

Lesson Worksheet 7.2A(I)

Objective: To solve problems involving constant growth rates.

If a quantity grows at a constant rate of $r\%$ per period, then

若一個量在每個時期以固定的率 $r\%$ 增長，則

$$\text{new value after } n \text{ periods} = \text{original value} \times (1 + r\%)^n$$

$$n \text{ 期後的新值} = \text{原值} \times (1 + r\%)^n$$

- $r\%$ is called the growth rate. $r\%$ 稱為增長率。
- $(1 + r\%)$ is called the growth factor. $(1 + r\%)$ 稱為增長因子。

1. Find the new values when \$13 000 grows(增長) with the following annual(每年) growth rates and periods(時期) of growth.

(a) Annual growth rate = 2% , period of growth = 5 years

(b) Annual growth rate = 15% , period of growth = 3 years

(Give the answers correct to the nearest dollar.)

(a) New value = $\$(13000) \times (1 + 2\%)^5$

= \$ 14353, corr. to the nearest dollar

(b) New value = $\$(13000) \times (1 + 15\%)^3$

= \$ 19771, corr. to the nearest dollar

Demonstration

Find the new value when \$5000 grows with a annual growth rate of 3% for 2 years.

Solution

$$\begin{aligned} \text{New value} &= \$5000 \times (1 + 3\%)^2 \\ &= \$5304.5 \end{aligned}$$

2. The present price of a bag is \$3000. If its price increases by 5% each year, find the price of the bag after three years.

(Give the answer correct to the nearest dollar.)

Price of the bag after three years

$$= \$(3000) \times (1 + 5\%)^3$$

$$= \$ 3473, \text{ corr. to the nearest dollar}$$

Demonstration

The price of a tour is \$4500 five years ago. Over the past five years, the price of the tour increased by 3% each year. Find the present price of the tour.

(Give the answer correct to the nearest dollar.)

Solution

$$\begin{aligned} \text{The present price of the tour} &= \$4500 \times (1 + 3\%)^5 \\ &= \$5217, \text{ cor. to the nearest dollar} \end{aligned}$$

increase(增加)

decrease(減少) period(時期)

growth rate(增長率)

growth factor(增長因子)

3. The present price of an air ticket is \$1800. If its price will increase by 15% each month, find the price of the air ticket after four months.

(Give the answer correct to the nearest dollar.)

Price of the air ticket after four months

$$= \$(\underline{1800}) \times (1 + \underline{15\%})^{(\underline{-4})}$$

$$= \$\underline{3148}, \text{ corr. to the nearest dollar}$$

How many times will the price increase after four months?

4. There was 500 students studying in a college in 2011. The number of students studying in the college is estimated to increase by 4% every year. Find the number of students studying in the college in 2015.

(Give the answer correct to the nearest integer.)

Number of students studying in the college in 2015

$$= (\underline{500}) \times (1 + \underline{4\%})^{(\underline{2015 - 2011})}$$

$$= \underline{585}, \text{ corr. to the nearest integer}$$

5. The average temperature of a city was 23°C in 2008. The average temperature is estimated to increase by 0.8% every year. Find the average temperature of the city in 2015.

(Give the answer correct to the nearest 0.1 °C.)

Average temperature of the city in 2015

$$= (\underline{23}) \times (1 + \underline{0.8\%})^{(\underline{2015 - 2008})} \text{ °C}$$

$$= \underline{24.3} \text{ °C, corr. to the nearest 0.1 °C}$$

Challenging Question(Optional)

- *6. The saving of Kelvin was \$38 000 in 2009. In the following two years, the saving increased by 40% each year. After that, the saving increased by 25% in each subsequent(隨後) year. Find Kelvin's saving in 2017. (Give the answer correct to the nearest thousand dollars.)

$$\text{Kelvin's saving in 2011} = \$(\underline{38000}) \times (1 + \underline{40\%})^{(\underline{-2})} = \$\underline{74480}$$

$$\text{Kelvin's saving in 2017} = \$(\underline{74480}) \times (1 + \underline{25\%})^{(\underline{2017 - 2011})}$$

$$= \$\underline{284000}, \text{ corr. to the nearest thousand dollars}$$