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# Increasing a price by a percentage

## Finding the increased price

The appreciation factor (F) (the factor by which the original amount is increased) is  $100\% + (\% \text{ marked price it is to be increased by})$  in decimal form. The increased price (IP) = marked price (MP)  $\times$  factor it is increased by.

### exercise

1 Calculate the increased price for each of the following examples. (The first one has been done for you.)

(a) MP = \$49 Increase = 15%

$$AP = 100\% + 15\%$$

$$= 115\% = 1.15$$

$$IP = \$49 \times 1.15$$

$$= \$ \dots$$

(b) MP = \$70 Increase =  $12\frac{1}{2}\%$

$$AP = 100\% + \dots\%$$

$$= \dots\% = \dots$$

$$IP = \$ \dots \times \dots$$

$$= \$ \dots$$

(c) MP = \$99.95 Increase = 10%

$$AP = 100\% + \dots\%$$

$$= \dots\% = 1.10$$

$$IP = \$99.95 \times \dots$$

$$= \$ \dots$$

(d) MP = \$79.95 Increase = 25%

$$AP = \dots\% + \dots\%$$

$$= \dots\% = \dots$$

$$IP = \$ \dots \times \dots$$

$$= \$ \dots$$

## Percentage increase

The increased price divided by the original (or marked) price, multiplied by 100, will give the percentage increase.

### exercise

2 Complete each of the following examples to calculate the percentage increase, correct to two decimal places.

(a) MP = \$65 IP = \$80

$$\text{Increase} = \$ \dots$$

$$\% \text{ increase} = \frac{\dots}{65} \times \frac{100}{1} \%$$

$$= \dots\%$$

(b) MP = \$130 IP = \$200

$$\text{Increase} = \$ \dots$$

$$\% \text{ increase} = \frac{\dots}{130} \times \frac{100}{1} \%$$

$$= \dots\%$$

(c) MP = \$79 IP = \$99

$$\text{Increase} = \$ \dots$$

$$\% \text{ increase} = \frac{\dots}{79} \times \frac{\dots}{1} \%$$

$$= \dots\%$$

(d) MP = \$30 IP = \$49.95

$$\text{Increase} = \$ \dots$$

$$\% \text{ increase} = \frac{\dots}{30} \times \frac{\dots}{\dots} \%$$

$$= \dots\%$$

# The Distributive Law

When we expand  $a(b + c)$  we get:  $a(b + c) = a \times (b + c)$   
 $= a \times b + a \times c$

$a(b + c) = a \times b + a \times c$  is the Distributive Law.

This means you must multiply each term inside the bracket by what is outside the bracket. So  $a$ , outside the bracket, must be multiplied with each term inside the bracket respectively,  $b$  and  $c$ .

## example 1

Expand  $5(3x + 2)$ .

### Solution

$$\begin{aligned} 5(3x + 2) &= 5 \times 3x + 5 \times 2 \\ &= 15x + 10 \end{aligned}$$

## exercise

1 Expand each of the following expressions. (Some parts have been done for you.)

(a)  $6(5x + 3) = 6 \times \dots + 6 \times \dots$   
 $= \dots + \dots$

(b)  $5(2x - 1) = 5 \times \dots + 5 \times \dots$   
 $= \dots - \dots$  (The minus sign makes no difference.)

(c)  $-4(2x + 5) = \dots \times \dots + \dots \times \dots$   
 $= -8x + -20$   
 $= -8x - 20$

(d)  $-3(4 - 2x) = \dots \times \dots - \dots \times \dots$   
 $= -12 \dots -6x$   
 $= -12 + 6x$

Remember the rules for multiplying positive and negative numbers:  
 (positive)  $\times$  (positive) gives a positive  
 (positive)  $\times$  (negative) gives a negative  
 (negative)  $\times$  (negative) gives a positive

## exercise

2 Expand each of the following expressions.

(a)  $-3(2x - 4) = \dots \times \dots - \dots \times \dots$   
 $= \dots + \dots$

(b)  $-3(4x + 1) = -3 \times \dots + \dots \times \dots$   
 $= \dots - \dots$

## example 2

Expand and simplify  $3(2x + 1) + 2x - 8$ .

### Solution

$$\begin{aligned} 3(2x + 1) + 2x - 8 &= 3 \times 2x + 3 \times 1 + 2x - 8 && \text{(Expand brackets normally and group like terms.)} \\ &= 6x + 3 + 2x - 8 \\ &= (6x + 2x) + (3 - 8) \\ &= 8x - 5 && \text{(Note: } + -5 = -5) \end{aligned}$$



# Compound interest

## exercise

- 1 Complete the following to calculate the amount to be repaid on a loan of \$2000 over 2 years at 12% p.a. compounded six-monthly.

For the first 6 months:  $P = 2000, R = 0.12, T = 0.5$  year (6 months)

$$\text{Use: } SI = PRT = 2000 \times 0.12 \times 0.5 = \$120$$

For the second 6 months:  $P = 2000 + 120, R = 0.12, T = 0.5$

$$\text{Use: } SI = \dots = \dots \times \dots \times \dots = \$127.20$$

For the third 6 months:  $P = 2120 + \dots = 2247.20, R = \dots, T = \dots$

$$\text{Use: } SI = \dots = \dots \times \dots \times \dots = \dots$$

For the last 6 months:  $P = 2247.20 + \dots = \dots, R = \dots, T = \dots$

$$\text{Use: } SI = \dots = \dots \times \dots \times \dots = \dots$$

$$\therefore \text{ Total to be repaid} = \dots + \dots = \$2524.95$$

- 2 Calculate the amount to be repaid on a loan of \$5000 at 15% p.a.:

- (a) over 18 months, compounded six-monthly

First 6 months:  $P = 5000, R = \dots, T = \dots$

$$\therefore SI = \dots \times \dots \times \dots = \dots$$

Second 6 months (12 months):

$P = 5000 + \dots = \dots, R = \dots, T = \dots$

$$\therefore SI = \dots \times \dots \times \dots = \dots$$

Third 6 months (18 months):

$P = \dots + \dots = \dots, R = \dots, T = \dots$

$$\therefore SI = \dots \times \dots \times \dots = \dots$$

$$\therefore \text{ Total to be repaid} = \dots + \dots$$

$$= \dots$$

- (b) over 1 year, compounded quarterly

First 3 months:  $P = 5000, R = \dots, T = 0.25$

$$\therefore SI = \dots \times \dots \times \dots = \dots$$

Second 3 months (6 months):

$P = 5000 + \dots = \dots, R = \dots, T = \dots$

$$\therefore SI = \dots \times \dots \times \dots = \dots$$

Third 3 months (9 months):

$P = \dots + \dots = \dots, R = \dots, T = \dots$

$$\therefore SI = \dots \times \dots \times \dots = \dots$$

Fourth 3 months (12 months or 1 year)

$P = \dots + \dots = \dots, R = \dots, T = \dots$

$$\therefore SI = \dots \times \dots \times \dots = \dots$$

$$\therefore \text{ Total to be repaid} = \dots + \dots$$

$$= \dots$$

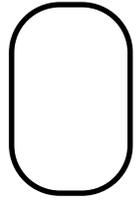
# Finance

The following questions refer to Exercises 1.1–1.3 in your textbook. If you are unsure of how to do a question, try looking at a worked example or other information in the section shown under the question number. Show all working in the space provided.

Name: \_\_\_\_\_

Class: \_\_\_\_\_ Due date: \_\_\_\_\_

Parent's signature/comment: \_\_\_\_\_



**1**  
1.1 An STD telephone call is charged at 16 cents for the first 3 minutes and 5 cents for every extra minute. What is the cost of a 12-minute call?

**4**  
1.2 Calculate the compound interest on a principal of \$5000 invested for 3 years at 8% interest compounded daily, assuming 365 days per year.

**2**  
1.1 Calculate the compound interest on a principal of \$5000 invested for 3 years at 8% interest compounded annually.

**5**  
1.3 Agnetha deposits \$16 000 towards the purchase of a new car she intends to buy in 6 years time. Find the interest earned if interest is calculated at 7.5% p.a. simple interest.

**3**  
1.2 Calculate the compound interest on a principal of \$5000 invested for 3 years at 8% interest compounded half-yearly.

**6**  
1.3 For Question 5 above, find the interest earned if interest is calculated at 7.5% p.a. compound interest, compounded annually.



# Assignment 1

1 A new electricity company is offering the following rates:

- 14.35 c/kWh for the first 950 kWh
- 15.04 c/kWh for the remaining use

Calculate the cost, correct to the nearest cent, for:

- (a) 620 kWh
- (b) 1420 kWh
- (c) 2160 kWh

2 Calculate the cost of a mobile phone call lasting 22 min, given the following charges:

- call connection fee of \$0.26
- first 10 min charged at \$0.055 per 30 s
- remainder of call charged at \$0.048 per 30 s.

3 How much interest is added to an account paying 7% p.a. on a sum of \$7200 over 10 years if the interest is compounded:

- (a) annually
- (b) quarterly?

4 \$5000 was placed into a bank account offering an interest rate of 3.5% p.a., compounded quarterly. Calculate the new account balance after:

- (a) 2 years
- (b) 5 years
- (c) 8 years

5 Calculate how long (in years) it will take for an investment of \$200 000 to grow to \$250 000, if the interest rate is 6.25% p.a., paid quarterly.

6 Find the book value, after 9 years (correct to the nearest dollar), of a Honda Accord with an original value \$43 000, if depreciation is:

- (a) straight line at 5.2% p.a. of the original value
- (b) reducing balance at 5.9% p.a. of the current value

7 Find the rate of depreciation (to the nearest per cent) of a tractor whose original book value was \$86 200, but had depreciated to \$74 000 in 13 years in accordance with straight-line depreciation.

8 What is the percentage profit made on a piece of cricket memorabilia, bought for \$5200 and sold for \$7800 at an auction 4 years later? Assume an inflation rate of 3.9% and an auctioneer's fee of 5% of the sale price.

9 A 100-W light globe uses 100 Wh of electricity every hour.

- (a) How many kilowatt hours would the globe use if it was on for 4.5 h each day over a 3-month period (92 days)?
- (b) How much would this cost if electricity was being charged at 14.22 c per kilowatt hour?
- (c) If the globe was replaced with an energy-saver globe, rated at 18 W, how much money would be saved?

