

(9.) The first term of arithmetic sequence is 2. The common difference is 5. Find  $a_6$ .

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

$$a_6 = 2 + (6 - 1)(5) \quad \text{make substitutions}$$

$$a_6 = 2 + 5*5 \quad \text{subtract}$$

$$a_6 = 2 + 25 \quad \text{multiply}$$

$$a_6 = 27$$

(21.) The fourth term of an arithmetic sequence is 13 and the 6th term is 7. Find the first term, and the common difference.

(i.)  $a_n = a_1 + (n - 1)d$  use this formula

$$13 = a_1 + (4 - 1)d \quad \text{make substitutions}$$

$$13 = a_1 + 3d \quad \text{subtract}$$

$$7 = a_1 + (6 - 1)d \quad \text{make substitutions}$$

$$7 = a_1 + 5d \quad \text{subtract}$$

$$-7 = -a_1 - 5d \quad \text{multiply thru by -1}$$

$$13 = a_1 + 3d \quad \text{put this here}$$

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$$6 = \quad -2d \quad \text{add equations}$$

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$$\frac{-2}{-2} \quad \frac{-2}{-2} \quad \text{divide each side by -2}$$

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

$$13 = a_1 + 3(-3) \quad \text{replace d with -3}$$

$$13 = a_1 - 9 \quad \text{multiply}$$

$$+ 9 \quad + 9 \quad \text{add 9 to each side}$$

$$\hline 21 = a_1 \quad \text{add}$$

results:  $a_1 = 21$  and  $d = -3$

(22.) The 3rd term of an arithmetic sequence is 5 and the eighth term is 20. Find the first term, the common difference, and the first three terms of the sequence.

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

$$5 = a_1 + (3 - 1)d \quad \text{make substitutions}$$

$$5 = a_1 + 2d \quad \text{subtract}$$

$$20 = a_1 + (8 - 1)d \quad \text{make substitutions}$$

$$20 = a_1 + 7d \quad \text{subtract}$$

$$5 = a_1 + 2d \quad \text{put this here}$$

$$\hline 15 = 5d \quad \text{subtract equations}$$

$$\hline 5 \quad 5 \quad \text{divide each side by 5}$$

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

$$a_1 + 2d = 5 \quad \text{use this equation to find } a_1$$

$$a_1 + 2(3) = 5 \quad \text{replace } d \text{ with } 3$$

$$a_1 + 6 = 5 \quad \text{multiply}$$

$$\hline -6 \quad -6 \quad \text{subtract 6 from each side}$$

$$a_1 = -1 \quad \text{subtract}$$

results:  $a_1 = -1; d = 3;$

and:  $-1, 2, 5$  these are the 1st 3 terms

(23.) The 7th term of an arithmetic sequence is 6 and the 13th term is -18. Find the 1st 5 terms of the sequence.

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

$$6 = a_1 + (7 - 1)d \quad \text{make substitutions}$$

$$6 = a_1 + 6d \quad \text{subtract}$$

$$-18 = a_1 + (13 - 1)d \quad \text{make substitutions}$$

$$-18 = a_1 + 12d \quad \text{subtract}$$

$$18 = -a_1 - 12d \quad \text{multiply thru by -1}$$

$$6 = a_1 + 6d \quad \text{put this here}$$

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$$24 = \quad -6d \quad \text{add equations}$$

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$$\begin{array}{r} -6 \\ -6 \end{array} \quad \text{divide each side by -6}$$

$$-4 = d \quad \text{divide and cancel}$$

$$a_1 + 6d = 6 \quad \text{use this equation}$$

$$a_1 + 6(-4) = 6 \quad \text{replace d with -4}$$

$$a_1 - 24 = 6 \quad \text{multiply}$$

$$\begin{array}{r} + \quad 24 \quad 24 \\ \hline \end{array} \quad \text{add 24 to each side}$$

$$\begin{array}{r} a_1 = \quad 30 \\ \hline \end{array} \quad \text{add}$$

result: The 1st five terms are: 30, 26, 22, 18, 14

(24.) The 4th term of an arithmetic sequence is 9 and the 7th term is 10. Find the 20th term.

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

$$9 = a_1 + (4 - 1)d \quad \text{make substitutions}$$

$$9 = a_1 + 3d \quad \text{subtract}$$

$$10 = a_1 + (7 - 1)d \quad \text{make substitutions}$$

$$10 = a_1 + 6d \quad \text{subtract}$$

$$9 = a_1 + 3d \quad \text{put this here}$$

$$\begin{array}{r} \hline 1 = \quad 3d \quad \text{subtract equations} \end{array}$$

$$\begin{array}{r} \hline 3 \quad \quad 3 \quad \quad \text{divide each side by 3} \end{array}$$

$$1/3 = d \quad \text{cancel}$$

$$a_1 + 3d = 9 \quad \text{use this equation to find } a_1$$

$$a_1 + 3(1/3) = 9 \quad \text{replace } d \text{ with } 1/3$$

$$a_1 + 1 = 9 \quad \text{multiply}$$

$$\quad - 1 \quad -1 \quad \text{subtract 1 from each side}$$

$$\begin{array}{r} \hline a_1 \quad = 8 \quad \text{subtract} \end{array}$$

$$a_{20} = 8 + (20 - 1)(1/3) \quad \text{use the formula, make substitutions}$$

$$a_{20} = 8 + (19/3) \quad \text{subtract and multiply}$$

$$a_{20} = (24 + 19)/3 \quad \text{add}$$

$$a_{20} = 43/3 \quad \text{add}$$

(25.) Find two arithmetic means between 3 and 15.

results: 7 and 11 are two arithmetic means between 3 & 15.

(27.) Find two arithmetic means between 4 and 80.

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

$$a_n = 4 + (n - 1)d \quad \text{replace } a_1 \text{ with } 4$$

$$80 = 4 + (4 - 1)d \quad \text{replace } n \text{ with } 4 \text{ and } a_n \text{ with } 80$$

$$80 = 4 + 3d \quad \text{subtract}$$

$$\begin{array}{r} -4 \quad -4 \\ \hline \end{array} \quad \text{subtract 4 from each side}$$

$$\begin{array}{r} \hline 76 = \quad 3d \quad \text{subtract} \\ \hline \frac{76}{3} = \quad \frac{3d}{3} \quad \text{divide each side by 3} \end{array}$$

$$76/3 = d \quad \text{cancel}$$

$$25 \frac{1}{3} = d \quad \text{divide, change to a mixed number}$$

$$4 + 25 \frac{1}{3} = 29 \frac{1}{3} \quad \text{add to 4}$$

$$29 \frac{1}{3} + 25 \frac{1}{3} = 54 \frac{2}{3} \quad \text{add to } 29 \frac{1}{3}$$

$$54 \frac{2}{3} + 25 \frac{1}{3} = 80 \quad \text{add}$$

results:  $29 \frac{1}{3}$  and  $54 \frac{2}{3}$  are two arithmetic means  
between 4 and 80

(31.) The top row of a pile of logs contains 6 logs, the row

below the top one contains 7 logs, the third row from the top contains 8 logs, and so on. If there are 45 rows, how many logs are there in the bottom row?

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

$$a_{45} = 6 + (45 - 1)(1) \quad \text{make substitutions}$$

$$a_{45} = 6 + 44 \quad \text{subtract and multiply}$$

$$a_{45} = 50 \quad \text{add}$$

(32.) Tuition costs for a certain university amount to \$8000 per year. Suppose that these costs increase by \$500 per year. How much will tuition costs be in 13 years?

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

$$a_{13} = 8000 + (13 - 1)(500) \quad \text{make substitutions}$$

$$a_{13} = 8000 + (12)(500) \quad \text{subtract}$$

$$a_{13} = 8000 + 6000 \quad \text{multiply}$$

$$a_{13} = 14,000 \quad \text{combine like terms}$$

(33.) In one city, the fine for a 1st parking ticket offense is \$15. The city adds \$25 to the fine for each further offense. What is the fine for the 6th parking ticket?

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

$$a_6 = 15 + (6 - 1)(25) \quad \text{make substitutions}$$

$$a_6 = 15 + (5)(25) \quad \text{subtract}$$

$$a_6 = 15 + 125 \quad \text{multiply}$$

$$a_6 = 140 \quad \text{add}$$

(33.) A theater has 54 seats in the last row at the back. Each of the other rows has 2 fewer seats than the row before it. If there are 17 rows of seats, how many seats are there in the 1st row?

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

$$54 = a_1 + (17 - 1)(-2) \quad \text{make substitutions}$$

$$54 = a_1 + (16)(-2) \quad \text{subtract}$$

$$54 = a_1 - 32 \quad \text{multiply}$$

$$+ \quad 32 \quad + \quad 32 \quad \text{add 32 to each side}$$

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$$86 = a_1 \quad \text{add}$$