Applied (Word) Problems NoteSheet
Consecutive Integers

Consecutive numbers (or more properly, ***consecutive integers***) are integers n_1 and n_2 such that $n_2 - n_1 = 1$, i.e., n_2 follows immediately after n_1.

Given two consecutive numbers, one must be <u>even</u> and one must be <u>odd</u>. Since the sum of an <u>even number</u> and an <u>odd number</u> is always odd, the sum of two consecutive numbers (and, in fact, of any number of consecutive numbers) is always <u>odd</u>.

Consecutive integers are <u>integers</u> that follow each other in order. They have a difference of 1 between every two <u>numbers</u>.

If n is an integer, then n, $n+1$, and $n+2$ will be <u>consecutive</u> integers.

Examples:

1, 2, 3, 4, 5

-3, -2, -1, 0, 1, 2

1004, 1005, 1006

Odd consecutive integers are odd integers that follow each other. They have a difference of 2 between every two numbers.

If n is an integer, then $2n+1$, $2n+3$, and $2n+5$ will be odd consecutive integers.

Examples:

3, 5, 7, 9

-23, -21, -19, -17, -15, -13, -11

123, 125, 127, 129

Even consecutive integers are even integers that follow each other. They have a difference of 2 between every two numbers.

If n is an integer, then $2n$, $2n+2$, and $2n+4$ will be even consecutive integers.

Examples:

4, 6, 8, 10

-2, 0, 2, 4, 6

-120, -118, -116

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Example 1 : Consecutive Integer Problem

The sum of the least and greatest of 3 consecutive integers is 60. What are the values of the 3 integers?

Solution:

Step 1: Assign variables :
   Let x = least integer
   $x + 1$ = middle integer
   $x + 2$ = greatest integer

Translate sentence into an equation.

Sentence: The sum of the least and greatest is 60.

Rewrite sentence: $x + (x + 2) = 60$

Step 2: Solve the equation

   <u>Combine</u> like terms: $2x + 2 = 60$
   <u>Isolate</u> variable x: $2x = 58$
$$x = \frac{58}{2} = 29$$

Step 3: Check your answer: $29 + 29 + 2 = 60$

The question wants all the 3 consecutive numbers: 29, 30 and 31
Answer: The 3 consecutive numbers are 29, 30 and 31.

Example 2 : Consecutive Odd Integer Problem

The lengths of the sides of a triangle are consecutive odd numbers. What is the length of the longest side if the perimeter is 45?

Solution:

Step 1: Being consecutive odd numbers we need to add 2 to the previous number.
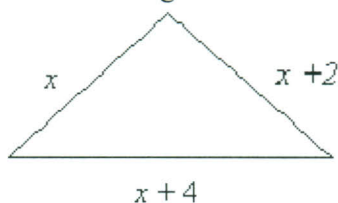Assign variables :
   Let x = length of shortest side
   $x + 2$ = length of medium side
   $x + 4$ = length of longest side

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Sketch the figure

Step 2: Write out the formula for <u>perimeter of triangle</u>.
  P = sum of the three sides

Step 3: Plug in the values from the question and from the sketch.
  $45 = x + x + 2 + x + 4$
  Combine like terms: $45 = 3x + 6$
  Isolate variable x: $3x = 45 - 6$
  $3x = 39$
  $x = 13$

Step 3: Check your answer
  $13 + 13 + 2 + 13 + 4 = 45$

Be careful! The question requires the length of the longest side.
The length of longest = $13 + 4 = 17$
Answer: The length of longest side is 17

Example 3: Consecutive Even Integer Problem

Two consecutive **even** numbers have a sum of 30. What are the numbers?

Solution:

Step 1: Being consecutive even numbers we need to add 2 to the previous number.
  Assign variables :
  Let x = smallest consecutive integer
  $x + 2$ = middle or next consecutive even integer
  $x + 4$ = largest consecutive even integer

Step 2: Write out a formula: $x + (x + 2) + (x+4) = 30$

Step 3: Solve the equation

  Combine like terms: $3x + 6 = 30$
  Isolate variable x: $3x = 24$
                $x = 8$
Step 4: Plug in values and check your answer: $8 + 10 + 12 = 30$

The question wants all the 3 consecutive even numbers. They are: 8, 10, and 12.

CONSECUTIVE INTEGER PROBLEMS

1. Find two consecutive integers whose sum is 123.

2. Find two consecutive integers whose sum is -97.

3. Find three consecutive integers whose sum is 171.

4. Find three consecutive integers whose sum is −54

5. Find two consecutive even integers whose sum is 54

6. Find two consecutive even integers whose sum is−38

7. Find three consecutive even integers whose sum is 84

8. Find three consecutive even integers whose sum is −48

9. Find two consecutive odd integers whose sum is 128

10. Find two consecutive odd integers whose sum is −36

11. Find three consecutive odd integers whose sum is 75

12. Find three consecutive odd integers whose sum is −45

13. Three consecutive odd integers are such that the sum of the first and the third is 70. Find the integers

14. Three consecutive integers are such that three times the smallest is 14 more than the largest. Find the integers.

15. Three consecutive odd integers are such that the sum of the first and second is 31 less than 3 times the third. Find the integers.

16. Three consecutive even integers are such that the sum of the smallest and 3 times the second is 38 more than twice the third. Find the integers.

17. Two consecutive integers are such that 3 times the larger exceeds twice the smaller by 34. Find the integers.

NUMBER PROBLEMS:

1. When 4 times a number is increased by 40, the answer is the same as when 100 is decreased by the number. Find the number.

2. When 7 times a number is decreased by 8, the answer is the same as when 3 times the number is increased by 4. Find the number.

Applied (Word) Problems
Consecutive Integer and Number Problems

3. Eight times a number increased by 9 is the same as 15 more than 7 times the number. Find the number.

4. Thirty decreased by 6 times a number is the same as 16 more than the number. Find the number.

5. When 6 times a number is increased by 11 the result is 16 less than 9 times the number. Find the number.

6. One number is twice another number. If the 12 is subtracted from the larger number the result is 7 more than the smaller number. Find the numbers.

7. The larger of two numbers is 10 more than the smaller number. Five times the larger number is 40 more than 6
times the smaller. Find the numbers.

8. If 13 is added to a number and the sum is multiplied by 3, the result is 7 times the number decreased by 9. Find the number.

9. The sum of two numbers is 57. If the larger of the two numbers is 9 less than twice the smaller, find the two numbers.

10. The total of two numbers is 35. Four times the larger number is 4 less than five times the smaller number.
Find the two numbers.

11. A piece of lumber which is 55 inches long is cut into two parts such that 2 times the larger part will be 12 more than 5 times the smaller part. How large are each of the pieces of lumber?

12. The larger of two numbers is 6 less than 3 times the smaller number. Three times the larger number is 7 more than 4 times the smaller number. Find the numbers.

13. The larger of two numbers is 7 times the smaller. The larger number exceeds the smaller number by 42. Find the numbers.

14. The smaller of two numbers is 18 less than the larger number. If 5 times the larger number exceeds 4 times the smaller number by 100. Find the numbers.

15. A piece of fabric 180 inches long is cut into two pieces such that 3 times the larger piece exceeds 4 times the smaller piece by 85 inches. How large are the two pieces of fabric?

Who Discovered the First Singing and Dancing Hawk?

Solve each problem, then cross out the letter next to the correct answer. When you finish, the answer to the title question will remain.

N	46, 48
T	–57, –55
P	58, 60
U	–13, –11, –9
F	16, 17, 18
O	77, 79
H	–41, –40, –39
C	44, 46, 48
S	54, 56
E	72, 74, 76
N	42, 44
O	–28, –27, –26
D	29, 31, 33, 35
T	–11, –9, –7
L	17, 18, 19
O	37, 38
N	81, 83
A	68, 70, 72
M	48, 50, 52
T	–39, –38, –37
A	33, 35, 37, 39
H	–27, –26, –25
T	–59, –57

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1. Find two consecutive integers whose sum is 75.

2. Find three consecutive integers whose sum is 51.

3. Find three consecutive integers whose sum is –78.

4. Find two consecutive even integers whose sum is 94.

5. Find three consecutive even integers whose sum is 222.

6. Find two consecutive odd integers whose sum is –116.

7. Find four consecutive odd integers whose sum is 128.

8. Find two consecutive even integers such that the sum of the larger and 3 times the smaller is 234.

9. Find two consecutive odd integers such that the sum of the smaller and 3 times the larger is 330.

10. Find three consecutive integers such that the sum of the largest and 5 times the smallest is –244.

11. Find three consecutive even integers such that the sum of twice the smallest and 4 times the largest is 304.

12. Find three consecutive odd integers such that the sum of 7 times the smallest and twice the largest is –91.