EXAM-STYLE CLASS TEST

MARKS	DURATION	QUESTIONS
35	55 minutes	3

Name: ..... Class: .....

Date: .....

MARK ____ / 35

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 between two points on a curve is ... (1)

A) the gradient of the tangent at the first point
B) the average of the two y-values
C) the gradient of the straight line joining them
D) the difference between the two y-values

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

A) 2
B) 8
C) 4
D) 5

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

A) h
B) $2 + h$
C) 2
D) $2h$

1.4 As h approaches 0, the average gradient becomes ... (1)

A) the gradient of the chord
B) zero
C) undefined
D) the gradient of the tangent at that point

1.5 The derivative from FIRST PRINCIPLES is defined as the limit of ... (1)

A) $\frac{f(x) - f(x+h)}{h}$, as x approaches 0
B) $\frac{f(x+h) + f(x)}{h}$, as h approaches 0
C) $\frac{f(x+h) - f(x)}{x}$, as h approaches 0
D) $\frac{f(x+h) - f(x)}{h}$, as h approaches 0

1.6 Using first principles, $f'(x)$ for $f(x) = 2x^2 - 3x$ is ... (1)

A) $4x - 3$ **B)** $4x - 3 + 2h$

C) $2x - 3$ **D)** $4x$

1.7 The AVERAGE RATE OF CHANGE of a quantity over an interval is ... (1)

A) the total change on its own **B)** the total change divided by the length of the interval

C) the change at a single instant **D)** the largest value in the interval

1.8 A tank holds $V = 100 - 4t$ litres after t minutes. Its rate of change is ... (1)

A) -4 litres per minute **B)** 4 litres per minute

C) 96 litres per minute **D)** 100 litres per minute

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

A) 4 **B)** 2

C) 8 **D)** 0

1.10 The average gradient of a STRAIGHT line between any two of its points is ... (1)

A) different for every pair of points **B)** always the same, and equal to the line's gradient

C) undefined **D)** always zero

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 [13 MARKS]

Given $f(x) = x^2 - 4x + 3$.

2.1 Calculate the average gradient of f between $x = 1$ and $x = 5$. (4)

2.2 Determine $f'(x)$, and calculate the gradient of the tangent to f at $x = 3$. **(3)**

2.3 The two answers above are equal. Explain what that means about the graph. **(3)**

2.4 Determine the value of x at which the gradient of f is zero, and state what this point is called. **(3)**

QUESTION 3 [12 MARKS]

The height, in metres, of a ball t seconds after it is thrown is given by $h(t) = 20t - 5t^2$.

3.1 Calculate the average speed of the ball over the first 2 seconds. **(3)**

3.2 Determine the speed of the ball at $t = 1$ second. **(3)**

3.3 Determine when the ball reaches its maximum height, and what that height is. **(4)**

3.4 Explain what a NEGATIVE value of $h'(t)$ would tell you about the ball. **(2)**

TOTAL: 35 marks

This question paper consists of 3 questions.

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