SIMPLE-COMPOUND INTEREST

1 **(a)** **(i)** Each year the value of a car decreases by 15% of its value at the beginning of that year.
Alberto buys a car for $18 000.

Calculate the value of Alberto's car after 3 years.

$ ..... [2]

(ii) Belinda bought a car one year ago.
The value of this car has decreased by 15% to $14025.

Calculate how much Belinda paid for the car.

$ ..... [3]

(b) Chris invested some money at a rate of 5% per year compound interest.
After 2 years the value of this investment is $286.65 .

Calculate how much Chris invested.

$ ..... [2]

(c) Dani invested $200 and after 2 years the value of this investment is $224.72 .

Calculate the rate of interest per year when the interest is

(i) simple,

.....% [3]

(ii) compound.

.....% [3]

MARKING SCHEME:

(a) (i)	11 054.25 final answer	**2**	**M1** for $18000\times\left(1-\frac{15}{100}\right)^3$ oe
(ii)	16 500	**3**	**M2** for $14025\div\left(1-\frac{15}{100}\right)$ oe or **M1** for recognition of 14 025 as 85% soi
(b)	260 final answer	**2**	**M1** for $P\left(1+\frac{5}{100}\right)^2=286.65$ oe
(c) (i)	6.18	**3**	**M2** for $\frac{224.72-200}{200\times2}\times100$ oe or $\frac{1}{2}\left(\frac{224.72}{200}\times100-100\right)$ or **M1** for $\frac{200\times r\times2}{100}$ oe or $\frac{224.72-200}{200\times2}$ or $\frac{224.72}{200}\times100-100$ soi by 12.36 If zero scored, **SC1** for 56.18 or 56.2 as final answer
(ii)	6	**3**	**M2** for $\sqrt{\frac{224.72}{200}}$ or $\sqrt{\frac{224.72}{2}}$ soi by 1.06 or 106 or 10.6 or **M1** for $200\left(1+\frac{r}{100}\right)^2=224.72$ oe

2 **(a)** Alex has \$20 and Bobbie has \$25.

(i) Write down the ratio Alex's money : Bobbie's money in its simplest form.

..... : ..... [1]

(ii) Alex and Bobbie each spend $\frac{1}{5}$ of their money.

Find the ratio Alex's remaining money : Bobbie's remaining money in its simplest form.

..... : ..... [1]

(iii) Alex and Bobbie **then** each spend \$4.

Find the new ratio Alex's remaining money : Bobbie's remaining money in its simplest form.

..... : ..... [2]

(b) **(i)** The population of a town in the year 1990 was 15 600.
The population is now 11 420.

Calculate the percentage decrease in the population.

.....% [3]

(ii) The population of 15 600 was 2.5% less than the population in the year 1980.

Calculate the population in the year 1980.

..... [3]

(c) Chris invests \$200 at a rate of x% per year simple interest.
At the end of 15 years the total interest received is \$48.

Find the value of x.

$x =$ ..... [2]

(d) Dani invests \$200 at a rate of y% per year compound interest.
At the end of 10 years the value of her investment is \$256.

Calculate the value of y, correct to 1 decimal place.

$y =$ ..... [3]

MARKING SCHEME:

(a)(i)	4 : 5	**1**	
(a)(ii)	4 : 5	**1**	
(a)(iii)	3 : 4	**2**	**B1** for 12 : 16 or answer 4 : 3
(b)(i)	26.8 or 26.79…	**3**	**M2** for $\frac{15600-11420}{15600}[\times 100]$ or $\frac{11420}{15600}\times 100$ or **M1** for $\frac{11420}{15600}$
(b)(ii)	16000 nfww	**3**	**M2** for $15600\times\frac{100}{100-2.5}$ oe or **M1** for 15600 associated with 97.5[%] seen
(c)	1.6 or $\frac{8}{5}$	**2**	**M1** for $\frac{200\times x\times 15}{100}=48$ oe or **M1** for figs 16
(d)	2.5 or $\frac{5}{2}$ cao nfww	**3**	**B2** for 2.49[9…] or 102.4[99…] or 1.024[99…] or 2.50 or 102.5 or 1.025 or **M2** for $\sqrt[10]{\frac{256}{200}}$ oe or **M1** for $256=200(x)^{10}$ seen

3 **(a)** Dina invests \$600 for 5 years at a rate of 2% per year compound interest.

Calculate the value of this investment at the end of the 5 years.

\$ ..... [2]

(b) The value of a gold ring increases exponentially at a rate of 5% per year.
The value is now \$882.

(i) Calculate the value of the ring 2 years ago.

\$ ..... [2]

(ii) Find the number of complete years it takes for the ring's value of \$882 to increase to a value greater than \$1100.

..... [2]

MARKING SCHEME:

(a)	662.45	**2**	**M1** for $600 \times \left(1+\frac{2}{100}\right)^5$ oe
(b)(i)	800	**2**	**M1** for $x\left(1+\frac{5}{100}\right)^2 = 882$ oe or **SC1** for answer 82
(b)(ii)	5 nfww	**2**	**M1** for trial with $882 \times \left(1+\frac{5}{100}\right)^n$ with $n > 1$

(a) In a cycling club, the number of members are in the ratio males : females = 8 : 3.
The club has 342 females.

(i) Find the total number of members.

..... [2]

(ii) Find the percentage of the total number of members that are female.

..... % [1]

(b) The price of a bicycle is $1020.
Club members receive a 15% discount on this price.

Find how much a club member pays for this bicycle.

$ ..... [2]

(c) In 2019, the membership fee of the cycling club is $79.50 .
This is 6% more than last year.

Find the **increase** in the cost of the membership.

$ ..... [3]

(d) Asif cycles a distance of 105 km.
On the first part of his journey he cycles 60 km in 2 hours 24 minutes.
On the second part of his journey he cycles 45 km at 20 km/h.

Find his average speed for the whole journey.

..... km/h [4]

(e) Bryan invested $480 in an account 4 years ago.
The account pays compound interest at a rate of 2.1% per year.
Today, he uses some of the money in this account to buy a bicycle costing $430.

Calculate how much money remains in his account.

$ ..... [3]

(f) The formula $s = \frac{1}{2}at^2$ is used to calculate the distance, s, travelled by a bicycle.

When $a = 3$ and $t = 10$, each correct to the nearest integer, calculate the lower bound of the distance, s.

..... [2]

MARKING SCHEME:

1(a)(i)	1254	**2**	**M1** for 342 ÷ 3
1(a)(ii)	27.3 or 27.27…	**1**	
1(b)	867	**2**	**M1** for $1020\times\frac{15}{100}$ oe or $1020\times\left(1-\frac{15}{100}\right)$ oe
1(c)	4.5[0]	**3**	**M2** for $\frac{79.5[0]}{100+6}[\times 6]$ oe or $\frac{79.5[0]}{100+6}\times 100$ oe or **M1** for 79.5[0] associated with 106[%]
1(d)	22.6 or 22.58… nfww	**4**	**M1** for $\frac{45}{20}$ or better and **M2** for $\frac{60+45}{\textit{their}\ 2\text{h}\ 24\,\text{min}+\textit{their}\ \frac{45}{20}}$ or **M1** for *their* $\frac{45}{20}$ + *their* 2h 24min
1(e)	91.6[0] to 91.61	**3**	**M2** for $480\times\left(1+\frac{2.1}{100}\right)^4-430$ oe OR **M1** for $480\times\left(1+\frac{2.1}{100}\right)^4$ oe **A1** for 522, 521.6[0] to 521.61
1(f)	112.8125	**2**	**B1** for 2.5 or 9.5 seen