9 $$f(x) = 3x^4 + 4x^3 - 36x^2 + 64$$

Given that $f(x)$ can be written in the form $(x-2)^2(ax^2 + bx + c)$

(a) find the value of a, the value of b and the value of c
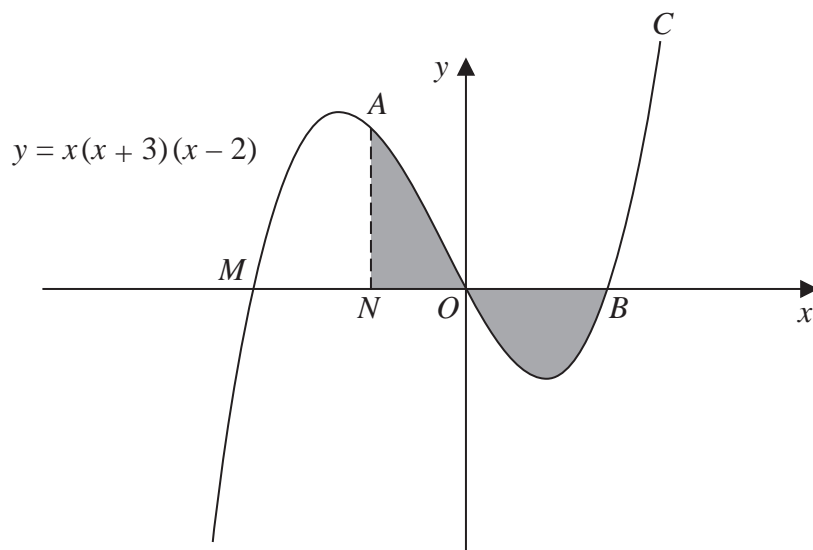
(4)

Diagram **NOT** accurately drawn

Figure 3

Figure 3 shows a sketch of part of the curve C with equation $y = x(x+3)(x-2)$

The curve C crosses the x-axis at the point M, the origin and the point B.
The point N lies on the x-axis between M and O.
The point A lies on C such that AN is parallel to the y-axis.

The area of the shaded region bounded by the curve and OB is numerically equal to the area of the shaded region bounded by the curve, ON and NA.

Given that the coordinates of N are $(n, 0)$,

(b) use algebraic integration to show that n satisfies the equation

$$(x-2)^2(3x^2 + 16x + 16) = 0$$

(7)

(c) Hence find the exact coordinates of A.

(5)

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Question 9 continued

Question 9 continued

Question 9 continued

(Total for Question 9 is 16 marks)

P 7 1 6 6 1 A 0 2 9 3 2