MATH 100 10-20-2008

In July of 2008 India's population was estimated to be 1,147,995,904. At that time India's population was estimated to be growing at the rate of 1.578% per year. Let's approximate India's population at 1.148 billion and assume its annual rate of growth is approximately 1.6%. On that basis we will estimate India's approximate population in billions for the years 2008 to 2018 inclusive.

Year	Years Since 2008 t	India's Population (billions) P(t)	$\frac{P(t)}{P(t-1)}$
2008	0	1.148	
2009	1		*1.016*
2010	2		
2011	3		
2012	4		
2013	5		
2014	6		
2015	7		
2016	8		
2017	9		
2018	10		

$P(1) = P(0) + 0.016P(0)$
$= (1.016)P(0)$
$= (1.016)(1.148)$
$\approx$

About when will India's population reach 1.3 billion?

In the situation considered here we refer to 1.6% as India's *growth rate* and (1.016) as India's *growth factor*.

The function defined below can be used to estimate India's population in billions t years after 2008.

P(t) =

Can we estimate when India's population will double?

Exponential Notation and Working with Exponents

In exercises 1 & 2 Calculate each of the following:

1. 2^5 = _____; 2^4 = _____; 2^3 = _____; 2^2 = _____; 2^1 = _____; 2^0 = _____;

   2^{-1} = _____; 2^{-2} = _____ ; 2^{-3} = _____; 2^{-4} = _____; 2^{-5} + _____

2. 10^4 = _____; 10^3 = _____; 10^2 = _____; 10^1 = _____; 10^0 = _____;

   10^{-1} = _____; 10^{-2} = _____; 10^{-3} = _____; 10^{-4} = _____

In exercises 3-14 solve for x:

3. $(2^3)^5 = 2^x$
4. $(2^3)(2^5) = 2^x$
5. $\dfrac{2^5}{2^3}$
6. $\dfrac{2^3}{2^5}$
7. $120{,}000 = 1.2(10^x)$
8. $0.000012 = 1.2(10^x)$
9. $120{,}000 = 1.2(10^x)$
10. $0.0000012 = 1.2(10^x)$
11. $2^x(2^7) = 2^3$
12. $(2^x)^2 = 2.$
13. $(2^x)^3 = 2$
14. $8^{\frac{2}{3}} = x$

15. Write in scientific notation: 1,230,000

16. Write in scientific notation: 0.00000000123

17. Simplify each expression:

a. $x^3 \cdot x^5 \cdot x^{-1}$ b. $\dfrac{x^7}{x^2} \cdot x^{-3}$ c. $\sqrt{x^6}$