

Consecutive Integer Word Problems

Consecutive Integers are integers that follow each other in order. The difference between them is 1 (integers that increase by 1)

Write four consecutive integers beginning with $\begin{array}{ccccccc} 7 & 8 & 9 & 10 & 11 \\ \downarrow & \downarrow & \downarrow & \downarrow & \\ & +1 & +1 & +1 & +1 \end{array}$

$$\begin{array}{r} x+1 \\ +1 \\ \hline x+2 \end{array}$$

Write four consecutive integers beginning with $\begin{array}{ccccccc} -2 & -1 & 0 & 1 & 2 \\ \downarrow & \downarrow & \downarrow & \downarrow & \\ & +1 & +1 & +1 & +1 \end{array}$

Write four consecutive integers beginning with $\begin{array}{ccccccc} x & x+1 & x+2 & x+3 & x+4 \\ \downarrow & \downarrow & \downarrow & \downarrow & \\ & +1 & +1 & +1 & +1 \end{array}$

Consecutive Even Integers are integers that are even that follow each other in order. The difference between them is 2. (integers that increase by 2 and start with an even #)

Write four consecutive even integers beginning with $\begin{array}{ccccccc} 4 & 6 & 8 & 10 & 12 \\ \downarrow & \downarrow & \downarrow & \downarrow & \\ & +2 & +2 & +2 & +2 \end{array}$

Write four consecutive even integers beginning with $\begin{array}{ccccccc} -10 & -8 & -6 & -4 & -2 \\ \downarrow & \downarrow & \downarrow & \downarrow & \\ & +2 & +2 & +2 & +2 \end{array}$

$$\begin{array}{r} x+2 \\ +2 \\ \hline x+4 \end{array}$$

Write four consecutive even integers beginning with $\begin{array}{ccccccc} x & x+2 & x+4 & x+6 & x+8 \\ \downarrow & \downarrow & \downarrow & \downarrow & \\ & +2 & +2 & +2 & +2 \end{array}$

Consecutive ODD Integers are integers that are odd that follow each other in order. The difference between them is 2. (integers that increase by 2 and start with an odd #)

Write four consecutive odd integers beginning with $\begin{array}{ccccccc} 5 & 7 & 9 & 11 & 13 \\ \downarrow & \downarrow & \downarrow & \downarrow & \\ & +2 & +2 & +2 & +2 \end{array}$

Write four consecutive odd integers beginning with $\begin{array}{ccccccc} -13 & -11 & -9 & -7 & -5 \\ \downarrow & \downarrow & \downarrow & \downarrow & \\ & +2 & +2 & +2 & +2 \end{array}$

$$\begin{array}{r} x+2 \\ +2 \\ \hline x+4 \end{array}$$

Write four consecutive odd integers beginning with $\begin{array}{ccccccc} x & x+2 & x+4 & x+6 & x+8 \\ \downarrow & \downarrow & \downarrow & \downarrow & \\ & +2 & +2 & +2 & +2 \end{array}$

**What do we notice about both consecutive even integers and consecutive odd integers?

The difference between both consecutive even integers and consecutive odd integers is 2.

LEGEND

Legend for Consecutive Integers (CI)	Legend for <u>Even/Odd</u> Consecutive Integers (CEI/COI)
$x = 1^{st} CI$	$x = 1^{st} CEI/COI$
$x+1 = 2^{nd} CI$	$x+2 = 2^{nd} CEI/COI$
$x+2 = 3^{rd} CI$	$x+4 = 3^{rd} CEI/COI$
$x+3 = 4^{th} CI \dots$	$x+6 = 4^{th} CEI/COI \dots$

1) If the sum of two consecutive integers is 13, find the smaller integer.

L	E	S	C
<p>let</p> <p>$x = 1^{st} CI$</p> <p>$x+1 = 2^{nd} CI$</p>	$x + x + 1 = 13$ $2x + 1 = 13$ $\begin{array}{r} -1 \quad -1 \\ \hline 2x = 12 \\ \frac{2}{2} \quad \frac{2}{2} \\ \hline x = 6 \\ \boxed{x = 6} \\ \boxed{x + 1 = 7} \end{array}$	<p>The smaller CI is 6</p>	<p>$6 + 7 = 13$</p> <p>13</p>

2) Find four consecutive even integers whose sum is -36.

L	E	S	C
<p>let</p> <p>$x = 1^{st} CEI$</p> <p>$x+2 = 2^{nd} CEI$</p> <p>$x+4 = 3^{rd} CEI$</p> <p>$x+6 = 4^{th} CEI$</p>	$x + x + 2 + x + 4 + x + 6 = -36$ $4x + 12 = -36$ $\begin{array}{r} -12 \quad -12 \\ \hline 4x = -48 \\ \frac{4}{4} \quad \frac{4}{4} \\ \hline x = -12 \\ \boxed{x = -12} \\ \boxed{x + 2 = -10} \\ \boxed{x + 4 = -8} \\ \boxed{x + 6 = -6} \end{array}$	<p>The four CEI's whose sum is -36 are</p> <p>-12, -10, -8, -6</p>	<p>$-12 + -10 + -8 + -6 = -36$</p>

3) Find two consecutive odd integers such that four times the larger is 29 more than three times the smaller.

L	E	S	C
<p>let</p> <p>$x = 1^{st} COI$</p> <p>$x+2 = 2^{nd} COI$</p>	$4(x+2) = 3x + 29$ $4x + 8 = 3x + 29$ $\begin{array}{r} -3x \quad -3x \\ \hline x + 8 = 29 \\ -8 \quad -8 \\ \hline \boxed{x = 21} \\ \boxed{x + 2 = 23} \end{array}$	<p>The two COI's are</p> <p>21 & 23</p>	<p>$4(23) = 92$</p> <p>$3(21) = 63$</p> <p>$63 + 29 = 92$</p>

4) Is it possible to find 3 consecutive even integers whose sum is 40? Why?

L	E	S	C
<p>let $x = 1^{st} CEI$ $x+2 = 2^{nd} CEI$ $x+4 = 3^{rd} CEI$</p>	$x + x + 2 + x + 4 = 40$ $3x + 6 = 40$ $\underline{-6 \quad -6}$ $3x = 34$ $\frac{3x}{3} = \frac{34}{3}$ <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;"> $x = 11\frac{1}{3}$ $x+2 = 13\frac{1}{3}$ $x+4 = 15\frac{1}{3}$ </div>	<p>No, it is not possible to find 3 CEI's whose sum is 40, b/c the #s are not integers & they are not even</p>	

5) The sum of two consecutive odd integers has a maximum value of 20. What are the greatest possible integers?

L	I	S	C
<p>let $x = 1^{st} COI$ $x+2 = 2^{nd} COI$</p>	$x + x + 2 \leq 20$ $2x + 2 \leq 20$ $\underline{-2 \quad -2}$ $2x \leq 18$ $\frac{2x}{2} \leq \frac{18}{2}$ <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;"> $x \leq 9$ $x+2 \leq 11$ </div>	<p>The greatest possible COI's whose sum has a max value of 20 are 9+11</p>	$9 + 11 = 20$ $20 \leq 20$ <hr/> $11 + 13 = 24$ $24 \notin 20$ <p><i>Wrong #s must be odd as well</i></p>

6) If the sum of the smallest and the greatest of 4 consecutive even integers is 30, what is the sum of all four integers?

L	E	S	C
<p>let $x = 1^{st} CEI$ $x+2 = 2^{nd} CEI$ $x+4 = 3^{rd} CEI$ $x+6 = 4^{th} CEI$</p>	$x + x + 6 = 30$ $2x + 6 = 30$ $\underline{-6 \quad -6}$ $2x = 24$ $\frac{2x}{2} = \frac{24}{2}$ <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;"> $x = 12$ $x+2 = 14$ $x+4 = 16$ $x+6 = 18$ </div>	<p>The sum of all four CEI's is 60</p>	$\frac{12}{+18}$ <hr/> $30 \checkmark$

7) Is it possible to find 3 consecutive odd integers whose sum is 59? Why?

L	E	S	C
<p>Let $x = 1^{st} \text{ COI}$ $x+2 = 2^{nd} \text{ COI}$ $x+4 = 3^{rd} \text{ COI}$</p>	$x + x + 2 + x + 4 = 59$ $3x + 6 = 59$ $\begin{array}{r} -6 \quad -6 \\ \hline 3x = 53 \\ \hline x = 17\frac{2}{3} \end{array}$ $x+2 = 19\frac{2}{3}$ $x+4 = 21\frac{2}{3}$	<p>It is not possible to find 3 COI's whose sum is 59 b/c the #s are not integers.</p>	

8) The sum of two consecutive integers is greater than 21. Find the smallest possible values for the integers.

L	I	S	C
<p>Let $x = 1^{st} \text{ CI}$ $x+1 = 2^{nd} \text{ CI}$</p>	$x + x + 1 > 21$ $2x + 1 > 21$ $\begin{array}{r} -1 \quad -1 \\ \hline 2x > 20 \\ \hline x > 10 \\ \hline x > 11 \end{array}$	<p>The smallest possible values for 2 CI's whose sum is greater than 21 is 11 + 12</p>	$11 + 12 = 23$ $23 > 21$ <hr/> $10 + 11 = 21$ $21 \nless 21$

9) The sum of two consecutive even number is greater than 98 decreased by twice the larger. Find the smallest possible values for the integers.

L	I	S	C
<p>Let $x = 1^{st} \text{ CEI}$ $x+2 = 2^{nd} \text{ CEI}$</p>	$x + x + 2 > 98 - 2(x+2)$ $2x + 2 > 98 - 2x - 4$ $2x + 2 > 94 - 2x - 4$ $\begin{array}{r} +2x \quad +2x \\ \hline 4x + 2 > 94 \\ \hline 4x > 92 \\ \hline x > 23 \end{array}$	<p>The smallest possible CEI's are 24 + 26</p>	$24 + 26 = 50$ $2(26) = 52$ $98 - 52 = 46$ $50 > 46$ <hr/> $22 + 24 = 46$ $2(24) = 48$ $98 - 48 = 50 \quad 46 \nless 50$

Challenge Set up the Legend & the Equation only. (don't solve)

10) Find three consecutive integers such that 4 times the first decreased by the second is 12 more than twice the third.

L	E
<p>Let $x = 1^{st} \text{ CI}$ $x+1 = 2^{nd} \text{ CI}$ $x+2 = 3^{rd} \text{ CI}$</p>	$4(x) - (x+1) = 2(x+2) + 12$