WORKSHEET

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

Date: .....

MARK ____ / 37

Answer all questions. Show all your working — marks are awarded for method as well as the final answer.

1 Differentiate $y = x^4$. *(power rule)* **(1)**

2 Differentiate $y = 5x^3 - 2x^2 + 7$. *(polynomial)* **(2)**

3 Differentiate $y = 2x^2 - 3x + 9$. *(polynomial)* **(2)**

4 Differentiate $y = \frac{3}{x}$ (write as $3x^{-1}$). *(rewrite)* **(2)**

5 Differentiate $y = \sqrt{x}$ (write as $x^\wedge\frac{1}{2}$). *(rewrite)* **(2)**

6 From first principles, differentiate $f(x) = 3x$. *(first principles)* **(4)**

7 Gradient of $y = x^2 + 2x$ at $x = 1$. *(gradient)* **(2)**

8 Gradient of $y = x^3$ at $x = 2$. *(gradient)* **(2)**

9 Find x where $y = x^2 - 6x$ has a turning point. *(turning point)* **(2)**

10 Find the turning points of $y = x^3 - 12x$. *(turning point)* **(4)**

11 Determine $f'(x)$ from first principles if $f(x) = 2x^2 - 3x$. **(5)**

12 Determine $f'(x)$ from first principles if $f(x) = \frac{3}{x}$. **(5)**

13 Use first principles to show that the derivative of $f(x) = 7$ is 0. **(2)**

14 Explain why you may NOT substitute $h = 0$ at the start of a first-principles question. **(2)**

TOTAL: 37 marks

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