Math 2 Name: KEY

Exponential Growth Worksheet

1. In 1990, the cost of tuition at a state university was $4300. The tuition increases at a rate of 4% each year.
   a. How much would it cost to attend the university in 2010? $(t=20)$

   $A = 4300(1+.04)^{20} = \boxed{\$9421.83}$

   b. How much would it cost to attend in 2025? $(t=35)$

   $A = 4300(1+.04)^{35} = \boxed{\$16968.18}$

2. You buy a house for $130,000. It appreciates 6% per year. How much is it worth in 10 years?

   $A = 130000(1+.06)^{10} = \boxed{\$232810.20}$

3. If you invest $40 in an account for 10 years at a 3% interest rate how much money will you have?

   $A = 40(1+.03)^{10} = \boxed{\$53.76}$

4. If you invest $2040 in an account with 5% interest rate for 15 years how much money will you have?

   $A = 2040(1+.05)^{15} = \boxed{\$4241.01}$

5. You invested $475 in an account with 8.5% interest for 12 years. How much money will you have at the end of 12 years?

   $A = 475(1+.085)^{12} = \boxed{\$1264.30}$

6. A population of 100 frogs increases at an annual rate of 22%. How many frogs will there be in 5 years?

   $A = 100(1+.22)^{5} = 270.27 \rightarrow \boxed{270 \text{ frogs}}$

7. A type of bacteria has a very high exponential growth rate at 80% *every hour*. If there are 10 bacteria, determine how many there will be in 5 hours, in 1 day and in 1 week?

   $t = 5$ hrs. $t = 24$ hrs $t = 168$ hrs.

   $A = 10(1+.8)^{5} = 188.96$

   $A = 10(1+.8)^{24} = 13382588.45$

   $A = 10(1+.8)^{168} = 7.687424391 \times 10^{43}$ (A LOT)

8. A species of extremely rare, deep water fish has an extremely long lifespan and rarely have children. If there are a total 821 of this type of fish and their growth rate is 2% *each month*, how many will there be in half of a year? What will be the population be in 10 years and in 100 years?

$t=6$ $\quad$ $t=120$ mo. $\quad$ $t=1200$ mo.

$A=821(1+.02)^6$ $\quad$ $A=821(1+.02)^{120}$ $\quad$ $A=821(1+.02)^{1200}$

$=\boxed{924.58}$ $\quad$ $=\boxed{8838.2}$ $\quad$ $=\boxed{1.716126396\times10^{13}}$

9. $1000 invested with compound interest at a rate of 15% per year for 9 years.

$A=1000(1+.15)^9$ OR $A=1000\left(1+\frac{.15}{1}\right)^{1(9)}$

$\boxed{A=\$3517.88}$

10. $400 invested with compound interest at a rate of 3% per year for 2 years.

$A=400(1+.03)^2$ OR $A=400\left(1+\frac{.03}{1}\right)^{1(2)}$

$\boxed{A=\$424.36}$

11. $1250 invested with compound interest at a rate of 5% per year for 4 years.

$A=1250(1+.05)^4$ OR $A=1250\left(1+\frac{.05}{1}\right)^{1(4)}$

$\boxed{A=\$1519.38}$

12. $1400 invested with compound interest at a rate of 9% per year for 6 months. $(t=.5)$

$A=1400(1+.09)^{.5}$ OR $A=1400\left(1+\frac{.09}{1}\right)^{1(.5)}$

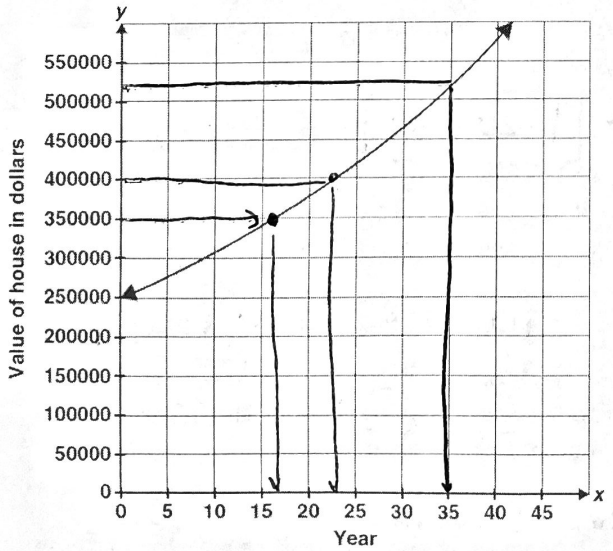
$\boxed{A=\$1461.64}$

13. $600 invested with compound interest at a rate of 4% per year for 10 years.

$A=600(1+.04)^{10}$ OR $A=600\left(1+\frac{.04}{1}\right)^{1(10)}$

$\boxed{A=\$888.15}$

14. Use the graph to determine when ....



a. The house will be worth $350,000.

≈ 16 yrs.

b. The house will be worth $400,000.

≈ 23 yrs.

c. The house will be worth $520,000.

≈ 35 yrs.