3 O, A and B are fixed points such that

$$\begin{vmatrix} \overrightarrow{OA} \end{vmatrix} = 3\sqrt{5}$$
 $\overrightarrow{AB} = \mathbf{i} + 3a\mathbf{j}$ $\overrightarrow{OB} = 7\mathbf{i} + 2a\mathbf{j}$

Given that a > 0

- (a) find the value of a
- (b) Hence find a unit vector parallel to \overrightarrow{OA}

(2)

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	Question 3 continued
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$f(x) = px^3 + qx^2 - 37x - 12q$ where p and q are constants.	
When $f'(x)$ is divided by $(x + 2)$ the remainder is -33	
Given that $(x + 5)$ is a factor of $f(x)$	
(ii) This the value of q	(6)
(b) Hence, use algebra to factorise $f(x)$ completely.	
	(3)
(c) Hence solve the equation $f(x) = 0$	(2)
	(2)
	When $f'(x)$ is divided by $(x + 2)$ the remainder is -33 Given that $(x + 5)$ is a factor of $f(x)$ (a) (i) show that $p = 2$ (ii) find the value of q (b) Hence, use algebra to factorise $f(x)$ completely. (c) Hence solve the equation $f(x) = 0$

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Question 4 continued
(Total for Question 4 is 11 marks)
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(6)

5 The force F newtons between two magnetic poles is given by the formula

$$F = \frac{3}{20r^2}$$

where r is the distance, in centimetres, between the poles.

The distance between the two poles is increasing at a constant rate of 0.7 cm/s

Find the rate of change of F, in newtons/s to 3 significant figures, when the distance between the poles is 2.8 cm

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Question 5 continued	
(To	tal for Question 5 is 6 marks)

