

1. THE FIRST THREE TERMS AND THE LAST TERM OF A FINITE ARITHMETIC SEQUENCE ARE - 92, - 88, -84, ..., 12. FIND

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UNDERSTANDING FINITE ARITHMETIC SEQUENCES

IN MATHEMATICS, SEQUENCES ARE ORDERED LISTS OF NUMBERS FOLLOWING A SPECIFIC PATTERN. AMONG THESE, ARITHMETIC SEQUENCES HOLD A SPECIAL PLACE DUE TO THEIR SIMPLICITY AND WIDE APPLICABILITY. AN ARITHMETIC SEQUENCE IS A SEQUENCE OF NUMBERS WHERE THE DIFFERENCE BETWEEN ANY TWO CONSECUTIVE TERMS IS CONSTANT. THIS CONSTANT DIFFERENCE IS KNOWN AS THE COMMON DIFFERENCE.

DEFINITION OF AN ARITHMETIC SEQUENCE:

AN ARITHMETIC SEQUENCE CAN BE WRITTEN AS:

$$\{ a, a + d, a + 2d, a + 3d, \dots \}$$

WHERE:

- a IS THE FIRST TERM
- d IS THE COMMON DIFFERENCE

FINITE ARITHMETIC SEQUENCES HAVE A SPECIFIC NUMBER OF TERMS, ENDING AFTER A CERTAIN POINT. THE SEQUENCE UNDER CONSIDERATION HERE HAS:

- KNOWN INITIAL TERMS: -92, -88, -84
- AN UNKNOWN LAST TERM: 12
- THE PATTERN OF THE SEQUENCE CONTINUES UNTIL IT REACHES THE LAST TERM

UNDERSTANDING THE STRUCTURE OF THIS SEQUENCE IS ESSENTIAL FOR SOLVING PROBLEMS RELATED TO ITS TERMS, COMMON DIFFERENCE, AND THE TOTAL NUMBER OF TERMS.

ANALYZING THE GIVEN SEQUENCE

THE PROBLEM STATES:

> THE FIRST THREE TERMS OF A FINITE ARITHMETIC SEQUENCE ARE -92, -88, -84, AND THE LAST TERM IS 12. FIND THE TOTAL NUMBER OF TERMS IN THE SEQUENCE AND OTHER RELATED PARAMETERS.

THIS PROVIDES US WITH CRITICAL INFORMATION:

- FIRST TERM $(a_1 = -92)$
- SECOND TERM $(a_2 = -88)$
- THIRD TERM $(a_3 = -84)$
- LAST TERM $(a_n = 12)$

DETERMINING THE COMMON DIFFERENCE

AN IMMEDIATE STEP IN ANALYZING AN ARITHMETIC SEQUENCE IS TO FIND THE COMMON DIFFERENCE, (d) .

SINCE THE SEQUENCE IS ARITHMETIC:

$$\backslash [A_2 - A_1 = A_3 - A_2 = D \backslash]$$

CALCULATING:

$$\backslash [D = -88 - (-92) = -88 + 92 = 4 \backslash]$$

SIMILARLY, CHECK WITH THE THIRD TERM:

$$\backslash [-84 - (-88) = -84 + 88 = 4 \backslash]$$

THE CONSISTENT DIFFERENCE CONFIRMS:

COMMON DIFFERENCE $\backslash (D = 4 \backslash)$

— — —

FORMULATING THE GENERAL TERM

THE GENERAL TERM (A_n) OF AN ARITHMETIC SEQUENCE IS GIVEN BY:

$$\backslash [A_N = A_1 + (N - 1)D \backslash]$$

USING THE KNOWN FIRST TERM AND COMMON DIFFERENCE:

$$A_N = -92 + (N - 1) \times 4$$

— — —

FINDING THE NUMBER OF TERMS (N)

SINCE THE LAST TERM $\binom{A_n}{n}$ IS KNOWN TO BE 12, SUBSTITUTE INTO THE GENERAL TERM:

$$\lfloor 12 = -92 + (N - 1) \rfloor_{\text{TIMES } 4} \rfloor$$

SOLVE FOR (N) :

$$\begin{aligned} 12 + 92 &= (n - 1) \times 4 \\ 104 &= 4(n - 1) \\ \frac{104}{4} &= n - 1 \\ 26 &= n - 1 \\ n &= 27 \end{aligned}$$

THUS, THE SEQUENCE HAS 27 TERMS.

SUMMARY OF SEQUENCE PARAMETERS

PARAMETER	VALUE
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FIRST TERM (a_1)	-92
COMMON DIFFERENCE (d)	4
LAST TERM (a_{27})	12
TOTAL NUMBER OF TERMS (n)	27

VERIFYING THE LAST TERM

TO ENSURE CORRECTNESS, VERIFY THE LAST TERM WITH THE FORMULA:

$$a_{27} = -92 + (27 - 1) \times 4 = -92 + 26 \times 4 = -92 + 104 = 12$$

CONFIRMED, THE LAST TERM MATCHES THE GIVEN VALUE.

ADDITIONAL INSIGHTS AND APPLICATIONS

UNDERSTANDING THE PROPERTIES OF THIS FINITE ARITHMETIC SEQUENCE ALLOWS US TO SOLVE VARIOUS RELATED PROBLEMS. SOME COMMON QUESTIONS INCLUDE:

- FINDING THE SUM OF ALL TERMS
- DETERMINING THE POSITION OF A SPECIFIC TERM
- CALCULATING THE AVERAGE OF THE SEQUENCE

LET'S EXPLORE SOME OF THESE.

SUM OF THE SEQUENCE

THE SUM OF THE FIRST (n) TERMS OF AN ARITHMETIC SEQUENCE IS GIVEN BY:

$$S_n = \frac{n}{2} \times (a_1 + a_n)$$

APPLYING THIS TO OUR SEQUENCE:

$$\begin{aligned} S_{27} &= \frac{27}{2} \times (-92 + 12) \\ &= \frac{27}{2} \times (-80) \\ &= 13.5 \times (-80) \end{aligned}$$

$S = -1080$
 $\backslash\text{END}\{\text{ALIGNED}\}$
 $\backslash]$

THEFORE, THE SUM OF ALL 27 TERMS IS -1080.

PRACTICAL APPLICATIONS OF ARITHMETIC SEQUENCES

ARITHMETIC SEQUENCES ARE FUNDAMENTAL IN VARIOUS FIELDS SUCH AS FINANCE, PHYSICS, AND COMPUTER SCIENCE. SOME REAL-WORLD APPLICATIONS INCLUDE:

1. FINANCIAL PLANNING: CALCULATING FIXED INSTALLMENT PAYMENTS OVER TIME.
2. PHYSICS: DESCRIBING UNIFORMLY ACCELERATED MOTION.
3. COMPUTER ALGORITHMS: ANALYZING ALGORITHMS WITH LINEAR TIME COMPLEXITY.
4. ENGINEERING: SIGNAL PROCESSING INVOLVING REGULAR SAMPLING.

UNDERSTANDING HOW TO ANALYZE AND MANIPULATE THESE SEQUENCES IS CRUCIAL FOR SOLVING REAL-WORLD PROBLEMS EFFICIENTLY.

SUMMARY AND KEY TAKEAWAYS

- AN ARITHMETIC SEQUENCE IS CHARACTERIZED BY A CONSTANT DIFFERENCE BETWEEN TERMS.
- GIVEN INITIAL TERMS, THE COMMON DIFFERENCE CAN BE CALCULATED EASILY.
- THE GENERAL TERM FORMULA ALLOWS US TO FIND ANY TERM IN THE SEQUENCE.
- USING THE LAST TERM VALUE, WE CAN DETERMINE THE TOTAL NUMBER OF TERMS.
- THE SUM OF THE SEQUENCE PROVIDES INSIGHT INTO THE OVERALL MAGNITUDE.

CONCLUSION

IN THIS DETAILED EXPLORATION, WE ANALYZED THE SEQUENCE WITH INITIAL TERMS -92, -88, -84, AND A LAST TERM OF 12. WE ESTABLISHED THAT THE COMMON DIFFERENCE IS 4, THE TOTAL NUMBER OF TERMS IS 27, AND THE SUM OF THE SEQUENCE IS -1080. THIS EXAMPLE DEMONSTRATES HOW FUNDAMENTAL PROPERTIES OF ARITHMETIC SEQUENCES FACILITATE SOLVING A VARIETY OF PROBLEMS EFFICIENTLY.

UNDERSTANDING THESE CONCEPTS IS ESSENTIAL NOT JUST FOR ACADEMIC PURPOSES BUT ALSO FOR PRACTICAL APPLICATIONS ACROSS MULTIPLE DISCIPLINES. MASTERY OF ARITHMETIC SEQUENCES ENABLES STUDENTS, PROFESSIONALS, AND ENTHUSIASTS TO ANALYZE PATTERNS, PREDICT FUTURE TERMS, AND COMPUTE SUMS WITH CONFIDENCE.

META DESCRIPTION: LEARN HOW TO FIND THE TOTAL NUMBER OF TERMS, COMMON DIFFERENCE, AND SUM OF A FINITE ARITHMETIC SEQUENCE WITH INITIAL TERMS -92, -88, -84, AND LAST TERM 12. STEP-BY-STEP EXPLANATION FOR BETTER UNDERSTANDING.

FREQUENTLY ASKED QUESTIONS

WHAT IS THE COMMON DIFFERENCE OF THE ARITHMETIC SEQUENCE WITH FIRST THREE TERMS -92, -88, -84, ...?

THE COMMON DIFFERENCE IS 4, OBTAINED BY SUBTRACTING ANY TERM FROM THE SUBSEQUENT TERM (E.G., $-88 - (-92) = 4$).

HOW MANY TERMS ARE THERE IN THE ARITHMETIC SEQUENCE FROM -92 TO 12 WITH THE GIVEN PATTERN?

THERE ARE 26 TERMS IN THE SEQUENCE, CALCULATED USING THE FORMULA FOR THE NUMBER OF TERMS IN AN ARITHMETIC SEQUENCE.

WHAT IS THE LAST TERM OF THE SEQUENCE, AND HOW IS IT DETERMINED?

THE LAST TERM IS 12, WHICH IS GIVEN AS THE LAST TERM IN THE SEQUENCE; IT CONFIRMS THE SEQUENCE'S PROGRESSION AND LENGTH.

HOW DO YOU FIND THE TOTAL NUMBER OF TERMS IN AN ARITHMETIC SEQUENCE WHEN THE FIRST AND LAST TERMS ARE KNOWN?

USE THE FORMULA $n = ((\text{LAST TERM} - \text{FIRST TERM}) / \text{COMMON DIFFERENCE}) + 1$; HERE, $n = ((12 - (-92)) / 4) + 1 = 26$.

WHAT IS THE SUM OF ALL TERMS IN THIS FINITE ARITHMETIC SEQUENCE?

THE SUM IS 338, CALCULATED USING THE FORMULA $S = (n/2) (\text{FIRST TERM} + \text{LAST TERM})$, SO $S = (26/2) (-92 + 12) = 13 (-80) = -1040$.

ADDITIONAL RESOURCES

1. THE FIRST THREE TERMS AND THE LAST TERM OF A FINITE ARITHMETIC SEQUENCE ARE - 92, -88, -84, ..., 12. FIND

UNDERSTANDING THE STRUCTURE OF AN ARITHMETIC SEQUENCE IS FUNDAMENTAL IN VARIOUS FIELDS SUCH AS MATHEMATICS, ENGINEERING, AND FINANCE. WHEN GIVEN SPECIFIC TERMS WITHIN A SEQUENCE, ALONG WITH THE LAST TERM, IT BECOMES POSSIBLE TO DETERMINE THE ENTIRE SEQUENCE'S CHARACTERISTICS, INCLUDING ITS COMMON DIFFERENCE, NUMBER OF TERMS, AND THE POSITION OF THE LAST TERM. THIS ARTICLE DELVES INTO THE SYSTEMATIC APPROACH TO SOLVING SUCH PROBLEMS, ILLUSTRATING THE PROCESS WITH THE EXAMPLE WHERE THE FIRST THREE TERMS ARE -92, -88, -84, AND THE LAST TERM IS 12.

THE NATURE OF ARITHMETIC SEQUENCES

TO APPRECIATE HOW TO ANALYZE THE GIVEN SEQUENCE, IT'S ESSENTIAL TO FIRST UNDERSTAND WHAT AN ARITHMETIC SEQUENCE ENTAILS.

DEFINITION:

AN ARITHMETIC SEQUENCE IS A SEQUENCE OF NUMBERS IN WHICH THE DIFFERENCE BETWEEN ANY TWO CONSECUTIVE TERMS IS CONSTANT. THIS CONSTANT DIFFERENCE IS CALLED THE COMMON DIFFERENCE (DENOTED AS d).

GENERAL FORM:

IF THE FIRST TERM OF THE SEQUENCE IS a_1 , THEN THE n -TH TERM, a_n , IS GIVEN BY:

$$\boxed{A_n = A_1 + (n - 1)D}$$

WHERE:

- A_1 IS THE FIRST TERM,
- D IS THE COMMON DIFFERENCE,
- N IS THE TERM NUMBER.

KEY PARAMETERS TO IDENTIFY:

- FIRST TERM, A_1
- COMMON DIFFERENCE, D
- NUMBER OF TERMS, N
- LAST TERM, A_n

ANALYZING THE GIVEN SEQUENCE

THE PROBLEM SPECIFIES THE FIRST THREE TERMS OF THE SEQUENCE AS:

$$\boxed{-92, -88, -84, \dots}$$

AND THE LAST TERM AS:

$$\boxed{12}$$

OUR GOAL IS TO FIND:

- THE COMMON DIFFERENCE (D)
- THE TOTAL NUMBER OF TERMS (N)
- THE POSITION OF THE LAST TERM WITHIN THE SEQUENCE

STEP 1: FIND THE COMMON DIFFERENCE

GIVEN THE FIRST THREE TERMS, CALCULATING THE COMMON DIFFERENCE IS STRAIGHTFORWARD:

$$\boxed{D = A_2 - A_1 = -88 - (-92) = 4}$$

SIMILARLY,

$$\boxed{A_3 - A_2 = -84 - (-88) = 4}$$

THIS CONFIRMS THE COMMON DIFFERENCE:

$$\boxed{\boxed{D = 4}}$$

STEP 2: IDENTIFY THE FIRST TERM

THE FIRST TERM IS EXPLICITLY GIVEN:

$$a_1 = -92$$

STEP 3: USE THE LAST TERM TO FIND THE NUMBER OF TERMS

THE LAST TERM a_n IS 12, AND THE SEQUENCE PROGRESSES WITH A COMMON DIFFERENCE OF 4. USING THE GENERAL FORMULA FOR THE n -TH TERM:

$$a_n = a_1 + (n - 1)d$$

PLUGGING IN THE KNOWN VALUES:

$$12 = -92 + (n - 1) \times 4$$

SOLVE FOR n :

$$12 + 92 = (n - 1) \times 4$$

$$104 = 4(n - 1)$$

DIVIDE BOTH SIDES BY 4:

$$\frac{104}{4} = n - 1$$

$$26 = n - 1$$

ADD 1 TO BOTH SIDES:

$$n = 27$$

THUS, THE SEQUENCE CONTAINS 27 TERMS.

STEP 4: CONFIRM THE SEQUENCE AND ITS LAST TERM

TO VERIFY, CALCULATE THE 27TH TERM:

$$a_{27} = a_1 + (27 - 1) \times d = -92 + 26 \times 4 = -92 + 104 = 12$$

INDEED, THE 27TH TERM IS 12, MATCHING THE GIVEN LAST TERM, CONFIRMING OUR CALCULATIONS.

SUMMARY OF FINDINGS

PARAMETER	VALUE
FIRST TERM (A_1)	-92
COMMON DIFFERENCE (D)	4
NUMBER OF TERMS (N)	27
LAST TERM (A_N)	12

THE SEQUENCE BEGINS AT -92, INCREASES BY 4 WITH EACH SUBSEQUENT TERM, AND TERMINATES AT 12, WHICH IS THE 27TH TERM.

SIGNIFICANCE AND APPLICATIONS

WHILE THIS PROBLEM IS ROOTED IN BASIC ARITHMETIC SEQUENCE CONCEPTS, ITS APPLICATIONS EXTEND INTO NUMEROUS REAL-WORLD SCENARIOS:

- FINANCIAL MODELING: CALCULATING PAYMENTS OR INVESTMENTS THAT GROW AT A CONSTANT RATE.
- ENGINEERING: SIGNAL PROCESSING WHERE SIGNALS CHANGE LINEARLY OVER TIME.
- DATA ANALYSIS: RECOGNIZING PATTERNS THAT FOLLOW ARITHMETIC PROGRESSION.

UNDERSTANDING HOW TO DETERMINE SEQUENCE PARAMETERS FROM PARTIAL INFORMATION IS A VITAL SKILL, EMPOWERING PROFESSIONALS AND STUDENTS TO ANALYZE COMPLEX DATA SETS EFFICIENTLY.

ADDITIONAL INSIGHTS

ARITHMETIC SEQUENCE PROPERTIES INCLUDE:

- THE AVERAGE OF THE FIRST AND LAST TERMS EQUALS THE AVERAGE OF ALL THE TERMS:

$$\text{AVERAGE} = \frac{A_1 + A_N}{2}$$

- THE SUM OF THE N TERMS (S_N) CAN BE CALCULATED USING:

$$S_N = \frac{N}{2} (A_1 + A_N)$$

APPLYING THIS TO OUR SEQUENCE:

$$S_{27} = \frac{27}{2} (-92 + 12) = \frac{27}{2} \times (-80) = 27 \times -40 = -1080$$

THIS SUM INDICATES THE TOTAL OF ALL 27 TERMS IN THE SEQUENCE.

FINAL REMARKS

ANALYZING AND SOLVING FOR PARAMETERS OF AN ARITHMETIC SEQUENCE WHEN GIVEN PARTIAL INFORMATION INVOLVES A

SYSTEMATIC APPROACH:

1. DETERMINE THE COMMON DIFFERENCE FROM KNOWN CONSECUTIVE TERMS.
2. USE THE GENERAL TERM FORMULA TO RELATE THE LAST TERM TO THE SEQUENCE PARAMETERS.
3. SOLVE FOR THE NUMBER OF TERMS.
4. VERIFY THE RESULT WITH THE SEQUENCE FORMULA.

THE PROBLEM OF IDENTIFYING THE TOTAL NUMBER OF TERMS AND OTHER SEQUENCE CHARACTERISTICS EXEMPLIFIES FOUNDATIONAL ALGEBRAIC TECHNIQUES THAT ARE WIDELY APPLICABLE ACROSS DISCIPLINES. MASTERY OF THESE CONCEPTS ALLOWS FOR EFFICIENT PROBLEM-SOLVING AND DEEPER INSIGHTS INTO LINEAR PATTERNS WITHIN DATA.

IN SUMMARY, GIVEN THE FIRST THREE TERMS $(-92, -88, -84)$ AND THE LAST TERM (12) , THE SEQUENCE IS AN ARITHMETIC PROGRESSION WITH A COMMON DIFFERENCE OF 4, COMPRISING 27 TERMS, STARTING AT -92 AND ENDING AT 12 . RECOGNIZING THESE PARAMETERS ENABLES A COMPREHENSIVE UNDERSTANDING OF THE SEQUENCE'S STRUCTURE AND FACILITATES FURTHER ANALYSIS OR APPLICATION IN PRACTICAL CONTEXTS.

1 The First Three Terms And The Last Term Of A Finite Arithmetic Sequence Are 92 88 84 12 Find

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