

Simplify each of the following.

$$1. \frac{2x^5y^{-2}}{8xy}$$

$$\frac{2}{8} = \frac{1}{4}$$

$$\frac{x^5}{x} = x^{5-1} = x^4$$

$$\frac{y^{-2}}{y} = y^{-2-1} = y^{-3} = \frac{1}{y^3}$$

$$\frac{x^4}{4y^3}$$

$$2. \left(\frac{36m^2m^3}{12mn^{-1}} \right)^2$$

$$\frac{36}{12} = 3$$

$$\frac{m^2}{m} = m^{2-1} = m$$

$$\frac{n^3}{n^{-1}} = n^{3-(-1)} = n^{3+1} = n^4$$

$$\left(\frac{36m^2m^3}{12mn^{-1}} \right)^2 = (3mn^4)^2$$

$$(3mn^4)^2 = 3^2 m^2 (n^4)^2 = 9m^2n^8$$

$$3. \left(\frac{6r^0x^{-3}y^4}{15x^4m} \right)^{-3}$$

$$\frac{6}{15} = \frac{2}{5}$$

$$r^0 = 1$$

$$\frac{x^{-3}}{x^4} = x^{-3-4} = x^{-7} = \frac{1}{x^7}$$

$$\left(\frac{6r^0x^{-3}y^4}{15x^4m} \right)^{-3} = \left(\frac{2y^4}{3x^7m} \right)^{-3} = \left(\frac{3x^7m}{2y^4} \right)^3 = \frac{3^3(x^7)^3 m^3}{2^3(y^4)^3} = \frac{27x^{21}m^3}{8y^{12}}$$

$$4. \frac{3x^3y^4w^{-2}}{4x^2y^{-8}}$$

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

$$\frac{y^4}{y^{-8}} = y^{4-(-8)} = y^{4+8} = y^{12}$$

$$w^{-2} = \frac{1}{w^2}$$

$$\frac{3x^3y^4w^{-2}}{4x^2y^{-8}} = \frac{3xy^{12}}{4w^2}$$

$$5. \left(\frac{2x^{-2}y^{43}w^{-2}}{6x^2y^0} \right)^3$$

$$\frac{2}{6} = \frac{1}{3}$$

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

$$\frac{y^{43}}{y^0} = \frac{y^{43}}{1} = y^{43}$$

$$w^{-2} = \frac{1}{w^2}$$

$$\left(\frac{2x^{-2}y^{43}w^{-2}}{6x^2y^0} \right)^3 = \left(\frac{y^{43}}{3x^4w^2} \right)^3 = \frac{(y^{43})^3}{3^3(x^4)^3(w^2)^3} = \frac{y^{129}}{27x^{12}w^6}$$

$$6. \left(\frac{4^{-2}r^{-3}y^{-5}}{3^{-1}x^{-4}y^{-5}} \right)^{-2} = \frac{(4^{-2})^{-2}(r^{-3})^{-2}(y^{-5})^{-2}}{(3^{-1})^{-2}(x^{-4})^{-2}(y^{-5})^{-2}} = \frac{4^4r^6y^{10}}{3^2x^8y^{10}}$$

$$\frac{4^4}{3^2} = \frac{256}{9}$$

$$\frac{y^{10}}{y^{10}} = 1$$

$$\frac{4^4r^6y^{10}}{3^2x^8y^{10}} = \frac{256r^6}{9x^8}$$

Solve for x in each of the following.

$$7. 4^x = 16$$

$$4^x = 4^2$$

$$x = 2$$

$$8. (25^x)(125^x) = 5^{10}$$

$$(5^2)^x (5^3)^x = 5^{10}$$

$$(5^{2x})(5^{3x}) = 5^{10}$$

$$5^{2x+3x} = 5^{10}$$

$$5^{5x} = 5^{10}$$

$$5x = 10$$

$$x = 2$$

$$9. 3(27^x)(243^{2x}) = 3^5$$

$$3(3^3)^x(3^5)^{2x} = 3^5$$

$$(3^1)(3^{3x})(3^{10x}) = 3^5$$

$$3^{1+3x+10x} = 3^5$$

$$3^{1+13x} = 3^5$$

$$1+13x = 5$$

$$13x = 4$$

$$x = \frac{4}{13}$$

$$10. (2^{x^2})\left(\frac{1}{32^x}\right) = 2^6$$

$$(2^{x^2})(32^{-x}) = 2^6$$

$$(2^{x^2})(2^5)^{-x} = 2^6$$

$$(2^{x^2})(2^{-5x}) = 2^6$$

$$2^{x^2-5x} = 2^6$$

$$x^2 - 5x = 6$$

$$x^2 - 5x - 6 = 0$$

	x^2	
		-6

Multiply to: -6

Add to: -5

-6 and 1

	x^2	$-6x$
	x	-6

Find the GCF

in all directions

	x	-6
x	x^2	$-6x$
1	x	-6

$$(x+1)(x-6) = 0$$

$$x+1=0 \quad \text{or} \quad x-6=0$$

$$x=-1 \quad \quad \quad x=6$$