M10 - 6/7.0 - Q1abcd Arithmetic Review

1a) 4, ___, -2, ___, ___

$4+2d=-2$

$-4 \quad -4$

$\frac{2d}{2}=\frac{-6}{2}$

$d=-3$

$t+\#d=t$

4, 1, -2, -5, -8

1b) 5, 10, 15, 20, 25 (+5)

$5+3d=20$

$-5 \quad -5$

$\frac{3d}{3}=\frac{15}{3}$

$d=5$

5, 10, 15, 20, 25

1c) 13, ___, ___, ___, 81

$13+4d=81$

$-13 \qquad -13$

$\frac{4d}{4}=\frac{68}{4}$

$d=17$

13, 30, 47, 64, 81

1d) $x+1, 3x-1, 5x-3, 7x-5, 9x-7$

$d = 3x-1-(x+1)$ $\quad d = 5x-3-(3x-1)$

$d = 2x-2$ $\quad d = 2x-2$

$5x-3+2x-2$ $\quad 7x-5+2x-2$

$7x-5$ $\quad 9x-7$

1e) $2x+2, \_\_\_, 7x-5, 5x+5$

2a) $t_2 = 8 \quad t_4 = -32$

$8 + 2d = -32$ $\quad 4 - 2 = 2$

$-8 \qquad -8$

$\frac{2d}{2} = \frac{-40}{2}$

$d = -20$

$28, 8, -12, -32$

$t + \#d = t$

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

$8 = a + (2-1)(d)$

$8 = a + d$

$-a \quad -a$

$d = 8 - a$

$d = 8 - 28$

$d = -20$

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

$-32 = a + (4-1)d$

$-32 = a + 3d$

$-32 = a + 3(8 - a)$

$-32 = a + 24 - 3a$

$-24 \qquad -24$

$\frac{-56}{-2} = \frac{-2a}{-2}$

$a = 28$

2b) $t_3 = 3 \quad t_{12} = -1527$

$3 + 9d = -1527$

$-3 \qquad -3$

$\frac{9d}{9} = \frac{-1530}{9}$

$d = 170$

$12 - 3 = 9$

$-170 \quad -170$

$-337, -167, 3$

$t_1 \quad t_2 \quad t_3$

$t_1 = -337$

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

$3 = a + (3-1)(170)$

$3 = a + 340$

$-340 \qquad -340$

$a = -337$

$t + \# d = t$

3) 3, 5, 7...

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

$t_n = 3 + (n-1)2$

$t_n = 3 + 2n - 2$

$t_n = 2n + 1$

$d = 7 - 5 = 2$

$d = 5 - 3 = 7$

b) $t_{10} = 2(10) + 1$

$t_{10} = 21$

3, 5, 7, 9, 11, 13, 15, 17, 19, 21

23, 25, 27, 29, 31

c) $t_n = 2n + 1$

$31 = 2n + 1$

$-1 \quad -1$

$\frac{30}{2} = \frac{2n}{2}$

$n = 15$

3d) $a = t_1$

3, 5, 7, 9, 11, 13, 15, 17, 19, 21
23, 25, 27, 29, 31

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

$S_{12} = \frac{12}{2}(3 + t_{12})$

$S_{12} = \frac{12}{2}(3 + 25)$

$S_{12} = 168$

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

$t_{12} = 3 + (12-1)(2)$

$t_{12} = 25$

$S_n = \frac{n}{2}(2t_1 + (n-1)d)$

$S_{12} = \frac{12}{2}(2(3) + (12-1)2)$

$S_{12} = 6(6 + 22)$

$S_{12} = 168$

$3+5+7+9+11+13+15+17+19+21+23+25 = 168$

e) $S_n = 24$

$S_n = \frac{n}{2}(2t_1 + (n-1)d)$

$2 \times 24 = n(2(3) + (n-1)2)$

$48 = n(6 + 2n - 2)$

$48 = n(4 + 2n)$

$48 = 4n + 2n^2$

$0 = 2n^2 + 4n - 48$

$\frac{0 = 2n^2 + 4n - 48}{2}$

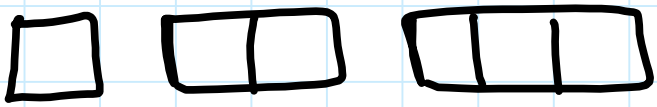
$0 = n^2 + 2n - 24$

$0 = (n-4)(n+6)$

$n - 4 = 0 \quad n + 6 = 0$

$n = 4 \quad n = -6$

$3 + 5 + 7 + 9 = 24$ ✓

4) 

$a = t_1$

4, 7, 10

$d = 10 - 7 = 3$

$d = 7 - 4 = 3$

$t_n = t_1 + (n-1)d$

$t_n = 4 + (n-1)(3)$

$t_n = 4 + 3n - 3$

a) $t_n = 3n + 1$

x	y
1	4
2	7
3	10

$y = 3x + 1$

b) $t_5 = 3(5) + 1$

$t_5 = 16$

4, 7, 10, 13, 16 ✓

c) $t_n = 3n + 1$

$t_{10} = 3(10) + 1$

$t_{10} = 31$

5) $x+2, 2x+1, 4x-3$

$d = 2x+1-(x+2)$ $\quad d = 4x-3-(2x+1)$

$d = x-1$ $\quad d = 2x-4$

$x-1 = 2x-4$

$-x \quad -x$

$-1 = x-4$

$+4 \quad +4$

$x = 3$

$5, 7, 9$ ✓

6) $2, 6, 10, \underline{14}, \underline{18}, \underline{22}$ $\quad d = 6-2 = 4$

$S_n = \frac{n}{2}(2t_1 + (n-1)d)$

$S_6 = \frac{6}{2}(2(2) + (6-1)4)$

$S_6 = 3(4+20)$

$S_6 = 72$ ✓ $\quad 2+6+10+14+18+22 = 72$

7a) $13, 15, 17, 19 \ldots 273$
$t_1 \quad t_2 \quad t_3 \quad t_4 \quad t_n$

$t_n = t_1 + (n-1)d \qquad d = 15 - 13 = 2$

$273 = 13 + (n-1)(2)$

$-13 \quad -13$

$260 = 2n - 2$

$+2 \quad +2$

$\frac{2n}{2} = \frac{262}{2}$

$n = 131$ 273 IS THE 131st TERM.

b) $8, -6, -20 \ldots -160 \qquad d = -6 - 8 = -14$

$t_n = t_1 + (n-1)d$

$-160 = 8 + (n-1)(-14)$

$-160 = 8 - 14n + 14$

$-160 = 22 - 14n$

$-22 \quad -22$

$\frac{-182}{-14} = \frac{-14n}{-14}$

$n = 13$

8) 10,000, 36000, 39,000, 42000
t_1 t_2 t_3

$t_n = t_1 + (n-1)d$ $\quad d = 3000$

$t_{10} = 36000 + (10-1)(3000)$

$t_{10} = 36000 + 27000$

$t_{10} = 63000$

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

$S_{10} = \frac{10}{2}(36000 + 63000)$

$S_{10} = 495000 + 10000 = \$505000$

9) $S_n = 72, d = 4, t_1 = 2 \quad n = ?$

$$S_n = \frac{n}{2}(2t_1 + (n-1)d)$$

$$2 \times 72 = \frac{n}{2}(2(2) + (n-1)4) \times 2$$

$$144 = n(4 + 4n - 4)$$

$$144 = 4n^2$$

$$\frac{144}{4} = \frac{4n^2}{4}$$

$$\sqrt{n^2} = \sqrt{36}$$

$$n = \pm 6$$

$n = 6$ $\checkmark$ $2 + 6 + 10 + 14 + 18 + 22 = 72$

10) $S_2 = 9$ $S_3 = 21$ 2, 7, 12, 17, 22

$t_1 + t_2 = 9$ $(t_1 + t_2) + t_3 = 21$

$9 + t_3 = 21$

$-9 \quad -9$

$t_3 = 12$

~~1, 8, 12~~

2, 7, 12

3, 6, 12

$d = 5$

11) $t_2 + t_3 = 20$

$t_1 + d + t_1 + 2d = 20$

$2t_1 + 3d = 20$

$2t_1 + 3(12 - 2t_1) = 20$

$2t_1 + 36 - 6t_1 = 20$

$-36 \quad -36$

$\frac{-4t_1}{-4} = \frac{-16}{-4}$

$\boxed{t_1 = 4}$

$S_2 = 12$

$t_1 + t_2 = 12$

$t_1 + t_1 + d = 12$

$2t_1 + d = 12$

$-2t_1 \quad -2t_1$

$d = 12 - 2t_1$

$d = 12 - 2(4)$

$\boxed{d = 4}$

4, 8, 12 ✓

12a) $\sum_{k=1}^{5} 3k =$

$5-1+1=5$

$\underset{k=1}{3} \quad \underset{k=2}{6} \quad \underset{k=3}{9} \quad \underset{k=4}{12} \quad \underset{k=5}{15}$

$3k$

$3(1)$

3

$S_5 = \frac{n}{2}(t_1 + t_n)$

$t_n = 3k$

$t_5 = 3(5) = 15$

$S_5 = \frac{5}{2}(3+15)$

$S_5 = 45$

$3+6+9+12+15=45$

(12b) $\sum_{k=2}^{5} 2k-1$

$5-2+1=4$

$S_4 = \frac{n}{2}(2t_1+(n-1)d)$

$S_4 = \frac{4}{2}(2(1)+(4-1)2)$

$S_4 = 2(2+6)$

$S_4 = 16$

$t_1 = 2(1)-1$

$t_1 = 1$

$t_2 = 2(2)-1$

$t_2 = 3$

$d = 3-1 = 2$