

Lesson 10

A-Level Pure Mathematics, Year 2 Functions II

10.1 Test

*Any solution based entirely on graphical
or numerical methods is not acceptable*

Marks Available : 40

Question 1

$$f(x) = e^{2x} + 4, \quad x \in \mathbb{R}$$

$$g(x) = \ln(x + 1), \quad x \in \mathbb{R}, x > -1$$

(i) Find $fg(x)$

Present your answer in simplified form and state its range.

[4 marks]

(ii) Solve $fg(x) = 85$

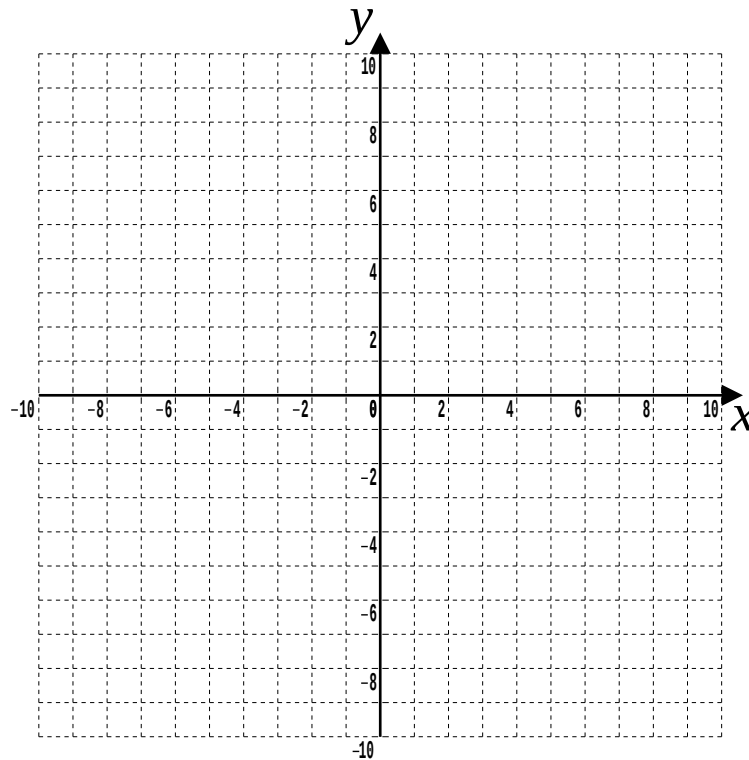
[3 marks]

Question 2

$$f(x) = |2x + 3| \quad x \in \mathbb{R}$$

- (i) Sketch the graph of $y = f(x)$ on the grid below, labelling its vertex and any points of intersection with the coordinate axes.

[3 marks]



$$g(x) = |2x + 3| - 7 \quad x \in \mathbb{R}$$

- (ii) Sketch the graph of $y = g(x)$ on the grid above, labelling its vertex and any points of intersection with the coordinate axes.

[3 marks]

- (iii) Using algebra, find the coordinates of the points of intersection of

$$y = |2x + 3| - 7 \quad \text{and} \quad y = -\frac{1}{2}x + \frac{7}{2}$$

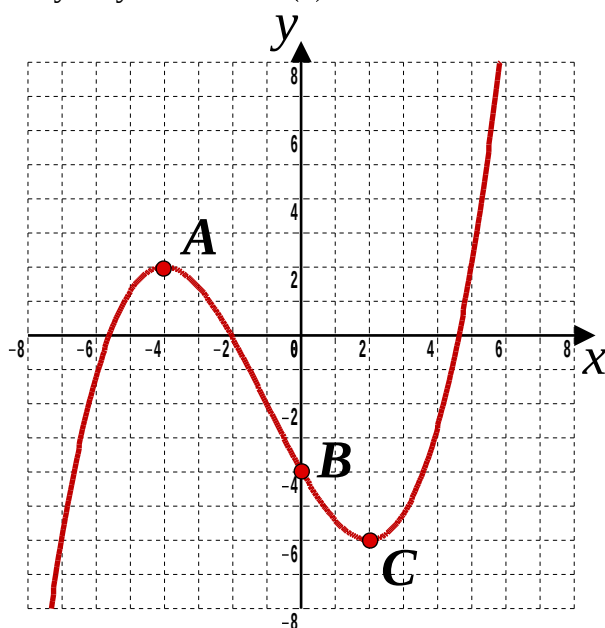
[4 marks]

- (iv) Add a line to the graph showing that your part (iii) answers are correct

[1 mark]

Question 3

The graph is of a mystery function $m(x)$



The points $A(-4, 2)$ and $C(2, -6)$ are turning points on the graph which also passes through the y -axis at $B(0, -4)$

Sketch on separate diagrams the graphs of,

(i) $y = |m(x)|$ (ii) $y = m(|x|)$ (iii) $y = \frac{1}{2}m(x - 2)$

Where possible, label clearly the transformations of the points A , B and C on your diagrams and give their coordinates.

[3, 3, 4 marks]

Question 4

A-Level Examination Question from January 2018, IAL, Paper C34, Q10 (Edexcel)

It is given that,

$$f(x) = e^{-2x} \quad x \in \mathbb{R}$$

$$g(x) = \frac{x}{x-3} \quad x > 3$$

- (a) Sketch the graph of $y = f(x)$, showing the coordinates of any points where the graph crosses the axes.

[2 marks]

- (b) Find the range of g

[2 marks]

(c) Find $g^{-1}(x)$ stating the domain of g^{-1}

[4 marks]

(d) Using algebra, find the exact value of x for which $fg(x) = 3$

[4 marks]

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Teachers may obtain detailed worked solutions to the exercises by email from MHHShrewsbury@Gmail.com