Section 2.3 - Practice Problems

EMERGING LEVEL QUESTIONS

Write the first four terms of each of the following sequences

1.
$$\{n^2 - 2\}$$
 $n = 1$ $\{2^2 - 2\}^2 = -1$
 $n = 2$ $\{2^2 - 2\}^2 = 2$
 $n = 3$ $\{3^2 - 2\}^2 = 2$
 $n = 4$ $\{4^2 - 2\}^2 = 1$
 $n = 4$ $\{4^2 - 2\}^2 = 1$
 $n = 1$ $\{(-1)^{n+1}n^2\}^2$
 $n = 1$ $\{(-1)^3(2)^3\}^2 = 1$
 $n = 2$ $\{(-1)^3(2)^3\}^2 = 1$
 $n = 3$ $\{(-1)^4(3)^3\}^2 = 9$
 $n = 4$ $\{(-1)^5(4)^4\}^2 = -16$
 $n = 1$ $\{(-1)^5(4)^4\}^2 = -16$
 $n = 1$ $\{(-1)^5(4)^4\}^2 = (-16)$
 $n = 1$ $\{(-1)^5(4)^4\}^2 = (-16)$

Find the indicated arithmetic term

n=3 $\left\{\frac{2}{3^{1}}\right\}=\frac{8}{9}$ n=4 $\left\{\frac{2^{4}}{4^{2}}\right\}=1$

7.
$$a = 5, d = 3, find t_{12}$$

$$t_{n^2} \propto + (n-1)d$$

$$t_{12} = 5 + (12-1)(3)$$

$$5 + 11(3)$$

$$t_{12} = 38$$

8.
$$a = \frac{2}{3}, d = -\frac{1}{4}, find t_9$$

$$t_q = \alpha + (n-1) d$$

$$t_q = \frac{2}{3} + (q-1)(-\frac{1}{4})$$

$$t_q = \frac{2}{3} + -2$$

$$t_q = \frac{2}{3} + -2$$

$$t_q = \frac{2}{3} - \frac{6}{3} = \frac{-4}{3}$$

9.
$$a = -\frac{3}{4}, d = \frac{1}{2}, find t_{10}$$
 $t_{10} = a + (n-1)d$
 $t_{10} = -\frac{3}{4} + (10-1)(\frac{1}{2})$
 $t_{10} = -\frac{3}{4} + \frac{9}{2}$
 $t_{10} = -\frac{3}{4} + \frac{19}{4}$
 $t_{10} = -\frac{3}{4} + \frac{19}{4}$

10.
$$a = 2.5, d = -1.25, find t_{20}$$

$$t_{20} = a + (n-1)d$$

$$t_{20} = 2.5 + (20-1)(-1.25)$$

$$t_{20} = 2.5 + 19(-1.25)$$

$$t_{20} = 2.5 - 23.75$$

$$t_{20} = -21.25$$

11.
$$a = -0.75, d = 0.05, find t_{40}$$
 $t_{40} = a + (n-1) d$
 $t_{40} = -0.75 + (40-1)(6.05)$
 $t_{40} = -0.75 + 1.95$
 $t_{40} = 1.2$

12.
$$a = -\frac{7}{4}, d = -\frac{2}{3}, find t_{37}$$

$$+_{37} = -\frac{1}{4} + (37 - 1)(-\frac{2}{3})$$

$$+_{37} = -\frac{7}{4} + 36(-\frac{2}{3})$$

$$+_{37} = -\frac{7}{4} - 24$$

$$+_{37} = -\frac{7}{4} - 96$$

$$= -\frac{103}{4} = -\frac{25.75}{4}$$

Find the number of terms in each arithmetic sequence

13.
$$a = 6, d = -3, t_n = -30$$
 $t_n = a + (n-1)d$
 $-30 = 6 + (n-1)(-3)$
 $-6 = -6$
 $-6 = -3(n-1)$
 $-3 = -3(n-1)$
 $-3 = -3(n-1)$
 $-3 = -3(n-1)$

15.
$$a = 0.6, d = 0.2, t_n = 9.2$$
 $t_n = a + (n-1)d$
 $9.2 = 0.6 + (n-1)(0.2)$
 $-0.6 = 6.2(n-1)$
 $0.2 = 0.2$
 $43 = n-1$
 $1 = 44$

16.
$$a = -0.3, d = -2.3, t_n = -39.4$$

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

$$-39.4 = -0.3 + (n-1)(-2.3)$$

$$+0.3 + 0.3$$

$$-39.1 = (n-1)(-2.3)$$

$$-2.3 - 2.3$$

$$|7 = n-1|$$

$$+1 + 1$$

$$18. 23,20,17,...,-100$$

$$t_{n} = a + (n-1)d$$

$$t_{n} = a + (n-1)d$$

$$159 = -1 + (n-1)5$$

$$+1 + 1$$

$$160 = 5(n-1)$$

$$5 = 5$$

$$100 = 33$$

$$32 = n-1$$

17.

41

8.
$$23,20,17,...,-100$$

$$t_{n} = a + (n-1)d$$

$$-100 = 23 + (n-1)(-3)$$

$$-123 = -3(n-1)$$

$$-3$$

$$41 = n-1$$

$$+1$$

$$+1$$

$$n = 42$$

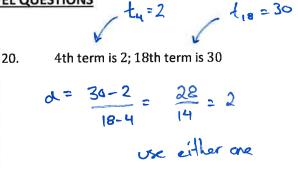
Find the first term in the arithmetic sequence

common different 12 terms:
$$\frac{36}{12}$$
=3

$$d=3$$
 $t_n = a + (n-1)d$

use either

 $t_6 = a + (6-1)(3)$
 $t_6 = 10$
 $t_6 = 10$
 $t_6 = a + (6-1)(3)$
 $t_6 = a + (6-1)(3)$
 $t_6 = a + (6-1)(3)$



Use either one
$$t_{10} = a + (18 - 1)(2)$$

$$30 = a + 17(2)$$

$$30 = a + 34$$

$$30 = a + 34$$

$$a = -4$$

PROFICIENT LEVEL QUESTIONS

21. 9th term is 23; 17th term is -1

$$d = \frac{-1-23}{17-9} = \frac{-24}{8} = -3$$

$$23 = a + (8)(-3)$$

$$23 = a - 24$$

5th term is 3; 25th term is -5722.

$$d = \frac{-57-3}{25-5} = \frac{-60}{20} = -3$$

$$t_{25} = \alpha + (25-1)(-3)$$

$$-57 = a + 24(-3)$$

 $-57 = a - 72$
 $+72 + 72$

13th term is -3; 20th term is -1723.

$$d = \frac{-17 - (-3)}{20 - 13} = \frac{-14}{7} = -2$$

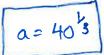
$$-3 = a + (2(-2))$$

11th term is 37; 26th term is 32 24.

$$d = \frac{32 - 37}{26 - 11} = \frac{-5}{15} = \frac{-1}{3}$$

$$32 = a - 25$$
 $425/3 + 25/3$

$$32 + 83 = a$$



$$S_n = \frac{n}{2}(a+\ell)$$

Find the sum of the arithmetic series

25.
$$3+5+7+\cdots+(2n+1)$$

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

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

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

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

27.
$$2+5+8+\cdots+77$$

$$S_{n} = \frac{n}{2}(2+77)$$

$$S_{26} = 13(79)$$

$$S_{26} = 1027$$

$$77 = 2+(n-1)(3)$$

$$75 = 3(n-1)$$

$$25 = n-1$$

n = 26

 $(-41) + (-35) + (-29) + \cdots + 541$

$$S_{48} = \frac{98}{2}(-41+541)$$
 $t_n = a + (n-1)d$
 $= 49(500)$ $541 = (-41) + (n-1)6$
 $S_{48} = 24500$ $582 = 6(n-1)$
 $97 = n-1$
 $n = 98$

 $39 + 33 + 27 + \cdots + (-15)$

$$S_{10} = \frac{10}{2}(39 + (-15))$$

$$-15 = 39 - 6(n-1)$$

$$-54 = -6(n-1)$$

$$9 = n-1$$

$$n = 10$$

31.

26.
$$-1+2+5+\cdots+(3n-4)$$

$$S_{n} = \frac{n}{2}(-1+3n-4)$$

$$S_{n} = \frac{n}{2}(3n-5)$$

$$S_{n} = \frac{3n^{2}-5n}{2} \text{ or } S_{n} = \frac{3n^{3}-5n}{2}$$
28. $5+9+13+\cdots+97$

$$S_{24} = 12(5+97)$$

$$= 12(102)$$

$$S_{24} = 12(102)$$

$$S_{24} = 1224$$

$$= 12(102)$$

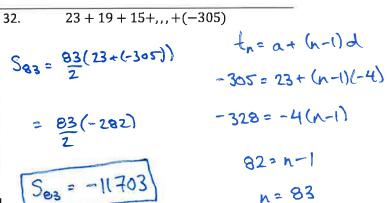
$$S_{24} = 1224$$

$$= 13 = 13 = 1224$$
30. $2\sqrt{5}+6\sqrt{5}+10\sqrt{5}+\cdots+50\sqrt{5}$

$$S_{18} = \frac{13}{2}(2\sqrt{5}+50\sqrt{5})$$

$$S_{18} = \frac{13}{2}(2\sqrt{5}+50\sqrt{5})$$

$$S_{18} = \frac{13}{2}(3\sqrt{5}+50\sqrt{5})$$



EXTENDING LEVEL QUESTIONS

Find the indicated value using the information given

33.
$$S_{20}$$
, if $a_1 = 8$, $a_{20} = 65$

$$S_{21}, if \ a_1 = 8, a_{20} = 65$$

$$S_{21} = \frac{21}{2}(8+68)$$

35.
$$S_{56}$$
, if $a_{56} = 13$, $d = -9$

$$13 = a + (56-1)(-9)$$

36.
$$n \text{ if } S_n = 180, a_1 = 4, t_n = 16$$

$$S_n = \frac{n(\alpha + R)}{2}$$
 Some as R

$$180 = \frac{n}{2}(4+16)$$

37.
$$d_1 if S_{40} = 680, a_1 = 11$$

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

38.
$$S_{62}$$
, if $a_1 = 10$, $d = 3$

$$= 31(203)$$

39.
$$S_{19}$$
, if $d = 4$, $a_{19} = 17$

$$S_{19}$$
, if $d=4$, $a_{19}=17$

40.
$$S_{40}$$
, if $d = -3$, $a_{40} = 65$

$$540 = \frac{40}{2}(182 + 65)$$
 Ten get a,
 $t_{40} = a + (n + 65)$

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