10 The points A, B, C and D are the vertices of a quadrilateral such that

$$\overrightarrow{AB} = 3\mathbf{a} + 4\mathbf{b}$$
 $\overrightarrow{AC} = 7\mathbf{a} + 9\mathbf{b}$ $\overrightarrow{AD} = 4\mathbf{a} + 5\mathbf{b}$

(a) Show that ABCD is a parallelogram.

(3)

BC is extended to the point E such that BCE is a straight line.

Point F lies on CD such that CF : FD = 1 : 2

Given that A, F and E are collinear,

(b) find the vector \overrightarrow{AE} in the form $X\mathbf{a} + Y\mathbf{b}$ where X and Y are rational numbers to be found.

(8)

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Question 10 continued	



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Question 10 continued	

Question 10 continued	
	(Total for Question 10 is 11 marks)



- 11 Using formulae from page 2, show that
 - (a) (i) $\cos 2A = 2\cos^2 A 1$

(3)

(ii) $\sin 2A = 2\sin A\cos A$

(1)

(b) Show that $\cos^3 A = \frac{\cos 3A + 3\cos A}{4}$

(4)

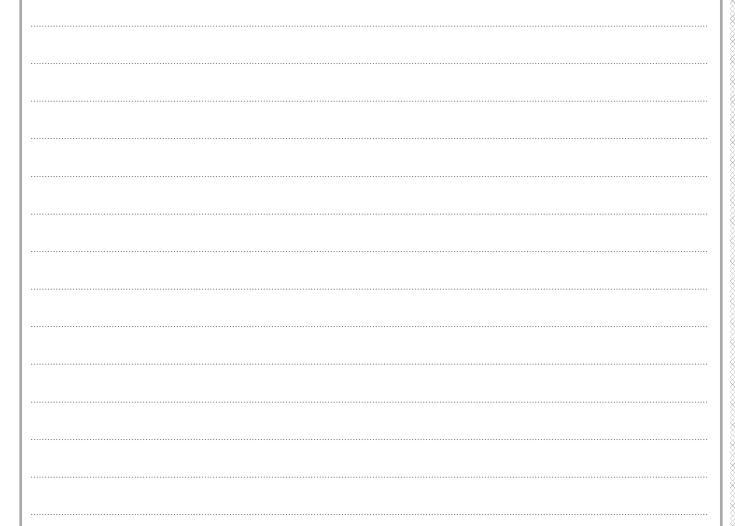
Hence, or otherwise,

(c) solve, giving exact values in terms of π

$$8\cos^{3}\left(\frac{\theta}{2}\right) - 6\cos\left(\frac{\theta}{2}\right) - 1 = 0 \quad \text{for } 0 \leqslant \theta \leqslant 2\pi$$
(4)

(d) use algebraic integration to find the exact value of

$$\int_0^{\frac{\pi}{6}} \left(4\cos^3\theta - \sin 2\theta \right) d\theta \tag{4}$$



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Question 11 continued	
	(Total for Question 11 is 16 marks)
	TOTAL FOR PAPER IS 100 MARKS

