

(1.) $a_1 = 7$; $d = -2$; Find S_{15}

$$S = (n/2)(a_1 + a_n) \quad \text{use this formula}$$

$$S = (n/2)[a_1 + a_1 + (n - 1)d] \quad \text{replace } a_n \text{ with } a_1 + (n - 1)d$$

$$S = (n/2)[2a_1 + (n - 1)d] \quad \text{combine like terms}$$

$$S = (15/2)[2(7) + (15 - 1)(-2)] \quad \text{make substitutions}$$

$$S = (15/2)(14 - 28) \quad \text{subtract and multiply}$$

$$S = (15/2)(-14) \quad \text{subtract}$$

$$S = (15)(-7) \quad \text{cancel, reduce}$$

$$S = -105 \quad \text{multiply}$$

(2.) $a_1 = 1/4$; $d = 1/2$; S_{16} here is the problem

$$S_n = (n/2)[2a_1 + (n - 1)d] \quad \text{use this formula}$$

$$S_{16} = (16/2)[2(1/4) + (16 - 1)(1/2)] \quad \text{make substitutions}$$

$$S_{16} = (8)[(1/2) + (15/2)] \quad \text{divide and multiply}$$

$$S_{16} = (8)(16/2) \quad \text{add fractions}$$

$$S_{16} = 64 \quad \text{divide and multiply}$$

(3.) $a_1 = -9$; $d = 6$; S_{20} here is the problem

$$S_n = (n/2)[2a_1 + (n - 1)d] \quad \text{use this formula}$$

$$S_{20} = (20/2)[2(-9) + (20 - 1)(6)] \quad \text{make substitutions}$$

$$S_{20} = (10)(-18 + 114) \quad \text{divide multiply subtract multiply}$$

$$S_{20} = (10)(96) \quad \text{add}$$

$$S_{20} = 960 \quad \text{multiply}$$

(4.) $a_1 = 5$; $d = 4$; $a_n = 401$

(5.) S : 100 natural numbers here is the problem

$$S = (n/2)(a_1 + a_n) \quad \text{use this formula}$$

$$S = (100/2)(1 + 100) \quad \text{make substitutions}$$

$$S = (50)(101) \quad \text{divide and add}$$

$$S = 5050 \quad \text{multiply}$$

(6.) S : 25 even integers here is the problem

$$S = (n/2)(a_1 + a_n) \quad \text{use this formula}$$

$$S = (25/2)(1 + 25) \quad \text{make substitutions}$$

$$S = (25/2)(26) \quad \text{add}$$

$$S = (25)(13) \quad \text{cancel, reduce}$$

$$S = 325 \quad \text{multiply}$$

(7.) $a_1 = -9$; $d = 3$; $S = 66$; $n = ?$

$$S_n = (n/2)[2a_1 + (n - 1)d] \quad \text{use this formula}$$

$$66 = (n/2)[2(-9) + (n - 2)(3)] \quad \text{make substitutions}$$

$$66 = (n/2)(-18 + 3n - 6) \quad \text{multiply}$$

$$66 = (n/2)(3n - 24) \quad \text{combine like terms}$$

$$132 = n(3n - 24) \quad \text{multiply each side by 2, cancel}$$

$$3n^2 - 24n = 132 \quad \text{multiply thru parentheses}$$

$$3 \quad 3 \quad 3 \quad \text{divide thru by 3}$$

$$n^2 - 8n = 44 \quad \text{divide and cancel}$$

$$\quad -44 \quad -44 \quad \text{subtract 44 from each side}$$

$$\frac{\quad}{n^2 - 8n - 44 = 0} \quad \text{subtract}$$

(8.) $a_1 = 26$; $d = -5$; $S = 74$; $n = ?$

$$S_n = (n/2)[2a_1 + (n - 1)d] \quad \text{use this formula}$$

$$74 = (n/2)[2(26) + (n - 1)(-5)] \quad \text{make substitutions}$$

$$74 = (n/2)(52 - 5n + 5) \quad \text{multiply multiply thru}$$

$$74 = (n/2)(57 - 5n) \quad \text{combine like terms}$$

$$148 = n(57 - 5n) \quad \text{multiply each side by 2, cancel}$$

$$57n - 5n^2 = 148 \quad \text{multiply thru parentheses}$$

$$5n^2 - 57n = -148 \quad \text{multiply thru by -1}$$

$$\quad + 148 \quad +148 \quad \text{add 148 to each side}$$

$$\frac{\quad}{5n^2 - 57n + 148 = 0} \quad \text{add}$$

$$(5n - 37)(n - 4) = 0 \quad \text{factor}$$

$$n - 4 = 0 \quad \text{set this factor equal to 0}$$

$$\quad +4 \quad +4 \quad \text{add 4 to each side}$$

$$\frac{\quad}{n = 4} \quad \text{add}$$

(9.) 4 arithmetic means: 1 and 36

$$a_n = a_1 + (n - 1)d \quad \text{use this formula}$$

$$36 = 1 + (6 - 1)(d) \quad \text{make substitutions}$$

$$36 = 1 + 5d \quad \text{subtract}$$

$$\begin{array}{r} -1 \quad -1 \\ \hline \end{array} \quad \text{subtract 1 from each side}$$

$$\begin{array}{r} 35 = \quad 5d \\ \hline \end{array} \quad \text{subtract}$$

$$\begin{array}{r} \frac{35}{5} = \quad \frac{5d}{5} \\ \hline \end{array} \quad \text{divide each side by 5}$$

$$7 = d \quad \text{divide and cancel}$$

result: 8, 15, 22, 29

(10.) 5 arithmetic means: 13 and 31

$$a_n = a_1 + (n - 1)d \quad \text{use this formula}$$

$$31 = 13 + (7 - 1)(d) \quad \text{make substitutions}$$

$$31 = 13 + 6d \quad \text{subtract}$$

$$\begin{array}{r} -13 \quad -13 \\ \hline \end{array} \quad \text{subtract 13 from each side}$$

$$\begin{array}{r} 18 = \quad 6d \\ \hline \end{array} \quad \text{subtract}$$

$$\begin{array}{r} \frac{18}{6} = \quad \frac{6d}{6} \\ \hline \end{array} \quad \text{divide each side by 6}$$

$$3 = d \quad \text{divide and cancel}$$

result: 16, 19, 22, 25, 28