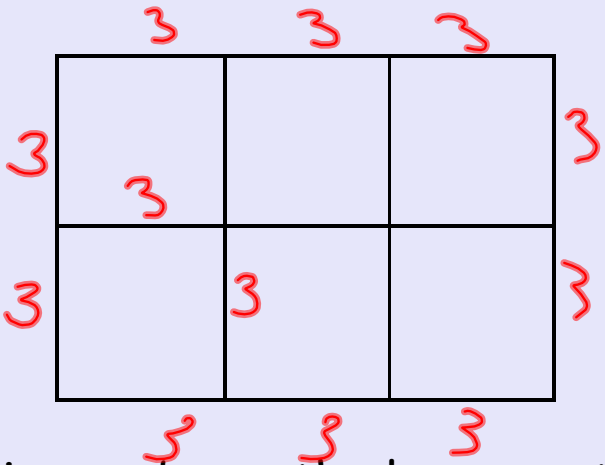
SAT



In the figure above, the large rectangle is divided into six identical small squares. If the perimeter of the large rectangle is 30, what is the perimeter of one of the small squares?

5.1/5.2 Exponential Growth and Decay

The natural base 'e' is found in some common mathematical formulas:

A Catenary

short video clip...

$$y = \frac{e^{x} + e^{-x}}{2}$$

The Normal Curve

$$y = e^{-x^2}$$

Continuously Compounded Interest

$$A = Pe^{rt}$$

e -- the natural base

e is an irrational constant, like π. It cannot be expressed as an exact fraction.

It is exactly equal to $\lim_{n\to\infty}\left(1+\frac{1}{n}\right)^n$

It is approximately 2.72.

The natural base 'e' follows all the other rules of bases and exponents that you have learned.

Simplify each expression

a) $e^{-2}\, e^{5} =$ e^{3}

b) $e^{-4} =$ $\frac{1}{e^{4}}$

c) e^{0} $= 1$

Use a calculator to evaluate each expression to three significant figures.

d) $e^{1.6}$ 4.95

e) $\sqrt[3]{e}$ $= e^{\frac{1}{3}} = 1.40$

f) $2\sqrt[4]{e^{3}}$

$= 2e^{\frac{3}{4}}$

$= 4.23$

Worksheet

1a $P(t) = 15 \cdot 1.0135^t$

growth, $P_0 = 15$, $r = 0.0135$ or 1.35%

$1.0135 - 1 = 0.0135$

1b decay

$P_0 = 35$, $r = -0.07$ or -7%

$0.93 - 1$

1c growth

$P_0 = 50$, $r = 5\%$

Worksheet

$12(1+0.12)^t$

2a $P(t) = 12 \cdot 1.12^t$

2b $P(t) = 5(1-0.08)^t$

$= 5(0.92)^t$

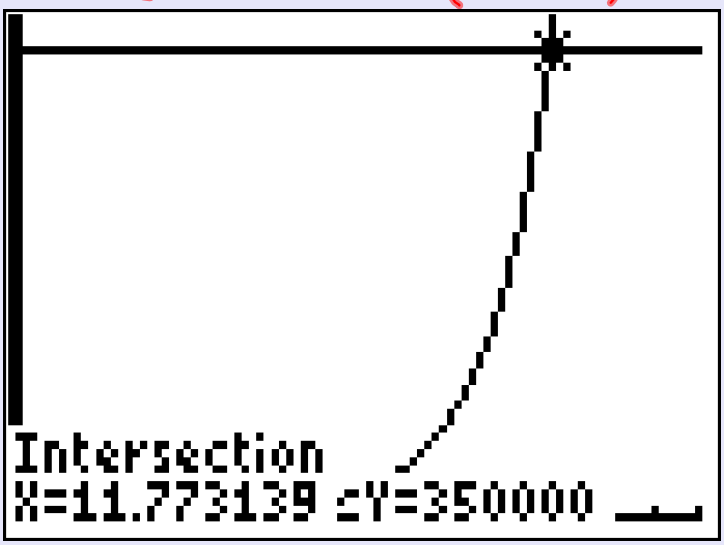
2c $P(t) = 502000(1-0.017)^t$

$502000(0.983)^t$

Worksheet

Suppose a culture of 100 bacteria is put into a petri dish and the culture doubles every hour. Write an exponential equation to represent this information. Then use a graph to predict when the number of bacteria will be 350,000.

$b(t) = 100(1+1)^t$



$t = 11.8$ hrs

Homework Assignment:

Worksheet attached to notes