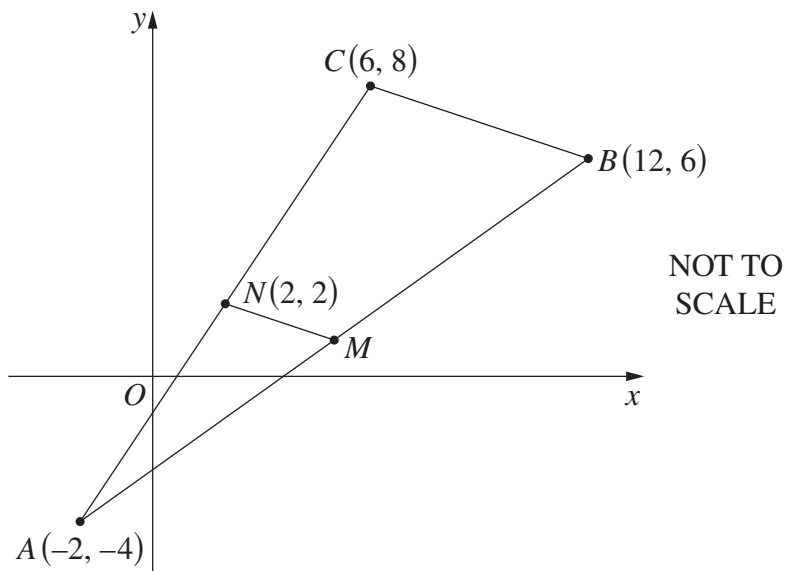


Question 3 (12 marks) Use the Question 3 Writing Booklet.

- (a) In the diagram A , B and C are the points $(-2, -4)$, $(12, 6)$ and $(6, 8)$ respectively. The point $N(2, 2)$ is the midpoint of AC . The point M is the midpoint of AB .



- | | |
|--|----------|
| (i) Find the coordinates of M . | 1 |
| (ii) Find the gradient of BC . | 1 |
| (iii) Prove that $\triangle ABC$ is similar to $\triangle AMN$. | 2 |
| (iv) Find the equation of MN . | 2 |
| (v) Find the exact length of BC . | 1 |
| (vi) Given that the area of $\triangle ABC$ is 44 square units, find the perpendicular distance from A to BC . | 1 |

Question 3 continues on page 5

Question 3 (continued)

(b) (i) Sketch the curve $y = \ln x$. **1**

(ii) Use the trapezoidal rule with three function values to find an approximation to **2**

$$\int_1^3 \ln x \, dx.$$

(iii) State whether the approximation found in part (ii) is greater than or **1**

less than the exact value of $\int_1^3 \ln x \, dx$. Justify your answer.

End of Question 3