

7.1 Multiplication Properties of Exponents

monomial is one term Ex $2x$

constant is a whole # Ex 4

$2x+4$ Expression

$2x+4=8$ Equation

$2x+4 < 8$ Inequality

$n \in$ exponent

x
 \uparrow base

$$2^3 = 2 \cdot 2 \cdot 2 = 8 \quad \text{on Calculator}$$

x^y

y^x
 \wedge

Ex) $3^3 = 27$

$$5^2 = 25$$

$$(-3)^4 = 81$$

$$x^2 \cdot x^3 = x \cdot x \cdot x \cdot x \cdot x = x^5$$

$$\boxed{x^n \cdot x^m = x^{n+m}}$$

Product of Powers

note bases are same!

Ex) $x^2 \cdot x^4 = x^6$

$$x^4 \cdot x^9 = x^{13}$$

$$2^2 \cdot 2^4 = 64$$

$$x = x^1$$

$$2^1 = 2$$

CD p. 392 Ex 2

Ex) $(x^2)^3 = (x^2)(x^2)(x^2) = x^6$

$(x^n)^m = x^{nm}$ Power of Power

Ex) $(x^4)^5 = x^{20}$

Ex) $(2^4)^5 = 2^{20}$
1048576

Ex) $(2x)^3 = 2^3 x^3 = 8x^3$

$(xy)^m = x^m y^m$ Power of a Product

To Simplify Monomial Expressions

- 1) Each variable base appears once
- 2) no powers of powers $(x^n)^m$
- 3) all fractions are in simplest form

CD p. 394 7-19 odd

CD p. 395 8-20 even

HW p. 395, 27-37 odd

Day 2

CD p. 395. 2-38 even

7.1 SPDP

7.2 Division of Exponents

$$\text{Ex) } \frac{2^4}{2^3} = \frac{2 \cdot 2 \cdot 2 \cdot 2}{2 \cdot 2 \cdot 2} = 2$$

$$\boxed{\frac{x^m}{x^n} = x^{m-n}}$$

Quotient of Powers

Ex)

$$\frac{x^7}{x^6} = x^1$$

$$\frac{x^{12}}{x^4} = x^8$$

$$\frac{2^5}{2^2} = 2^3 = 8$$

$$\frac{4^2}{4} = 4$$

CD p. 398 Ex 1

$$\text{Ex) } \left(\frac{x}{y}\right)^3 = \frac{x^3}{y^3}$$

$$\boxed{\left(\frac{x}{y}\right)^n = \frac{x^n}{y^n}}$$

Power of a Quotient

$$\left(\frac{2}{9}\right)^2 = \frac{4}{81}$$

CD p. 399 Ex 2

$$\left(\frac{6}{36}\right)^2 = \left(\frac{1}{6}\right)^2 = \frac{1}{36}$$

3^0

4^0

25^0

276^0

2385^0

$= 1$

$$\boxed{x^0 = 1}$$

Zero Exponent Property

7.2 Division of Exponents Day 2

$$x^m \cdot x^n = x^{m+n}$$

$$\frac{x^m}{x^n} = x^{m-n}$$

$$(x^m)^n = x^{mn}$$

$$\left(\frac{x}{y}\right)^n = \frac{x^n}{y^n}$$

$$(xy)^m = x^m y^m$$

$$x^0 = 1$$

Ex) $\frac{x^7}{x^3} = x^4$

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

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

$$x^{-n} = \frac{1}{x^n}$$

Negative Exponent Property

Ex) $\frac{x^{-4} y^9}{z^{-6}} = \frac{y^9 z^6}{x^4} \quad -4+6$

Ex) $\frac{75 p^3 m^5}{15 p^5 m^4 r^{-2}} = \frac{75 p^3 m^4 r^2}{15 p^2 m^5}$

$= \frac{5 r^2}{p^2 m}$ move 1st or
cancel 1st!

CD p. 401 Ex 4

p. 402 Q 15 = 17, 26

CCP p. 403 33-39

HW 7.2 SPER

7.3 Rational Exponents

Rational Exponents \rightarrow Exponents that are Fractions

$$\sqrt{64} = 8 \quad \sqrt{36} = 6 \quad + \text{roots}$$

$$\sqrt{64} = 64^{1/2} \quad \text{Calculator} \quad \sqrt{64} = 8$$

$$36^{1/2} = \sqrt{36} \quad 64^{1/2} = 8$$

$$\sqrt[3]{64} = 4$$

\rightarrow CDP. 406 2x1 26P.

Prime factorization to break down #

Prime # divisible only by 1 and itself

2, 3, 5, 7, 11, 13, 17, 19, 23 etc

$$\sqrt{64} = \sqrt{2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2} = 8$$

2 exactly the same inside
total drops

$$\sqrt{36} = \sqrt{2 \cdot 2 \cdot 3 \cdot 3} = 6$$

$\sqrt[3]{x}$	cube root	$x^{1/3}$	3 exactly the same inside total drops
$\sqrt[4]{x}$	4 th root	$x^{1/4}$	4 exactly the same total drops
$\sqrt[5]{x}$	5 th root	$x^{1/5}$	5 exactly the same inside total drops

$$\sqrt[3]{27} = \sqrt[3]{3 \cdot 3 \cdot 3} = 3$$

$$27^{1/3} = 3$$

→ CDP. 407 Ex 2 d GP

$8^{2/3}$ on calculator = 4

or by hand

$$\sqrt[3]{8^2} = \sqrt[3]{64}$$

$$\sqrt[3]{\cancel{2} \cdot \cancel{2} \cdot \cancel{2} \cdot \cancel{2} \cdot \cancel{2} \cdot \cancel{2}} = 4$$

3 inside
+ cancel 2s

→ CDP. 408 Ex 4 d GP

CDP. 410, 1-12

Wp. 410, 17-43 odd

Hw p 410, 18-44 even

7.3 Day 2

Solving Exponential Equations

Guess & Check

Ex) $9^x = 129$

$$9 = 3^2$$

$$\underline{3^6 = 129}$$

$$(3^2)^x = 3^6$$

$$3^{2x} = 3^6$$

$$2x = 6$$

$$x = 3$$

Ex) $5^x = 125$

$$\underline{5^3 = 125}$$

$$5^x = 5^3 \quad x = 3$$

Ex) $16^{2x-1} = 8$

$$\underline{2^4 = 16}$$

$$\underline{2^3 = 8}$$

$$(2^4)^{2x-1} = 2^3$$

$$2^{8x-4} = 2^3$$

$$8x - 4 = 3$$

$$8x = 7$$

$$x = 7/8$$

Ex) $12^{2x+3} = 144$

$$12^{2x+3} = 12^2$$

$$\underline{12^2 = 144}$$

$$2x + 3 = 2$$

$$2x = -1$$

$$x = -1/2$$

CDP. 410 13-15, 45-55 odd

CW p. 410, 46-56 even

HW 7.3 SP4P

7.4 Scientific Notation

Scientific notation is another way to

write really large or really small
#s

Format

$$a \times 10^n \quad 1 \leq a < 10$$

n is an integer

Only 1 non zero # to the left of the

decimal pt

SF \rightarrow SN

Ex) $210 = 2.1 \times 10^2$

Ex) $.0210 = 2.1 \times 10^{-2}$

Ex) $51365000 = 5.1365 \times 10^7$

Ex) $.0005183 = 5.183 \times 10^{-4}$

check on calculator

SN \rightarrow SF

Ex) $3.201 \times 10^6 = 3201000$

Ex) $9.803 \times 10^{-5} = .00009803$

Products

$$\text{Ex) } (5 \times 10^{-6}) (2.3 \times 10^{12})$$

$$x^m \cdot x^n = x^{m+n}$$

$$5(2.3) = 11.5$$
$$10^{-6} \cdot 10^{12} = 10^6$$

$$11.5 \times 10^6 \text{ Not SN!}$$

$$\leftarrow$$
$$1.15 \times 10^7 \quad +1$$

$$\text{Ex) } (6.5 \times 10^{12}) (8.7 \times 10^{-15})$$

$$6.5(8.7) = 56.55$$
$$10^{12} \cdot 10^{-15} = 10^{-3}$$

$$56.55 \times 10^{-3} \quad +1$$
$$\leftarrow$$
$$5.655 \times 10^{-2}$$

$\leftarrow +1$

$\rightarrow -1$

Division

$$\text{Ex) } \frac{4.5 \times 10^8}{1.5 \times 10^{10}}$$

$$\frac{x^m}{x^n} = x^{m-n}$$

$$\frac{4.5}{1.5} \cdot \frac{10^8}{10^{10}} = 3 \times 10^{-2}$$

CD p. 417 1-17 odd skip 5

Day 2

Cwp. 417 21-53 odd

Cwp. 417, 2-18 even
skip 6

Hwp 417. 20-52 even

HW 7.4 SP4P

7.5 Exponential Functions

Exponential Function $y = ab^x$
 $a \neq 0, b \neq 1$

Ex) $y = 2^x$

x	-3	-2	-1	0	1	2	3
y	1/8	1/4	1/2	1	2	4	8

$x = -3$

$y = 2^{-3} = \frac{1}{2^3} = \frac{1}{8}$

$x = -1$

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

[Note Pattern]

$x = -2$

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

$x = 0$

$y = 2^0 = 1$

Ex) $y = 1/2^x$

x	-3	-2	-1	0	1	2	3
y	8	4	2	1	1/2	1/4	1/8

[Note Pattern]

$x = -3$

$y = 1/2^{-3} = \frac{1}{(1/2)^3} = \frac{1}{1/8} = 8$

$x = -1$

$y = 1/2^{-1} = \frac{1}{(1/2)} = 2$

$x = -2$

$y = 1/2^{-2} = \frac{1}{(1/2)^2} = \frac{1}{1/4} = 4$

Ex) $y = 3^x$

x	-3	-2	-1	0	1	2	3
y	1/27	1/9	1/3	1	3	9	27

[Note Pattern]

Ex) $y = 1/3^x$

x	-3	-2	-1	0	1	2	3
y	27	9	3	1	1/3	1/9	1/27

[Note Pattern]

$y = a^x$ if a is a whole #
pattern starts with fraction
if a is a fraction
pattern starts with a whole #

$y = ba^x$ find a^x then multiply by b
 $y = a^x + b$ find a^x then add b

CD p. 427, 1-6 } Charts
CW p. 427, 10-16 even } Only
HW p. 427, 11-15 odd } No Graphing!