

REVIEW OF LOGS

Please get into groups for the day.

Solve for t.

$$1. 300(1.07)^t = 5,000$$

$$2. 6000 = 200 \left(1 + \frac{.15}{4}\right)^{4t}$$

$$3. 500 = 150e^{0.12t}$$

$$1. 300(1.07)^t = 5,000$$

41.6 yrs

$$2. 6000 = 200 \left(1 + \frac{.15}{4}\right)^{4t}$$

23.1 yrs

$$3. 500 = 150e^{0.12t}$$

10.02 yrs

SOLVING WORD PROBLEMS



Sequences & Series Word Problems

- Determine if it is a Sequence or a Series – *are you being asked for a specific event/amount or the sum of events/amounts?*
- Determine if it's Arithmetic or Geometric – *is there a common difference or ratio between the given pieces of data?*
- Determine which formula to use

Ex 1. A mine worker discovers an ore sample containing 500 mg of radioactive material. It is discovered that the radioactive material has a *half life* of 1 day. Find the amount of radioactive material in the sample at the beginning of the 7th day.

Geometric Sequence

$$a_1 = 500$$

$$r = .5$$

$$n = 7$$

$$a_n = a_1 \cdot r^{(n-1)}$$

$$a_7 = 500 \cdot .5^{(7-1)}$$

$$a_7 = 500 \cdot .5^{(6)}$$

$$a_7 = 500 \cdot .0156$$

$$a_7 = 7.8125$$

Ex2. The sum of the interior angles of a triangle is 180° , of a quadrilateral is 360° and of a pentagon is 540° . Assuming this pattern continues, find the sum of the interior angles of a dodecagon (12 sides) then find the sum of all the shapes interior angles.

Arithmetic Series

$$a_1 = 180$$

$$n = 10$$

$$d = 180$$

- Find 12th term
- Find the sum

$$a_n = a_1 + (n - 1) \cdot d$$

$$a_{12} = 180 + (12 - 1) \cdot 180$$

$$a_{12} = 2160$$

$$S_n = \frac{n}{2} (a_1 + a_n)$$

$$S_{12} = \frac{12}{2} (180 + 2160)$$

$$S_{12} = 14,040$$

Ex 3. The hotel tells you that they will increase the temperature by 10% each hour. If the current temperature of the hot tub is 75° F, what will be the temperature of the hot tub after 3 hours, to the nearest tenth of a degree?

Geometric Series

$$a_1 = 75$$

$$r = .10$$

$$n = 3$$

$$S_n = \frac{a_1 \cdot (1 - r^n)}{(1 - r)}$$

$$S_3 = \frac{75 \cdot (1 - .10^3)}{(1 - .10)}$$

$$S_3 = 83.25^\circ$$

Investment Formulas:

- P_0 = principal or initial amount (can use either)
- A = investment amount accumulated after a period of time
- r = rate at which an investment amount can grow (as a decimal)
- t = number of years
- n = number of times an investment is compounded per year
 - ▣ Annually – once a year
 - ▣ Semiannually – twice a year
 - ▣ Quarterly – every four months
 - ▣ Monthly – 12 times a year
 - ▣ Continuously – every day, 365 times

Types of Compounding Interest:

□ Not Continuous

- Annually
- Semiannually
- Quarterly
- Monthly

$$A = P_0 \left(1 \pm \frac{r}{n} \right)^{nt}$$

□ Continuously

- Accruing interest every day

$$A = P_0 \left(1 \pm r \right)^t$$

Ex 1.

- How long will it take \$30,000 to accumulate to \$110,000 in a trust that earns a 10% annual interest compounded monthly?

$$A = P_0 \left(1 + \frac{r}{n}\right)^{nt}$$

Ex2.

- How long will it take \$30,000 to accumulate to DOUBLE in a trust that earns a 10% annual interest compounded continuously?

$$A = P_o (1 \pm r)^t$$

Group Activity

- Select an interest rate (r)
- Select an initial investment amount (P_0)
- Calculate how long it would take your investment to be worth \$100,000 compounded....
 - ▣ 1. Annually
 - ▣ 2. Monthly
 - ▣ 3. Continuously

Solve each equation for “r”

1. $4000 = 2500(1 + r)^5$

0.1 or 10%

2. $7000 = 200 \left(1 + \frac{r}{4}\right)^{24}$

0.64 or 64%

3. $800 = 120e^{3r}$

0.63 or 63%

Solve each equation for “ P_0 ”

1. $8,500 = P_0(1.09)^8$

4,265.86

2. $P_0 \left(1 + \frac{0.10}{12}\right)^{36} = 15,000$

11,126.10

3. $P_0 e^{(0.14 \cdot 6)} = 12,000$

5,180.53

Ticket Out:

- 1. At what rate of interest would a person need to invest in order to turn \$200.00 into \$5,000 in 6 years if **compounded monthly**?
- 2. A student wants to save \$8000 for college in 5 years. How much should be put into an account that pays 5.2% annual interest **compounded continuously**?