Name: KEY TA:_____

Math 11 Pre-Calculus LG 1 Ver A /20

1. Write the first 4 terms of the arithmetic sequence where $t_1 = 4$ and $d = -3$. *(2 marks)*

$t_1 = 4$

$t_2 = t_1 + d = 4 + (-3) = 1$

$t_3 = t_2 + d = 1 + (-3) = -2$

$t_4 = t_3 + d = -2 + (-3) = -5$

$\boxed{4, 1, -2, -5}$

2. If $t_n = 3n - 1$, determine t_8. *(1 mark)* → $n = 8$

$t_n = 3n - 1$

$t_8 = 3(8) - 1$

$= 24 - 1$

$= \boxed{23}$

3. If t_1 is 8 and t_7 is 80, determine t_2 and t_4. *(2 marks)*

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

$t_7 = 8 + (7-1)(d) = 80$

$8 + 6d = 80$

$-8 \qquad -8$

$6d = 72$

$d = \frac{72}{6} = 12$

$t_2 = t_1 + d$

$= 8 + 12 = 20$

$t_4 = t_2 + 2d$

$= 20 + 2(12)$

$= 20 + 24$

$= 44$

/5

$\boxed{t_2 = 20}$

$\boxed{t_4 = 44}$

4. Determine the first term of an arithmetic sequence if the 16th term is 112 and the difference is 6. *(2 marks)*

$t_1 = ?$

$t_{16} = 112$

$d = 6$

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

$t_{16} = t_1 + (16-1)(6) = 112$

$t_{16} = t_1 + (15)(6) = 112$

$= t_1 + 90 = 112$

$t_1 = 112 - 90$

$= \boxed{22}$

5. Determine the sum of the arithmetic series: 7 + 1 + (-5) + (-11) + ... + (-125). *(3 marks)*

$t_1 = 7$

$d = -6$

$t_n = -125$

$S_n = \frac{23}{2}(7 + (-125))$

$S_n = 11.5(-118)$

$\boxed{S_n = -1357}$

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

$-125 = 7 + (n-1)(-6)$

$-125 = 7 - 6n + 6$

$-125 = 13 - 6n$

$-138 = -6n$

$n = 23$

6. Find the sum of the first 16 terms of the following series: 15 + 13 + 11 + ... *(2 marks)*

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

$= 15 + (16-1)(-2)$

$= 15 + (15)(-2)$

$= 15 + -30 = -15$

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

$= \frac{16}{2}(15 + -15)$

$= 8(0)$

$\boxed{= 0}$

/7

7. Alan decided to join a fitness program that incorporated push-ups that followed an arithmetic sequence. He did 32 push-ups on the 4th day and 65 push-ups on the 15th day.

a) Write a general term that relates the number of push-ups to the number of days. *(2 marks)*

$t_4 = 32$
$t_{15} = 65$

$4 \to 15 = 11$ days

$65 - 32 = 33$ push-ups over 11 days $\to d = 3$

$t_1 = t_4 - 3d$
$= 32 - 3(3)$
$= 23$

$t_n = t_1 + (n-1)(d)$
$= 23 + (n-1)(3)$
$= 23 + 3n - 3 = \boxed{3n + 20}$

b) On what day will he have performed at least 100 push-ups? *(1 mark)*

$100 = 3n + 20$
$-20 \quad -20$

$80 = 3n$

$n = 26.\overline{6} \Rightarrow$ At least 100 push-ups on the 27^{th} day.

8. The 12th term of an arithmetic sequence is 71 and the sum of the first 12 terms is 456. Determine the first 4 terms of the series. *(2 marks)*

$t_{12} = 71$
$S_{12} = 456$ $\Rightarrow S_n = \frac{n}{2}(t_1 + t_n)$

$= \frac{12}{2}(t_1 + 71) = 456$

$= \frac{6}{6}(t_1 + 71) = \frac{456}{6}$

$t_1 + 71 = 76$

$t_1 = 5$

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

$71 = 5 + (12-1)d$

$71 = 5 + 11d$

$66 = 11d$

$d = 6$

terms are $\boxed{5, 11, 17, 23}$

/5

9. The terms $x + 4$, $3x + 5$, and $7x - 4$ are consecutive terms in an arithmetic sequence. Determine the value of x and state the three terms. *(3 marks)*

$d = t_2 - t_1$

$d = t_3 - t_2$

Therefore,

$$3x+5-(x+4) = 7x-4-(3x+5)$$

$$3x+5-x-4 = 7x-4-3x-5$$

$$2x+1 = 4x-9$$

$$-4x \quad -1 \qquad -4x \quad -1$$

$$-2x = -10$$

$$x = 5$$

There are three terms

$$x+4 = 5+4 = 9$$

$$3x+5 = 3(5)+5 = 20$$

$$7x-4 = 7(5)-4 = 31$$

/3