

# M3. The End of Oil

The End of Oil Calculation—Student Handout

**PROBLEM:** In how many years will all of the known oil reserves on planet earth be completely consumed?

**Math content area topics:** Geometric series—sums, ratios, exponential functions, growth rates, geometric means, scientific notation, laws of exponents, equation solving, computation, critical thinking

To answer this question you will need the facts and tools listed below:

- CURRENT KNOWN OIL RESERVES: 1.7-4 trillion barrels.
- CURRENT WORLDWIDE OIL CONSUMPTION: 31 billion barrels per year
- ANNUAL GROWTH RATE OF CONSUMPTION: approximately 3.5 % per year.

GENERAL GEOMETRIC SUM FORMULA: 
$$S = P_0 \left( \frac{1-r^n}{1-r} \right)$$

The two largest variables in the end of oil calculation are

- 1) the estimated reserves on earth and
- 2) the projected global growth rate of consumption.

To gain a clear understanding of how these variables relate to each other and affect the final calculation, perform the calculation several times using different values for reserves and growth rate as indicated below and compare your results in the table:

**Years to the end of oil**  
Global annual consumption growth rates

		0%	1.7%	3.5%	5%
Global Reserves In trillions of barrels	2 (reasonable estimate)	66	45	34	30
	4 (high estimate)	133	70	50	41
	20 (impossible)	667	148	92	72

Questions to consider....

1. Based on the above data, what would be the wisest energy policy to maximize the length of time before oil will run out?
2. What other factors will change consumption rates or supply? List them, discuss their probabilities and resulting impact on the future of oil and the global economy.

# End of Oil

Total Resources 2 trillion barrels

annual consumption 31 billion Barrels

$$2 \times 10^{12}$$

$$3.1 \times 10^{10}$$

$$A, A + \frac{.035A}{A} = 1.035 = r$$

$$2.0(10^{12}) \frac{3.1(10^{10})(1-1.035)^n}{1-1.035} \\ = .035$$

$$-.035(2.0)(10^{12}) = 3.1(10^{10})(1-1.035)^n$$

$$\frac{-.035(2.0)(10^{12})}{3.1(10^{10})} = 1-1.035^n$$

$$-.0226(10^2) = 1-1.035^n$$

$$\begin{array}{r} -2.26 = 1-1.035^n \\ -1 \quad -1 \\ \hline \end{array}$$

$$-3.26 = -1.035^n$$

$$3.26 = 1.035^n$$

$$= 34.35 \text{ years}$$

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