Comparing linear with exponential change

6 questions | 13 marks

Equivalent correct methods earn the corresponding marks.

1. Classify 40, 50, 60, 70 and give a rule starting at $n = 0$. [2 marks]

Constant difference is 10.

Answer: Linear; $L = 40 + 10n$.

2. Classify 40, 60, 90, 135 and give a rule. [2 marks]

Each ratio is 1.5.

Answer: Exponential; $E = 40(1.5)^n$.

3. Compare $A = 300 + 30t$ and $B = 300(1.08)^t$ at $t = 2$. [2 marks]

Substitute the same time in both models.

Answer: A = 360; B = 349.92; A is larger.

4. Find the differences for 100, 110, 121, 133.1 and identify its change. [2 marks]

Differences vary but consecutive ratios are all 1.1.

Answer: 10, 11, 12.1; exponential factor 1.1.

5. One tank loses 4 L/min; another loses 4% of its current volume per minute. Identify the model types. [2 marks]

One removes a fixed amount; the other applies factor 0.96.

Answer: The first is linear; the second is exponential.

6. Why might neither an unrestricted linear nor an exponential model describe a population indefinitely? [3 marks]

A simple rule may ignore crowding, migration or limited food.

State a useful domain and check new observations.

Answer: Resources, capacity and conditions may change.