10 The roots of a quadratic equation are α and β where

$$\alpha + \beta = -\frac{5}{2} \quad \text{and} \quad \alpha^3 + \beta^3 = \frac{115}{8}$$

(a) Show that $\alpha\beta = 4$

(3)

(b) Form a quadratic equation with integer coefficients, that has roots

$$\frac{\alpha^2 + 1}{\beta} \quad \text{and} \quad \frac{\beta^2 + 1}{\alpha}$$

(7)

Question 10 continued

P 7 3 5 8 6 A 0 2 7 3 2

Question 10 continued

P 7 3 5 8 6 A 0 2 8 3 2

Question 10 continued

(Total for Question 10 is 10 marks)

P 7 3 5 8 6 A 0 2 9 3 2

11
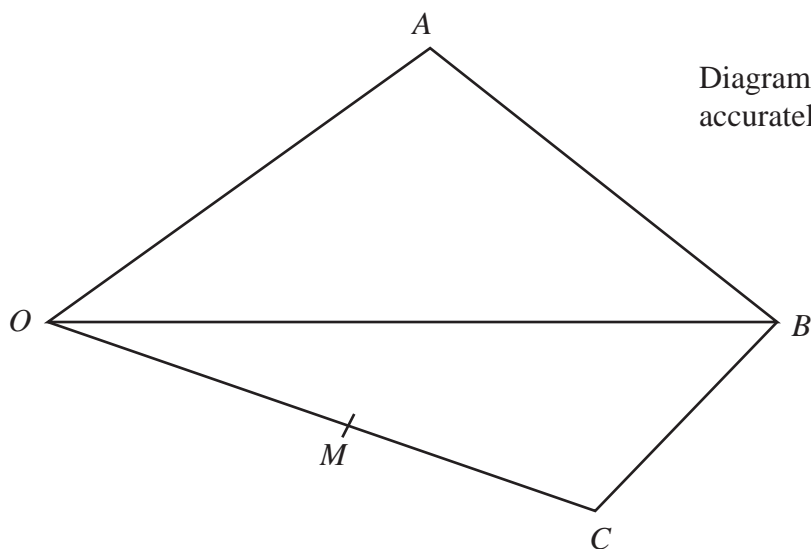
Figure 3

Figure 3 shows quadrilateral *OABC* where

$$\overrightarrow{OA} = 4\mathbf{p} + 5\mathbf{q} \qquad \overrightarrow{OB} = 3\mathbf{p} + \mathbf{q} \qquad \overrightarrow{OC} = 2\mathbf{p} - 4\mathbf{q}$$

The point *M* is the midpoint of *OC*

(a) Find $\overrightarrow{MA}$ as a simplified expression in terms of **p** and **q**

(3)

The point *N* lies on *OB* such that *M*, *N* and *A* are collinear.

(b) Find the ratio *MN* : *NA*

(6)

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Question 11 continued

Question 11 continued

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(Total for Question 11 is 9 marks)

TOTAL FOR PAPER IS 100 MARKS

P 7 3 5 8 6 A 0 3 2 3 2