10 The curve C has equation $y = \dfrac{ax - 5}{b - x}$ where a and b are integers and $x \neq b$

One intersection of C with the coordinate axes is at the point with coordinates $\left(\dfrac{5}{4}, 0\right)$

The asymptote parallel to the y-axis has equation $x = 3$

(a) Find the value of a and the value of b

(2)

(b) Sketch C, showing clearly the asymptotes with their equations and the coordinates of the points of intersection with the coordinate axes.

(5)

The straight line l with equation $4y - 7x = k$ has no points of intersection with C

(c) Show, using algebra, that the range of possible values of k can be written as

$$m < k < n$$

where m and n are integers to be found.

(9)

Question 10 continued

Question 10 continued

Question 10 continued

Question 10 continued

(Total for Question 10 is 16 marks)

TOTAL FOR PAPER IS 100 MARKS