

Investigating Monomials (pp. 1 of 4)

Definition

1) **Monomial**—What is a *monomial*?

The following are monomials:

2	$\frac{5}{3}$	-8.5
$2x$	$\frac{5}{3}y^2$	$-8.5xy^2$
0	$9a^2b^3c^7$	$\sqrt{5}$

So monomials can include:

However, these are not monomials:

$2 + x$	$x^2 - 8.5$
$\frac{9}{x}$	\sqrt{x}

So a monomial cannot have:

Vocabulary

Using the monomials above, identify examples of the following definitions.

2) A _____ is a monomial with no variables,

Examples:

3) In a monomial, the _____ is the numeric factor of the variable (or variables)

Examples:

4) The _____ of a monomial is the sum of the exponents on the variables only

Examples:

Monomial	
$2x$	1
$\frac{5}{3}y^2$	
$-8.5xy^2$	

Monomial	
$9a^2b^3c^7$	
$\sqrt{5}$	
0	

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Simplifying Monomials

Multiplying	Dividing
Sample: $(5x^2y^3)(4xy^4)$ Expand: $5 \cdot x \cdot x \cdot y \cdot y \cdot y \cdot 4 \cdot x \cdot y \cdot y \cdot y \cdot y$ Re-order: $5 \cdot 4 \cdot x \cdot x \cdot x \cdot y \cdot y \cdot y \cdot y \cdot y \cdot y$ Simplify: 	Sample: $\frac{18x^4y^3}{6xy^2}$ Expand: $\frac{18 \cdot x \cdot x \cdot x \cdot x \cdot y \cdot y \cdot y}{6 \cdot x \cdot y \cdot y}$ Simplify:
<ul style="list-style-type: none"> What's the short-cut? _____ the coefficients _____ the exponents 	<ul style="list-style-type: none"> What's the short-cut? _____ the coefficients _____ the exponents
<ul style="list-style-type: none"> What's the rule? $a^m \cdot a^n =$ Note: Bases must be the same. 	<ul style="list-style-type: none"> What's the rule? $\frac{a^m}{a^n} =$ Note: Bases must be the same.

Other Rules	Samples		
$a^{-n} = \frac{1}{a^n}$	$5^{-2} =$	$x^{-4} =$	$\frac{b^3}{b^9} =$
$(a^m)^n = a^{mn}$	$(5^2)^3 =$	$(x^4)^5 =$	$(b^{-2})^6 =$
$\left(\frac{a}{b}\right)^m = \frac{a^m}{b^m}$	$\left(\frac{5}{8}\right)^2 =$	$\left(\frac{x}{y}\right)^7 =$	$\left(\frac{b^3}{c^2}\right)^5 =$
$(ab)^m = a^m b^m$	$(5x^2)^2 =$	$(xy^2)^6 =$	$(4x^2y^4)^3 =$

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Sample Problems

1) $(2ab^2)(-4a^3b^3c)$

2) $(3x^2)^3$

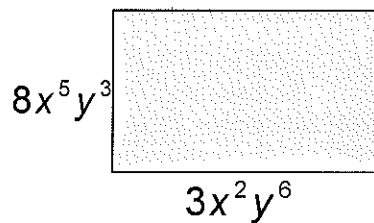
3) $\frac{x^{11}}{x^5}$

4) $(6x^2y^3)(xyz)^3$

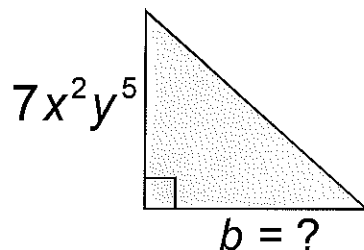
5) $(6a^{-3}b^2)^{-3}$

6) $\left(\frac{-3x^3y^6}{x^5y^{-2}z^{-1}}\right)^2$

- 7) A rectangle has a width represented by $3x^2y^6$ and a length represented by $8x^5y^3$. What expression can be used to represent the area of the rectangle?



- 8) The area of the triangle below is represented by $14x^4y^9$. Find the expression that represents the base of the triangle.



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Practice Problems

Simplify the following expressions.

1) $x^3 \cdot x^3 \cdot x \cdot x^5$

2) $(-3xy^2)^3$

3) $\frac{-x^6y^6}{x^3y^4}$

4) $(3x^2y^6)(-4x^2y^6)$

5) $\frac{ab^4c^6}{a^5bc^2}$

6) $\frac{2a^5b^3c^3}{8a^3b^3c}$

7) $\frac{40a^{-1}b^{-7}}{20a^{-5}b^3}$

8) $\frac{(-15m^5n^8)(m^3n^2)^{-2}}{45m^4n}$

- 9) The height of a triangle is represented by the expression $15p^6qr^3$. The base is represented by $8p^2q^3r^5$. Find the expression that can be used to represent the area of the triangle.

- 10) The length and area of a rectangle are given in the diagram below. Find the expression that can be used to represent the width of the rectangle.

