10 - [10x^2(x+4)]}{2x(x-10)(x+4)(x+5)}$$

$$= \frac{2x+10-10x^3-40x^2}{2x(x-10)(x+4)(x+5)}$$

$$= \frac{-10x^3-40x^2+2x+10}{2x(x-10)(x+4)(x+5)}$$

$$12. \frac{1}{5} + \frac{w-1}{5w} = \frac{5+w^2-w}{5w} = \frac{w^2-w+5}{5w}$$

Perform the indicated operations and reduce to lowest terms.

13.
$$\frac{y+1}{2y-1} - \frac{(y+1) \cdot (2y-1)}{1(2y-1)} = \frac{y+1 - [(y+1)(2y-1)]}{2y-1} = \frac{y+1 - [2y^2 - 1y + 2y - 1]}{2y-1}$$

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

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

14.
$$\frac{(d+1)2d + \frac{4}{d+1}}{(d+1)1} = \frac{(d+1)2d + 4}{d+1} = \frac{2d^2 + 2d + 4}{d+1}$$

or

$$\frac{2(d^2 + d + 2)}{d+1}$$

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

15.
$$\frac{3}{r+2} + \frac{2r}{r+2} - \frac{7}{r+2} = \frac{2r-4}{r+2}$$

16.
$$\frac{(d-2)5d}{(d-2)3(d+2)} + \frac{2(d+2)(d-2)}{3} + \frac{4d-3}{3} = \frac{5d^2 - 10d + (2d+4)(d-2) + 12d}{3(d+2)(d-2)}$$

$$= \frac{5d^2 - 10d + 2d^2 - 4d + 4d - 8 + 12d}{3(d+2)(d-2)}$$

$$= \frac{7d^2 + 2d - 8}{3(d+2)(d-2)}$$

FREE RESPONSE

16. Given the graph of the polynomial $g(x)$.
 a. Is the polynomial $g(x)$ even or odd?

Even

b. State the root(s) of the polynomial $g(x)$.

-3, 0, 4, 7

