Graphing Linear, Quadratic, Exponential and Logarithmic Functions: exam practice

10 questions · 26 marks · worked solutions and markschemes

Name _____ Date _____ Score / 26

- Answer every question before you look at the solutions. They start after the last question, with the marks for each line: M for method, A for accuracy, R for reasoning.
- Online, with more practice: ibmathrevision.com/hlai/graphing-linear-quadratic-exponential-and-logarithmic-functions-exam-practice

1. **2 marks · Paper 1 style · calculator allowed**

The graph of $y = x^2$ is translated 3 units right and 2 units down.

Write down the new equation and its vertex. **[2]**

2. **2 marks · Paper 1 style · calculator allowed**

The graph of $y = e^x$ is stretched vertically by factor 3 and horizontally by factor 2.

Write down the new equation and its y-intercept. **[2]**

3. **2 marks · Paper 1 style · calculator allowed**

The graph of $y = f(x)$ has a maximum at $(2, 7)$. Find the maximum of $y = f(x - 5) + 3$.

Find the maximum point. **[2]**

4. **2 marks · Paper 1 style · calculator allowed**

The point $(6, -2)$ lies on $y = f(x)$.

Find its image on $y = 4f\left(\frac{x}{3}\right)$. **[2]**

5. **2 marks · Paper 2 style · calculator allowed**

Let $f(x) = \log_{10}(x + 2)$ and $g(x) = 0.5x - 1$.

Use technology to solve $f(x) = g(x)$ for $x > 0$. **[2]**

6. **3 marks · Paper 1 style · calculator allowed**

The graph of $y = \ln x$ is reflected in the x-axis and then translated 4 units up.

Find the equation of the new graph and its x-intercept. **[3]**

7. **3 marks · Paper 2 style · calculator allowed**

Let $f(x) = 2^x$ and $g(x) = x^2$.

Use technology to find all points of intersection of the graphs. **[3]**

8. 3 marks · Paper 1 style · calculator allowed

The graph of $y = x^2$ is transformed by a vertical stretch of factor 2, then a translation by $\begin{pmatrix} 1 \\ -8 \end{pmatrix}$.

Find the new equation and its x-intercepts. **[3]**

9. 3 marks · Paper 2 style · calculator allowed

Let $f(x) = \dfrac{10}{1 + e^{-x}}$.

Write down the equations of the horizontal asymptotes and the y-intercept. **[3]**

10. 4 marks · Paper 2 style · calculator allowed

Let $f(x) = x^3 - 4x^2 + x + 6$.

Use technology to find the zeros and the local minimum point. **[4]**

Answers and worked solutions

Question 1 — 2 marks

Answer: $y = (x-3)^2 - 2$; $(3, -2)$

$y = (x-3)^2 - 2$ **A1**

vertex $(3, -2)$ **A1**

Question 2 — 2 marks

Answer: $y = 3e^{\frac{x}{2}}$; $(0, 3)$

$y = 3e^{\frac{x}{2}}$ **A1**

$(0, 3)$ **A1**

Question 3 — 2 marks

Answer: $(7, 10)$

$x = 7$ **A1**

$y = 10$ **A1**

Question 4 — 2 marks

Answer: $(18, -8)$

$x = 18$ **A1**

$y = -8$ **A1**

Question 5 — 2 marks

Answer: $x = 3.48$

GDC **(M1)**

$x = 3.48$ **A1**

Question 6 — 3 marks

Answer: $y = 4 - \ln x$; $x = e^4$

$y = 4 - \ln x$ **A2**

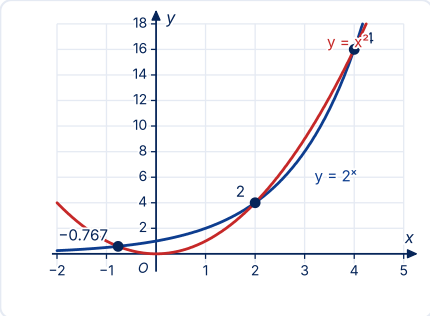
$x = e^4$ **A1**

Question 7 — 3 marks

Answer: $x = -0.767, 2, 4$

$x = 2$, $x = 4$ **A1A1**

$x = -0.767$ **A1**



Three intersections: -0.767, 2, 4

Question 8 — 3 marks

Answer: $y = 2(x-1)^2 - 8$; $x = -1, 3$

$y = 2(x-1)^2 - 8$ **A1**

$(x-1)^2 = 4$ **M1**

$x = -1$, $x = 3$ **A1**

Question 9 — 3 marks

Answer: $y = 0$, $y = 10$; $(0, 5)$

$y = 0$ **A1**

$y = 10$ **A1**

$(0, 5)$ **A1**

Question 10 — 4 marks

Answer: $x = -1,\ 2,\ 3$; $(2.54,\ -0.879)$

$x = -1,\ 2,\ 3$ **A2**

local minimum $(2.54,\ -0.879)$ **A1A1**

Every solution is also on ibmathrevision.com/hlai/graphing-linear-quadratic-exponential-and-logarithmic-functions-exam-practice

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