FMPC 10
6.1, page 236
#4a & 4c

FMPC 10 6.1, page 236

4a) If (5,2) is a solution to the system then it MUST satisfy both equations

CHECK $3x + y = 17 \longrightarrow$ does $3(5) + 2 = 17$
$15 + 2 = 17$ YES!

now CHECK $2x + 3y = 17 \longrightarrow$ does $2(5) + 3(2) = 17$
$10 + 6 = 17$ NO!

$\therefore$ (5,2) is NOT a solution to the system. This simply means that the graphs of two lines do not intersect at (5,2)

4c) Is $(\underset{x}{2}, \underset{y}{-4})$ a solution to the linear system?

CHECK $x + 2y = -2 \longrightarrow$ does $2 + 2(-4) = -2$
$2 - 8 = -2$
$-6 = -2$ NO!

$\therefore$ since it is NOT a solution for this equation it is NOT a solution to the system.

FMPC 10
6.1, page 236
#4h

FMPC 10 p.236

4h) $0.3x - 0.2y = 4$ $\qquad\left(\frac{140}{13}, \frac{-50}{13}\right)$

$0.2x + 0.3y = 1$

Plug the number into each equation to see if the left side equals the right side.

$0.3 = \frac{3}{10}$ and $0.2 = \frac{2}{10}$

$\therefore \frac{3}{\cancel{10}}\left(\frac{14\cancel{0}}{13}\right) - \frac{2}{\cancel{10}}\left(\frac{-5\cancel{0}}{13}\right) = 4$

$\frac{42}{13} + \frac{10}{13} = 4 \longrightarrow \frac{42+10}{13} = 4$

$\frac{52}{13} = 4$

$4 = 4$ TRUE

$\frac{2}{\cancel{10}}\left(\frac{14\cancel{0}}{13}\right) + \frac{3}{\cancel{10}}\left(\frac{-5\cancel{0}}{13}\right) = 1$

$\frac{28}{13} - \frac{15}{13} = 1 \longrightarrow \frac{28-15}{13} = 1$

$\frac{13}{13} = 1$

$1 = 1$ TRUE

$\therefore \left(\frac{140}{13}, \frac{-50}{13}\right)$ is a solution to the linear system.

FMPC 10
6.1, page 237
#6c

FMPC 10 6.1 p.237

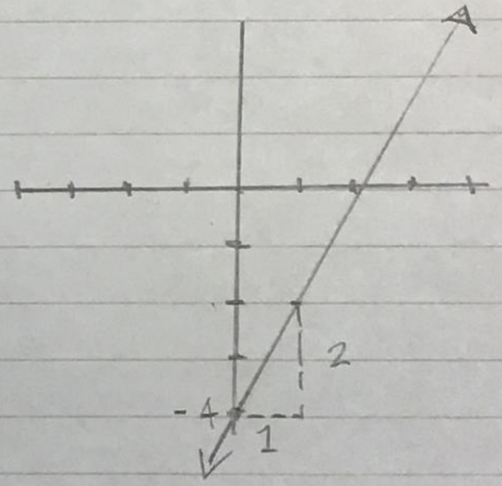
6c) Graph both equations on the same grid

$f(x) = 2x - 4$ is a line with a slope $= 2$ and a y-int $= -4$

$x - \frac{1}{2}y = 2$ is a line with a slope $= \frac{-1}{-\frac{1}{2}} = 2$

and a y-int $= \frac{2}{-\frac{1}{2}} = -4$

Both graphs are the <u>same</u> line! Therefore there are an infinite number of solutions



FMPC 10
6.2, page 243
#1b

FMPC 10 6.2 p.243

1b) $(3x - y = 4)$
$x + 2y = 2$

The idea here is to determine a number that we can multiply the first equation by in order to eliminate one of the variable when we ADD the two equations.

In this case, we can multiply $(3x-y=4)$ by 2 because when we ADD the equations the y's cancel out.

so, $(3x - y = 4) \times 2 \longrightarrow 6x - 2y = 8$

$$\begin{array}{r} 6x - 2y = 8 \\ \oplus \quad x + 2y = 2 \\ \hline 7x \quad = 10 \end{array}$$

we can solve this for x and then substitute $x = 10/7$ into either equation and find y.

OR// we can multiply $(3x - y = 4)$ by $-1/3$ because when we ADD the equation the x's cancel out.

so, $(3x - y = 4) \times -1/3 \longrightarrow -1x + y/3 = -4/3$

$$\begin{array}{r} -1x + \frac{y}{3} = -\frac{4}{3} \\ x + 2y = 2 \\ \hline 2\frac{1}{3}y = \frac{2}{3} \end{array}$$

$\frac{7}{3}y = \frac{2}{3}$

$y = \frac{2}{3} \times \frac{3}{7} = \frac{2}{7}$

FMPC 10
6.2, page 243
#2a

FMPC 10 p.243

2a) $x - y = 4$

$x + y = -6$

- simply ADD these equations because we can see y will cancel out

$$\begin{array}{r} x - y = 4 \\ \underline{x + y = -6} \\ 2x = -2 \end{array} \longrightarrow \boxed{x = -1}$$

substitute this into the first equation and solve for y.

$-1 - y = 4 \longrightarrow -y = 4 + 1 \longrightarrow -y = 5 \longrightarrow \boxed{y = -5}$

Check $(-1, -5)$ with the second equation

$-1 + (-5) = -6 \longrightarrow -6 = -6$ <u>TRUE</u>

$\therefore$ the solution is $(-1, -5)$

FMPC 10
6.3, page 248
#1a

FMPC 10 6.3 p.248

1a) $y = -x + 2$ ①

$2x - y = 4$ ②

- In this system we see that y is already defined in equation ①
  that is, $y = -x+2$
- we can use this definition of y and substitute it into equation ②
  $$2x - y = 4$$
- we write equation ② as $2x - (-x+2) = 4$
- We solve this equation for x and get
  $$2x + x - 2 = 4$$
  $$3x - 2 = 4$$
  $$3x = 4 + 2 \longrightarrow 3x = 6 \longrightarrow \boxed{x = 2}$$
- Substitute $x=2$ into <u>either</u> equation and solve for y
  Using equation ① $y = -(2) + 2 \longrightarrow \boxed{y = 0}$

CHECK $(2,0)$ with equation ②

$$2(2) - 0 = 4$$
$$4 = 4 \quad \text{TRUE}$$

$\therefore$ $(2,0)$ is the solution to this system

FMPC 10

6.2, page 250

#2a

FMPC 10 6.3 p. 250

2a) $y = 3x + 2 \longleftarrow$ slope, $m = 3$

$y = kx + 2 \longleftarrow$ slope, $m = k$

In order for this system to have one solution, the lines MUST have different slopes. Therefore $k \neq 3$

FMPC 10
6.4, page 254
#2

FMPC 10 6.4 p.254

2. Let's call the numbers x and y.

$x+y=6$ ⟵ FROM THE FIRST SENTENCE

$x-y=10$ ⟵ FROM THE SECOND SENTENCE

$2x = 16$ ADDITION METHOD

$x=8$ substitute x into first equation → $8+y=6$

$y=6-8$

$y=-2$

CHECK to see if results are valid in second equation

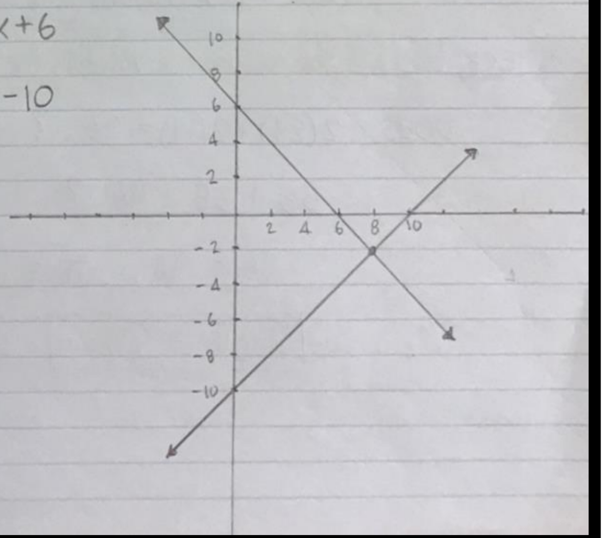
DOES $8-(-2)=10$ ... YES!

$\therefore$ the two numbers are $\boxed{x=8}$ and $\boxed{y=-2}$

* IF WE HAD SOLVE THIS QUESTION BY GRAPHING THE TWO EQUATIONS, IT WOULD LOOK LIKE THIS...

$x+y=6 \longrightarrow y=-x+6$

$x-y=10 \longrightarrow y=x-10$

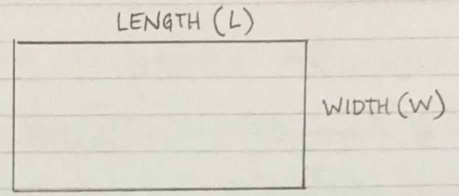


The two lines intersect at $(8,-2)$

FMPC 10
6.4, page 254
#3

FMPC 10 6.4 p. 254

3. Draw a rectangle



The first sentence tells us PERIMETER = 96 $\therefore$ $2L + 2W = 96$

second sentence tells us $L = W + 10$

USE THE SUBSTITUTION METHOD

substitute the second equation into the first equation for L

$$2(W+10) + 2W = 96$$

$$2W + 20 + 2W = 96$$

$$4W + 20 = 96$$

$$4W = 96 - 20$$

$$4W = 76 \longrightarrow W = 19 \text{ cm}$$

"PLUG" THIS VALUE INTO THE SECOND EQUATION $L = 19 + 10 = 29$ cm

CHECK to see if the results are valid in the first equation

DOES $2(29) + 2(19) = 96$?

$58 + 38 = 96$?

$96 = 96$ TRUE

$\therefore$ The $\boxed{\text{length} = 29 \text{ cm}}$ and the $\boxed{\text{width} = 19 \text{ cm}}$

FMPC 10
6.4, page 254
#6

FMPC 10 6.4 p. 254

6. Let E represent Ellie's age and K represent Kate's age.

The first sentence tells us $\longrightarrow$ $E = 2K$ ①

The second sentence tells us $\longrightarrow$ $(K+7)+(E+7)=20$

$K+E+14=20$

$K+E=20-14$

$K+E=6$ ②

Substitute ① into ② for E $\longrightarrow$ $K+2K=6$

$3K=6$

$\boxed{K=2}$

"PLUG" K=2 INTO THE FIRST EQUATION $\boxed{E=2(2)=4}$

CHECK using equation ②

DOES $K+E=6$?

$2+4=6$? TRUE

$\therefore$ Ellie is 4 years old and Kate is 2 years old.

FMPC 10
6.4, page 254
#7

FMPC 10 6.4 p. 254

7. The question tells us

TOTAL COST = THE AMOUNT CHARGED FOR RENTING A TRUCK + y DOLLARS per KILOMETER

OR// $C = x + y \times (\text{kilometers travelled})$

if the rental charge is

\$90 for 100 km then $x + 100y = \$90$ ①

\$110 for 150 km then $x + 150y = \$110$ ②

multiply eqn. ① by -1 and use the ADDITION method to solve this system

$$
\begin{array}{r}
-x - 100y = -\$90 \quad ①\times -1 \\
x + 150y = \$110 \quad ② \\
\hline
50y = \$20
\end{array}
$$

$$y = \frac{\$20}{50\text{ km}} = \$0.4/\text{km}$$

"PLUG" this value into ①

$x + 100(0.4) = 90$
$x + 40 = 90$
$x = \$50$

CHECK using eqn ②

DOES $50 + 150(0.4) = 110$?
$50 + 60 = 110$ TRUE ✓

∴ $\boxed{x = \$50 \text{ and } y = \$0.40/\text{km}}$

FMPC 10
6.4, page 255
#9

FMPC 10 6.4 p. 255

9. Let's call the numbers x and y

The first sentence says $5x + 3y = 8$ ①

The second sentence says $3x + 5y = 24$ ②

Multiply equation ① by -5 and equation ② by 3 and then ADD the equations

$-5\times$ ① $-25x - 15y = -40$

$3\times$ ② $9x + 15y = 72$

$-16x = 32 \longrightarrow x = -2$

"PLUG" this value into ① $5(-2) + 3y = 8$

$-10 + 3y = 8$

$3y = 8 + 10$

$3y = 18 \longrightarrow y = 6$

CHECK using eqn. ②

DOES $3(-2) + 5(6) = 24$?

$-6 + 30 = 24$ TRUE

$\therefore$ $\boxed{\text{the numbers are } -2 \text{ and } 6}$

FMPC 10
6.4, page 255
#10

FMPC 10 6.4 p.255

10. Let the number of dimes be d.

Let the number of quarters be q.

The first sentence tells us $d + q = 80$ ①

The second sentence tells us $0.1d + 0.25q = 15.20$ ②

because each dime is worth \$0.10

because each quarter is worth \$0.25

Rewrite eqn. ① as $d = 80 - q$

Substitute for d into eqn. ②

$$\therefore \quad 0.1(80-q) + 0.25q = 15.20$$

$$8 - 0.1q + 0.25q = 15.20$$

$$8 + 0.15q = 15.20$$

$$0.15q = 15.20 - 8$$

$$0.15q = 7.20 \longrightarrow q = 48$$

"PLUG" this value into ① $\longrightarrow d = 80 - 48 \longrightarrow d = 32$

CHECK using eqn ②

DOES $0.1(32) + 0.25(48) = 15.20$?

$3.2 + 12 = 15.20$ TRUE

$\therefore$ Jerry has 32 dimes and 48 quarters

FMPC 10
6.4, page 255
#12

FMPC 10 6.4 p. 255

12. Let's call the amount of the first bottle A
and the amount of the second bottle B

combining portions of both $\longrightarrow$ $8A + 15B = 12.2 \times 100$

the total volume is 100 ml $\therefore$ $A + B = 100$

Let's rewrite the first eqn. as $8A + 15B = 1220$ ①
second eqn. as $B = 100 - A$ ②

Substitute ② into ① for B

$$8A + 15(100 - A) = 1220$$
$$8A + 1500 - 15A = 1220$$
$$1500 - 7A = 1220$$
$$-7A = 1220 - 1500$$
$$-7A = -280$$
$$\boxed{A = 40\text{ L}}$$

"PLUG" $A = 40$ into ② $\therefore$ $B = 100 - 40 = \boxed{60\text{ L}}$

CHECK using eqn. ①

DOES $8(40) + 15(60) = 1220$?

$320 + 900 = 1220$ TRUE

$\therefore$ You would need 40 L of 8% wine and 60 L of 15% wine to have 100 L of 12.2% wine.

FMPC 10
6.4, page 256
#15

FMPC 10, 6.4 p.256

15. We need to use the equation DISTANCE = RATE × TIME
Use example #2 (p.252) to help set this up.

We will use x as the speed of the plane
and y as the windspeed

	SPEED (km/h)	TIME (h)	DISTANCE (km)
with wind	$x+y$	7	2835
against wind	$x-y$	7	1827

USING D=RT we get
$$(x+y)(7) = 2835$$
$$(x-y)(7) = 1827$$

$\therefore$
$$7x+7y = 2835 \quad ①$$

USING ADDITION METHOD
$$7x-7y = 1827 \quad ②$$
$$14x = 4662 \longrightarrow x = 333 \text{ km/h}$$

"PLUG" this into ① $\longrightarrow$
$$7(333)+7y = 2835$$
$$2331 + 7y = 2835$$
$$7y = 2835-2331$$
$$7y = 504 \longrightarrow y = 72 \text{ km/h}$$

CHECK using eqn. ②

DOES
$$7(333) - 7(72) = 1827 \ ?$$
$$2331 - 504 = 1827$$
$$1827 = 1827 \quad \text{TRUE}$$

$\therefore$ The speed of the plane is 333 km/h and wind speed is 72 km/h

FMPC 10
6.4, page 256
#17

FMPC 10 6.4, p.256

17.

	SPEED (km/h)	TIME (h)	DISTANCE (km)
CAR	X+16	t	480
TRUCK	X	t	400

- let the speed of the truck be x
  the speed of the car be $x+16$ (from the second sentence)
- The first sentence tells us both vehicles travel for the same amount of time

Since $d = rt$

this means that $(x+16)t = 480$

and $xt = 400$ ①

$\therefore$ $xt + 16t = 480$ ②

multiply eqn. ① by -1 and ADD both equations

$$-xt = -400$$
$$\underline{xt + 16t = 480}$$
$$16t = 80 \longrightarrow t = 5 \text{ hrs.}$$

"PLUG" this into eqn. ① $\longrightarrow$ $x(5\text{ hrs}) = 400\text{km} \longrightarrow \boxed{x = 80\frac{\text{km}}{\text{h}}}$

CHECK using eqn ②

DOES $(80)(5) + 16(5) = 480$?
$400 + 80 = 480$ TRUE

$\therefore$ the speed of the truck is 80 km/h

FMPC 10

6.5, page 261

#2a

FMPC 10 6.5 p. 261

2a) To find the first term, let $n=1$ $\therefore 1^2-2 = 1-2 = -1$

second term, let $n=2$ $\therefore 2^2-2 = 4-2 = 2$

third term, let $n=3$ $\therefore 3^2-2 = 9-2 = 7$

fourth term, let $n=4$ $\therefore 4^2-2 = 16-2 = 14$

we see the first four terms of the sequence

$\{n^2-2\}$ are $\boxed{-1, 2, 7, 14}$

FMPC 10

6.5, page 261

#3a

3a) Since the denominator of each fraction is increasing by 1 incrementally, I suspect the n^{th} term is $1/n$

just as the second term is $1/2$ and the third term $1/3$ ...

FMPC 10
6.5, page 261
#4a

4. $a = 4$, $t_n = 2 + t_{n-1}$

this statement is telling us that the value of ANY term in the sequence is determined by adding 2 to the previous term.

In this case, the first term is 4. This means the next term is $4+2=6$ and the following term is $6+2=8$ which makes the last term $= 8+2=10$

so, 4, 6, 8, 10 are the first 4 terms.

FMPC 10

6.5, page 261

#4c

FMPC 10 6.5, p. 261

4c) $a = 2$ this is the first term

$a_2 = 3$ this is the second term

if $a_n = a_{n-1} + a_{n-2}$ then $a_3 = a_{3-1} + a_{3-2}$

$a_3 = a_2 + a_1 = 3 + 2 = 5$

and $a_4 = a_{4-1} + a_{4-2}$

$a_4 = a_3 + a_2 = 5 + 3 = 8$

the first 4 terms of the recursive sequence are

2, 3, 5, 8

FMPC 10

6.5, page 262

#5a-f

FMPC 10 6.5 p.262

5 a) $\sum_{k=1}^{5} 4 = 4+4+4+4+4 = \boxed{20}$

b) $\sum_{k=1}^{4} (k^2-2) = (1^2-2)+(2^2-2)+(3^2-2)+(4^2-2)$

$= (1-2)+(4-2)+(9-2)+(16-2)$

$= (-1)+2+7+14 = \boxed{22}$

c) $\sum_{k=2}^{5} (k^2-1) = (2^2-1)+(3^2-1)+(4^2-1)+(5^2-1)$

$= (4-1)+(9-1)+(16-1)+(25-1)$

$= 3+8+15+24 = \boxed{50}$

d) $\sum_{k=0}^{3} (k^3-1) = (0^3-1)+(1^3-1)+(2^3-1)+(3^3-1)$

$= (0-1)+(1-1)+(8-1)+(27-1)$

$= (-1)+0+7+26 = \boxed{32}$

e) $\sum_{k=1}^{4} \frac{k^2}{2} = \left(\frac{1^2}{2}\right)+\left(\frac{2^2}{2}\right)+\left(\frac{3^2}{2}\right)+\left(\frac{4^2}{2}\right)$

$= \frac{1}{2}+\frac{4}{2}+\frac{9}{2}+\frac{16}{2} = \frac{30}{2} = \boxed{15}$

f) $\sum_{k=6}^{8} (k+1)^2 = (6+1)^2+(7+1)^2+(8+1)^2$

$= 7^2+8^2+9^2$

$= 49+64+81 = \boxed{194}$

FMPC 10
6.5, page 262
#8b

FMPC 10 6.5, p.262

8b) If $a = 2/3$ and $d = -1/4$ then for t_9, $n = 9$

$\therefore\ t_9 = 2/3 + (9-1)(-1/4)$

$= 2/3 + (8)(-1/4)$

$= 2/3 - 8/4$

$= 2/3 - 2$ but $2 = 6/3$

$t_9 = 2/3 - 6/3 = \boxed{-4/3}$

FMPC 10

6.5, page 263

#10a

10a) $t_6 = 10$ and $t_{18} = 46$

$18 - 6 = 12$ differences between the 6^{th} and 18^{th} terms

$\therefore \quad 10 + 12d = 46$

$12d = 46 - 10$

$12d = 36$

$d = 3$

The number of differences between the first term and the sixth term is $6 - 1 = 5$ differences

$\therefore \quad a + 5d = 10$ but $d = 3$

$a + 5(3) = 10$

$a = 10 - 15$

$a = -5$

FMPC 10
6.5, page 263
#11a

11a $\underbrace{x+3,\ 2x+1}_{d},\ \underbrace{,\ 5x+2}_{d}$

$x+3+d=2x+1$ **and** $2x+1+d=5x+2$

$d=2x-x-3+1$ $\qquad$ $d=5x+2-2x-1$

$\underline{d=x-2}$ $\qquad$ $\underline{d=3x+1}$

$\therefore\ x-2=3x+1$ because both $=d$

$-2-1=3x-x$

$-3=2x$

$\boxed{-\frac{3}{2}=x}$

FMPC 10
6.5, page 263
#11e

FMPC 10 6.5, page 263

11 e) If $x+4$, x^2+5, and $x+30$ are consecutive terms of an Arithmetic Sequence

Then $x^2+5-(x+4) = x+30-(x^2+5)$ because the common difference between each consecutive term is equal

$$\therefore \quad x^2+5-x-4 = x+30-x^2-5$$

$$x^2-x+1 = -x^2+x+25$$

let's move everything to the left side

$$x^2-x+1+x^2-x-25=0$$

$$2x^2-2x-24=0 \qquad \text{factor out 2}$$

$$2(x^2-x-12)=0 \qquad \text{if } 2A=0 \text{ then } A=0$$

$$\therefore \quad x^2-x-12=0$$

$$(x-4)(x+3)=0$$

$$x-4=0 \quad \text{OR} \quad x+3=0$$

$$\therefore \quad \boxed{x=4} \quad \text{OR} \quad \boxed{x=-3}$$

FMPC 10
6.6, page 268
#1a,c,i

FMPC 10 6.6, p.268

1a) Use $S_n = \frac{n}{2}(a+l)$ where $a=3$, $l=2n+1$ and $n=n$

$\therefore S_n = \frac{n}{2}(3+(2n+1)) = \frac{n}{2}(3+2n+1) = \frac{n}{2}(2n+4)$

$= \frac{2n^2+4n}{2}$

$= \boxed{n^2+2n}$

c) ① We know $a=2$ and $l=77$ but we don't know how many terms are in the series. We need to find n using

$t_n = a+(n-1)d$ where $t_n = 77$, $a=2$, and $d=3$

$\therefore 77 = 2+(n-1)3 \longrightarrow 77 = 2+3n-3$

$77 = 3n-1 \longrightarrow 78 = 3n \longrightarrow n = 26$

$\therefore$ ② $S_{26} = \frac{26}{2}(2+77) = 13(79) = \boxed{1027}$

i) ① $a = \frac{1}{2}$, $l = \frac{55}{8}$ Find the number of terms in the series using $t_n = a+(n-1)d$ where $t_n = \frac{55}{8}$, $a = \frac{1}{2}$

$d = \frac{7}{8} - \frac{1}{2} = \frac{7}{8} - \frac{4}{8} = \frac{3}{8}$

$\frac{55}{8} = \frac{1}{2} + (n-1)\frac{3}{8} \longrightarrow \frac{55}{8} = \frac{1}{2} + \frac{3}{8}n - \frac{3}{8}$

$\frac{55}{8} = \frac{4}{8} + \frac{3n}{8} - \frac{3}{8} \longrightarrow 55 = 4+3n-3$

$55 = 1+3n \longrightarrow 54 = 3n \longrightarrow n = 18$

② $S_{18} = \frac{18}{2}\left(\frac{1}{2} + \frac{55}{8}\right) \longrightarrow S_{18} = 9\left(\frac{4}{8} + \frac{55}{8}\right) = 9\left(\frac{59}{8}\right) = \boxed{\frac{531}{8}}$

FMPC 10
6.6, page 269
#2a,c,i

FMPC 10 6.6, p.269

2a) $S_{20} = \frac{20}{2}(8+65) = 10(73) = \boxed{730}$

c) ① Determine the value of the first term, a, using

$t_n = a + (n-1)d$ where $t_{56} = 13$, $n = 56$ and $d = -9$

$\therefore 13 = a + (56-1)(-9) \longrightarrow 13 = a + (55)(-9)$

$13 = a - 495 \longrightarrow 495 + 13 = a \longrightarrow \underline{a = 508}$

② Using $S_n = \frac{n}{2}(a + l)$

$S_{56} = \frac{56}{2}(508 + 13) = 28(521) = \boxed{14588}$

i) ① Find d first. There are 15-5 = 10 differences between a_5 and a_{15}

$\therefore a_5 + 10d = a_{15}$

$42 + 10d = -18 \longrightarrow 10d = -18 - 42 \longrightarrow 10d = -60 \longrightarrow \underline{d = -6}$

② Find a using $t_n = a + (n-1)d$ where $t_5 = 42$, $d = -6$ and $n = 5$

$\therefore 42 = a + (5-1)(-6) \longrightarrow 42 = a + (4)(-6) \longrightarrow 42 = a - 24$

$42 + 24 = a \longrightarrow \underline{a = 66}$

③ Find S_{40} using $S_n = \frac{n}{2}(2a + (n-1)d)$ where $n = 40$, $a = 66$, $d = -6$

$$\begin{aligned} \therefore S_{40} = \frac{40}{2}(2(66) + (40-1)(-6)) &= 20(132 + (39)(-6)) \\ &= 20(132 - 234) \\ &= 20(-102) \\ &= \boxed{-2040} \end{aligned}$$

FMPC 10
6.6, page 270
#3a,d & 4a,b,c

FMPC 10 6.6 p.270

3a) $\sum_{n=1}^{100} n$ The number of terms in this series is $100-1+1=100$

$a=1$ and $l=100$

$S_{100}=\frac{100}{2}(1+100)=50(101)=\boxed{5050}$

d) $\sum_{x=7}^{24}(2x+5)$ The number of terms is $24-7+1=17+1=18$

$a=2(7)+5=14+5=19$

$l=2(24)+5=48+5=53$

$S_{18}=\frac{18}{2}(19+53)=9(72)=\boxed{648}$

4a) List the sequence like this $5, \_\_, \_\_, 10$

d d d

we can see $5+3d=10 \longrightarrow 3d=10-5 \longrightarrow 3d=5 \longrightarrow d=\frac{5}{3}$

or $d=1\frac{2}{3}$ $\therefore$ the sequence is $5,\ 5+1\frac{2}{3},\ 5+1\frac{2}{3}+1\frac{2}{3},\ 10$

$\boxed{5,\ 6\frac{2}{3},\ 8\frac{1}{3},\ 10}$

$\frac{20}{3}, \frac{25}{3}$

b) $3, \_\_, \_\_, \_\_, 6 \longrightarrow 3+4d=6 \longrightarrow 4d=3 \longrightarrow d=\frac{3}{4}$

d d d d

$3+\frac{3}{4}=\boxed{\frac{15}{4}}$, $\frac{15}{4}+\frac{3}{4}=\frac{18}{4}=\boxed{\frac{9}{2}}$, $\frac{18}{4}+\frac{3}{4}=\boxed{\frac{21}{4}}$

c) $a, \_\_, \_\_, b \longrightarrow a+3d=b \longrightarrow 3d=b-a \longrightarrow d=\frac{b-a}{3}$

d d d

$a+\frac{b-a}{3}=\frac{3a}{3}+\frac{b-a}{3}=\frac{3a+b-a}{3}=\boxed{\frac{2a+b}{3}}$

$\frac{2a+b}{3}+\frac{b-a}{3}=\frac{2a+b+b-a}{3}=\boxed{\frac{a+2b}{3}}$

FMPC 10
6.6, page 270
#5a

FMPC 10 6.6 p. 270

5a) $\sum_{x=2}^{b} (23-2x) = 91$ The number of terms in this series is $b-2+1 = b-1$

list a few terms of this series to see what it looks like

$a = 23-2(2) = 23-4 = 19 \leftarrow$ THE FIRST TERM

$a_2 = 23-2(3) = 23-6 = 17$

$a_3 = 23-2(4) = 23-8 = 15$

The series looks like this $\underset{a_1}{19} + \underset{a_2}{17} + \underset{a_3}{15} + \ldots + \underset{a_b}{(23-2b)} = 91$

THE LAST TERM

Use $S_n = \frac{n}{2}(a+\ell)$ where $a=19$, $\ell = 23-2b$, $n = b-1$ and $S_{b-1} = 91$

$\therefore \quad 91 = \frac{b-1}{2}(19+23-2b)$

$91 = \frac{b-1}{2}(42-2b)$

$2 \times 91 = (b-1)(42-2b)$

$182 = 42b - 2b^2 - 42 + 2b$

$182 = -2b^2 + 44b - 42$

$0 = -2b^2 + 44b - 42 - 182$

$0 = -2b^2 + 44b - 224$

$0 = -2(b^2 - 22b + 112)$

$\therefore \quad 0 = b^2 - 22b + 112$

PRODUCT +112	SUM −22
−2 −56	−58
−4 −28	−32
−8 −14	−22 ✓

$0 = (b-8)(b-14)$

$\therefore \boxed{b=8}$ or $\boxed{b=14}$

FMPC 10
6.6, page 271
#8

FMPC 10 6.6, p. 271

8. $a = 1491$, $d = -7$, $S_n = 0$, $n = n$

Use the formula $S_n = \frac{n}{2}\left(2a + (n-1)d\right)$

$\therefore\ 0 = \frac{n}{2}\left(2(1491) + (n-1)(-7)\right)$

$0 = \frac{n}{2}(2982 - 7n + 7)$

$0 = \frac{n}{2}(2989 - 7n)$

$0 = \frac{2989n}{2} - \frac{7n^2}{2}$ mult. each term by 2

$0 = 2989n - 7n^2$ divide both terms by 7

$0 = 427n - n^2$ factor out n

$0 = n(427 - n)$

$\therefore\ n = 0$ or $\boxed{n = 427}$

FMPC 10
6.6, page 271
#9, 10, 12

FMPC 10 6.6, p.271

9. $a=8,\ d=4,\ n=50$

Use $t_n = a+(n-1)d \quad \therefore t_{50} = 8+(50-1)4$

$= 8+(49)(4)$

$= \boxed{204 \text{ seats}}$

10. $a=1000,\ d=100,\ n=19$ use $S_n = \frac{n}{2}(2a+(n-1)d)$

$S_{18} = \frac{19}{2}(2(1000)+(19-1)(100))$

$= \frac{19}{2}(2000+(18)(100)) = \frac{19}{2}(2000+1800) = \frac{19}{2}(3800) = \boxed{\$36100}$

* on the child's 18^{th} birthday, the child has received 19 deposits.

12. Let's call the terms x, $x+d$, and $x+2d$

We are told $x+(x+d)+(x+2d)=3 \longrightarrow 3x+3d=3 \rightarrow \boxed{x+d=1}$

and $x^2+(x+d)^2+(x+2d)^2=75$ $\boxed{x=1-d}$

$\therefore x^2+(x+d)(x+d)+(x+2d)(x+2d)=75$

$x^2+x^2+2xd+d^2+x^2+4xd+4d^2=75$

$3x^2+6xd+5d^2=75$ sub $x=1-d$

$3(1-d)^2+6(1-d)d+5d^2=75$

$3(1-d)(1-d)+6d-6d^2+5d^2=75$

$3(1-2d+d^2)+6d-d^2=75$

$3-6d+3d^2+6d-d^2=75$

$2d^2+3=75$

$2d^2=72$

$d^2=36$

$d=+6$ or $d=-6$

$\therefore x=1-6$ or $x=1-(-6)$

$=-5$ $\quad = 7$

The terms are

$\boxed{-5, 1, 7}$ or $\boxed{7, 1, -5}$