

I COUNT IN EQUAL STEPS MY FIRST NUMBER IS -2 MY FIFTH NUMBER IS 26 WHATS MY THIRD NUMBER

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UNDERSTANDING SEQUENCES AND PATTERNS IS AN ESSENTIAL PART OF MATHEMATICS THAT HELPS DEVELOP CRITICAL THINKING AND PROBLEM-SOLVING SKILLS. AMONG THE FASCINATING TOPICS WITHIN THIS AREA IS THE CONCEPT OF ARITHMETIC SEQUENCES, WHERE EACH TERM IN THE SEQUENCE INCREASES OR DECREASES BY A CONSISTENT AMOUNT. A COMMON PROBLEM ENCOUNTERED INVOLVES DETERMINING AN UNKNOWN TERM IN SUCH A SEQUENCE WHEN GIVEN CERTAIN PIECES OF INFORMATION. IN THIS ARTICLE, WE WILL EXPLORE THE PROBLEM: "I COUNT IN EQUAL STEPS MY FIRST NUMBER IS -2 MY FIFTH NUMBER IS 26 WHATS MY THIRD NUMBER," AND DELVE INTO THE METHODS TO FIND THE THIRD TERM OF THE SEQUENCE.

UNDERSTANDING ARITHMETIC SEQUENCES

WHAT IS AN ARITHMETIC SEQUENCE?

AN ARITHMETIC SEQUENCE IS A LIST OF NUMBERS WHERE EACH TERM AFTER THE FIRST IS OBTAINED BY ADDING A FIXED NUMBER CALLED THE COMMON DIFFERENCE TO THE PREVIOUS TERM. FOR EXAMPLE, THE SEQUENCE 3, 7, 11, 15, ... HAS A COMMON DIFFERENCE OF 4.

KEY FEATURES:

- FIRST TERM (a_1): THE STARTING NUMBER OF THE SEQUENCE.
- COMMON DIFFERENCE (d): THE CONSTANT AMOUNT ADDED TO EACH TERM TO GET THE NEXT.
- NTH TERM (a_n): THE VALUE OF THE SEQUENCE AT POSITION n .

THE GENERAL FORMULA FOR THE NTH TERM OF AN ARITHMETIC SEQUENCE IS:

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

DECODING THE PROBLEM: "I COUNT IN EQUAL STEPS MY FIRST NUMBER IS -2 MY FIFTH NUMBER IS 26 WHATS MY THIRD NUMBER"

GIVEN DATA

- FIRST TERM ($a_1 = -2$)
- FIFTH TERM ($a_5 = 26$)

QUESTION: WHAT IS THE THIRD TERM (a_3)?

THIS PROBLEM INVOLVES DETERMINING THE COMMON DIFFERENCE AND THEN FINDING THE THIRD TERM.

STEP-BY-STEP APPROACH

1. IDENTIFY THE KNOWNs:

- $(a_1 = -2)$
- $(a_5 = 26)$

2. USE THE NTH TERM FORMULA:

- For (a_5) :

$$a_5 = a_1 + (5 - 1)d$$

$$26 = -2 + 4d$$

3. SOLVE FOR THE COMMON DIFFERENCE (d) :

$$26 + 2 = 4d$$

$$28 = 4d$$

$$d = \frac{28}{4} = 7$$

4. FIND THE THIRD TERM (a_3) :

$$a_3 = a_1 + (3 - 1)d$$

$$a_3 = -2 + 2 \times 7$$

$$a_3 = -2 + 14 = 12$$

ANSWER: THE THIRD NUMBER IN THE SEQUENCE IS 12.

GENERAL FORMULA FOR THE SEQUENCE AND ITS APPLICATIONS

ONCE THE COMMON DIFFERENCE IS KNOWN, THE ENTIRE SEQUENCE CAN BE GENERATED, WHICH IS USEFUL FOR VARIOUS MATH PROBLEMS AND REAL-WORLD APPLICATIONS.

SEQUENCE GENERATION

GIVEN (a_1) AND (d) :

TERM NUMBER	FORMULA	CALCULATION	RESULT
1	$(a_1 = -2)$	(GIVEN)	-2
2	$(a_2 = a_1 + d)$	$-2 + 7$	5
3	$(a_3 = a_1 + 2d)$	$-2 + 14$	12
4	$(a_4 = a_1 + 3d)$	$-2 + 21$	19
5	$(a_5 = a_1 + 4d)$	$-2 + 28$	26

THIS TABLE CONFIRMS THE SEQUENCE PROGRESSES IN STEPS OF 7.

REAL-WORLD APPLICATIONS OF ARITHMETIC SEQUENCES

- FINANCE: CALCULATING INSTALLMENT PAYMENTS OR SAVINGS OVER TIME.
- PHYSICS: DESCRIBING UNIFORM ACCELERATION.
- COMPUTER SCIENCE: ITERATING OVER DATA STRUCTURES WITH FIXED STEP SIZES.
- SCHEDULING: PLANNING EVENTS AT REGULAR INTERVALS.

HOW TO APPROACH SIMILAR SEQUENCE PROBLEMS

IDENTIFY THE KNOWN VALUES

- FIRST TERM (a_1)
- ANY OTHER SPECIFIC TERM (a_n)
- THE POSITION OF THE KNOWN TERM (E.G., 5TH, 10TH)

APPLY THE NTH TERM FORMULA

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

- USE THE KNOWN TERMS TO SOLVE FOR THE COMMON DIFFERENCE (d) .

CALCULATE THE UNKNOWN TERM

- ONCE (d) IS KNOWN, SUBSTITUTE THE POSITION OF THE DESIRED TERM INTO THE FORMULA TO FIND ITS VALUE.

PRACTICE PROBLEMS

1. IF THE FIRST TERM OF AN ARITHMETIC SEQUENCE IS 3 AND THE 4TH TERM IS 15, WHAT IS THE 2ND TERM?
2. A SEQUENCE STARTS AT -5 AND INCREASES BY 3 EACH STEP. WHAT IS THE 6TH TERM?

MASTERING THE ART OF SEQUENCE PROBLEMS

TIPS FOR SUCCESS

- CAREFULLY READ THE PROBLEM: IDENTIFY WHAT IS GIVEN AND WHAT IS BEING ASKED.
- WRITE DOWN KNOWN VALUES: CLEAR NOTATION HELPS PREVENT CONFUSION.
- USE THE FORMULA SYSTEMATICALLY: PLUG IN KNOWN VALUES AND SOLVE STEP-BY-STEP.
- CHECK YOUR SOLUTIONS: VERIFY BY PLUGGING YOUR ANSWER BACK INTO THE SEQUENCE FORMULA.

UNDERSTANDING PATTERNS BEYOND ARITHMETIC SEQUENCES

WHILE ARITHMETIC SEQUENCES INVOLVE A CONSTANT DIFFERENCE, OTHER SEQUENCES FOLLOW DIFFERENT RULES:

- GEOMETRIC SEQUENCES: EACH TERM MULTIPLIES BY A FIXED RATIO.
- FIBONACCI SEQUENCE: EACH TERM IS THE SUM OF THE TWO PRECEDING ONES.
- RECURSIVE SEQUENCES: DEFINED IN TERMS OF PREVIOUS TERMS.

CONCLUSION

THE PROBLEM "I COUNT IN EQUAL STEPS MY FIRST NUMBER IS -2 MY FIFTH NUMBER IS 26 WHATS MY THIRD NUMBER" EXEMPLIFIES HOW UNDERSTANDING THE STRUCTURE OF ARITHMETIC SEQUENCES ENABLES ONE TO FIND UNKNOWN TERMS EFFICIENTLY. BY IDENTIFYING THE FIRST TERM AND THE SPECIFIC TERM'S VALUE, CALCULATING THE COMMON DIFFERENCE BECOMES STRAIGHTFORWARD, LEADING DIRECTLY TO THE SOLUTION. REMEMBER, MASTERING THESE CONCEPTS EQUIPS YOU WITH A POWERFUL TOOL FOR TACKLING A WIDE RANGE OF MATHEMATICAL PROBLEMS AND REAL-WORLD SCENARIOS INVOLVING SEQUENCES AND PATTERNS.

WHETHER YOU ARE A STUDENT PREPARING FOR EXAMS OR SOMEONE INTERESTED IN THE BEAUTY OF MATHEMATICAL PATTERNS, PRACTICING SEQUENCE PROBLEMS ENHANCES YOUR LOGICAL THINKING AND PROBLEM-SOLVING ABILITIES. KEEP PRACTICING DIFFERENT VARIATIONS, AND SOON, IDENTIFYING AND SOLVING SEQUENCE PROBLEMS WILL BECOME SECOND NATURE!

KEYWORDS: ARITHMETIC SEQUENCE, SEQUENCE PATTERN, COMMON DIFFERENCE, NTH TERM, MATH PROBLEMS, SEQUENCE CALCULATION, PROBLEM-SOLVING, SEQUENCE FORMULAS, SEQUENCE APPLICATIONS

FREQUENTLY ASKED QUESTIONS

WHAT IS THE COMMON DIFFERENCE IN THE SEQUENCE WHERE THE FIRST TERM IS -2 AND THE FIFTH TERM IS 26?

THE COMMON DIFFERENCE IS 8.

HOW DO YOU FIND THE THIRD NUMBER IN THE SEQUENCE WHERE THE FIRST TERM IS -2 AND THE FIFTH TERM IS 26?

FIRST, DETERMINE THE COMMON DIFFERENCE, THEN USE THE FORMULA FOR THE NTH TERM TO FIND THE THIRD TERM.

WHAT IS THE SEQUENCE IF THE FIRST TERM IS -2, THE FIFTH TERM IS 26, AND THE STEPS ARE EQUAL?

THE SEQUENCE IS -2, 6, 14, 22, 30.

HOW DO YOU CALCULATE THE THIRD NUMBER IN THE SEQUENCE GIVEN THE FIRST AND FIFTH TERMS?

CALCULATE THE COMMON DIFFERENCE AND THEN FIND THE THIRD TERM USING THE FORMULA: $A_3 = A_1 + 2D$.

WHAT IS THE VALUE OF THE THIRD NUMBER IN THE SEQUENCE WHERE THE FIRST TERM IS -2 AND THE FIFTH TERM IS 26?

THE THIRD NUMBER IS 14.

CAN YOU EXPLAIN HOW TO FIND THE SEQUENCE TERMS WITH GIVEN FIRST AND FIFTH TERMS AND EQUAL STEPS?

YES, FIRST FIND THE COMMON DIFFERENCE BY DIVIDING THE TOTAL INCREASE BY 4, THEN USE IT TO FIND THE INTERMEDIATE TERMS.

WHAT IS THE GENERAL FORMULA TO FIND ANY TERM IN THIS ARITHMETIC SEQUENCE?

THE NTH TERM IS GIVEN BY $A_n = A_1 + (n - 1)d$, WHERE A_1 IS THE FIRST TERM AND d IS THE COMMON DIFFERENCE.

ADDITIONAL RESOURCES

I COUNT IN EQUAL STEPS MY FIRST NUMBER IS -2 MY FIFTH NUMBER IS 26 WHATS MY THIRD NUMBER: AN IN-DEPTH EXPLORATION OF ARITHMETIC SEQUENCES AND PROBLEM-SOLVING STRATEGIES

INTRODUCTION

MATHEMATICS OFTEN CHALLENGES STUDENTS AND ENTHUSIASTS ALIKE TO THINK CRITICALLY ABOUT PATTERNS, SEQUENCES, AND LOGICAL REASONING. THE PROBLEM TITLED “I COUNT IN EQUAL STEPS MY FIRST NUMBER IS -2 MY FIFTH NUMBER IS 26 WHATS MY THIRD NUMBER” EXEMPLIFIES SUCH A CHALLENGE, INVITING US TO EXPLORE THE WORLD OF ARITHMETIC SEQUENCES WITH GIVEN PARAMETERS. THIS PROBLEM IS NOT ONLY AN ENGAGING PUZZLE BUT ALSO AN EXCELLENT OPPORTUNITY TO DEEPEN UNDERSTANDING OF SEQUENCES, COMMON DIFFERENCES, AND ALGEBRAIC METHODS USED TO FIND UNKNOWN TERMS.

IN THIS COMPREHENSIVE REVIEW, WE WILL DISSECT THE PROBLEM STEP-BY-STEP, EXPLORE RELEVANT CONCEPTS, AND PROVIDE STRATEGIES FOR SOLVING SIMILAR PROBLEMS EFFICIENTLY. WHETHER YOU ARE A STUDENT PREPARING FOR EXAMS, A MATH ENTHUSIAST, OR A TEACHER SEEKING ILLUSTRATIVE EXAMPLES, THIS ARTICLE AIMS TO SERVE AS A DETAILED GUIDE.

UNDERSTANDING THE PROBLEM

BEFORE DELVING INTO CALCULATIONS, IT'S ESSENTIAL TO INTERPRET THE PROBLEM ACCURATELY:

- THE SEQUENCE “I COUNT IN EQUAL STEPS” INDICATES AN ARITHMETIC SEQUENCE, WHERE EACH TERM INCREASES OR DECREASES BY A CONSTANT DIFFERENCE.
- THE FIRST NUMBER IN THE SEQUENCE IS -2.
- THE FIFTH NUMBER IN THE SEQUENCE IS 26.
- THE GOAL IS TO FIND THE THIRD NUMBER IN THE SEQUENCE.

THIS PROBLEM PROVIDES TWO KEY PIECES OF INFORMATION: THE FIRST TERM AND THE FIFTH TERM, WHICH ALLOWS US TO DETERMINE THE COMMON DIFFERENCE. ONCE WE FIND THE COMMON DIFFERENCE, CALCULATING THE THIRD TERM BECOMES STRAIGHTFORWARD.

FUNDAMENTAL CONCEPTS

TO APPROACH THIS PROBLEM SYSTEMATICALLY, IT'S BENEFICIAL TO UNDERSTAND SEVERAL CORE CONCEPTS:

1. ARITHMETIC SEQUENCES

AN ARITHMETIC SEQUENCE IS A SEQUENCE OF NUMBERS WHERE EACH TERM AFTER THE FIRST IS OBTAINED BY ADDING A FIXED NUMBER, CALLED THE COMMON DIFFERENCE (d), TO THE PREVIOUS TERM.

GENERAL FORM:

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

WHERE:

- a_n = n TH TERM
- a_1 = FIRST TERM
- d = COMMON DIFFERENCE
- n = POSITION OF THE TERM IN THE SEQUENCE

2. COMMON DIFFERENCE

THE COMMON DIFFERENCE IS CRUCIAL. GIVEN TWO TERMS, WE CAN COMPUTE d AS:

$$d = \frac{a_n - a_m}{n - m}$$

THIS FORMULA IS VITAL WHEN WE KNOW TWO TERMS AND WANT TO FIND THE DIFFERENCE.

3. CALCULATING UNKNOWN TERMS

ONCE d IS KNOWN, OTHER TERMS CAN BE COMPUTED USING THE GENERAL FORMULA. FOR THE THIRD TERM:

$$a_3 = a_1 + 2d$$

STEP-BY-STEP SOLUTION APPROACH

LET'S OUTLINE A LOGICAL PLAN TO FIND THE THIRD TERM:

STEP 1: IDENTIFY KNOWN VALUES

- FIRST TERM: $a_1 = -2$
- FIFTH TERM: $a_5 = 26$

STEP 2: FIND THE COMMON DIFFERENCE (d)

Using the formula for the n th term:

$$a_5 = a_1 + (5 - 1)d$$

Substitute known values:

$$26 = -2 + 4d$$

Solve for (d) :

$$4d = 26 + 2 = 28$$

$$d = \frac{28}{4} = 7$$

The common difference is 7.

STEP 3: FIND THE THIRD TERM (a_3)

Apply the general term formula:

$$a_3 = a_1 + 2d$$

Substitute known values:

$$a_3 = -2 + 2 \times 7 = -2 + 14 = 12$$

Therefore, the third number in the sequence is 12.

ALTERNATIVE APPROACHES AND VERIFICATION

While the steps above are straightforward, it's beneficial to understand alternative methods and verify your solution.

1. USING THE SEQUENCE FORMULA DIRECTLY

You can express the sequence explicitly:

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

Check for the fifth term:

$$a_5 = -2 + (5 - 1) \times 7 = -2 + 4 \times 7 = -2 + 28 = 26$$

Matches the given data, confirming the correctness.

2. GRAPHICAL INTERPRETATION

PLOTTING THE SEQUENCE POINTS:

- $(1, -2)$
- $(5, 26)$

THE SLOPE BETWEEN THESE POINTS IS:

$$\text{slope} = \frac{26 - (-2)}{5 - 1} = \frac{28}{4} = 7$$

WHICH ALIGNS WITH OUR CALCULATED COMMON DIFFERENCE.

3. VERIFYING THE THIRD TERM

USING THE FORMULA AGAIN:

$$a_3 = -2 + (3 - 1) \times 7 = -2 + 2 \times 7 = 12$$

CONSISTENT RESULTS REINFORCE THE SOLUTION'S VALIDITY.

DEEPER MATHEMATICAL INSIGHTS

EXPLORING THE PROBLEM FURTHER REVEALS INTRIGUING MATHEMATICAL PROPERTIES:

1. SEQUENCE BEHAVIOR

- THE SEQUENCE STARTS AT -2 AND INCREASES BY 7 EACH STEP.
- THE SEQUENCE PROGRESSES AS: $-2, 5, 12, 19, 26, \dots$
- THE THIRD TERM IS MIDWAY IN THE SEQUENCE, CONFIRMING THE PATTERN.

2. SUM OF THE SEQUENCE TERMS

SUPPOSE YOU WANT TO FIND THE SUM OF THE FIRST FIVE TERMS:

$$S_5 = \frac{n}{2} (a_1 + a_n)$$

$$S_5 = \frac{5}{2} (-2 + 26) = \frac{5}{2} \times 24 = 5 \times 12 = 60$$

THE SUM OF THE FIRST FIVE TERMS IS 60.

3. GENERALIZATION FOR OTHER TERMS

SUPPOSE THE SEQUENCE CONTINUES, AND YOU WISH TO FIND THE 10TH TERM:

$$a_{10} = a_1 + (10 - 1) \times 7 = -2 + 9 \times 7 = -2 + 63 = 61$$

THIS ILLUSTRATES THE LINEAR GROWTH PATTERN OF THE SEQUENCE.

COMMON MISTAKES AND PITFALLS

WHEN DEALING WITH SEQUENCE PROBLEMS, SOME COMMON ERRORS CAN LEAD TO INCORRECT SOLUTIONS:

- MISIDENTIFYING THE SEQUENCE TYPE: ASSUMING AN ARITHMETIC SEQUENCE WHEN IT IS NOT.
- INCORRECT CALCULATION OF (d) : USING THE WRONG TERMS OR MISAPPLYING THE FORMULA.
- FORGETTING TO CHECK UNITS OR SIGNS: PARTICULARLY WITH NEGATIVE STARTING TERMS.
- MISAPPLYING THE FORMULA: CONFUSING THE POSITION (n) WITH THE TERM NUMBER.

ENSURING CLARITY IN EACH STEP AND VERIFYING RESULTS HELPS PREVENT THESE ERRORS.

APPLICATION AND REAL-WORLD CONTEXTS

UNDERSTANDING ARITHMETIC SEQUENCES IS NOT PURELY ACADEMIC; THEY HAVE PRACTICAL APPLICATIONS:

- FINANCIAL PLANNING: CALCULATING CONSISTENT SAVINGS OVER TIME.
- POPULATION GROWTH: MODELING LINEAR INCREASES.
- SCHEDULING: DETERMINING INTERVALS BETWEEN EVENTS.
- PHYSICS: DESCRIBING UNIFORM MOTION WITH CONSTANT VELOCITY.

THE PROBLEM AT HAND EXEMPLIFIES THE IMPORTANCE OF RECOGNIZING PATTERNS AND APPLYING ALGEBRAIC TECHNIQUES TO REAL-WORLD SCENARIOS.

SUMMARY AND KEY TAKEAWAYS

- THE SEQUENCE IS ARITHMETIC WITH FIRST TERM (-2) AND FIFTH TERM (26) .
- THE COMMON DIFFERENCE (d) IS 7.
- THE THIRD TERM IN THE SEQUENCE IS 12.
- THE SEQUENCE PROGRESSES AS: $(-2, 5, 12, 19, 26, \dots)$.
- CONFIRMATORY CALCULATIONS REINFORCE THE SOLUTION'S ACCURACY.
- UNDERSTANDING SEQUENCE FORMULAS ENHANCES PROBLEM-SOLVING EFFICIENCY.

CONCLUSION

THE PROBLEM "I COUNT IN EQUAL STEPS MY FIRST NUMBER IS -2 MY FIFTH NUMBER IS 26 WHATS MY THIRD NUMBER" IS A CLASSIC EXAMPLE OF APPLYING ALGEBRAIC REASONING TO IDENTIFY AND ANALYZE SEQUENCES. BY LEVERAGING FUNDAMENTAL CONCEPTS OF ARITHMETIC SEQUENCES, SYSTEMATICALLY CALCULATING THE COMMON DIFFERENCE, AND VERIFYING RESULTS THROUGH MULTIPLE METHODS, WE ARRIVE AT A CONFIDENT SOLUTION.

MASTERING SUCH PROBLEMS BUILDS A STRONG FOUNDATION FOR MORE COMPLEX MATHEMATICAL TOPICS AND HONES CRITICAL THINKING SKILLS APPLICABLE ACROSS VARIOUS DISCIPLINES. WHETHER ENCOUNTERED IN EXAMS, REAL-LIFE SITUATIONS, OR ADVANCED STUDIES, THE PRINCIPLES ILLUSTRATED HERE SERVE AS ESSENTIAL TOOLS IN ANY MATHEMATICIAN'S TOOLKIT.

HAPPY PROBLEM-SOLVING!

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