Page 470 #11-20
Page 477 #7-13

11a) Let A_n represent the money in the nth year.

$A_1 = 46850$ $A_8 = 56650$

It's arithmetic sequence ∴

$A_n = a + (n-1)d$

$A_1 = a$ $A_8 = a + (8-1)d$

① $46850 = a$ ② $56650 = a + 7d$

sub ① into ②

$56650 = 46850 + 7d$

$\frac{9800}{7} = \frac{7d}{7}$

$\boxed{1400 = d}$

∴ $A_n = 46850 + (n-1)(1400)$

11b) ∴ $A_6 = 46850 + (6-1)(1400)$

$A_6 = 55\,850$

∴ The salary in the 6th year is $55 850

11c) Let $A_n = 50000$

$50000 = 46850 + (n-1)1400$

$50000 = 46850 + 1400n - 1400$

$50000 = 45450 + 1400n$

$\frac{4550}{1400} = \frac{1400n}{1400}$

$3.25 = n$

∴ After 3 years she starts making more than 50000 a year.

Page 470 #11d, 12

11 d) $S_n = \frac{n}{2}(t_1 + t_n)$

$S_8 = \frac{8}{2}(46850 + 56650)$

$= 4(103500)$

$\boxed{S_8 = 414000}$

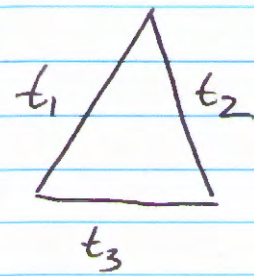
∴ Total made in 8 years is #414000

12. $P = 30$

$t_1 = a$

$t_2 = a + d$

$t_3 = a + 2d$



$P = t_1 + t_2 + t_3$

$30 = a + a + d + a + 2d$

$30 = 3a + 3d$

$10 = a + d$

P	a	d
10	1	9
10	2	8
10	3	7
10	4	6
10	5	5
10	6	4
10	7	3
10	8	2
10	9	1

These are possible sets.

Page 470 #13

13. Let d_n be the distance in the n^{th} second in m.

$d_1 = 4.9$ > 9.8
$d_2 = 14.7$ > 9.8
$d_3 = 24.5$

$d_1 = 4.9 = a$ $\quad d = 9.8$

$$d_n = 4.9 + (n-1)(9.8)$$

We need the total distance in S_5, so find

$$S_5 = \frac{5}{2}\left(2(4.9) + (5-1)(9.8)\right)$$

$$\boxed{S_5 = 122.5m}$$

∴ The building is 122.5m tall

14. Let t_n represent the number of boxes on the n'th level.

$$t_n = 4 + (n-1)4$$

$$S_{12} = \frac{12}{2}\left[2(4) + (12-1)4\right]$$
$$= 6[8 + 11(4)]$$
$$= 6[8 + 44]$$
$$= 6[52]$$
$$\boxed{S_{12} = 312}$$

∴ There ar 312 blocks for the entire 12 layers.

Page 470 #15, 16a

#15 Let d_n be the distance travelled in the

$d_1 = 10$ $d_2 = 40$ $d_3 = 70$

$a = 10$ $d = 30$

$d_n = 10 + (n-1)30$

$$S_{20} = \frac{20}{2}\left(2(10) + (20-1)30\right)$$

$$= 10(20 + 19(30))$$

$$\boxed{S_{20} = 5900}$$

∴ The rocket is 5900m!

#16a) Let t_n represent the number of sweaters sold in the nth week.

$t_1 = 20$ $a = 20$ $d = 20$

$t_2 = 40$

$t_3 = 60$ Let $S_n = 300$ in

$$S_n = \frac{n}{2}\left(2(20) + (n-1)(20)\right)$$

$$300 = \frac{n}{2}\left(40 + 20n - 20\right)$$

$$600 = n(20 + 20n)$$

$$0 = 20n + 20n^2 - 600$$

$$0 = n^2 + n - 30$$

$$0 = (n+6)(n-5)$$

∴ $n = -6$ $n = 5$

inadmissible

∴ It takes 5 weeks to finish selling 300 shirts.

Page 470, #16b

16b) Let P_n represent the price on the nth week.

$P_1 = 100$ $\quad a = 100,\ d = -10$

$P_2 = 90$

$P_3 = 80$ $\quad$ *Find week is 5 ∴ $n = 5$!

$$P_n = 100 + (n-1)(-10)$$
$$P_5 = 100 + (5-1)(-10)$$
$$P_5 = 100 + 4(-10)$$
$$P_5 = 100 - 40$$
$$P_5 = 60$$

∴ The price in the final week is \$60.

17a) $12 + 11 + 10 + 9 + 8 + 7$ or $t_n = 12 + (n-1)(-1)$

$= 57$

$$\therefore S_6 = \frac{6}{2}\left(2(12) + (6-1)(-1)\right)$$

$$\boxed{S_6 = 57}$$

∴ There are 57 pipes!

17b) $t_n = 15 + (n-1)(-1)$

$$S_{10} = \frac{10}{2}\left(2(15) + (10-1)(-1)\right)$$
$$= 5(30 - 9)$$
$$\boxed{S_{10} = 105}$$

∴ There are 105 pipes

18 $t_n = 1000 + (n-1)500$, $a = 1000$, $d = 500$

$S_n = \frac{n}{2}(2a + (n-1)d$

$115000 = \frac{n}{2}\left(2(1000) + (n-1)500\right)$

$230000 = n(2000 + 500n - 500)$

$230000 = n(1500 + 500n)$

$\frac{230000}{500} = \frac{n(500)(3+n)}{}$

$460 = n(3+n)$

$460 = 3n + n^2$

$0 = n^2 + 3n - 460$

$0 = (n+23)(n-20)$

$\therefore$ $n = -23$ or $n = 20$

inadmissible

$\therefore$ The company was 20 days late!

19. $t_2 = 10$ $\quad$ $t_5 = 31$

$\therefore$ $10 = a + 1d$ $\quad$ ② $31 = a + 4d$

$\Rightarrow$ ① $a = 10 - 1d$

sub ① into ②

$31 = 10 - 1d + 4d$

$21 = 3d$

$\frac{21}{3} = \frac{3d}{3}$

$\boxed{7 = d}$

$\boxed{\therefore a = 3}$

$\therefore S_{16} = \frac{16}{2}(2(3) + (16-1)7)$

$\boxed{S_{16} = 888}$

20. $f(3) = 11$
$f(7) = 13$

Since $f(3) = 11$

$11 = a + 2d$
① $a = 11 - 2d$

Since $f(7) = 13$

② $13 = a + 6d$

sub ① into ②

$$13 = (11 - 2d) + 6d$$
$$13 = 11 - 2d + 6d$$
$$2 = 4d$$
$$\boxed{\frac{1}{2} = d}$$

$$a = 11 - 2\left(\frac{1}{2}\right)$$
$$\boxed{a = 10}$$

$$\therefore \; S_n = \frac{n}{2}\left(2a + (n-1)d\right)$$

$$S_{20} = \frac{20}{2}\left(2(10) + (19)\frac{1}{2}\right)$$
$$= 10\,(20 + 9.5)$$
$$= 10\,(29.5)$$
$$\boxed{S_{20} = 295}$$

Page 476 #7–13

7. Let a_n be the area of the nth rectangle

$a_1 = 6\,cm^2$
$a_2 = 18\,cm^2$
$a_3 = 54\,cm^2$
$a_4 = 162\,cm^2$

General Term
$a_n = 6(3)^{n-1}$

$\therefore a = 6 \quad r = 3$

$$S_{10} = \frac{6(3^{10}-1)}{3-1}$$

$$S_{10} = 177\,144\,cm^2$$

$\therefore$ The total area of the first 10 triangles is: 177144 c

8a) Let P_n represent the perimeter of the nth square in cm

$P_1 = 40\,cm$
$P_2 = 80\,cm$
$P_3 = 160\,cm$

General Term

$P_n = 40(2)^{n-1}$

$\therefore a = 40 \quad r = 2$

$$S_3 = \frac{40(2^3-1)}{2-1}$$
$$= 40(7)$$
$$= 280\,cm$$

$$S_{10} = \frac{40(2^{10}-1)}{2-1}$$
$$S_{10} = 40920\,cm$$

$\therefore$ The total perimeter for the first 10 are 40920cm

8b) Let A_n represent the area of the nth square in cm^2.

$A_1 = 100\ cm^2$
$A_2 = 400\ cm^2$
$A_3 = 1600$

General Term
$A_n = 100(4)^{n-1}$

$\therefore a = 100 \quad r = 4$

$$S_{10} = \frac{100(4^{10} - 1)}{4 - 1}$$

$= 34\ 952\ 500\ cm^2$

$\therefore$ The total area for 10 squares is $34\ 952\ 500\ cm^2$

9 Let C_n represent the number of calls that were made by the nth round.

$C_1 = 4$
$C_2 = 16$
$C_3 = 64$

General Term
$C_n = 4(4)^{n-1}$
$a = 4, r = 4$

$$S_6 = \frac{4(4^6 - 1)}{4 - 1}$$

$S_6 = 5460$

$\therefore$ By the sixth call round 5460 have been calledin total.

10. Let M_n represent the nth place prize in the lottery in \$.

$M_1 = 100000$

$M_2 = 100000(0.40)$
$M_2 = 40000$

$M_3 = 40000(0.40)$
$= 16000$

General Term

$M_n = 100000(0.4)^{n-1}$

$a = 100000 \quad r = 0.4$

$$S_6 = \frac{100000(0.4^6 - 1)}{0.4 - 1}$$

$$\boxed{S_6 = 165\,984}$$

∴ The total money handed out for the first 6 rounds is \$165984.00.

11. Let H_n represent the height travelled in the nth minute in m.

$H_1 = 50$
$H_2 = 50 \times 0.70$
$H_2 = 35$

$H_3 = 35(0.7)$
$= 24.5$

General Term
$H_n = 50(0.7)^{n-1}$

$a = 50 \quad r = 0.7$

$$S_7 = \frac{50(0.7^7 - 1)}{0.7 - 1}$$

$S_7 = 152.94$

∴ The balloon rises 152.94m in 7 minutes

Geometric Series

$$\boxed{S_n = \frac{a(r^n - 1)}{r-1}}$$

12 a) $S_7 = 70933$, $r = 4$

$$S_7 = \frac{a(4^7 - 1)}{4-1}$$

$$70933 = \frac{a(16383)}{3}$$

$$\therefore a = 70933\left(\frac{\cancel{3}^{\,1}}{\cancel{16383}_{\,5461}}\right)$$

$$\boxed{a = \frac{70933}{5461}}$$

b) $S_6 = -364$ $\quad r = -3$

$$S_7 = \frac{a((-3)^7 - 1)}{-3-1}$$

$$a = S_7\left(\frac{-4}{(-3)^7 - 1}\right)$$

$$a = -364\left(\frac{\cancel{-4}^{\,1}}{\cancel{-2188}_{\,547}}\right)$$

$$a = \frac{-364}{547}$$

$$\therefore a = \frac{-364}{547}$$

12 c) $S_5 = 310 \quad r = 0.5$

$$S_5 = \frac{a(0.5^5 - 1)}{0.5 - 1}$$

$$a = S_5\left(\frac{0.5-1}{0.5^5-1}\right)$$

$$= 364 \frac{\left(-\frac{1}{2}\right)}{\left(\frac{-31}{32}\right)}$$

$$= 310\left(\frac{-1}{2}\right) \div \left(\frac{-31}{32}\right)$$

$$= 310\left(\frac{-1}{2}\right) \times \left(\frac{-32}{31}\right)$$

$$= -155\left(\frac{-32}{31}\right)$$

$$\boxed{\therefore a = 160}$$

13a) Let M_n be his deposit of money on the nth day.

$M_1 = 0.01$
$M_2 = 0.02$
$M_3 = 0.04$
$\vdots$

General Term
$M_n = 0.01(2)^{n-1}$

$a = 0.01 \quad r = 2$

$$S_{20} = \frac{0.01(2^{20}-1)}{2-1}$$

$$= \frac{0.01(1\,048575)}{1}$$

$$S_{20} = 10\,485.75$$

$\therefore$ He has a total of \$10485.75 in 20 days.

13b) For this problem

$$S_n = \frac{0.01(2^n-1)}{2-1}$$

$$S_n = 0.01(2^n-1)$$

Let $S_n = 1\,000\,000\,000$, find n

$$\frac{1000\,000\,000}{0.01} = \frac{0.01(2^n-1)}{0.01}$$

$$100\,000\,000\,000 = 2^n - 1$$

$$99999999999 = 2^n$$

If $n=37$ he has over 1 billion dollars. Thus 37 days to become a billionaire