Chapter 5 Class 10 - Arithmetic Progressions - Case Based Question Worksheet 1 by teachoo

Chapter: Chapter 5 Class 10 Maths - Arithmetic Progressions

Name: _____

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Case Study 1: The Commuter Train

A commuter train starts its journey from a terminus (station 0) and travels to the city. At the first station (Station 1), 15 people board the train. At Station 2, 19 people board. At Station 3, 23 people board. This pattern, where the number of people boarding at each station forms an AP, continues.

1. How many people will board the train at Station 8?
2. What is the total number of passengers on the train after it leaves Station 10?
3. If the train has a maximum capacity of 400 passengers, after which station will the train be full (i.e., the total number of passengers will exceed 400)?
4. Show that the number of people boarding at Station 5 is the arithmetic mean of the number boarding at Station 4 and Station 6.
5. A second, express train follows the same pattern, but it starts with 25 people boarding at its first stop. How many more passengers are on the express train than the commuter train after 5 stops?

Case Study 2: The Online Gamer

Anaya is playing an online game where she needs to earn Experience Points (XP) to level up her character. To get from Level 1 to Level 2, she needs 1000 XP. To get from Level 2 to Level 3, she needs 1200 XP. To get from Level 3 to Level 4, she needs 1400 XP. The XP required for each level-up forms an AP.

1. How much XP does Anaya need to get from Level 10 to Level 11?
2. What is the total amount of XP Anaya must earn to take her character from Level 1 all the way to Level 10?
3. Anaya currently has 30,000 XP. What is the highest character level she can reach starting from Level 1 ?
4. The game introduces a "Mentor Bonus" where the XP required for any level-up is reduced by 10%. How much total XP is now needed to get from Level 1 to Level 5?
5. Explain why the XP needed for Level 10 is the average of the XP needed for Level 9 and Level 11.

Case Study 3: The Baker's Schedule

A baker starts her day at 6:00 AM. The first batch of cakes takes 40 minutes to prepare and bake. As the kitchen gets organized and the oven heats up, each subsequent batch of the same size takes 3 minutes less time than the previous one.

1. The time taken to make each batch forms an AP. What is the common difference 'd'?
2. How long will the 7 th batch of cakes take to make?
3. The baker has a large order and needs to make 10 batches. At what time will she finish the 10 th batch?
4. After some time, the efficiency gains stop, and the time required for a batch cannot fall below 25 minutes. How many batches are made before the time stabilizes at 25 minutes?

5. If she had not become more efficient and every batch took 40 minutes, how much more time would the first 10 batches have taken compared to her actual time?

Important links

- Answer of this worksheet - https://www.teachoo.com/25626/5379/Case-Based-Questions---Worksheet-1/category/Teachoo-Questions---Case-Based/
- Full Chapter with Explanation, Activity, Worksheets and more – https://www.teachoo.com/subjects/cbse-maths/class-10th/ch5-10th-arithmetic-progressions/
- Science Class 10– https://www.teachoo.com/subjects/science/class-10/
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