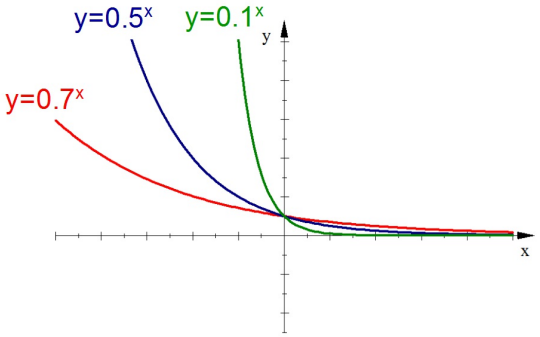
As b gets smaller, but still positive, the graph decreases faster ("steeper")



Graphs of $y = a \cdot b^x$

a: the y-intercept. If a is negative graph is upside down (x-axis reflection)

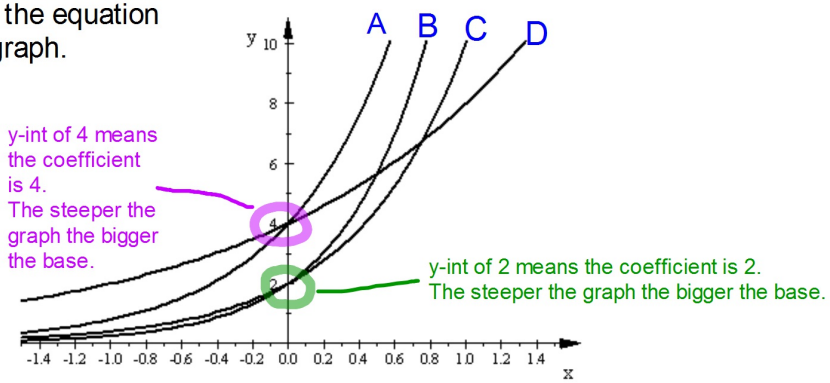
b: Growth or Decay Factor

Growth Factor: The larger the value of b the faster the graph increases.
b>1

Decay Factor: The smaller the value of b the faster the graph decreases
0<b<1

D $y = 4(2)^x$ C $y = 2(5)^x$ B $y = 2(8)^x$ A $y = 4(5)^x$

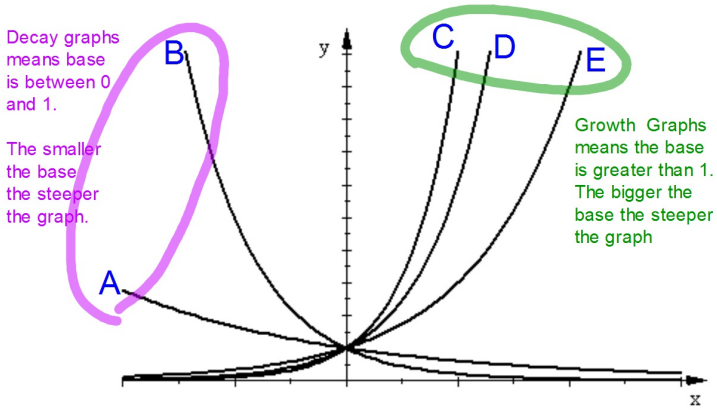
Match the equation to its graph.



E $y = 6^x$ D $y = 10^x$ B $y = 0.5^x$ C $y = 12^x$

A $y = 0.8^x$

Match the equation to its graph.



Simple Interest:

You only earn interest in the initial amount you invested.

Simple Interest: $I = prt$

- Interest earned
- Principal (initial amount)
- Interest rate as a decimal
- # of time periods (usually years)

You invest $10,000 in an account that pays 8% annual interest.

How much will you have after 10 years if you only get simple interest?

$I = 10{,}000(.08)(10)$

$I = \$8000$

$10{,}000 + \$8000 = \$18{,}000$

Compounding Interest: earning interest on the interest.

You invest $10,000 in an account that pays 8% annual interest.

How much will you have after 10 years if interest is compounded annually?

end of 1st year you'll have: $10{,}000(1.08)$
end of 2nd year you'll have: $10{,}000(1.08)(1.08)$
end of 3rd year you'll have: $10{,}000(1.08)(1.08)(1.08)$

This is basic exponential growth. After 10 years you'll have: $10{,}000(1.08)^{10}$
$= \$21{,}589.25$

You invest $10,000 in an account that pays 8% annual interest.

How much more will you have after 20 years if interest is compounded annually versus simple interest?

Simple Interest

$10000 + 10,000(.08)(20)$

$= \$26,000$

Interest Compounded

$10,000(1.08)^{20}$

$46,609.57$

46,609.57 - 26,000 = $20,609.57

You get $20,609.57 more after 20 years by compounding interest.

What if you compound interest more often than annually?

You should earn more interest!

Compound Interest Formula:

$$A = P\left(1 + \frac{r}{n}\right)^{nt}$$

A = final amount
P = Principal (intial amount)
r = inerest rate (as a decimal)
n = # of times interest is compounded each year
t = # of years

Find the amount of money you will have after 20 years if you invest $10,000 at 8% annual interest compounded quarterly.

$$A = P\left(1 + \frac{r}{n}\right)^{nt}$$

$$= 10,000\left(1 + \frac{.08}{4}\right)^{4 \cdot 20}$$

$\$48,754.39$