

# Chapter 7 Review

## Review 5A

- 2) Arithmetic sequence  $\rightarrow$  add between terms (same "d")  
To find d subtract subsequent terms

$$\left. \begin{array}{l} (k-2) - 3k = d \\ (k+7) - (k-2) = d \end{array} \right\} \rightarrow$$

$$(k-2) - 3k = (k+7) - (k-2)$$

$$k-2-3k = k+7-k+2$$

$$-2k-2 = 9$$

$$-2k = 11$$

$$\boxed{k = -11/2}$$

- 4) Geometric sequence  $\rightarrow$  multiply between terms (same "r")  
To find r divide subsequent terms

$$\left. \begin{array}{l} k/4 = r \\ k^2-12/k = r \end{array} \right\} \rightarrow$$

$$\frac{k}{4} = \frac{k^2-12}{k}$$

$$k^2 = 4k^2 - 48$$

$$-3k^2 = -48$$

$$k^2 = 16$$

$$\boxed{k = \pm 4}$$

7) a)  $r = 1/5$        $u_8 = 5(1/5)^{8-1} = 6.4 \times 10^{-5}$  or  $\frac{1}{15625}$   
 $u_1 = 5$

b)  $d = 2.5$        $u_8 = -11 + (8-1)(2.5) = 6.5$   
 $u_1 = -11$

8)  $u_0 = 3000$   $d = -183$

(a) week 1: 2817 week 2: 2634 week 3: 2451 week 4: 2268

(b) decreases by the same amount each week

(c)  $a_n = 2817 + (n-1)(-183)$

$0 = 2817 - 183n + 183$

$0 = -183n + 3000$

$183n = 3000$

$n = 16.4 \rightarrow \boxed{17 \text{ weeks}}$

10)  $u_1 = 12$   $d = 7$

(a)  $u_8 = 12 + (8-1)(7) = \boxed{61}$

(b)  $S_n = n/2 (2u_1 + (n-1)d)$   
 $= 10/2 (2 \cdot 12 + (10-1)(7)) = 5(24 + 9(7)) = \boxed{435}$

(c)  $915 = n/2 (2 \cdot 12 + (n-1)(7))$

$1830 = n(24 + 7n - 7)$

$1830 = n(7n + 17)$

$0 = 7n^2 + 17n - 1830$

use calc app to solve  $n = \boxed{15}$  or  $-17.4$

12)  $PV = 8700$   $r = 9.75\%$   $FV = 8700 \left(1 + \frac{9.75}{100 \cdot 12}\right)^{12 \cdot (1.75)}$   
 $n = 9/12 = .75$   $k = 12$

$FV = 9357.26$

Interest earned...  $9357.26 - 8700 = \boxed{\$657.26}$

13)  $PV = 135000$   $r = -15\%$   $FV = 135000 \left(1 - \frac{15}{100}\right)^5$   
 $n = 5$   $k = 1$

(a)  $FV = \$59900.22$

(b)  $135000 - 59900.22 = \$75099.78$

14)  $PV = 7800$     $r = 4.8\%$     $9000 = 7800 \left(1 + \frac{4.8}{100} \cdot 4\right)^{4n}$   
 $FV = 9000$     $K = 4$

use calc or app  $\rightarrow N = 12 \div 4$   
 3 yrs

**Review 5B**

1)  $u_1 = 6$     $u_2 = 3$     $u_3 = 1.5$

(a) Geometric  $r = 1/2$

(b)  $u_1 = 6$     $r = 1/2$

(c)  $u_{16} = 6 \left(\frac{1}{2}\right)^{16-1} = 1.83 \times 10^{-4}$  or 0.000183

7)  $u_6 = 24 \rightarrow 24 = u_1 r^{6-1} \rightarrow 24 = u_1 r^5$     $\frac{768}{24} = \frac{r^{10} \cdot u_1}{r^5 u_1}$   
 $u_{11} = 768$     $768 = u_1 r^{11-1}$     $768 = u_1 r^{10}$

$32 = r^5$     $r = 2$     $24 = u_1 (2)^{6-1}$   
 $u_1 = .75$

(a)  $u_n = .75 (2)^{n-1}$

(b)  $u_{17} = 49152$

(c)  $S_n = \frac{u_1 (r^n - 1)}{r - 1} = \frac{.75 (2^{15} - 1)}{2 - 1} = 24,575.25$

10) (a)  $r = \frac{60}{180} = 1/3$

(b)  $u_6 = 180 \left(\frac{1}{3}\right)^{6-1} = 20/27$

(c)  $269.9 = \frac{180 (1 - (1/3)^n)}{1 - 1/3} \Rightarrow 269.9 = 270 (1 - (1/3)^n)$   
 solve by graphing  
 $n = 8$

$$11) \begin{array}{l} PV = ? \\ FV = 5970.26 \end{array} \quad \begin{array}{l} r = 6\% \\ k = 2 \quad n = 3 \end{array}$$

$$5970.26 = PV \left(1 + \frac{6}{100 \cdot 2}\right)^{3 \cdot 2}$$

$$PV = 5000$$

Interest:  $5970.26 - 5000$   
€ 970.26

$$12) \begin{array}{l} PV = 3700 \\ FV = 4072 \end{array} \quad \begin{array}{l} r = ? \\ k = 12 \quad n = 2 \end{array}$$

$$4072 = 3700 \left(1 + \frac{r}{100 \cdot 12}\right)^{12 \cdot 2}$$

solve by graphing or app  
 $N = 12 \cdot 2 = 24$  ←  
 $r = 4.8\%$

### Review 5C

$$1) \begin{array}{l} u_1 = 68 - 5(1) = 63 \\ u_2 = 68 - 5(2) = 58 \\ u_3 = 68 - 5(3) = 53 \end{array}$$

Arithmetic since  $d = -5$

$$d) \begin{array}{l} -200 = 63 + (n-1)(-5) \\ -200 = 63 - 5n + 5 \\ -200 = 68 - 5n \\ -268 = -5n \rightarrow n = 53.6 \end{array}$$

54

$u_{54} = -202$

$$3) \begin{array}{l} u_{15} = -17 \rightarrow -17 = u_1 + (15-1)d \rightarrow -17 = u_1 + 14d \\ u_7 = 31 \rightarrow 31 = u_1 + (7-1)d \rightarrow 31 = u_1 + 6d \end{array}$$

$$-48 = 8d$$

$d = -6$

$$-17 = u_1 + 14(-6)$$
 $u_1 = 67$

$u_n = 67 + (n-1)(-6)$   
 $u_{34} = 67 + (34-1)(-6)$

$u_{34} = -131$

4) a) arithmetic  
 $24 + d + d = 6$   
 $2d = -18$   
 $d = -9$

$$24 + (-9) = \boxed{15 = a}$$

b) geometric  
 $24 \cdot r \cdot r = 6$   
 $r^2 = 1/4$   
 $r = \pm 1/2$

$$24 \cdot 1/2 = \boxed{12} \quad \text{or} \quad 24 \cdot (-1/2) = \boxed{-12}$$

6) initially 3000  $\uparrow 5\%$   $r = 1.05$   $u_1 = 3000(1.05)$   
 $u_1 = 3150$

a)  $u_n = 3150(1.05)^{n-1}$

$$u_1 = 3150 \quad u_2 = 3307.5 \quad u_3 = 3472.875$$

$$\boxed{3472 \text{ Koalas}}$$

b)  $5000 = 3150(1.05)^{n-1}$

Solve by graphing  $10.47 \rightarrow \boxed{11 \text{ yrs}}$

13)  $PV = 2300$   $n = 4$   
 $FV = 1300$   $k = 1$

$$1300 = 2300 \left(1 - \frac{r}{100}\right)^4$$

Solve by graphing or app  
 $N = 4$

$$\boxed{13.3\%}$$

# Review Paper 1 style questions

2)  $\uparrow 2.3\% = r = 1.023$

a)  $240\,000$      $245\,520$      $251\,166.96$

3yrs            2yrs            1yr

$\$ 256,943.80$   
now

b)  $214\,245 = 200\,000 r^3$   
 $r = 1.0232$

→ Increase 2.32%

3) a)  $PV = 1200$      $n = 4$   
 $FV = ?$              $k = 1$      $r = 4.3$

$FV = 1200 \left(1 + \frac{4.3}{100}\right)^4$

$FV = 1420.10$

$- 1200$

$\$ 220.10$  interest

b) 250 interest = FV of 1450  
 $1450 = 1200 \left(1 + \frac{4.3}{100}\right)^n$

solve by graphing or app

4.49 →

5yrs

c)  $2400 = 1200 \left(1 + \frac{4.3}{100}\right)^n$

solve by graphing or app

16.5 →

17yrs

6) a)  $PV = 18000$      $n = 15$   
 $FV = ?$              $k = 4$      $r = 4.5$

$FV = 18000 \left(1 + \frac{4.5}{(4 \cdot 100)}\right)^{4 \cdot 15}$

$35219.61 = \text{€ } 35220$

b)  $PV = 18000$      $n = ?$   
 $FV = 19862.21$      $k = 4$      $r = 4.5$

$19862.21 = 18000 \left(1 + \frac{4.5}{(4 \cdot 100)}\right)^{4n}$

solve by graphing or app

$n = 2.2$  yrs

$N = 8.8$

26.4 months

$\frac{4}{2.2}$  yrs

27 months

# Renew Paper 2 style questions

1) (a) option two

$$u_1 = 1000 \quad d = 250$$

$$u_8 = 1000 + (8-1)(250) = \boxed{\$2750}$$

option three

$$u_1 = 15 \quad r = 2$$

$$u_8 = 15(2)^{8-1} = \boxed{\$1920}$$

(b) 10 weeks sum

$$S_{10} = 10/2 (2 \cdot 1000 + (10-1)(250)) = \boxed{\$21,250} \text{ option 2}$$

(c) option 1:  $10(2000) = \boxed{\$20,000}$

option 3:  $\frac{15(2^{10}-1)}{2-1} = \boxed{\$15,345}$

Best option  
option 2

2) (a) Choice A:  $12(150) = \$1800$

Choice B:  $1600(1 + \frac{10}{12 \cdot 100})^{12 \cdot 1} = \$1767.54$

Choice C:  $12/2 (2 \cdot 105 + (12-1)(10)) = \$1920$

Choice D:  $\frac{120(1.05^{12}-1)}{1.05-1} = \$1910.06$

(b) choice C is the best

(c) PV = 1500    n = 3     $1800 = 1500(1 + \frac{r}{100})^3$   
FV = 1800    k = 1

solve by graphing or with app  
 $r = 6.27\%$

3) (a) 1st 2000 2nd 2250 3rd 2500

(i)  $u_1 = 2000$   $d = 250$   $n = 20$   $u_{20} = 2000 + (20-1)(250) = \boxed{6750}$

(iii)  $S_{20} = \frac{20}{2}(2(2000) + (20-1)(250)) = \boxed{87500}$  optimal sum

(b) 1st 2800 2nd  $2800(1.05) = \underline{2940}$

(i)  $u_1 = 2800$   $r = 1.05$   $n = 5$   $u_5 = 2800(1.05)^{5-1} = \boxed{3403.42}$

(c) option 2 Sum  $\frac{2800(1.05^{20}-1)}{1.05-1} = \boxed{92584.67}$

Best option  $\rightarrow$  option 1

Saving:  $92584.67 - 87500 = \boxed{\$5084.67}$

5) (a)  $u_1 = 28000$   
 $r = 1.04$   $n = 4$

$u_4 = 28000(1.04)^{4-1} = \boxed{\$31496.19}$

(b) (i)  $u_1 = 24000$   
 $r = 1.05$

$24000(1.05)^n > 28000(1.04)^n$

By graphing see where they equal

$x = 16.1$

$\boxed{17 \text{ yrs}}$

(ii)  $24000(1.05)^{17} - 28000(1.04)^{17} = \boxed{\$4167.23}$



$$6) \quad u_1 = 2$$

$$r = 4$$

$$\text{sum} = 11,184,810$$

$$n = ?$$

$$11,184,810 = \frac{2(4^n - 1)}{4 - 1}$$

$$33,554,430 = 2(4^n - 1)$$

$$16,777,215 = 4^n - 1$$

$$16,777,216 = 4^n$$

Solve by graphing

$$n = 12$$