

9.1 Greatest Common Factor

PRACTICE

Factor the following if possible.

$$1. \frac{12x-15}{3} \frac{15}{3}$$

$$3(4x-5)$$

$$2. \frac{4y^2+12y}{4y} \frac{12y}{4y}$$

$$4y(y+3)$$

$$3. \frac{7t^2+10t}{t} \frac{10t}{t}$$

$$t(7t+10)$$

$$4. \frac{5m^4+10m^2}{5m^2} \frac{10m^2}{5m^2}$$

$$5m^2(m^2+2)$$

$$5. \frac{x^2-9x}{x} \frac{9x}{x}$$

$$x(x-9)$$

$$6. \frac{4x^2-10}{2} \frac{10}{2}$$

$$2(2x^2-5)$$

$$7. 7x+12$$

Does not factor!

$$8. \frac{3x^2-9x+12}{3} \frac{9x}{3} \frac{12}{3}$$

$$3(x^2-3x+4)$$

$$9. \frac{14x^3+7x^2-21x}{7x} \frac{7x^2}{7x} \frac{21x}{7x}$$

$$7x(2x^2+x-3)$$

$$10. \frac{8x^3-15x^2}{x^2} \frac{15x^2}{x^2}$$

$$x^2(8x-15)$$

$$11. \frac{5y^3-15y^2+3y}{y} \frac{15y^2}{y} \frac{3y}{y}$$

$$y(5y^2-15y+3)$$

$$12. \frac{9n^2-15n}{3n} \frac{15n}{3n}$$

$$3n(3n-5)$$

Use the Zero Product Rule to solve the following factored equations.

$$13. 3x(x+5) = 0$$

$$\begin{array}{l|l} 3x=0 & x+5=0 \\ \hline \frac{3}{3} & \frac{-5}{-5} \end{array}$$

$$x=0 \quad x=-5$$

$$x = -5, 0$$

$$14. 0 = (x-2)(x+3)$$

$$\begin{array}{l|l} x-2=0 & x+3=0 \\ \hline \frac{+2}{+2} & \frac{-3}{-3} \end{array}$$

$$x=2 \quad x=-3$$

$$x = -3, 2$$

$$15. 2(x-1) = 0$$

$$\begin{array}{l} x-1=0 \\ \frac{+1}{+1} \\ \hline x=1 \end{array}$$

$$x = 1$$

$$16. 0 = (2t+1)(t-7)$$

$$\begin{array}{l|l} 2t+1=0 & t-7=0 \\ \hline \frac{-1}{2} & \frac{+7}{+7} \end{array}$$

$$2t = -1 \quad t = 7$$

$$t = -\frac{1}{2} \quad t = 7$$

$$t = -\frac{1}{2}, 7$$

$$17. (3d-2)(2d+5) = 0$$

$$\begin{array}{l|l} 3d-2=0 & 2d+5=0 \\ \hline \frac{+2}{3} & \frac{-5}{2} \end{array}$$

$$\frac{3d}{3} = \frac{2}{3} \quad \frac{2d}{2} = \frac{-5}{2}$$

$$d = \frac{2}{3}, d = -\frac{5}{2}$$

$$18. 0 = 5x(2x+7)(x-8)$$

$$\begin{array}{l|l|l} 5x=0 & 2x+7=0 & x-8=0 \\ \hline \frac{0}{5} & \frac{-7}{2} & \frac{+8}{+8} \end{array}$$

$$x=0 \quad \frac{2x}{2} = \frac{-7}{2} \quad x=8$$

$$x = -\frac{7}{2}, 0, 8$$

$$19. 4x(x+5)(2x-1)(4x+7) = 0$$

$$\begin{array}{l} 4x=0 \quad | \quad x+5=0 \quad | \quad 2x-1=0 \quad | \quad 4x+7=0 \\ \frac{4x}{4} = 0 \quad | \quad x = -5 \quad | \quad \frac{2x}{2} = \frac{1}{2} \quad | \quad \frac{4x}{4} = -\frac{7}{4} \\ x=0 \quad | \quad x=-5 \quad | \quad x=\frac{1}{2} \quad | \quad x=-\frac{7}{4} \end{array}$$

$x = -5, -\frac{7}{4}, 0, \frac{1}{2}$ $x = \frac{1}{2}$ $x = -\frac{7}{4}$

$$20. 0 = 2(r+3)(r-2)(3r+1)$$

$$\begin{array}{l} r+3=0 \quad | \quad r-2=0 \quad | \quad 3r+1=0 \\ -3 \quad | \quad +2 \quad | \quad -1 \quad | \quad -1 \\ r=-3 \quad | \quad r=2 \quad | \quad \frac{3r}{3} = -\frac{1}{3} \\ r = -3, -\frac{1}{3}, 2 \quad | \quad r = -\frac{1}{3} \end{array}$$

Solve the following by factoring.

$$21. \frac{3x^2}{3x} - \frac{12x}{3x} = 0$$

$$\begin{array}{l} 3x(x-4) = 0 \\ 3x=0 \quad | \quad x-4=0 \\ x=0 \quad | \quad x=4 \end{array}$$

$$22. 0 = \frac{5x^2}{5x} + \frac{25x}{5x}$$

$$\begin{array}{l} 0 = 5x(x+5) \\ 5x=0 \quad | \quad x+5=0 \\ x=0 \quad | \quad x=-5 \end{array}$$

$$23. \frac{4a^2}{2a} - \frac{10a}{2a} = 0$$

$$\begin{array}{l} 2a(2a-5) = 0 \\ 2a=0 \quad | \quad 2a-5=0 \\ a=0 \quad | \quad 2a=5 \\ a=0 \quad | \quad a=\frac{5}{2} \end{array}$$

$$24. 3x^2 = 9x$$

$$\begin{array}{l} -9x \quad -9x \quad \rightarrow \quad \frac{3x^2}{3x} - \frac{9x}{3x} = 0 \\ 3x(x-3) = 0 \\ 3x=0 \quad | \quad x-3=0 \\ x=0 \quad | \quad x=3 \end{array}$$

Solve the following by factoring.

$$25. \frac{15g}{3g} + \frac{6g^2}{3g} = 0$$

$$\begin{array}{l} 3g(5+2g) = 0 \\ 3g=0 \quad | \quad 5+2g=0 \\ g=0 \quad | \quad 2g=-5 \\ g=0 \quad | \quad g=-\frac{5}{2} \end{array}$$

$$26. 21y = 6y^2$$

$$\begin{array}{l} -21y \quad -21y \quad \rightarrow \quad 0 = \frac{6y^2}{3y} - \frac{21y}{3y} \\ 0 = 3y(2y-7) \\ 3y=0 \quad | \quad 2y-7=0 \\ y=0 \quad | \quad 2y=7 \\ y=0 \quad | \quad y=\frac{7}{2} \end{array}$$

$$27. 8x^2 = 20x$$

$$\begin{array}{l} -20x \quad -20x \quad \rightarrow \quad \frac{8x^2}{4x} - \frac{20x}{4x} = 0 \\ 4x(2x-5) = 0 \\ 4x=0 \quad | \quad 2x-5=0 \\ x=0 \quad | \quad 2x=5 \\ x=0 \quad | \quad x=\frac{5}{2} \end{array}$$

$$28. 0 = 4h + 2h^2 + 12h$$

$$\begin{array}{l} 0 = \frac{2h^2}{2h} + \frac{16h}{2h} \\ 0 = 2h(h+8) \\ 2h=0 \quad | \quad h+8=0 \\ h=0 \quad | \quad h=-8 \end{array}$$

29. $3x^2 - 12x = 3x$

$$\frac{3x^2}{x} - \frac{12x}{x} = \frac{3x}{x}$$

$$3x^2 - 12x - 3x = 0$$

$$3x^2 - 15x = 0$$

$$x(3x - 5) = 0$$

$$x = 0 \quad | \quad 3x - 5 = 0$$

$$3x = 5$$

$$x = \frac{5}{3}$$

$x = 0, x = \frac{5}{3}$

30. $2c^2 = 5c^2 + 18c$

$$2c^2 - 5c^2 - 18c = 0$$

$$-3c^2 - 18c = 0$$

$$0 = 3c^2 + 18c$$

$$0 = 3c(c + 6)$$

$$3c = 0 \quad | \quad c + 6 = 0$$

$$c = 0 \quad | \quad c = -6$$

$c = 0, c = -6$

Answer the following.

31. Simplify

$$(3x^2 - 2x + 1) + (3x^2 - x + 5)$$

$$6x^2 - 3x + 6$$

32. Simplify $(3x - 2)(x + 5)$

$$3x^2 + 15x - 2x - 10$$

$3x^2 + 13x - 10$

33. Solve $3(x + 5) = 0$

$$3x + 15 = 0$$

$$-15 \quad -15$$

$$3x = -15$$

$$\frac{3x}{3} = \frac{-15}{3}$$

$x = -5$

34. Write the equation of the linear function.

x	0	2	4	6
f(x)	15	12	9	6

$$y = mx + b$$

$$m = -\frac{3}{2} \quad b = 15$$

$f(x) = 15 - \frac{3}{2}x$

35. Write the equation of the exponential function.

x	0	1	2	3
f(x)	4	12	36	108

$$y = a \cdot b^x$$

$f(x) = 4(3)^x$

36. If $f(x) = 12 - 3x$, find $f(3) + 1$

$$f(3) = 12 - 3(3)$$

$$12 - 9$$

$$f(3) = 3$$

$$f(3) + 1$$

$$3 + 1$$

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