

REVIEW - UNIT 3

1. 3 Types of Mathematical Models

Linear - 1st Differences are the same

Quadratic - 2nd Differences are the same

Exponential - Finite Ratios are the same

Which one has the largest growth rate as x increases?2. Exponential Models: $y = a b^x$ What does a tell you about the graph?What does b tell you?If $b < 1$ then _____If $b > 1$ then _____

Eg. The population of Ottawa can be modelled by the formula

 $P = 1.2 (1.05)^t$, where t is the number of years since 2010 and P is the population in millions.

What was the population in 2010?

Is the population increasing or decreasing? By how much?

What will the population be in 2020?

3. Working with Exponents -

3^0

3^{-2}

$81^{1/2}$

$27^{5/3}$

4. Solving in Exponential Relations.

$x^{5/6} = 98$

$4^x = 16^{3x+2}$

$1200 = 900(1.021)^x$



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

$a \rightarrow$ y-intercept
initial value

$b \rightarrow$ ratio, growth rate.
 $b < 1 \rightarrow$ decreasing
 $y = 4(0.75)^x$
 $b > 1 \rightarrow$ increasing
 $y = 4(1.25)^x$

$b = 1 + r$
or
 $1 - r$

$1.25 = 1 + 0.25$

$0.75 = 1 - 0.25$

$y = 4(1.37)^x$

$1.37 = 1 + 0.37$
It is increasing by 37%

$y = 4(0.92)^x$

$0.92 = 1 - 0.08$
decreasing 8%

Eg. $P = 1.2(1.05)^t$
 1.2 million people
 $P = 1.2(1.05)^0$
 $= 1.2$

Population is increasing
 $1.05 = 1 + 0.05$
 increasing by 5%

$P = 1.2(1.05)^{10}$
 $= 1.95$ million.

3. $3^0 = 1$
 $-3^{224000} = 1$
 $3^{-2} = \frac{1}{3^2}$
 $= \frac{1}{9}$

$8^{1/2} = \sqrt{81}$

$\frac{5}{3} = \frac{1}{3} \times 5$
 $= \frac{1}{3} \times 5^5$
 $27^{5/3} = (27^{1/3})^5$

3b) $a^7 \times a^3 = a^{7+3} = a^{10}$
 $\frac{a^7}{a^3} = a^{7-3} = a^4$
 $\frac{a^7}{a^{10}} = a^{7-10} = a^{-3} = \frac{1}{a^3}$
 $\frac{a^3}{a^7} = a^{3-7} = a^{-4} = \frac{1}{a^4}$

4. $(a^3 b^2)(a^3 b^2)(a^3 b^2)(a^3 b^2)(a^3 b^2)$
 $x^{24} = 96$

$x = 96^{1/24}$
 $= 245.17$

$4^x = 16^{2x+2}$

$4^x = (4^2)^{2x+2}$

$4^x = 4^{4x+4}$

$x = 4x + 4$

$x - 4x = 4$

$-3x = 4$

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

$2^{2x} = 2^{-(8/3)}$
 $2x = -\frac{8}{3}$
 $x = -\frac{4}{3}$
 $4^{-4/3} = 4^{-(4/3)}$

$1200 = 900(1.02)^x$