

WILL GIVE BRAINLEST!! FIND THE FIRST 5 TERMS OF THE SEQUENCE. THEN, FIND THE COMMON DIFFERENCE. ARITHMETIC:

WILL GIVE BRAINLEST!! FIND THE FIRST 5 TERMS OF THE SEQUENCE. THEN, FIND THE COMMON DIFFERENCE. ARITHMETIC:

UNDERSTANDING ARITHMETIC SEQUENCES IS A FUNDAMENTAL ASPECT OF MATHEMATICS THAT HELPS STUDENTS AND LEARNERS GRASP THE CONCEPT OF REGULAR PATTERNS IN NUMBERS. WHETHER YOU'RE PREPARING FOR EXAMS, TUTORING, OR JUST LOOKING TO SHARPEN YOUR MATH SKILLS, KNOWING HOW TO IDENTIFY THE FIRST TERMS OF A SEQUENCE AND DETERMINE THE COMMON DIFFERENCE IS ESSENTIAL. THIS COMPREHENSIVE GUIDE WILL WALK YOU THROUGH THE PROCESS STEP-BY-STEP, PROVIDING CLEAR EXPLANATIONS, PRACTICAL EXAMPLES, AND TIPS TO MASTER THE TOPIC.

WHAT IS AN ARITHMETIC SEQUENCE?

AN ARITHMETIC SEQUENCE IS A SEQUENCE OF NUMBERS IN WHICH THE DIFFERENCE BETWEEN CONSECUTIVE TERMS REMAINS CONSTANT. THIS CONSTANT DIFFERENCE IS KNOWN AS THE COMMON DIFFERENCE (DENOTED AS D).

FOR EXAMPLE, CONSIDER THE SEQUENCE:

2, 5, 8, 11, 14, ...

HERE, THE DIFFERENCE BETWEEN EACH PAIR OF SUCCESSIVE TERMS IS 3, MAKING $D = 3$.

KEY FEATURES OF AN ARITHMETIC SEQUENCE:

- EACH TERM ADDS A FIXED AMOUNT TO THE PREVIOUS TERM.
- THE SEQUENCE CAN INCREASE, DECREASE, OR STAY CONSTANT IF THE COMMON DIFFERENCE IS ZERO.
- THE GENERAL FORM OF AN ARITHMETIC SEQUENCE IS:

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

WHERE:

- a_n IS THE N TH TERM,
- a_1 IS THE FIRST TERM,
- D IS THE COMMON DIFFERENCE,
- n IS THE POSITION OF THE TERM.

HOW TO FIND THE FIRST 5 TERMS OF AN ARITHMETIC SEQUENCE

DETERMINING THE FIRST FIVE TERMS OF AN ARITHMETIC SEQUENCE INVOLVES UNDERSTANDING THE INITIAL TERM AND THE COMMON DIFFERENCE.

STEP-BY-STEP PROCESS:

1. IDENTIFY THE FIRST TERM (a_1):
 - USUALLY PROVIDED IN THE PROBLEM.
 - IF NOT EXPLICITLY GIVEN, LOOK FOR CLUES OR INITIAL TERMS.

2. DETERMINE THE COMMON DIFFERENCE (d):

- FIND THE DIFFERENCE BETWEEN TWO SUCCESSIVE KNOWN TERMS.
- CONFIRM THAT THIS DIFFERENCE IS CONSISTENT ACROSS THE SEQUENCE.

3. CALCULATE THE NEXT TERMS:

- USE THE FORMULA:

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

- FOR THE FIRST FIVE TERMS, COMPUTE $(a_1, a_2, a_3, a_4, a_5)$.

EXAMPLE: FIND THE FIRST 5 TERMS AND COMMON DIFFERENCE

SUPPOSE YOU'RE GIVEN THE SEQUENCE:

- 7, 10, 13, 16, ...

STEP 1: IDENTIFY THE FIRST TERM:

- $(a_1 = 7)$

STEP 2: FIND THE COMMON DIFFERENCE:

- $(a_2 - a_1 = 10 - 7 = 3)$
- $(a_3 - a_2 = 13 - 10 = 3)$

SINCE THE DIFFERENCES ARE EQUAL, $d = 3$.

STEP 3: LIST THE FIRST FIVE TERMS:

- $(a_1 = 7)$
- $(a_2 = a_1 + d = 7 + 3 = 10)$
- $(a_3 = a_1 + 2d = 7 + 2 \times 3 = 13)$
- $(a_4 = a_1 + 3d = 7 + 3 \times 3 = 16)$
- $(a_5 = a_1 + 4d = 7 + 4 \times 3 = 19)$

RESULT:

FIRST FIVE TERMS: 7, 10, 13, 16, 19

COMMON DIFFERENCE: 3

HOW TO FIND THE COMMON DIFFERENCE IN AN ARITHMETIC SEQUENCE

THE COMMON DIFFERENCE IS THE CORNERSTONE OF AN ARITHMETIC SEQUENCE. HERE'S HOW TO FIND IT:

METHOD 1: USING SUCCESSIVE TERMS

- SUBTRACT ANY TERM FROM THE TERM IMMEDIATELY FOLLOWING IT.

- CONFIRM THAT THIS DIFFERENCE IS CONSISTENT THROUGHOUT THE SEQUENCE.

EXAMPLE:

SEQUENCE: 12, 15, 18, 21, 24

- $(15 - 12 = 3)$
- $(18 - 15 = 3)$
- $(21 - 18 = 3)$
- $(24 - 21 = 3)$

COMMON DIFFERENCE $(d = 3)$.

METHOD 2: FROM THE FIRST TWO TERMS

- IF THE FIRST TWO TERMS ARE KNOWN, SIMPLY SUBTRACT:

$$d = a_2 - a_1$$

METHOD 3: USING THE GENERAL FORMULA

- IF THE FIRST TERM (a_1) AND THE (n^{th}) TERM (a_n) ARE KNOWN, AND YOU KNOW THE POSITION (n) , THEN:

$$d = \frac{a_n - a_1}{n - 1}$$

COMMON MISTAKES TO AVOID

UNDERSTANDING COMMON PITFALLS CAN HELP YOU AVOID ERRORS:

- **ASSUMING THE SEQUENCE IS ARITHMETIC WITHOUT VERIFYING:** ALWAYS CHECK THE DIFFERENCES BETWEEN SUCCESSIVE TERMS.
- **CONFUSING THE COMMON DIFFERENCE WITH THE DIFFERENCE BETWEEN NON-CONSECUTIVE TERMS:** ONLY SUBTRACT NEIGHBORING TERMS FOR THE COMMON DIFFERENCE.
- **IGNORING THE SIGNS OF THE DIFFERENCE:** THE COMMON DIFFERENCE CAN BE NEGATIVE IF THE SEQUENCE DECREASES.
- **MISAPPLYING THE FORMULA:** ENSURE THE CORRECT FORMULA IS USED BASED ON KNOWN DATA.

PRACTICE PROBLEMS

TO REINFORCE YOUR UNDERSTANDING, TRY THESE PRACTICE PROBLEMS:

1. GIVEN THE SEQUENCE 5, 8, 11, 14, ?, ?, ?, FIND THE FIRST 7 TERMS AND THE COMMON DIFFERENCE.

2. THE SEQUENCE STARTS WITH 20, AND THE COMMON DIFFERENCE IS -4. LIST THE FIRST FIVE TERMS.
3. IF THE 3RD TERM OF AN ARITHMETIC SEQUENCE IS 10 AND THE 7TH TERM IS 22, FIND THE FIRST TERM AND THE COMMON DIFFERENCE.

SOLUTIONS:

1. FIRST TERM: 5, COMMON DIFFERENCE: 3
NEXT TERMS: 17, 20, 23, 26, 29, 32

2. FIRST TERM: 20, COMMON DIFFERENCE: -4
TERMS: 20, 16, 12, 8, 4

3. USING THE FORMULA:

$$\begin{aligned} \backslash[\\ a_3 &= a_1 + 2d = 10 \\ a_7 &= a_1 + 6d = 22 \\ \backslash] \end{aligned}$$

SUBTRACT:

$$\begin{aligned} \backslash[\\ (a_7 - a_3) &= (a_1 + 6d) - (a_1 + 2d) = 4d = 12 \rightarrow d = 3 \\ \backslash] \end{aligned}$$

THEN:

$$\begin{aligned} \backslash[\\ 10 &= a_1 + 2 \times 3 \rightarrow a_1 = 10 - 6 = 4 \\ \backslash] \end{aligned}$$

FIRST TERM: 4
COMMON DIFFERENCE: 3

CONCLUSION

MASTERING THE IDENTIFICATION OF THE FIRST FIVE TERMS AND THE COMMON DIFFERENCE IN AN ARITHMETIC SEQUENCE IS A FOUNDATIONAL SKILL IN MATHEMATICS. THESE CONCEPTS ARE NOT ONLY VITAL FOR SOLVING SEQUENCE PROBLEMS BUT ALSO FOR UNDERSTANDING MORE ADVANCED TOPICS LIKE ARITHMETIC SERIES AND ALGEBRAIC FORMULAS. REMEMBER TO VERIFY THE COMMON DIFFERENCE BY CHECKING SUCCESSIVE TERMS, AND USE THE FORMULAS CONFIDENTLY TO FIND MISSING TERMS OR SEQUENCE PARAMETERS.

WITH CONSISTENT PRACTICE AND ATTENTION TO DETAIL, YOU'LL DEVELOP A STRONG GRASP OF ARITHMETIC SEQUENCES THAT WILL SERVE YOU WELL IN ACADEMIC AND REAL-WORLD MATHEMATICAL APPLICATIONS.

FREQUENTLY ASKED QUESTIONS

WHAT ARE THE FIRST FIVE TERMS OF AN ARITHMETIC SEQUENCE IF THE FIRST TERM IS 3 AND THE COMMON DIFFERENCE IS 4?

THE FIRST FIVE TERMS ARE 3, 7, 11, 15, AND 19.

HOW DO YOU FIND THE COMMON DIFFERENCE IN AN ARITHMETIC SEQUENCE?

SUBTRACT THE FIRST TERM FROM THE SECOND TERM (OR ANY TERM FROM THE PREVIOUS ONE) TO FIND THE COMMON DIFFERENCE.

IF THE FIRST TERM OF AN ARITHMETIC SEQUENCE IS 10 AND THE COMMON DIFFERENCE IS 3, WHAT ARE THE FIRST FIVE TERMS?

THE FIRST FIVE TERMS ARE 10, 13, 16, 19, AND 22.

WHY IS IT IMPORTANT TO FIND THE FIRST FIVE TERMS OF AN ARITHMETIC SEQUENCE?

FINDING THE FIRST FIVE TERMS HELPS IDENTIFY THE PATTERN AND VERIFY THE COMMON DIFFERENCE, MAKING IT EASIER TO PREDICT SUBSEQUENT TERMS.

CAN THE COMMON DIFFERENCE IN AN ARITHMETIC SEQUENCE BE NEGATIVE?

YES, IF EACH TERM DECREASES BY A FIXED AMOUNT, THE COMMON DIFFERENCE WILL BE NEGATIVE.

HOW DO YOU DETERMINE THE NTH TERM OF AN ARITHMETIC SEQUENCE?

USE THE FORMULA: $NTH\ TERM = FIRST\ TERM + (n - 1) \times COMMON\ DIFFERENCE$.

GIVEN THE SEQUENCE 2, 5, 8, 11, WHAT IS THE COMMON DIFFERENCE AND THE NEXT TERM?

THE COMMON DIFFERENCE IS 3, AND THE NEXT TERM IS 14.

WHAT IS THE SIGNIFICANCE OF THE COMMON DIFFERENCE IN AN ARITHMETIC SEQUENCE?

IT DEFINES THE CONSISTENT AMOUNT ADDED OR SUBTRACTED BETWEEN CONSECUTIVE TERMS, SHAPING THE SEQUENCE'S PATTERN.

HOW CAN YOU VERIFY IF A SEQUENCE IS ARITHMETIC?

CHECK IF THE DIFFERENCE BETWEEN EACH PAIR OF CONSECUTIVE TERMS IS CONSTANT; IF YES, THE SEQUENCE IS ARITHMETIC.

ADDITIONAL RESOURCES

WILL GIVE BRAINILEST!! FIND THE FIRST 5 TERMS OF THE SEQUENCE. THEN, FIND THE COMMON DIFFERENCE. ARITHMETIC:

UNDERSTANDING THE FUNDAMENTALS OF ARITHMETIC SEQUENCES IS ESSENTIAL FOR MASTERING MANY AREAS OF MATHEMATICS, FROM BASIC ALGEBRA TO MORE ADVANCED TOPICS. WHEN FACED WITH A SEQUENCE, ONE OF THE PRIMARY TASKS IS TO IDENTIFY ITS FIRST FEW TERMS AND DETERMINE THE COMMON DIFFERENCE. THIS PROCESS HELPS IN PREDICTING SUBSEQUENT TERMS AND UNDERSTANDING THE SEQUENCE'S BEHAVIOR. IN THIS GUIDE, WE'LL WALK THROUGH A COMPREHENSIVE APPROACH TO FINDING THE FIRST FIVE TERMS OF AN ARITHMETIC SEQUENCE AND CALCULATING ITS COMMON DIFFERENCE, PROVIDING CLARITY AND CONFIDENCE IN TACKLING SIMILAR PROBLEMS.

WHAT IS AN ARITHMETIC SEQUENCE?

BEFORE DIVING INTO PROBLEM-SOLVING, IT'S CRUCIAL TO GRASP WHAT AN ARITHMETIC SEQUENCE IS. AN ARITHMETIC SEQUENCE IS A LIST OF NUMBERS WHERE THE DIFFERENCE BETWEEN ANY TWO CONSECUTIVE TERMS IS CONSTANT. THIS CONSTANT DIFFERENCE IS CALLED THE COMMON DIFFERENCE.

DEFINITION:

AN ARITHMETIC SEQUENCE IS A SEQUENCE OF NUMBERS $(a_1, a_2, a_3, \dots)$ SUCH THAT:

$$a_{n+1} = a_n + d$$

WHERE:

- a_1 IS THE FIRST TERM
- d IS THE COMMON DIFFERENCE

STEP 1: UNDERSTANDING THE GIVEN DATA

MOST PROBLEMS WILL PRESENT YOU WITH SOME INITIAL INFORMATION ABOUT THE SEQUENCE. THIS COULD BE:

- A FEW TERMS OF THE SEQUENCE
- THE RELATIONSHIP BETWEEN TERMS
- OR THE VALUE OF THE FIRST TERM AND THE COMMON DIFFERENCE DIRECTLY

EXAMPLE SCENARIO:

SUPPOSE YOU'RE GIVEN THE FOLLOWING DATA:

- THE SEQUENCE STARTS WITH 3
- THE SECOND TERM IS 7
- THE THIRD TERM IS 11

YOUR GOAL: FIND THE FIRST FIVE TERMS AND DETERMINE THE COMMON DIFFERENCE.

STEP 2: FIND THE FIRST TERM

THE FIRST TERM, a_1 , IS USUALLY GIVEN DIRECTLY OR CAN BE INFERRED FROM THE DATA.

IN OUR EXAMPLE:

$$a_1 = 3$$

STEP 3: FIND THE COMMON DIFFERENCE

THE COMMON DIFFERENCE d CAN BE CALCULATED BY SUBTRACTING ANY TERM FROM THE SUBSEQUENT TERM.

IN OUR EXAMPLE:

- BETWEEN THE FIRST AND SECOND TERMS:

$$d = a_2 - a_1 = 7 - 3 = 4$$

- TO VERIFY CONSISTENCY, CHECK BETWEEN THE SECOND AND THIRD TERMS:

$$11 - 7 = 4$$

SINCE THE DIFFERENCE IS CONSISTENT, $d = 4$.

STEP 4: FIND THE NEXT TERMS

ONCE THE FIRST TERM AND THE COMMON DIFFERENCE ARE KNOWN, CALCULATING SUBSEQUENT TERMS BECOMES STRAIGHTFORWARD:

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

FOR THE FIRST FIVE TERMS:

1. $\{[A_1 = 3]\}$ (GIVEN)
2. $\{[A_2 = 3 + (2-1) \times 4 = 3 + 4 = 7]\}$
3. $\{[A_3 = 3 + (3-1) \times 4 = 3 + 8 = 11]\}$
4. $\{[A_4 = 3 + (4-1) \times 4 = 3 + 12 = 15]\}$
5. $\{[A_5 = 3 + (5-1) \times 4 = 3 + 16 = 19]\}$

RESULT: THE FIRST FIVE TERMS ARE 3, 7, 11, 15, 19.

STEP 5: GENERALIZING THE APPROACH

IF THE SEQUENCE IS GIVEN WITH DIFFERENT DATA, FOLLOW THESE STEPS:

1. IDENTIFY THE FIRST TERM, $\{[A_1]\}$
 - LOOK FOR EXPLICIT MENTION OR INFER FROM THE SEQUENCE.
2. CALCULATE THE COMMON DIFFERENCE, $\{[D]\}$
 - USE TWO CONSECUTIVE TERMS:
 $\{[D = A_{n+1} - A_n]\}$
 - VERIFY WITH ADDITIONAL PAIRS IF AVAILABLE.
3. FIND SUBSEQUENT TERMS
 - USE THE FORMULA:
 $\{[A_n = A_1 + (n - 1)D]\}$
 - CALCULATE AS MANY AS NEEDED.

PRACTICAL EXAMPLE WITH LESS DATA

SUPPOSE YOU ONLY KNOW:

- THE FIRST TERM $\{[A_1 = 5]\}$
- THE THIRD TERM $\{[A_3 = 13]\}$

FIND THE FIRST FIVE TERMS.

SOLUTION:

- THE THIRD TERM:
 $\{[A_3 = A_1 + 2D]\}$
 $\{[13 = 5 + 2D]\}$
 $\{[2D = 8]\}$
 $\{[D = 4]\}$

- NOW, FIND SUBSEQUENT TERMS:

1. $\{[A_1 = 5]\}$
2. $\{[A_2 = A_1 + D = 5 + 4 = 9]\}$
3. $\{[A_3 = 13]\}$ (GIVEN)
4. $\{[A_4 = A_1 + 3D = 5 + 12 = 17]\}$

$$5. \ (a_5 = a_1 + 4d = 5 + 16 = 21 \)$$

FIRST FIVE TERMS: 5, 9, 13, 17, 21

SUMMARY OF KEY STEPS

STEP	ACTION	EXPLANATION
1	IDENTIFY THE FIRST TERM (a_1)	FROM GIVEN DATA OR CONTEXT
2	FIND THE COMMON DIFFERENCE (d)	SUBTRACT CONSECUTIVE KNOWN TERMS OR USE GIVEN TERMS
3	USE THE FORMULA $(a_n = a_1 + (n - 1)d)$	TO CALCULATE SUBSEQUENT TERMS

ADDITIONAL TIPS AND TRICKS

- CONSISTENCY IS KEY: ALWAYS VERIFY THE COMMON DIFFERENCE WITH MULTIPLE PAIRS OF TERMS IF POSSIBLE.
- USE THE FORMULA WISELY: ONCE (a_1) AND (d) ARE KNOWN, GENERATING SUBSEQUENT TERMS IS STRAIGHTFORWARD.
- CHECK YOUR WORK: CONFIRM THAT THE DIFFERENCES BETWEEN THE CALCULATED TERMS ARE CONSISTENT TO ENSURE ACCURACY.

HANDLING SPECIAL CASES

- SEQUENCE WITH UNKNOWN FIRST TERM: IF ONLY DIFFERENCES ARE PROVIDED, YOU MAY NEED TO DEDUCE (a_1) FROM INITIAL CONDITIONS.
- NON-ARITHMETIC SEQUENCES: IF DIFFERENCES ARE NOT CONSTANT, THE SEQUENCE IS NOT ARITHMETIC, AND OTHER METHODS ARE NEEDED.

FINAL THOUGHTS

FINDING THE FIRST FIVE TERMS OF AN ARITHMETIC SEQUENCE AND ITS COMMON DIFFERENCE IS FOUNDATIONAL IN UNDERSTANDING PATTERNS WITHIN SEQUENCES. BY CAREFULLY ANALYZING INITIAL DATA, VERIFYING DIFFERENCES, AND APPLYING THE CORE FORMULA, YOU CAN DECODE A WIDE ARRAY OF SEQUENCES WITH CONFIDENCE. PRACTICE WITH DIFFERENT TYPES OF PROBLEMS, AND SOON IDENTIFYING THE STRUCTURE OF ANY ARITHMETIC SEQUENCE WILL BECOME SECOND NATURE. REMEMBER, THE KEY IS TO START SIMPLE, VERIFY YOUR DIFFERENCES, AND BUILD FROM THERE.

HAPPY SOLVING!

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