

Word Problems

- **Read Problem Carefully**
- Determine the appropriate formula
- Write down what you are given
- Solve

For a compact car the cost of maintenance and repairs increased by \$85 each year. If in the first year the amount was \$120, how much was the maintenance at the end of year five?

• **Read Problem Carefully**

- Determine the appropriate formula
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$$t_n = a + (n - 1)d$$

Given:

$$a = \$120$$

$$d = \$85$$

$$\begin{aligned} t_5 &= 120 + (5-1)(85) \\ &= 120 + 4(85) \\ &= 120 + 340 \\ &= \$460 \end{aligned}$$

The maintenance cost for year 5 was \$460

70,000, —, —, 105,000 ← t_4

A house worth \$70 000 sold for \$105 000 3 years later.
Find the *annual rate of increase* if the value of the house increased geometrically.

• **Read Problem Carefully**

- Determine the appropriate formula
- Write down what you are given
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$$t_n = ar^{n-1}$$

$$105\,000 = (70\,000)r^{4-1}$$

Given:

$$a = 70\,000$$

$$n = 4$$

$$t_4 = 105\,000$$

$$r = ?$$

$$1.5 = r^3$$

$$1.1447 = r$$

← Common Ratio

To Find Annual Rate of Increase

$$1.1447 - 1 = 0.1447$$

$$0.1447 \times 100 = 14.47\%$$

The AROI is 14.47%.

As it aged, a maple tree produced sap according to the pattern shown in the table below.

Year	2001	2002	2003	2004
Sap (Litres)	$t_1 = \underline{\underline{60.000}}$	$t_2 = 57.000$	$t_3 = 54.150$	$t_4 = 51.4425$

a) Does the data follow an arithmetic or geometric pattern?

$$r = \frac{57}{60} = \frac{54.15}{57} = \frac{51.4425}{54.150} = 0.95$$

Sap production is decreasing by 5% each year

b) Write down a formula for t_n ?

$$t_n = ar^{n-1}$$

$$t_n = (60)(0.95)^{n-1}$$

c) Assuming the pattern continues, how long will it take for the sap production to be approximately 17.5L? $\leftarrow t_n$

$$a = 60$$

$$r = 0.95$$

$$t_n = 17.5$$

$$n = ?$$

$$t_n = ar^{n-1}$$

$$\frac{17.5}{60} = \frac{(60)(0.95)^{n-1}}{60} \quad (\text{Divide by } 60)$$

$$0.291\bar{6} = (0.95)^{n-1} \quad (\text{Get common base})$$

$$(\cancel{0.95})^{24} = (\cancel{0.95})^{n-1} \quad \left(\frac{\log 0.2916}{\log 0.95} \right)$$

$$24 = n - 1$$

$$25 = n$$

In year 25 the sap production will be 17.5L.

Homework