



知新教育
Novel Learning

數學

中

三

答案

More about Percentages

Class L

Lam Sir

L 0

1. (a) Percentage increase = $\frac{480 - 400}{400} \times 100\%$

= 20%

(b) New value = $50 \times (1 + 30\%) \text{ kg}$

= $50 \times 1.3 \text{ kg}$

= 65 kg

2. (a) Percentage decrease = $\frac{300 - 255}{300} \times 100\%$

= 15%

(b) New value = $80 \times (1 - 20\%) \text{ cm}$

= $80 \times 0.8 \text{ cm}$

= 64 cm

3. (a) Percentage change = $\frac{4.5 - 5}{5} \times 100\%$

= -10%

(b) Percentage change = $\frac{210 - 150}{150} \times 100\%$

= 40%

4. Simple interest = $\$ \frac{5\,000 \times 4 \times 5}{100}$

= \$1 000

5. Amount = $\$ \left(\frac{100\,000 \times 2 \times 3}{100} + 100\,000 \right)$

= \$106 000

6. Let $r\%$ be the interest rate.

$$\frac{10\,000 \times r \times 4}{100} = 1\,200$$

$r = 3$

\therefore The interest rate is 3%.

L 1

1. Amount received after 4 years

$$= \$10\,000 \times \left(1 + \frac{2}{100}\right)^4$$

$$= \underline{\$10\,824}, \text{ cor. to the nearest dollar}$$

2. (a) Interest received after 5 years

$$= \$ \left[20\,000 \times \left(1 + \frac{5}{100}\right)^5 - 20\,000 \right]$$

$$= \underline{\$5\,526}, \text{ cor. to the nearest dollar}$$

- (b) If simple interest is used,

$$\begin{aligned} \text{the amount} &= \$ \left(\frac{20\,000 \times 5 \times 5}{100} + 20\,000 \right) \\ &= \underline{\$25\,000} \end{aligned}$$

3. The value of the vase after 5 years

$$= \$4\,700 \times \left(1 + \frac{4}{100}\right)^5$$

$$= \underline{\$5\,718}, \text{ cor. to the nearest dollar}$$

4. The height of the plant after a week

$$= 5 \times \left(1 + \frac{6}{100}\right)^7 \text{ cm}$$

$$= \underline{7.52 \text{ cm}}, \text{ cor. to 2 d.p.}$$

5. The value of the computer after 3 years

$$= \$8\,000 \times \left(1 - \frac{20}{100}\right)^3$$

$$= \underline{\$4\,096}$$

6. Let
- $\$P$
- be the original price of the printer, then

$$1\,445 = P \left(1 - \frac{15}{100}\right)^2$$

$$1\,445 = P(0.85)^2$$

$$P = \frac{1\,445}{0.85^2}$$

$$= 2\,000$$

\therefore The original price of the printer is \$2 000.

7. (a) New value = $100 \times (1 + 8\%) \times (1 + 5\%)$
 $= 100 \times 1.08 \times 1.05$
 $= \underline{113.4}$
- (b) New value = $80 \times (1 - 6\%) \times (1 + 25\%) \text{ cm}$
 $= 80 \times 0.94 \times 1.25 \text{ cm}$
 $= \underline{94 \text{ cm}}$
- (c) New value = $120 \times (1 + 15\%) \times (1 - 20\%) \text{ g}$
 $= 120 \times 1.15 \times 0.8 \text{ g}$
 $= \underline{110.4 \text{ g}}$
- (d) New value = $\$150 \times (1 - 9\%) \times (1 - 30\%)$
 $= \$150 \times 0.91 \times 0.7$
 $= \underline{\$95.55}$
8. (a) Value of stock A in 2004 = $\$25 \times (1 + 12\%) \times (1 - 10\%)$
 $= \$25 \times 1.12 \times 0.9$
 $= \underline{\$25.2}$
- (b) Its value in 2004 was greater than in 2002 by \$0.2.
9. (a) Rates payable in a quarter of a year
 $= \$ \frac{200\,000 \times 5\%}{4}$
 $= \underline{\$2\,500}$
- (b) $\$60\,000 = \$30\,000 + \$30\,000$
 Tax on the first $\$30\,000 = \$30\,000 \times 2\% = \$600$
 Tax on the next $\$30\,000 = \$30\,000 \times 7\% = \$2\,100$
 Therefore, her salaries tax payable is \$2 700.

A 1

1. (a) The required percentage = $\frac{\$50}{\$80} \times 100\%$
 $= \underline{62.5\%}$
- (b) The required percentage = $\frac{\$80}{\$50} \times 100\%$
 $= \underline{160\%}$

$$\begin{aligned}
 2. \text{ Percentage change in the price} &= \frac{\text{New price} - \text{Original price}}{\text{Original price}} \times 100\% \\
 &= \frac{\$1020 - \$1250}{\$1250} \times 100\% \\
 &= \underline{\underline{-18.4\%}}
 \end{aligned}$$

3. *Method 1:*

∴ The price is increased by 12%.

∴ Percentage change in the price = +12%

$$\begin{aligned}
 \text{New price} &= \text{Original price} \times (1 + \text{Percentage change}) \\
 &= \$135 \times (1 + 12\%) \\
 &= \$135 \times 1.12 \\
 &= \underline{\underline{\$151.2}}
 \end{aligned}$$

Method 2:

$$\begin{aligned}
 \text{Increase in the price} &= \$135 \times 12\% \\
 &= \$16.2
 \end{aligned}$$

$$\begin{aligned}
 \text{New price} &= \$135 + \$16.2 \\
 &= \underline{\underline{\$151.2}}
 \end{aligned}$$

4. *Method 1:*

∴ 16% of the cats are sold.

∴ Percentage change in the number of cats = -16%

$$\begin{aligned}
 \text{Number of cats left} &= \text{Original number of cats} \times (1 + \text{Percentage change}) \\
 &= 50 \times (1 - 16\%) \\
 &= 50 \times 0.84 \\
 &= \underline{\underline{42}}
 \end{aligned}$$

Method 2:

$$\begin{aligned}
 \text{Number of cats sold} &= 50 \times 16\% \\
 &= 8
 \end{aligned}$$

$$\begin{aligned}
 \text{Number of cats left} &= 50 - 8 \\
 &= \underline{\underline{42}}
 \end{aligned}$$

$$\begin{aligned}
 5. \text{ The value of the flat after 1 year} &= \$3\,600\,000 \times (1 - 5\%) \\
 &= \$3\,420\,000
 \end{aligned}$$

$$\text{The value of the flat after 2 years} = \$3\,420\,000 \times (1 - 5\%)$$

$$= \underline{\underline{\$3249000}}$$

6. (a) The monthly salary this month = $\$26\,000 \times (1 + 5\%)$
 $= \$26\,000 \times 1.05$
 $= \$27\,300$

The monthly salary next month = $\$27\,300 \times (1 - 5\%)$
 $= \$27\,300 \times 0.95$
 $= \underline{\underline{\$25935}}$

(b) Percentage change in his monthly salary = $\frac{\text{New salary} - \text{Original salary}}{\text{Original salary}} \times 100\%$
 $= \frac{\$25935 - \$26000}{\$26000} \times 100\%$
 $= \underline{\underline{-0.25\%}}$

7. $\therefore P = \$5\,000, R = 6\%$ and $T = 3$.

\therefore Interest = $\$5\,000 \times 6\% \times 3$
 $= \underline{\underline{\$900}}$

Amount = $\$5\,000 + \900
 $= \underline{\underline{\$5900}}$

8. $\therefore I = \$720, R = 12\%$ and $T = \frac{18}{12} = \frac{3}{2}$.

$$\$720 = P \times 12\% \times \frac{3}{2}$$

$$\$720 = P \times \frac{12}{100} \times \frac{3}{2}$$

$$\$720 = \frac{9P}{50}$$

$$P = \$4\,000$$

\therefore The principal is $\underline{\underline{\$4\,000}}$.

9. $\therefore P = \$43\,200, I = \$8\,100$ and $R = 7.5\%$.

$$\$8\,100 = \$43\,200 \times 7.5\% \times T$$

$$\$8\,100 = \$3\,240 \times T$$

$$T = 2.5$$

∴ It takes two and a half years to get \$8 100 simple interest.

10. Method 1:

∴ $P = \$20\,000$, $n = 3$ (compounded yearly) and $R = 15\%$.

$$\begin{aligned} \therefore \text{Amount after 3 years} &= \$20\,000 \times (1 + 15\%)^3 \\ &= \underline{\underline{\$30417.5}} \end{aligned}$$

Method 2:

$$\begin{aligned} \text{Amount after 1 year} &= \$20\,000 \times (1 + 15\%) \\ &= \$23\,000 \end{aligned}$$

$$\begin{aligned} \text{Amount after 2 years} &= \$23\,000 \times (1 + 15\%) \\ &= \$26\,450 \end{aligned}$$

$$\begin{aligned} \text{Amount after 3 years} &= \$26\,450 \times (1 + 15\%) \\ &= \underline{\underline{\$30417.5}} \end{aligned}$$

11. (a) ∴ $P = \$320\,000$, $n = 6$ (compounded quarterly) and $R = \frac{8\%}{4} = 2\%$.

$$\begin{aligned} \therefore \text{Amount after } 1\frac{1}{2} \text{ years} &= \$320\,000 \times (1 + 2\%)^6 \\ &= \$320000 \times (1.02)^6 \\ &= \underline{\underline{\$360372}} \text{ (corr. to the nearest dollar)} \end{aligned}$$

$$\begin{aligned} \text{(b) Interest} &= \$320\,000 \times (1.02)^6 - \$320\,000 \\ &= \underline{\underline{\$40372}} \text{ (corr. to the nearest dollar)} \end{aligned}$$

$$\begin{aligned} \text{12. The height of the plant after 2 years} &= 10 \text{ m} \times (1 + 10\%)^2 \\ &= 10 \text{ m} \times (1.1)^2 \\ &= \underline{\underline{12.1 \text{ m}}} \end{aligned}$$

$$\begin{aligned} \text{13. The value of the car after 4 years} &= \$150\,000 \times (1 - 20\%)^4 \\ &= \$150\,000 \times (0.8)^4 \\ &= \underline{\underline{\$61440}} \end{aligned}$$

$$\begin{aligned} \text{14. Annual rates} &= \$62\,400 \times 5\% \\ &= \$3\,120 \end{aligned}$$

$$\text{Quarterly rates} = \$3\,120 \div 4$$

$$= \underline{\underline{\$780}}$$

15. Property tax = \$115 200 × 80% × 15%

$$= \underline{\underline{\$13824}}$$

16. Net profit = Gross profit – Operating cost

$$= \$1\,720\,000 - \$360\,000$$

$$= \$1\,360\,000$$

∴ Profits tax = \$1 360 000 × 16%

$$= \underline{\underline{\$217\,600}}$$

17. Net chargeable income = Total income – Allowances

$$= \$252\,000 - \$108\,000$$

$$= \$144\,000$$

Net chargeable income		Rate	Tax
First	\$30 000	2%	\$ 600
Second	\$30 000	8%	\$ 2 400
Third	\$30 000	14%	\$ 4 200
Remainder = \$144 000 – \$90 000			
	= \$54 000	20%	\$10 800

$$\text{Salaries tax payable} = \$18\,000$$

The upper limit for tax = \$252 000 × 15%

$$= \$37\,800$$

∴ Salaries tax payable = \$18 000

18. Allowances:

Married person allowance \$ 216 000

Two children \$ 60 000

Dependent parent allowance \$ 30 000

Additional dependent parent allowance \$ 30 000

$$\text{Total allowances} = \$ 336\,000$$

Net chargeable income = \$340 000 – \$336 000

$$= \$4\,000$$

∴ The net chargeable income (\$4 000) was less than \$30 000.

$$\begin{aligned}\therefore \text{Salaries tax} &= \$4\,000 \times 2\% \\ &= \underline{\underline{\$80}}\end{aligned}$$

L 2

1. Interest rate per three-month period = $6\% \div 4 = 1.5\%$
 Total number of three-month periods in 2.5 years = $2.5 \times 4 = 10$

Amount received after 2.5 years

$$\begin{aligned}&= \$30\,000 \times \left(1 + \frac{1.5}{100}\right)^{10} \\ &= \underline{\underline{\$34\,816}}, \text{ cor. to the nearest dollar}\end{aligned}$$

Interest received after 2.5 years

$$\begin{aligned}&= \$(34\,816.225 - 30\,000) \\ &= \underline{\underline{\$4\,816}}, \text{ cor. to the nearest dollar}\end{aligned}$$

2. Let $r\%$ be the interest rate offered by the first bank.

$$200\,000 \times \left(1 + \frac{r}{100}\right)^2 - 200\,000 = 28\,980$$

$$\left(1 + \frac{r}{100}\right)^2 = 1.1449$$

$$1 + \frac{r}{100} = 1.07$$

$$r = 7$$

The principal deposited in the second bank = $\$(200\,000 + 28\,980) = \$228\,980$

Interest rate per month = $7\% \div 12 = \frac{7}{12}\%$

Total number of months in 2 years = $2 \times 12 = 24$

Total amount received 2 more years later

$$\begin{aligned}&= \$228\,980 \times \left(1 + \frac{7}{1200}\right)^{24} \\ &= \underline{\underline{\$263\,283}}, \text{ cor. to the nearest dollar}\end{aligned}$$

3. Total number of 4-minute period in an hour = $60 \div 4 = 15$
 Number of bacteria after an hour

$$\begin{aligned}&= 20 \times \left(1 + \frac{50}{100}\right)^{15} \\ &= \underline{\underline{8\,758}}, \text{ cor. to the nearest integer}\end{aligned}$$

4. Let $\$P$ be the price of the flat 3 years ago, then

$$2\,083\,725 = P \times \left(1 + \frac{5}{100}\right)^3$$

$$P = \frac{2\,083\,725}{1.05^3}$$

$$= 1\,800\,000$$

∴ The price of the flat 3 years ago was \$1 800 000.

∴ The actual increase in the price of flat over these 3 years
 = \$(2 083 725 – 1 800 000)
 = \$283 725

5. (a) The value of the mobile phone in 2004

$$= \$2\,200 \times \left(1 - \frac{15}{100}\right)^3$$

$$= \underline{\$1\,351}, \text{ cor. to the nearest dollar}$$

(b) The decrease in value

$$= \$2\,200 - 1\,351$$

$$= \underline{\$849}$$

Percentage decrease in value

$$= \frac{849}{2\,200} \times 100\%$$

$$= \underline{38.6\%}, \text{ cor. to 3 sig. fig.}$$

6. (a) Let D be the decay factor.

$$1125 = 1500 \times D$$

$$D = \frac{1125}{1500}$$

$$= 0.75$$

∴ The decay factor is 0.75.

(b) Value of the MP3 player in 2006

$$= \$1500 (0.75)^4$$

$$= \$475, \text{ cor. to the nearest dollar}$$

Since one third of the original value = \$1 500 ÷ 3 = \$500, and
 \$475 < \$500,

Mary will receive the player in 2006.

7. The new number of boys = $24 \times (1 + 25\%) = 30$

The new number of girls = $30 \times (1 - 10\%) = 27$

The new number of students = $30 + 27 = 57$

Percentage change in the number of students in the choral

$$= \frac{57 - 54}{54} \times 100\% = \underline{5.56\%}, \text{ cor. to 3 sig. fig.}$$

8. (a) This month the consumption of electricity = $28 \times (1 - 8\%)$ units
 $= 25.76$ units

This month the charge for electricity = $\$12 \times (1 + 5\%)$
 $= \$12.6$ per unit

Difference in the expenditure on electricity between these two months
 $= \$(12 \times 28 - 12.6 \times 25.76)$
 $= \underline{\$11.424}$

(b) Percentage change in the expenditure on electricity over these two months

$$= \frac{11.424}{12 \times 28} \times 100\%$$

$$= \underline{3.4\%}$$

9. The new quarterly rates payable = $\$ \frac{110\,000 \times 5\%}{4}$
 $= \$1\,375$

Percentage change in the quarterly rates payable over these two years

$$= \frac{1\,375 - 1\,500}{1\,500} \times 100\%$$

$$= \underline{-8.33\%}, \text{ cor. to 3 sig. fig.}$$

A 2

19. Let x be the original monthly salary.

$$x(1.7\%) = 357$$

$$x = 357 \div 1.7\%$$

$$= 21\,000$$

\therefore The original monthly salary is \$21 000.

20. Let x be the number of students who passed the last test.

$$x(1 + 12\%) = 140$$

$$x = 140 \div 1.12$$

$$= 125$$

\therefore 125 students passed the last test.

21. Let x be the monthly rental income.

$$12x \times 80\% \times 15\% = 7\,632$$

$$12x \times \frac{80}{100} \times \frac{15}{100} = 7\,632$$

$$x \times \frac{36}{25} = 7\,632$$

$$x = 5\,300$$

\therefore The monthly rental income is \$5 300.

22. Interest paid by Ben after 1 year = $\$5\,000 \times 6\% \times 1$

$$= \$300$$

Interest paid by Simon after 1 year = $\$6\,000 \times 5\% \times 1$

$$= \$300$$

Total interest after 1 year = $\$300 + \300

$$= \underline{\underline{\$600}}$$

23. Let ℓ and b be the length and the width of the rectangle respectively.

Original area = ℓb

New length = $\ell(1 + 25\%)$

$$= 1.25\ell$$

New width = $b(1 - 15\%)$

$$= 0.85b$$

New area = $(1.25\ell)(0.85b)$

$$= 1.0625\ell b$$

$$\therefore \text{Percentage change in area} = \frac{1.0625\ell b - \ell b}{\ell b} \times 100\%$$

$$= +0.0625 \times 100\%$$

$$= \underline{\underline{+6.25\%}}$$

24. Let ℓ be the length of a side of the cube.

Original volume = ℓ^3

New length of the side = $\ell(1 - 10\%)$

$$= 0.9\ell$$

$$\begin{aligned}\text{New volume} &= (0.9\ell)^3 \\ &= 0.729\ell^3\end{aligned}$$

$$\begin{aligned}\therefore \text{Percentage change in volume} &= \frac{0.729\ell^3 - \ell^3}{\ell^3} \times 100\% \\ &= -0.271 \times 100\% \\ &= \underline{\underline{-27.1\%}}\end{aligned}$$

25. When $R = 8\%$, $T = 1$,

$$\begin{aligned}\text{interest} &= P \times 8\% \times 1 \\ &= 0.08P\end{aligned}$$

When $R = 5\%$, $T = 1$,

$$\begin{aligned}\text{interest} &= P \times 5\% \times 1 \\ &= 0.05P\end{aligned}$$

\therefore He would get \$5 100 less as simple interest.

$$\therefore 0.08P - 0.05P = \$5\ 100$$

$$0.03P = \$5\ 100$$

$$P = \$170\ 000$$

\therefore The principal was \$170 000.

26. (a) $\therefore R = 6\%$, $T = \frac{1}{2}$ and $I = \$600$.

$$\therefore \$600 = P \times 6\% \times \frac{1}{2}$$

$$\$600 = \frac{3P}{100}$$

$$P = \$20\ 000$$

\therefore Mr. Tsang deposits \$20 000.

(b) $\therefore P = \$20\ 000$, $R = 6\% + 2\% = 8\%$ and $T = \frac{1}{2}$.

$$\therefore \text{Interest} = \$20\ 000 \times 8\% \times \frac{1}{2}$$

$$= \underline{\underline{\$800}}$$

27. (a) The value of the car after 3 years = $\$289\,000 \times (1 - 15\%)^3$
 $= \$289\,000 \times (0.85)^3$
 $= \underline{\underline{\$177\,500}}$ (corr. to the nearest hundred dollars)

(b) Let x be the price of the car 2 years ago.

$$x(1 - 15\%)^2 = 289\,000$$

$$x = \frac{289\,000}{(0.85)^2}$$

$$= 400\,000$$

\therefore The price of the car was $\underline{\underline{\$400\,000}}$.

28. Let x be the net profit of the company.

$$x \times 17.5\% = 66\,400$$

$$x = 379\,428.6$$

\therefore The net profit of the company was $\$379\,428.6$.

\therefore Gross profit = Net profit + Operating cost

$$= \$379\,428.6 + \$35\,000$$

$$= \$414\,428.6$$

29. Allowances:

Basic allowance \$ 108 000

Dependent parent allowance $\$30\,000 \times 2 = \$ 60\,000$

Total allowances = \$ 168 000

As she did not have to pay salaries tax,

maximum net chargeable income = total allowance

$$= \$168\,000$$

\therefore Maximum average salary per month = $\$168\,000 \div 12$

$$= \underline{\underline{\$14\,000}}$$

L3

1. The interest rate of Bank A = 5.5%

Interest rate per six-month period = $5.5\% \div 2 = 2.75\%$

Total number of six-month periods in 3 years = $3 \times 2 = 6$

Amount received from Bank A after 3 years

$$= \$ 250\,000 \times \left(1 + \frac{2.75}{100}\right)^6$$

$$= \$294\,192, \text{ cor. to the nearest dollar}$$

The interest rate of Bank B = 5.4%

$$\text{Interest rate per month} = 5.4\% \div 12 = 0.45\%$$

$$\text{Total number of months in 3 years} = 3 \times 12 = 36$$

Amount received from Bank B after 3 years

$$= \$ 250\,000 \times \left(1 + \frac{0.45}{100}\right)^{36}$$

$$= \$293\,858, \text{ cor. to the nearest dollar}$$

\therefore Patrick should choose to deposit his money in Bank A.

2. (a) Suppose Ivan invests $\$P$, then
the simple interest received by Ivan

$$= \$ \frac{P \times 6 \times 3}{100}$$

$$= \$0.18P$$

The compounded interest received by Victor

$$= \$ P \times \left(1 + \frac{5}{100}\right)^3 - P$$

$$= \$(1.05^3 - 1)P$$

$$0.18P - (1.05^3 - 1)P = 22\,375$$

$$P = \frac{22\,375}{1.18 - 1.05^3}$$

$$= 1\,000\,000$$

The simple interest received by Ivan

$$= \$0.18 \times 1\,000\,000$$

$$= \underline{\underline{\$180\,000}}$$

- (b) The compound interest received by Victor

$$= \$(180\,000 - 22\,375)$$

$$= \underline{\underline{\$157\,625}}$$

3. (a) His weight when he was 25 years old

$$= 60 \times \left(1 + \frac{2.5}{100}\right)^4 \text{ kg}$$

$$= \underline{\underline{66.2 \text{ kg}}}, \text{ cor. to 3 sig. fig.}$$

- (b) Increase in his weight during these 4 years

$$= (66.228\,773 - 60) \text{ kg}$$

$$= \underline{\underline{6.23 \text{ kg}}}, \text{ cor. to 3 sig. fig.}$$

Percentage increase in his weight during these 4 years

$$= \frac{66.228\ 773 - 60}{60} \times 100\% = \underline{10.4\%}, \text{ cor. to 3 sig. fig.}$$

4. (a) Let G be the growth factor.

$$7\ 070\ 175 = 7\ 000\ 000 \times G^2$$

$$G = \sqrt{\frac{7\ 070\ 175}{7\ 000\ 000}}$$

$$= 1.005$$

\therefore The growth factor is 1.005.

(b) Population in 2006 = $7\ 000\ 000 \times (1.005)^6$
 $= \underline{7\ 212\ 600}, \text{ cor. to the nearest hundred}$

5. (a) Percentage decrease in its value

$$= \frac{150\ 000 - 123\ 000}{150\ 000} \times 100\%$$

$$= \underline{18\%}$$

- (b) (i) The value of car in 4 years' time

$$= \$123\ 000 \times \left(1 - \frac{18}{100}\right)^4$$

$$= \underline{\$55\ 611}, \text{ cor. to the nearest dollar}$$

- (ii) Let $\$V$ be the value of car 3 years ago

$$V \times \left(1 - \frac{18}{100}\right)^3 = 123\ 000$$

$$V = \frac{123\ 000}{0.82^3}$$

$$= 223\ 081, \text{ cor. to the nearest dollar}$$

\therefore The value of car in 3 years ago is \$223 081.

6. Suppose the percentage change in the value of flat during the second half of the year be $a\%$.

Let $\$P$ the value of flat at the beginning of 2005. Then

$$\frac{P \times (1 - 15\%) \times (1 + a\%) - P}{P} \times 100\% = 2\%$$

$$\frac{P[0.85(1 + a\%) - 1]}{P} = 0.02$$

$$0.85(1 + a\%) = 1.02$$

$$1 + a\% = 1.2$$

$$a = 20$$

\therefore The percentage change during the second half of the year is 20%.

7. (a) The new cost of making a wooden bed is \$2 394, so

$$1\ 000 \times (1 + 14\%) + a(1 - 5\%) + 950 \times (1 + 8\%) = 2\ 394$$

$$1\,000 \times 1.14 + 0.95a + 950 \times 1.08 = 2\,394$$

$$2\,166 + 0.95a = 2\,394$$

$$0.95a = 228$$

$$a = \underline{240}$$

(b) The old cost of making a wooden bed

$$= \$ (1\,000 + 240 + 950)$$

$$= \$2\,190$$

Percentage increase in the cost of making a wooden bed

$$= \frac{2\,394 - 2\,190}{2\,190} \times 100\%$$

$$= \underline{9.32\%}, \text{ cor. to 3 sig. fig.}$$

8. Tax on the first \$30 000 = \$30 000 × 2% = \$600

Tax on the next \$30 000 = \$30 000 × 7 = \$2 100

Tax on the next \$30 000 = \$30 000 × 13 = \$3 900

∴ \$7 500 = \$600 + \$2 100 + \$3 900 + \$900

∴ The net chargeable income for the tax of \$900

$$= \$900 \div 19\%$$

$$= \$4\,736.8$$

Therefore, his chargeable income = \$(30 000 + 30 000 + 30 000 + 4 500)

$$= \underline{\underline{\$94\,736.8}}$$

B

30. ∴ Amount borrowed = \$80 000, $R = \frac{12\%}{12} = 1\%$ (compounded monthly).

∴ The debts Benjamin will owe at the end of the first month

$$= \$80\,000 \times (1 + 1\%)$$

$$= \$80\,800$$

The debts Benjamin will owe at the beginning of the second month

$$= \$80\,800 - \$25\,000$$

$$= \$55\,800$$

The debts Benjamin will owe at the end of the second month

$$= \$55\,800 \times (1 + 1\%)$$

$$= \$56\,358$$

The debts Benjamin will owe at the beginning of the third month

$$= \$56\,358 - \$25\,000$$

$$= \$31\,358$$

$$\begin{aligned} & \text{The debts Benjamin will owe at the end of the third month} \\ & = \$31\,358 \times (1 + 1\%) \\ & = \underline{\underline{\$31671.58}} \end{aligned}$$

31. $\therefore R = \frac{20\%}{2} = 10\%$ (compounded half-yearly), $T = 3 \times 2 = 6$, amount = \$531 468.3.

$$\therefore \$531\,468.3 = P(1 + 10\%)^6$$

$$\$531\,468.3 = P(1.1)^6$$

$$P = \$300\,000$$

\therefore The loan is \$300 000.

32. In 1kg of green tea,

	Original price	New price
Brand A tea	$\$36 \times \frac{1}{3} = \12	$\$12 \times (1 + 10\%) = \13.2
Brand B tea	$\$24 \times \frac{2}{3} = \16	$\$16 \times (1 + 5\%) = \16.8
Green tea	$\$12 + \$16 = \$28$	$\$13.2 + \$16.8 = \$30$

$$\begin{aligned} \therefore \text{Percentage change in the price} &= \frac{\$30 - \$28}{\$28} \times 100\% \\ &= \underline{\underline{+7.14\%}} \quad (\text{corr. to 3 sig. fig.}) \end{aligned}$$

33. (a) $\therefore P = \$15\,000$, $R = 12\%$ and $T = 1$.

$$\begin{aligned} \therefore \text{Interest} &= \$15\,000 \times 12\% \times 1 \\ &= \underline{\underline{\$1800}} \end{aligned}$$

(b) $\therefore P = \$15\,000$, $R = \frac{10\%}{2} = 5\%$ (compounded half-yearly) and $n = 2$.

$$\begin{aligned} \therefore \text{Interest} &= \$15\,000 \times (1 + 5\%)^2 - \$15\,000 \\ &= \$16\,537.5 - \$15\,000 \\ &= \underline{\underline{\$1537.5}} \end{aligned}$$

(c) $\therefore P = \$15\,000$, $R = \frac{10\%}{2} = 5\%$ (compounded half-yearly) and $n = 2$.

$$\therefore \text{The debts Mr. Law will owe after } \frac{1}{2} \text{ year} = \$15\,000 \times (1 + 5\%)$$

$$= \$15\,750$$

$$\begin{aligned} \text{The debts Mr. Law will owe after a repayment of } \$5\,000 &= \$15\,750 - \$5\,000 \\ &= \$10\,750 \end{aligned}$$

$$\begin{aligned} \text{The debts Mr. Law will owe after 1 year} &= \$10\,750 \times (1 + 5\%) \\ &= \$11\,287.5 \end{aligned}$$

$$\begin{aligned} \text{Interest} &= \$11\,287.5 + \$5\,000 - \$15\,000 \\ &= \underline{\underline{\$1287.5}} \end{aligned}$$

NC 1

1. The answer is A.

$$\begin{aligned} \text{Amount} &= \$10\,000 \times \left(1 + \frac{5}{100}\right)^3 \\ &= \underline{\underline{\$11\,576}}, \text{ cor. to the nearest dollar} \end{aligned}$$

2. The answer is C.

$$\begin{aligned} \text{Interest} &= \$ \left[150\,000 \times \left(1 + \frac{3}{100}\right)^4 - 150\,000 \right] \\ &= \underline{\underline{\$18\,826}}, \text{ cor. to the nearest dollar} \end{aligned}$$

3. The answer is D.

Suppose the principal be $\$P$. Then

$$\begin{aligned} P \times \left(1 + \frac{1}{200}\right)^{36} - P &= 10\,000 \\ [(1.005)^{36} - 1]P &= 10\,000 \\ P &= \frac{10\,000}{\underline{\underline{(1.005)^{36} - 1}}} \end{aligned}$$

4. The answer is A.

Let $r\%$ be the simple interest rate offered by the first bank.

$$\frac{300\,000 \times r \times 2}{100} = 24\,000$$

$$r = 4$$

The principal deposited in the second bank = $\$(300\,000 + 24\,000) = \$324\,000$

Interest rate per three-month period = $4\% \div 4 = 1\%$

Total number of three-month periods in 2 years = $2 \times 4 = 8$

Total amount received 2 more years later

$$= \$ 324\,000 \times \left(1 + \frac{1}{100}\right)^8$$
$$= \underline{\underline{\$350\,846}}, \text{ cor. to the nearest dollar}$$

5. The answer is B.

The value after 8 years

$$= \$2\,400 \times \left(1 + \frac{5}{100}\right)^4$$

$$= \underline{\$2\,917}, \text{ cor. to the nearest dollar}$$

6. The answer is C.

Suppose the population in 2001 be x .

$$x \times \left(1 + \frac{1.5}{100}\right)^3 = 508\,000$$

$$x = \frac{508\,000}{(1.015)^3}$$

$$= 485\,810, \text{ cor. to the nearest ten}$$

\therefore The population in 2001 is 485 810.

7. The answer is C.

Suppose his weight be x kg 4 years ago. Then

$$x \times \left(1 + \frac{5}{100}\right)^4 = 48$$

$$x = \frac{48}{(1.05)^4}$$

$$= 39.489\,7, \text{ cor. to 6 sig. fig.}$$

\therefore The increase in his weight

$$= (48 - 39.489\,7) \text{ kg}$$

$$= \underline{8.51 \text{ kg}}, \text{ cor. to 3 sig. fig.}$$

8. The answer is A.

$$\text{Growth factor} = \frac{19\,080}{18\,000} = 1.06$$

His monthly salary in 2004 = $\$18\,000 \times (1.06)^4$

Percentage increase in his monthly salary

$$= \frac{18\,000 \times (1.06)^4 - 18\,000}{18\,000} \times 100\%$$

$$= \underline{26.2\%}, \text{ cor. to 3 sig. fig.}$$

9. The answer is C.

The value of ship after 5 years

$$= \$1\,200\,000 \times \left(1 - \frac{12}{100}\right)^5$$

$$= \underline{\$633\,278}, \text{ cor. to the nearest dollar}$$

10. The answer is D.

Suppose the value of pen be \$x 3 years ago. Then

$$x \times \left(1 - \frac{16}{100}\right)^3 = 2\,700$$

$$x = \frac{2\,700}{(0.84)^3}$$

$$= 4\,555, \text{ cor. to the nearest dollar}$$

\therefore The value of pen 3 years ago was \$4 555.

11. The answer is A.

Suppose the decay factor be x. Then

$$12\,000x^2 = 9\,720$$

$$x^2 = 0.81$$

$$x = 0.9$$

\therefore The decay factor each year is 0.9.

12. The answer is B.

$$\text{Decay factor} = \frac{7\,820}{8\,500} = 0.92$$

The value of the television set in 3 years' time

$$= \$7\,820 \times (0.92)^3$$

$$= \underline{\$6\,089}, \text{ cor. to the nearest dollar}$$

13. The answer is A.

Suppose the original number be x.

$$x(1 - 35\%)(1 + 30\%) = 5\,070$$

$$x = \frac{5\,070}{0.65 \times 1.3}$$

$$= 6\,000$$

\therefore The original number is 6 000.

14. The answer is B.

Suppose the price at the beginning of 2004 be \$ P . Then

$$P(1 + 4\%)^2(1 - 5\%)^2 = 30$$

$$\begin{aligned} P &= \frac{30}{1.04^2 \times 0.95^2} \\ &= 30.7, \text{ cor. to 3 sig. fig.} \end{aligned}$$

\therefore The price at the beginning of 2004 was \$30.7.

15. The answer is C.

The value of the flat at the end of 2007

$$= \$1\,500\,000(1 - 10\%)^5(1 + 12\%)^4$$

$$= \underline{\$1\,393\,721}, \text{ cor. to the nearest dollar}$$

16. The answer is B.

Suppose the length and width of the rectangle are l and w respectively.

Percentage change in area

$$= \frac{(1 + 20\%)l \times (1 - 15\%)w - lw}{lw} \times 100\%$$

$$= (1.2 \times 0.85 - 1) \times 100\%$$

$$= \underline{2\%}$$

17. The answer is D.

Suppose the daily working hours and hourly pay are h and \$ x respectively.

Percentage change in her daily income

$$= \frac{(1 + 18.75\%)h \times (1 - 5\%)x - hx}{hx} \times 100\%$$

$$= (1.1875 \times 0.95 - 1) \times 100\%$$

$$= \underline{12.8\%}, \text{ cor. to 1 d. p.}$$

18. The answer is D.

Let \$ x be the rateable value of the flat. Then

$$\frac{x \times 5\%}{4} = 1\,250$$

$$x = 100\,000$$

\therefore The rateable value of the flat is \$100 000.

19. The answer is A.

$$\$150\,000 = \$30\,000 + \$30\,000 + \$30\,000 + \$60\,000$$

$$\text{Tax on the first } \$30\,000 = \$30\,000 \times 2\% = \$600$$

$$\text{Tax on the next } \$30\,000 = \$30\,000 \times 7\% = \$2\,100$$

$$\text{Tax on the next } \$30\,000 = \$30\,000 \times 13\% = \$3\,900$$

$$\text{Tax on the remaining } \$60\,000 = \$60\,000 \times 19\% = \$11\,400$$

$$\begin{aligned} \text{Therefore, his salaries tax payable} &= \$(600 + 2\,100 + 3\,900 + 11\,400) \\ &= \underline{\underline{\$18\,000}} \end{aligned}$$

20. The answer is C.

Since $\$6\,600 = \$600 + \$2\,100 + \$3\,900$, the net chargeable income of Mandy is $\$90\,000$.

The net chargeable income of John = $\$(90\,000 + 20\,000) = \$110\,000$

Tax on the remaining $\$20\,000 = \$20\,000 \times 19\% = \$3\,800$

$$\begin{aligned} \therefore \text{John's salaries tax payable} &= \$(600 + 2\,100 + 3\,900 + 3\,800) \\ &= \underline{\underline{\$10\,400}} \end{aligned}$$

NC 2

1. B

$$\begin{aligned} \text{The required percentage} &= \frac{347}{756} \times 100\% \\ &= 46\% \quad (\text{corr. to the nearest integer}) \end{aligned}$$

2. A

$$\begin{aligned} \text{The required percentage} &= \frac{54}{359} \times 100\% \\ &= 15.0\% \quad (\text{corr. to 3 sig. fig.}) \end{aligned}$$

3. C

$$\begin{aligned} \text{The required percentage} &= \frac{\frac{4}{5}x}{x} \times 100\% \\ &= \frac{4}{5} \times 100\% \\ &= 80\% \end{aligned}$$

4. C

Let $\$y$ be the selling price of the air-conditioner today.

$$\frac{3800}{y} \times 100\% = 80\%$$

$$y = \frac{3800 \times 100}{80}$$

$$= 4750$$

∴ The selling price of the air-conditioner is \$4 750 today.

5. A

$$\text{Percentage change} = \frac{70-50}{50} \times 100\%$$

$$= +40\%$$

6. D

Let x be the number.

$$x(1 - 25\%) = 60$$

$$0.75x = 60$$

$$x = 80$$

∴ The number is 80.

7. B

Let y m be the height of the tree last year.

$$y(1 + 6\%) = 6$$

$$1.06y = 6$$

$$y = 5.66 \quad (\text{corr. to 3 sig. fig.})$$

∴ The tree was 5.66 m tall last year.

8. D

Let x mL be the original capacity of the bottle of green tea.

$$x(1 - 12\%) = 484$$

$$0.88x = 484$$

$$x = 550$$

∴ The original capacity of the bottle of green tea is 550 mL.

9. B

Let x be the number.

After increasing the number by 70%, the number becomes $x(1 + 70\%) = 1.7x$.

After decreasing by 70%, the number becomes $1.7x(1-70\%)=0.51x$.

$$\begin{aligned}\therefore \text{ The percentage change of the number} &= \frac{0.51x-x}{x} \times 100\% \\ &= -49\%\end{aligned}$$

10. B

$$\begin{aligned}B\text{'s amount} &= \$2\,500 \times (1 + 20\%) \\ &= \$3\,000\end{aligned}$$

$$\begin{aligned}C\text{'s amount} &= \$3\,000 \times (1 - 35\%) \\ &= \$1\,950\end{aligned}$$

$$\begin{aligned}\therefore \text{ The required percentage} &= \frac{1950}{2500} \times 100\% \\ &= 78\%\end{aligned}$$

11. C

$$\begin{aligned}\text{Original length} &= \sqrt{400} \text{ cm} \\ &= 20 \text{ cm}\end{aligned}$$

$$\begin{aligned}\text{New length} &= [20 \times (1 - 20\%)] \text{ cm} \\ &= 16 \text{ cm}\end{aligned}$$

$$\begin{aligned}\text{New area} &= (16^2) \text{ cm}^2 \\ &= 256 \text{ cm}^2\end{aligned}$$

$$\begin{aligned}\text{Percentage change in area} &= \frac{256-400}{400} \times 100\% \\ &= -36\%\end{aligned}$$

\therefore The area of square is decreased by 36%.

12. A

Let x be the original number of students in F.3.

In the first term, the numbers of boys and girls are $\frac{3}{5}x$ and $\frac{2}{5}x$ respectively.

In the second term,

$$\text{the number of girls} = \frac{2}{5}x \times (1 - 18\%) = 0.328x$$

$$\text{the number of boys} = \frac{3}{5}x \times (1 + 14\%) = 0.684x$$

$$\text{Percentage change in the number of students in F.3} = \frac{(0.328x + 0.684x) - x}{x} \times 100\%$$

$$\begin{aligned} &= \frac{1.012x - x}{x} \times 100\% \\ &= 1.2\% \end{aligned}$$

∴ The number of students in F.3 is increased by 1.2%.

13. B

$$\begin{aligned}\text{Interest} &= \$7\,000 \times 6\% \times 3 \\ &= \$1\,260\end{aligned}$$

14. D

$$\begin{aligned}\text{Amount} &= \$70\,000 + \$70\,000 \times 15\% \times 4 \\ &= \$70\,000 + \$42\,000 \\ &= \$112\,000\end{aligned}$$

15. A

Let P be the principal.

$$P \times 8\% \times 5 = 4\,000$$

$$P = 10\,000$$

\therefore The principal is \$10 000.

16. C

Let T years be the time required.

$$10000 \times 4\% \times T = 2000$$

$$T = 5$$

\therefore The time required is 5 years.

17. B

$$\begin{aligned}\text{Interest in the first year} &= \$3\,500 \times 8\% \\ &= \$280\end{aligned}$$

$$\begin{aligned}\text{Interest in the second year} &= (\$3\,500 + \$280) \times 8\% \\ &= \$302.4\end{aligned}$$

$$\begin{aligned}\text{Total interest after 2 years} &= \$280 + \$302.4 \\ &= \$582.4\end{aligned}$$

18. C

$$\begin{aligned}\text{Interest} &= \$12000 \times \left(1 + \frac{6\%}{2}\right)^4 - \$12000 \\ &= \$12000 \times (1 + 3\%)^4 - \$12000 \\ &= \$1\,506 \quad (\text{corr. to the nearest dollar})\end{aligned}$$

19. A

$$\begin{aligned} \text{Compound interest after 5 years} &= \$3\,000 \times (1 + 10\%)^5 - \$3\,000 \\ &= \$1\,831.53 \end{aligned}$$

$$\begin{aligned} \text{Simple interest after 5 years} &= \$3\,000 \times 10\% \times 5 \\ &= \$1\,500 \end{aligned}$$

$$\begin{aligned} \therefore \text{The difference} &= \$1\,831.53 - \$1\,500 \\ &= \$331.53 \end{aligned}$$

20. A

For the finance company S ,

$$\begin{aligned} \text{repayment} &= \$10\,000 \times \left(1 + \frac{18\%}{12}\right)^8 \\ &= \$11\,265 \quad (\text{corr. to the nearest dollar}) \end{aligned}$$

For the finance company Q ,

$$\begin{aligned} \text{repayment} &= \$10\,000 \times \left(1 + \frac{28\%}{3}\right)^2 \\ &= \$11\,954 \quad (\text{corr. to the nearest dollar}) \end{aligned}$$

For the finance company R ,

$$\begin{aligned} \text{repayment} &= \$10\,000 \times \left(1 + \frac{22\%}{6}\right)^4 \\ &= \$11\,549 \quad (\text{corr. to the nearest dollar}) \end{aligned}$$

$$\therefore S < R < Q$$

21. D

$$\begin{aligned} \text{Growth factor} &= 1 + 15\% \\ &= 1 + 0.15 \\ &= 1.15 \end{aligned}$$

22. D

Let x be the value of the flat per square foot two years ago.

$$x(1 - 3\%)^2 = 3\,850$$

$$x(0.97)^2 = 3\,850$$

$$x = 4\,092 \quad (\text{corr. to the nearest integer})$$

\therefore The value of the flat is \$4 092 per square foot two years ago.

23. C

Let x be the number of bacteria 2 hours ago.

$$x(1+10\%)^2 = 80000$$

$$1.21x = 80000$$

$$x = 66115.7 \quad (\text{corr. to 1 d.p.})$$

\therefore There are 66 115.7 bacteria 2 hours ago.

$$\begin{aligned} \text{Number of bacteria 2 hours later} &= 80\,000 \times (1 + 10\%)^2 \\ &= 96\,800 \end{aligned}$$

$$\begin{aligned} \therefore \text{The difference} &= 96\,800 - 66\,115.7 \\ &= 30\,684 \quad (\text{corr. to the nearest integer}) \end{aligned}$$

24. C

For the financial year 2000/2001,

$$\begin{aligned} \text{property tax of flat } B &= \$36\,000 \times 80\% \times 15\% \\ &= \$4\,320 \end{aligned}$$

$$\begin{aligned} \text{property tax of flat } A &= \$4\,320 \times 2 \\ &= \$8\,640 \end{aligned}$$

$$\begin{aligned} \text{annual rental income of flat } A &= \$8\,640 \div 80\% \div 15\% \\ &= \$72\,000 \end{aligned}$$

For the financial year 2001/2002,

$$\begin{aligned} \text{property tax of flat } A &= \$72\,000 \times (1 - 16\%) \times 80\% \times 15\% \\ &= \$7\,257.6 \end{aligned}$$

$$\begin{aligned} \text{property tax of flat } B &= \$36\,000 \times (1 - 13\%) \times 80\% \times 15\% \\ &= \$3\,758.4 \end{aligned}$$

$$\begin{aligned} \text{The difference} &= \$7\,257.6 - \$3\,758.4 \\ &= \$3\,499.2 \end{aligned}$$

25. A

$$\begin{aligned} \text{Net chargeable income} &= \$109\,000 - \$108\,000 \\ &= \$1\,000 \end{aligned}$$

$$\begin{aligned} \therefore \text{Salaries tax payable} &= \$1\,000 \times 2\% \\ &= \$20 \end{aligned}$$