EXAM-STYLE CLASS TEST

MARKS	DURATION	QUESTIONS
33	50 minutes	3

Name: _____ Class: _____

Date: _____

MARK ____ / 33

INSTRUCTIONS AND INFORMATION

1. Answer **ALL** the questions in this question paper.
2. Answer QUESTION 1 by **circling** the letter (A–D) in the answer grid at the end of that section.
3. Show **ALL** calculations clearly.
4. Show all units where applicable.
5. Number the answers correctly according to the numbering system used in this question paper.
6. A non-programmable calculator may be used, unless stated otherwise.
7. Write neatly and legibly.

QUESTION 1 [10 MARKS]

Four options are given as possible answers to the following questions. Choose the correct answer and circle the letter (A–D) in the grid at the end of this section. If you want to change your choice, put a cross through the wrong letter and circle your new choice.

1.1 The average gradient of f between $x = a$ and $x = b$ is ... (1)

A) $\frac{f(b) - f(a)}{b - a}$ **B)** $\frac{f(b) + f(a)}{b - a}$

C) $\frac{b - a}{f(b) - f(a)}$ **D)** $f(b) - f(a)$

1.2 For $f(x) = x^2$, the average gradient between $x = 1$ and $x = 4$ is ... (1)

A) 15 **B)** 3

C) 8 **D)** 5

1.3 For $f(x) = x^2 - 2x$, the average gradient between $x = 0$ and $x = 2$ is ... (1)

A) 2 **B)** -2

C) 0 **D)** 4

1.4 For $g(x) = \frac{6}{x}$, the average gradient between $x = 1$ and $x = 3$ is ... (1)

A) 2 **B)** -2

C) -4 **D)** 4

1.5 A NEGATIVE average gradient over an interval means that the curve ... (1)

A) ends lower than it started **B)** falls all the way

C) is a straight line **D)** has no turning point in between

1.6 As the two points slide together, the chord becomes the ... (1)

A) asymptote **B)** axis of symmetry

C) diameter **D)** tangent at that point

1.7 For $f(x) = x^2$, the average gradients from $x = 3$ to $x = 3{,}1$; $3{,}01$; $3{,}001$ get closer and closer to ... (1)

A) 9 **B)** 3

C) 6 **D)** 0

1.8 An object's distance is $s(t) = 2t^2$ metres after t seconds. Its average speed from $t = 1$ to $t = 3$ is ... (1)

A) 16 m/s **B)** 8 m/s

C) 18 m/s **D)** 4 m/s

1.9 For $f(x) = 2^x$, the average gradient between $x = 0$ and $x = 3$ is ... (1)

A) $\frac{7}{3}$ **B)** $\frac{8}{3}$

C) 7 **D)** 2

1.10 For $f(x) = x^2$, which statement is TRUE? (1)

A) The average gradient is the same over every interval **B)** The average gradient is always 2

C) The average gradient from $x = -1$ to $x = 1$ is 2 **D)** The average gradient from $x = 1$ to $x = 2$ is greater than from $x = 0$ to $x = 1$

ANSWER GRID — CIRCLE YOUR ANSWERS FOR QUESTION 1

1.1	A	B	C	D
1.2	A	B	C	D
1.3	A	B	C	D
1.4	A	B	C	D
1.5	A	B	C	D
1.6	A	B	C	D
1.7	A	B	C	D
1.8	A	B	C	D
1.9	A	B	C	D
1.10	A	B	C	D

QUESTION 2 [12 MARKS]

Given $f(x) = -x^2 + 4x$.

2.1 Calculate $f(1)$ and $f(3)$. (2)

2.2 Determine the average gradient of f between $x = 1$ and $x = 3$, and explain what your answer tells you about the curve. **(3)**

2.3 Determine the average gradient of f between $x = 0$ and $x = 2$. **(3)**

2.4 Determine the average gradient of f between $x = 1$ and $x = 1 + h$, where $h \neq 0$. Simplify your answer. **(4)**

QUESTION 3 [11 MARKS]

A stone is thrown upwards. Its height after t seconds is $h(t) = 20t - 5t^2$ metres.

3.1 Calculate the average rate of change of the height between $t = 0$ and $t = 1$, and give its units. **(3)**

3.2 Calculate the average rate of change between $t = 2$ and $t = 4$, and explain the sign of your answer. **(4)**

3.3 Use the average rates of change from $t = 2$ to $t = 2{,}1$ and from $t = 2$ to $t = 2{,}01$ to estimate the rate of change at $t = 2$, and explain your estimate. **(4)**

TOTAL: 33 marks

This question paper consists of 3 questions.

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