

IB Maths AA SL Unit 2 Functions Practice Exam: Mark Scheme

IB Mathematics: Analysis and Approaches SL · 11 questions · 54 marks

- M marks are for a correct method; A marks for an accurate answer that follows a correct method; R marks are for clear reasoning; AG means the answer is given in the question, so the working must be complete.
- Accept any correct method that reaches a correct answer, unless the question says which method to use.
- Practise these topics online with instant feedback: ibmathrevision.com/SLAAUnit2

Section A: no calculator

Question 1

4 marks

- a. $x = -2, 1, 3$ **A1**
- b. $f(0) = (-1)(2)(-3) = 6$ **A1**
- c. cubic shape with positive leading coefficient (rises to the right) **A1**
through $(-2, 0)$, $(1, 0)$, $(3, 0)$ and $(0, 6)$ **A1**

Question 2

3 marks

- $(x - 5)(x + 3) < 0$ **(M1)**
critical values $x = -3, 5$ **A1**
 $-3 < x < 5$ **A1**

Question 3

4 marks

- a. $f(x) > 1$ **A1**
- b. $x > 2$ **A1**
 $x = 2$ **A1**
- c. $\ln(x - 2) = 0 \implies x = 3$ **A1**

Question 4

5 marks

- a. $g(0) = -3$: $(0, -3)$ **A1**
 $2^x = 4 \implies x = 2$: $(2, 0)$ **A1**
- b. $y = -4$ **A1**
- c. increasing exponential shape, approaching $y = -4$ as $x \rightarrow -\infty$ **A1**
intercepts $(0, -3)$, $(2, 0)$ shown **A1**

Question 5

4 marks

- a. $x = e^{2y} - 3$ **(M1)**
 $f^{-1}(x) = \frac{1}{2} \ln(x + 3)$ **A1**
- b. $x > -3$ **A1**
- c. reflections of each other in the line $y = x$ **A1**



Question 6**9 marks**

- a. $x^2 - 3x + 3 = kx - 1$ **M1**
 $x^2 - 3x - kx + 4 = 0 \implies x^2 - (3 + k)x + 4 = 0$ **AG**
- b. $\Delta = (3 + k)^2 - 16 = 0$ **M1**
 $3 + k = \pm 4$ **(A1)**
 $k = 1$ or $k = -7$ **A1A1**
- c. $(3 + k)^2 - 16 < 0$ **(M1)**
 $-7 < k < 1$ **A1**
- d. $x^2 - 4x + 4 = 0 \implies x = 2$ **(M1)**
 $(2, 1)$ **A1**

Section B: calculator allowed

Question 7**4 marks**

- a. max $(1, 5)$ **A1**
min $(3, 1)$ **A1**
- b. $1 \leq f(x) \leq 5$ **A1A1**

Question 8**4 marks**

- a. $x > -2$ **A1**
- b. $x = -1.22$ **A1**
 $x = 2.21$ **A1**
- c. $-1.22 < x < 2.21$ **A1**

Question 9**6 marks**

- a. $x = 0$ **A1**
- b. using technology, $x = 2.52$ **A1**
 $y = 4.76$ **A1**
- c. $x^3 = -32 \implies x = -3.17$ **A1**
- d. two branches either side of $x = 0$; right branch has a minimum, left branch crosses the x -axis **A1**
asymptotic behaviour near $x = 0$ and parabolic growth for large $|x|$ **A1**

Question 10**5 marks**

- a. $x = -2, x = 2$ **A1**
- b. $x = 1$ **A1**
- c. $x^2 - 4 = 3x - 3 \implies x^2 - 3x - 1 = 0$ **(M1)**
 $x = -0.303$ or $x = 3.30$ **A1A1**



Question 11

6 marks

a. $90\text{ }^{\circ}\text{C}$ **A1**

b. $T(10) = 20 + 70e^{-0.8} = 51.5\text{ }^{\circ}\text{C}$ **A1**

c. $70e^{-0.08t} = 30$ **(M1)**

$$t = \frac{\ln(7/3)}{0.08} = 10.6 \text{ minutes}$$
 A1

d. $T = 20$ **A1**

the coffee cools towards room temperature, $20\text{ }^{\circ}\text{C}$ **R1**

End of mark scheme · More free exams: ibmathrevision.com/free-practice-exams

