

# A Man Receives Rs. 60 For The First Week And Rs. 3 More Each Week Than The Preceeding Week. How Much

A Man Receives Rs. 60 For The First Week And Rs. 3 More Each Week Than The Preceding Week.

How Much

Understanding arithmetic progressions and their applications in real-life scenarios is vital for solving various mathematical problems. One such practical problem involves calculating the total amount received over multiple weeks when the weekly amount increases by a fixed increment. Consider a scenario where a man receives Rs. 60 in the first week, and each subsequent week, his earnings increase by Rs. 3 compared to the previous week. The question then arises: How much will he earn over a specified number of weeks?

This problem not only demonstrates the application of arithmetic sequences but also highlights the importance of formulas and systematic approaches in solving real-world financial and mathematical problems.

In this comprehensive article, we will explore the problem in detail, understand the underlying concepts, derive the necessary formulas, and apply them step-by-step to find the total amount received over multiple weeks. Additionally, we will discuss variations, practical applications, and tips to approach similar problems confidently.

---

# Understanding the Problem Statement

Let's begin by breaking down the problem:

- The man receives Rs. 60 in the first week.
- Each subsequent week, his earnings increase by Rs. 3 compared to the previous week.
- The goal is to determine how much he earns over a certain number of weeks, say 'n' weeks.

This problem involves an arithmetic progression (AP), where:

- The first term,  $a$ , is Rs. 60.
- The common difference,  $d$ , is Rs. 3.
- The number of terms,  $n$ , is the total number of weeks.

---

## Key Concepts and Terminology

Before diving into calculations, it's essential to understand the fundamental terms associated with arithmetic progressions:

### Arithmetic Progression (AP)

An arithmetic progression is a sequence of numbers in which the difference between any two consecutive terms is constant. This constant difference is called the common difference ( $d$ ).

Example: 60, 63, 66, 69, 72, ...

## Terms of an AP

- First term ( $a_1$ ): The initial term of the sequence.
- Common difference ( $d$ ): The constant amount added to each term to get the next.
- $n$ -th term ( $a_n$ ): The term at position  $n$  in the sequence.

## Sum of First $n$ Terms ( $S_n$ )

The total amount received over  $n$  weeks is the sum of the first  $n$  terms of the AP.

---

## Formulas for Arithmetic Progression

To solve problems involving sums and terms of APs, certain formulas are essential:

### 1. $n$ -th Term of an AP

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

Where:

- $a_n$  =  $n$ -th term
- $a_1$  = first term
- $d$  = common difference
- $n$  = term number

### 2. Sum of First $n$ Terms of an AP

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

or equivalently,

$$S_n = \frac{n}{2} [2a_1 + (n - 1)d]$$

Where:

- $S_n$  = sum of first n terms
- $a_1$  = first term
- $a_n$  = n-th term
- d = common difference
- n = number of terms

---

## Applying the Formulas to the Given Problem

Let's now apply these formulas step-by-step to determine the total earnings over a specified number of weeks.

Suppose we want to find out how much the man earns over n weeks.

Step 1: Identify Known Values

- First term,  $a_1$  = Rs. 60
- Common difference, d = Rs. 3
- Number of weeks, n = ?

Step 2: Find the n-th Term

If, for example, we are asked to find the total earnings over 10 weeks, the n = 10.

Calculate the 10th week's earning ( $a_{10}$ ):

$$a_{10} = a_1 + (10 - 1)d$$

$$\backslash[ a_{10} = 60 + (9) \times 3 = 60 + 27 = \text{Rs. } 87 \backslash]$$

Step 3: Calculate the Sum of First n Terms

Using the sum formula:

$$\backslash[ S_{10} = \frac{10}{2} \times (a_1 + a_{10}) \backslash]$$

$$\backslash[ S_{10} = 5 \times (60 + 87) = 5 \times 147 = \text{Rs. } 735 \backslash]$$

Therefore, over 10 weeks, the man earns Rs. 735.

---

## General Formula for Total Earnings Over n Weeks

For any number of weeks, n, the total earnings  $S_n$  can be expressed as:

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

$$\backslash[ S_n = \frac{n}{2} \times [2a_1 + (n - 1)d] \backslash]$$

Example:

Suppose you want to find the total earnings over 20 weeks:

$$\backslash[ a_{20} = 60 + (20 - 1) \times 3 = 60 + 19 \times 3 = 60 + 57 = \text{Rs. } 117 \backslash]$$

$$\backslash[ S_{20} = \frac{20}{2} \times (60 + 117) = 10 \times 177 = \text{Rs. } 1770 \backslash]$$

Thus, over 20 weeks, the man earns Rs. 1770.

---

# Practical Applications of the Arithmetic Progression Problem

Understanding how earnings accumulate when weekly income increases by a fixed amount has numerous real-life applications:

- Salary hikes: Calculating total earnings over multiple years with fixed annual increases.
- Loan repayments: Planning installments where payments increase periodically.
- Savings plans: Estimating total savings when depositing increasing amounts periodically.
- Business revenue projections: Forecasting income with consistent incremental growth.

---

## Variations and Extensions

While the above example considers a fixed weekly increase, real-world scenarios may involve more complex patterns:

- Decreasing payments: When amounts decrease over time.
- Variable increments: When increases vary each week.
- Compound growth: When earnings grow proportionally rather than additively.

For such cases, different mathematical models such as geometric progressions or mixed sequences are applicable.

---

## Tips for Solving Similar Problems

- Identify the pattern: Determine if the sequence is arithmetic, geometric, or another type.
- List known values: Write down the first term, common difference, and total terms.
- Use formulas systematically: Apply appropriate formulas for  $n$ th term and sum.
- Check calculations: Always verify intermediate and final results.
- Practice with different numbers: Gain confidence by solving problems with various values.

---

## Conclusion

The problem of calculating total earnings when weekly income increases by a fixed amount is a classic example of an arithmetic progression. By understanding the fundamental concepts, applying the correct formulas, and practicing systematic calculations, you can efficiently solve such problems.

In our example, starting with Rs. 60 in the first week and increasing by Rs. 3 each subsequent week, we can determine total earnings over any number of weeks. Whether for academic purposes, financial planning, or business analysis, mastering arithmetic progressions is a valuable mathematical skill.

Remember, the key steps involve identifying the first term and common difference, calculating the  $n$ th term, and then computing the sum. With these tools, you are well-equipped to tackle similar problems confidently and accurately.

---

Keywords: Arithmetic progression, sum of AP, weekly earnings increase, Rs. 60, Rs. 3, total earnings, mathematical problem-solving, real-life applications, formulas,  $n$ th term, sum formula.

## Frequently Asked Questions

**How much does the man earn in the first week and in subsequent weeks?**

He earns Rs. 60 in the first week and Rs. 3 more each subsequent week than the previous week.

**What is the amount the man earns in the second week?**

In the second week, he earns Rs. 63, which is Rs. 3 more than the first week.

**How can we calculate the total amount earned over 'n' weeks?**

The total can be calculated using the sum of an arithmetic series:  $\text{Total} = n/2 (\text{first term} + \text{last term})$ .

**What is the formula for the amount earned in the nth week?**

The amount in the nth week is  $\text{Rs. } 60 + (n - 1) 3$ .

**How do we find the total earnings after 10 weeks?**

Calculate the 10th week's amount using the formula, then sum all weekly amounts using the arithmetic series sum formula.

## Additional Resources

A Man Receives Rs. 60 For The First Week And Rs. 3 More Each Week Than The Preceding Week.  
How Much

In the realm of arithmetic progressions and financial planning, understanding how weekly incomes or payments evolve over time is essential. Whether you're a student tackling a mathematics problem or a professional designing a payment schedule, grasping the concept of increasing sequences can be



invaluable. Today, we explore a classic problem: a man receives Rs. 60 in the first week, and each subsequent week, his earnings increase by Rs. 3 compared to the previous week. The question beckons: how much will he receive over a certain period? In this article, we will dissect this problem, delve into the mathematics behind it, and demonstrate how to compute total earnings over multiple weeks, all while maintaining a reader-friendly yet technically sound narrative.

---

## Understanding the Problem: Weekly Income as an Arithmetic Progression

At the core of this problem lies a fundamental mathematical structure known as an arithmetic progression (AP). An AP is a sequence of numbers where each term after the first is obtained by adding a fixed number, called the common difference, to the previous term.

Problem Breakdown:

- First term ( $a_1$ ): Rs. 60
- Common difference ( $d$ ): Rs. 3
- Term  $n$  ( $a_n$ ): Income received in the  $n$ th week

Given these parameters, the sequence of weekly incomes can be written as:

$$a_1 = 60$$

$$a_2 = a_1 + d = 60 + 3 = 63$$

$$a_3 = a_2 + 3 = 63 + 3 = 66$$

$$a_3 = 66 + 3 = 69$$

And so on.

This structure allows us to analyze the man's earnings systematically, whether we're interested in his income at a specific week or his total earnings over a period.

---

## Formulating the Sequence: The General Term

To analyze or compute specific terms in the sequence, we need a formula for the  $n$ th term of an arithmetic progression.

General term formula:

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

Where:

-  $a_n$  = income in the  $n$ th week

-  $a_1$  = Rs. 60

-  $d$  = Rs. 3

-  $n$  = week number (1, 2, 3, ...)

Applying the formula:

For example, to find the income in the 10th week:

$$a_{10} = 60 + (10 - 1) 3 = 60 + 9 \times 3 = 60 + 27 = \text{Rs. } 87$$

This formula enables us to find the income for any specific week efficiently.

---

## Calculating Total Earnings Over Multiple Weeks

While understanding weekly payments is useful, often the more significant question pertains to total earnings over a period, such as a month or a year. This involves summing the terms of the arithmetic progression.

Sum of the first  $n$  terms ( $S_n$ ):

$$S_n = (n/2) [2a_1 + (n - 1) d]$$

This formula calculates the total amount received over  $n$  weeks.

Explanation of the formula:

- The sum of an AP is equal to the average of the first and last terms multiplied by the number of terms.

- The average of the first and last terms is  $(a_1 + a_n) / 2$ .

- Since  $a_n = a_1 + (n - 1) d$ , substituting into the sum formula gives the above.

---

# Practical Examples: Computing Earnings over Specific Periods

Let's consider some practical scenarios to illustrate how these formulas work.

Example 1: Total earnings in the first 10 weeks

Calculate the total amount received from week 1 to week 10.

Solution:

First, find  $a_{10}$ :

$$a_{10} = 60 + (10 - 1) 3 = 60 + 27 = \text{Rs. } 87$$

Next, compute the sum:

$$S_{10} = (10/2) [2 \cdot 60 + (10 - 1) 3]$$

$$= 5 [120 + 27] = 5 \cdot 147 = \text{Rs. } 735$$

Result: The man receives Rs. 735 over 10 weeks.

Example 2: Total earnings over 20 weeks

Calculation:

$$a_{20} = 60 + (20 - 1) 3 = 60 + 57 = \text{Rs. } 117$$

$$S_{20} = (20/2) [2 \cdot 60 + (20 - 1) 3]$$

$$= 10 [120 + 57] = 10 \cdot 177 = \text{Rs. } 1770$$

Result: Rs. 1770 accumulated over 20 weeks.

---

## Determining the Number of Weeks for a Target Total

Suppose the man wants to know after how many weeks his total earnings will reach Rs. 10,000. This is an application of the sum formula, where we solve for  $n$  given  $S_n$ .

Given:

$$S_n = \text{Rs. } 10,000$$

$$a_1 = 60$$

$$d = 3$$

Equation:

$$S_n = (n/2) [2a_1 + (n - 1) d]$$

Plugging in the values:

$$10,000 = (n/2) [2 \cdot 60 + (n - 1) \cdot 3]$$

Simplify:

$$10,000 = (n/2) [120 + 3n - 3]$$

$$= (n/2) (117 + 3n)$$

Multiply both sides by 2:

$$20,000 = n (117 + 3n)$$

Rearranged:

$$n (3n + 117) = 20,000$$

Expressed as a quadratic:

$$3n^2 + 117n - 20,000 = 0$$

Divide through by 3 for simplicity:

$$n^2 + 39n - 6666.67 \approx 0$$

Now, solve the quadratic equation:

$$n^2 + 39n - 6666.67 \approx 0$$

Using quadratic formula:

$$n = [-b \pm \sqrt{(b^2 - 4ac)}] / 2a$$

Where:

$$a = 1$$

$$b = 39$$

$$c \approx -6666.67$$

Calculate discriminant:

$$\Delta = 39^2 - 4 \cdot 1 \cdot (-6666.67) = 1521 + 26666.68 = 28287.68$$

Square root:

$$\sqrt{\Delta} = 168.09$$

Calculate n:

$$n = \frac{-39 + 168.09}{2} = 129.09 / 2 = 64.55$$

or

$$n = \frac{-39 - 168.09}{2} = -207.09 / 2 = -103.55 \text{ (discard negative value)}$$

Since weeks can't be fractional, approximate to 65 weeks.

Conclusion: After approximately 65 weeks, the total earnings will reach Rs. 10,000.

---

## Real-World Applications and Implications

While this problem is posed in a purely mathematical context, its principles have practical applications in various fields:

- Salary and wages planning: Many jobs involve incremental raises, which can be modeled using arithmetic progressions.

- Savings and investment growth: Understanding how regular incremental deposits grow over time.
- Loan repayment schedules: Calculating total payments when installments increase periodically.
- Business revenue projections: Estimating future income when sales increase steadily over time.

Understanding the arithmetic progression and sum formulas enables individuals and organizations to make informed financial decisions, plan budgets, and forecast future earnings or expenses with confidence.

---

## Final Thoughts: The Power of Arithmetic Progressions in Financial Calculations

The problem of a man receiving Rs. 60 initially, with Rs. 3 more each subsequent week, encapsulates a fundamental concept in mathematics that extends far beyond academic exercises. By recognizing the sequence as an arithmetic progression, we unlock a suite of tools—namely, the general term and sum formulas—that facilitate precise calculations of individual terms and cumulative totals.

In practical scenarios, these formulas serve as powerful instruments for financial planning, allowing individuals to project earnings, savings, or repayments accurately. Whether you're managing personal finances, designing payment schedules, or analyzing business growth, mastering arithmetic progressions offers clarity and precision.

Ultimately, this exploration underscores the importance of mathematical literacy in everyday life. By translating real-world financial patterns into mathematical models, we can navigate complex decisions with greater confidence and accuracy. The next time you encounter a scenario involving steadily increasing amounts, remember: the principles of arithmetic progression are your allies in making sense



of the numbers.

## **A Man Receives Rs 60 For The First Week And Rs 3 More Each Week Than The Preceeding Week How Much**

A Man Receives Rs 60 For The First Week And Rs 3 More Each Week Than The Preceeding Week  
How Much

### **Related Articles**

- [\(q011\) What Do You Predict Would Happen If You Replace The Lac Operator Dna From The Lac Operon With](#)
- [1. Using A Block-and-tackle, A Mechanic Pulls 8. 2 M Of Chain With A Force Of 90 N Inorder To Lift A](#)
- [A 5. 0 Kg Magnetic Toy Car Traveling At 0. 50 M/s East Collides And Sticks To A 2. 0 Kg Toy Magnetic](#)

[Back to Home](#)