AP PRECALCULUS • EXERCISE SHEET

2.2 Change in Linear and Exponential Functions

Name: _____ Class: _____ Date: _____ **Total: 8 marks**

Objective

Build the skills to answer exam questions on **change in linear and exponential functions**.

You must be able to:

- describe how a **linear function** 线性函数 changes over equal intervals
- describe how an **exponential function** 指数函数 changes over equal intervals

1 Worked examples

Study these first. Each one shows the method for a question type used later.

Linear vs exponential

- a **linear** function changes by equal **differences** over equal intervals (it **adds** a constant);
- an **exponential** function changes by equal **ratios** over equal intervals (it **multiplies** by a constant).

Linear change matches an arithmetic sequence; exponential change matches a geometric sequence.

Spotting the pattern in a table

x	**0**	**1**	**2**	**3**
A	3	5	7	9
B	3	6	12	24

A **adds** 2 each step, so it is **linear**; B **multiplies** by 2 each step, so it is **exponential**. Test which stays constant: the difference (linear) or the ratio (exponential).

2 Practice

2.1 State how a linear function changes over equal intervals. [1]

2.2 State how an exponential function changes over equal intervals. [1]

2.3 A function multiplies by 3 each step. Is it linear or exponential? [1]

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3 Exam-style questions

3.1 A function that adds a constant each unit is [1]

- **A** exponential
- **B** linear
- **C** quadratic
- **D** rational

3.2 A function that multiplies by a constant each unit is [1]

- **A** linear
- **B** exponential
- **C** constant
- **D** polynomial

3.3 The values $4, 12, 36, 108, \ldots$ are recorded at equal intervals.

(a) Is the change by equal difference or equal ratio? [1]

(b) State the constant. [1]

(c) State the model type. [1]

4 Go further

- work through the **2.2 Change in Linear and Exponential Functions** lesson on the **Learn** page;

- read the **Exponential and Logarithmic Functions** section of the AP Precalculus handout on the **Know** page.

Solutions

2.1 by equal differences (it adds a constant amount).

2.2 by equal ratios (it multiplies by a constant factor).

2.3 exponential.

3.1 B.

3.2 B.

3.3 (a) equal ratio. (b) 3. (c) exponential.