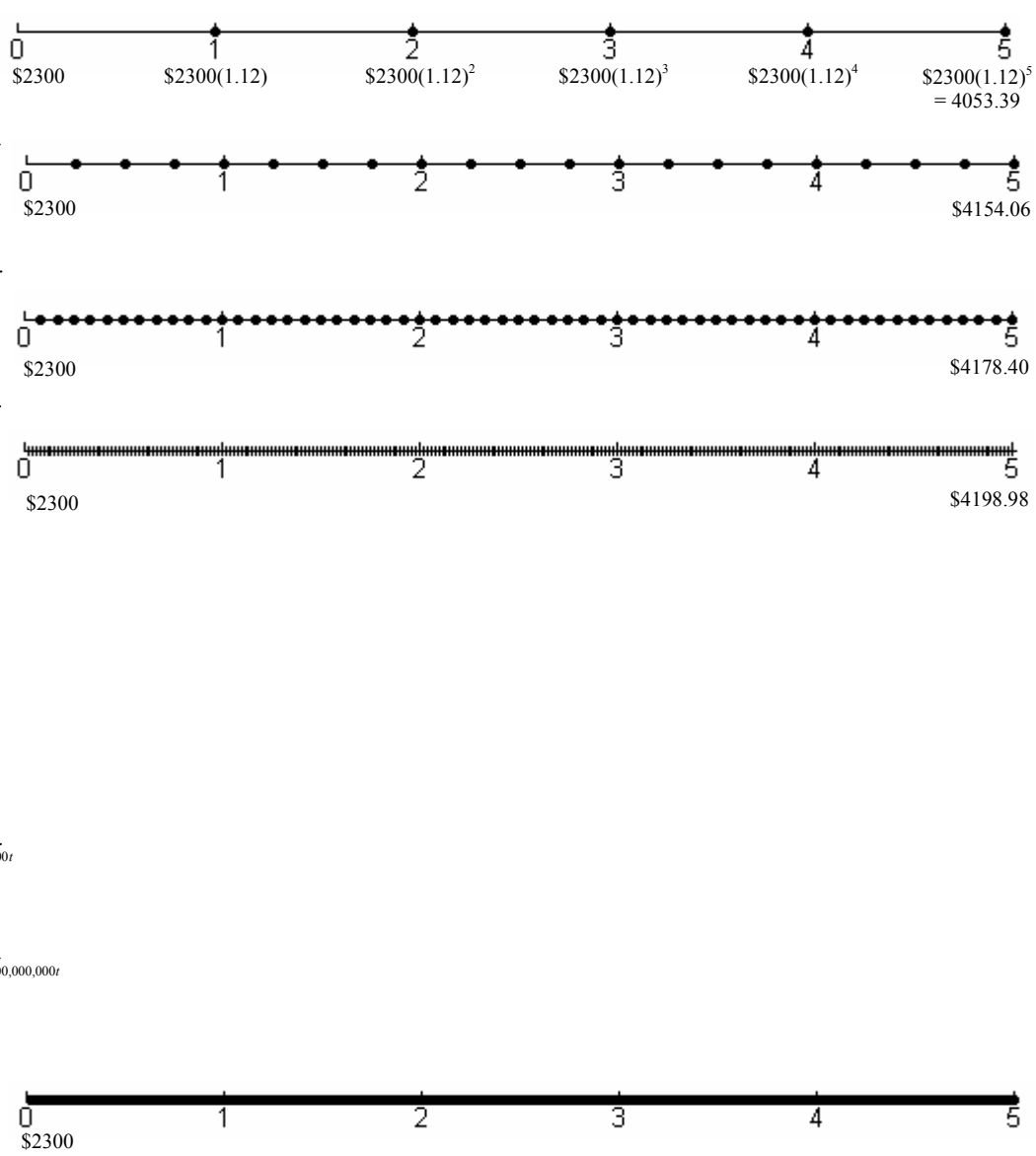
Compounding Interest Continuously

Invest \$2300 at an annual percentage rate* (APR) of 12% for 5 years.

Compounding frequency	n times per/yr	Total Amount A	A numerical expression which involves the numbers 2300, 0.12, and 5	Total # dots	Annual Growth Rate**
Annually	1	4053.39	$2300(1.12)^5$ $= 2300(1+\frac{0.12}{1})^{1\cdot 5}$	5	If P_0 =2300, then in t years we have $A = P_0(1.12)^t$ So 12%
Quarterly	4	4154.06	$2300(1.03)^{20}$ $= 2300(1+\frac{0.12}{4})^{4\cdot 5}$	20	Have $P_0(1.03)^{4t}$ $\approx P_0\,(1.1255)^t$ so 12.55%
Monthly	12	4178.40	$2300(1.01)^{60}$ $= 2300(1+\frac{0.12}{12})^{12\cdot 5}$	60	Have $P_0 1.01^{12t}$ $\approx P_0(1.1268)^t$ so 12.68%
Weekly	52	4188.98	$2300(1+\frac{0.12}{52})^{260}$ $= 2300(1+\frac{0.12}{52})^{52\cdot 5}$	260	$P_o(1+\frac{0.12}{52})^{52t}$ $\approx P_o(1.12734)^t$ so 12.73%
Daily	365	4190.46	$2300(1+\frac{0.12}{365})^{1825}$ $= 2300(1+\frac{0.12}{365})^{365\cdot 5}$	1825	$P_o(1+\frac{0.12}{365})^{365t}$ $\approx P_o(1.12747)^t$ so 12.747%
One thousand times per year	1000	4190.72	$2300(1+\frac{0.12}{1000})^{5000}$ $= 2300(1+\frac{0.12}{1000})^{1000\cdot 5}$	5000	$P_0(1+\frac{0.12}{1000})^{1000t}$ $\approx P_0(1.1274959)^t$ so 12.749**59**%
One million times per year	10^6	4190.87309	$2300(1+\frac{0.12}{1{,}000{,}000})^{5{,}000{,}000}$ $= 2300(1+\frac{0.12}{1{,}000{,}000})^{1{,}000{,}000\cdot 5}$	5×10^6	$P_o(1+\frac{0.12}{1{,}000{,}000})^{1{,}000{,}000t}$ $\approx P_o(1.1274968)^t$ so12.749**68**%
One billion times per year	10^9	4190.87324	$2300(1+\frac{0.12}{1{,}000{,}000{,}000})^{5{,}000{,}000{,}000}$ $= 2300(1+\frac{0.12}{1{,}000{,}000{,}000})^{1{,}000{,}000{,}000\cdot 5}$	5×10^9	$P_o(1+\frac{0.12}{1{,}000{,}000{,}000})^{1{,}000{,}000{,}000t}$ $\approx P_o(1.1274977)^t$ so 12.749**77**%
Continuously					



* The annual percentage rate is also called the *nominal rate* (nominal means "in name only").

** The annual growth rate is also called *effective rate* or *effective annual yield*.