COMPOUND INTEREST APPLICATIONS

1 **(a)** The price of a book increases from \$2.50 to \$2.65 .

Calculate the percentage increase.

..... % [3]

(b) Scott invests \$500 for 7 years at a rate of 1.5% per year simple interest.

Calculate the value of his investment at the end of the 7 years.

\$..... [3]

(c) In a city the population is increasing exponentially at a rate of 1.6% per year.

Find the overall percentage increase at the end of 20 years.

..... % [2]

(d) The population of a village is 6400.
The population is decreasing exponentially at a rate of r% per year.
After 22 years, the population will be 2607.

Find the value of r.

r = ... [3]

MARKING SCHEME:

(a)	6 nfww	**3**	**M2** for $\frac{2.65-2.50}{2.50}[\times 100]$ or for $\frac{2.65}{2.50}\times 100$ or **M1** for $\frac{2.65}{2.50}$
(b)	552.5[0]	**3**	**B2** for 52.5[0] or **M2** for $500\times\frac{1.5}{100}\times 7+500$ oe or **M1** for $500\times\frac{1.5}{100}$ [× 7] oe
(c)	37.4 or 37.36…	**2**	**M1** for $\left(1+\frac{1.6}{100}\right)^{20}$ oe soi 1.37…
(d)	4[.00...]	**3**	**M2** for $\sqrt[22]{\frac{2607}{6400}}$ or **M1** for $6400\times x^{22}=2607$ oe or better

2 **(a)** **(i)** Divide \$105 in the ratio 4 : 3.

\$ ..... and \$ ..... [2]

(ii) Increase \$105 by 12%.

\$ ..... [2]

(iii) In a sale the original price of a jacket is reduced by 16% to \$105.

Calculate the original price of the jacket.

\$ ..... [3]

(b) Jakob invests \$500 at a rate of 2% per year compound interest.
Claudia invests \$500 at a rate of 2.5% per year simple interest.

Calculate the difference between these two investments after 30 years.
Give your answer in dollars correct to the nearest cent.

\$ ..... [6]

(c) Michel invests $\$P$ at a rate of 3.8% per year compound interest.
After 30 years the value of this investment is \$1469.

Calculate the value of P.

$P =$ ..... [3]

(d) The population of a city increases exponentially at a rate of x% **every 5 years**.
In 1960 the population was 60 100.
In 2015 the population was 120 150.

Calculate the value of x.

$x =$ ..... [3]

MARKING SCHEME:

(a) (i)	60 and 45	**2**	**M1** for $105 \div (4 + 3)$
(ii)	117.6[0] final answer	**2**	**M1** for 105×1.12 oe
(iii)	125	**3**	**M2** for $105 \div (1 - \frac{16}{100})$ oe or **M1** for 105 seen associated with 84%
(b)	30.68 final answer	**6**	**B5** for 30.7[0] or 30.68… or **B4** for 905 to 906 **and** 875 or 405 to 406… **and** 375 **OR** **M1** for $500 \times \left(1+\frac{2}{100}\right)^{30}$ [– 500] oe **M1** for [500 +] $\frac{500 \times 2.5 \times 30}{100}$ **B1** for 905 to 906 or 875 or 405 to 406 or 375
(c)	480 or 479.8 to 479.9…	**3**	**M2** for $1469 \div \left(1+\frac{3.8}{100}\right)^{30}$ oe or **M1** for $P \times \left(1+\frac{3.8}{100}\right)^{30} = 1469$ oe
(d)	6.5[0] or 6.500…	**3**	**M2** for $\sqrt[11]{\frac{120150}{60100}}$ [×100 – 100] oe or **M1** for $60100 \times (\ )^n = 120150$ oe where $n = 5$ or 11 or 55