BE-Geometry 11 Tuesday 4-10-12

① Name the 5 Platonic Solids, the number of sides, and the type of regular polygon that makes up each of these polyhedrons

- Homework read 5.

Geo 1 HW Review

#1-8

① $(7m)^{\frac{3}{2}}$

② $r^{\frac{6}{5}}$

③ $(6x)^{\frac{3}{2}}$

④ $(5n)^{\frac{1}{2}}$

⑤ $\left(\sqrt[5]{x}\right)^3$

⑥ $\sqrt[3]{(5n)^4}$

⑦ $\sqrt[5]{a^8}$

⑧ $\sqrt{v^3}$ or $\left(\sqrt{v}\right)^3$ WHY? Look

$\sqrt{v \cdot v \cdot v} = \sqrt{v} \cdot \sqrt{v} \cdot \sqrt{v} = \left(\sqrt{v}\right)^3$

Exponential Functions

EXPONENTIAL FUNCTION — A function where the independent variable (x) is an exponent.

(Ex) $y = a\,b^x$

b = base

a = constant, often called the "initial value" since when $x = 0$, $y = ab^0 = a(1)$

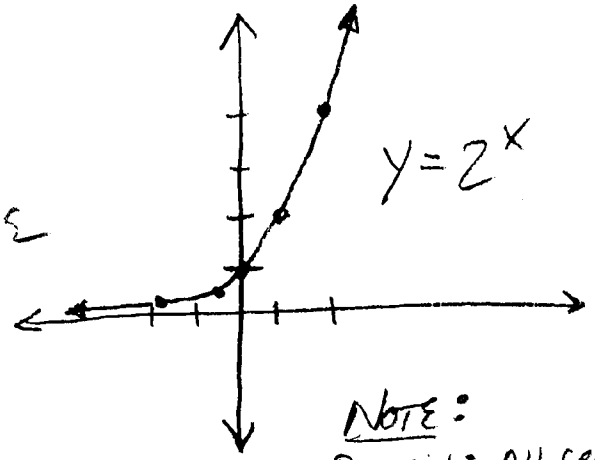
$y = a$

Ex $y = 2^x \Rightarrow a = 1,\ b = 2$

$a = 1$

base is 2

x	$y = 2^x$
-2	$2^{-2} = \frac{1}{2^2} = \frac{1}{4}$
-1	$2^{-1} = \frac{1}{2}$
0 (key point)	$2^0 = 1$ ← starting value
1	$2^1 = 2$
2	$2^2 = 4$
$-\infty$	Approaches 0 asymptotically – never crosses 0
$+\infty$	keeps getting bigger, passes to right of any x eventually

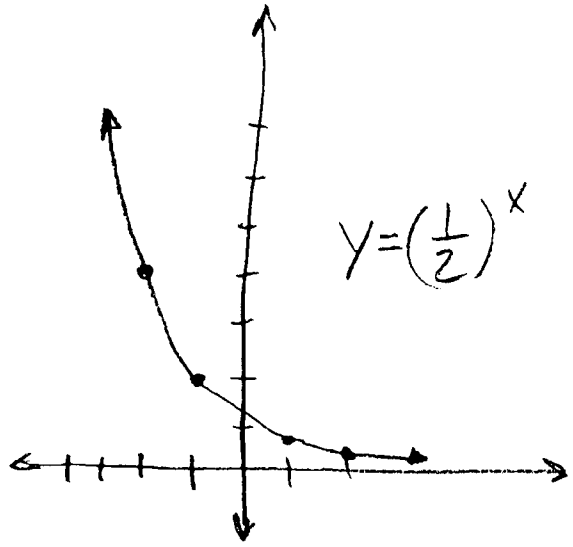


NOTE:
Domain: All reals
Range: $y > 0$

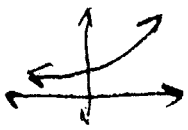
(EX) $y = \left(\frac{1}{2}\right)^x$ $\quad a = 1$, $b = \frac{1}{2}$

x	$\left(\frac{1}{2}\right)^x$
-2	$\left(\frac{1}{2}\right)^{-2} = \frac{1}{\left(\frac{1}{2}\right)^2} = \frac{1}{\frac{1}{4}} = 4$
-1	$\left(\frac{1}{2}\right)^{-1} = \frac{1}{\left(\frac{1}{2}\right)^1} = 2$
0	$\left(\frac{1}{2}\right)^0 = 1$
1	$\left(\frac{1}{2}\right)^1 = \frac{1}{2}$
2	$\left(\frac{1}{2}\right)^2 = \frac{1}{4}$
$+\infty$	APPROACHES 0 ASYMPTOTICALLY
$-\infty$	KEEP ↑, NOT ASYMPTOTE

KEY POINT ⇓ Y-INTERCEPT ⇓ "INITIAL" VALUE

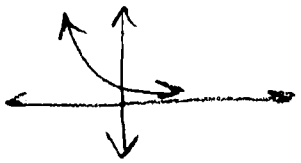


EXPONENTIAL FUNCTIONS:



EXPONENTIAL GROWTH

BASE > 1



EXPONENTIAL DECAY

$0 <$ BASE < 1

- BASE $\neq 1$, why? $y = 1^x = 1$ NOT EXPONENTIAL, JUST HORIZONTAL LINE
- BASE $\neq$ NEGATIVE, why?

$(-b)^x$ EVEN ⇒ POSITIVE

$(-b)^x$ ODD ⇒ NEGATIVE

GRAPH IS "CRAZY" ↑ ↓

Domain of $y = 2^x$ is "All reals"

$\therefore$ $y = 2^{\sqrt{5}}$ MUST EXIST $\Rightarrow$ Need calculator to approximate

$y = 2^{\sqrt{5}} \approx 2^{(2.2361)} \approx 4.7112$

NOTE: $2^2 = 4$ $2^3 = 8$

$\therefore 2^{\sqrt{5}} \cong 4.7$ is reasonable

Do not mix up $y = x^2$ WITH $y = 2^x$

$y = x^2$: QUADRATIC FUNCTION (parabola)
DOMAIN: All reals
RANGE: All reals

$y = 2^x$: EXPONENTIAL function
DOMAIN: All reals
RANGE: $y > 0$

Ex Identify: Exponential Growth or Decay?

(A.) $y = \left(\frac{1}{5}\right)^x$ $a = 1$ $b = \frac{1}{5}$

(B.) $y = 3(4)^x$ $a = 3$ $b = 4$

(C.) $y = 7(1.2)^x$ $a = 7$ $b = 1.2$

A trick for solving exponential equations:

Get the bases equal!

If bases are equal, the exponents have to be equal.

(Ex) If $2^x = 2^5$ $\boxed{x = 5}$

(Ex) $2^{3x} = 2^{12}$ $3x = 12$

$\boxed{x = 4}$

(Ex) $3^{5x} = 9^{x+1}$

$3^{5x} = (3^2)^{x+1}$

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

$5x = 2x + 2$

$3x = 2$

$\boxed{x = \frac{2}{3}}$

(Ex) $3^{x-2} = 27$

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

$x-2 = 3 \therefore \boxed{x=5}$

(Ex) $3^{2N+1} = 81$

$3^{2N+1} = 3^4$

$2N+1 = 4$

$2N = 3 \therefore \boxed{N = \frac{3}{2}}$

(Ex) $4^{2x} = 8^{x-1}$

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

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

$4x = 3x - 3$

$\boxed{x = -3}$

Homework: • Practice Worksheet # 9-27 ODD
• Graph $y = 3^x$ • Graph $y = \left(\frac{1}{3}\right)^x$