10 The curve C has equation $y = \dfrac{2x - 1}{x + 4}$ $\quad x \neq -4$

(a) Write down an equation of the asymptote to C that is

(i) parallel to the x-axis,

(ii) parallel to the y-axis.

(2)

(b) Find the coordinates of the points of intersection of C with the coordinate axes.

(2)

(c) Using the axes on the opposite page, sketch C, showing clearly the asymptotes and the coordinates of the points of intersection of C with the coordinate axes.

(3)

The line with equation $y = x + k_1$ is the tangent to C at the point P

The line with equation $y = x + k_2$ is the tangent to C at the point Q

Given that the x coordinate of P is greater than the x coordinate of Q

(d) using calculus, find the coordinates of

(i) P

(ii) Q

(8)

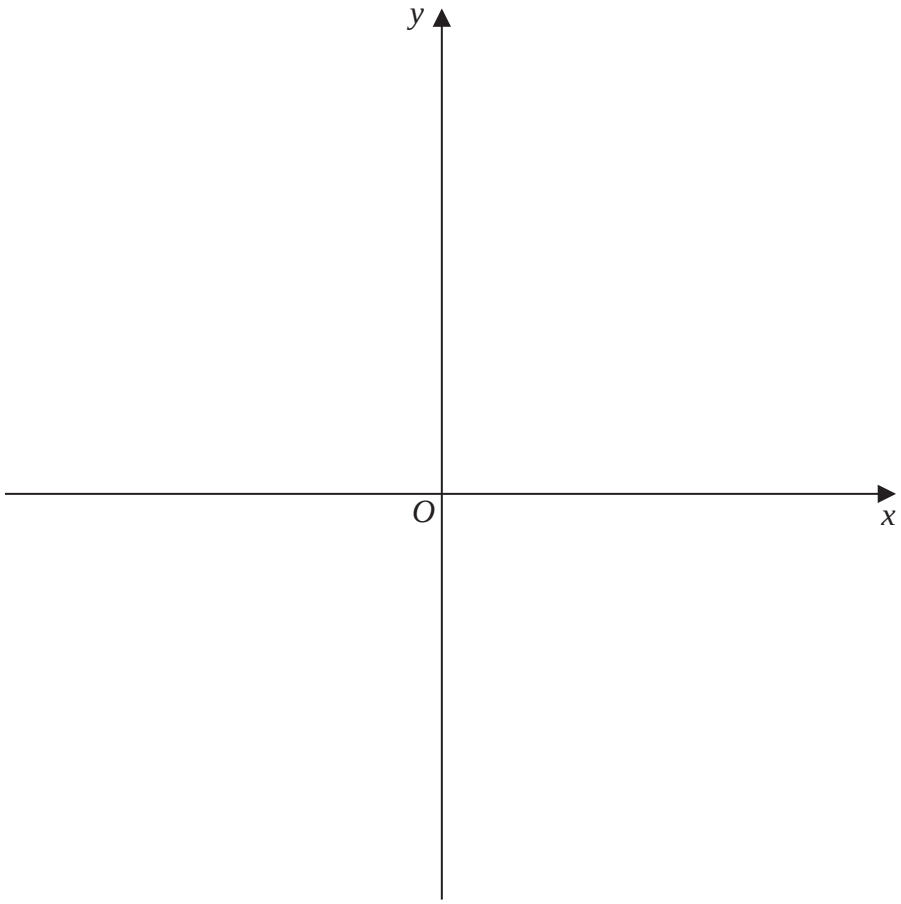
(e) Hence find the value of

(i) k_1

(ii) k_2

(3)

Question 10 continued

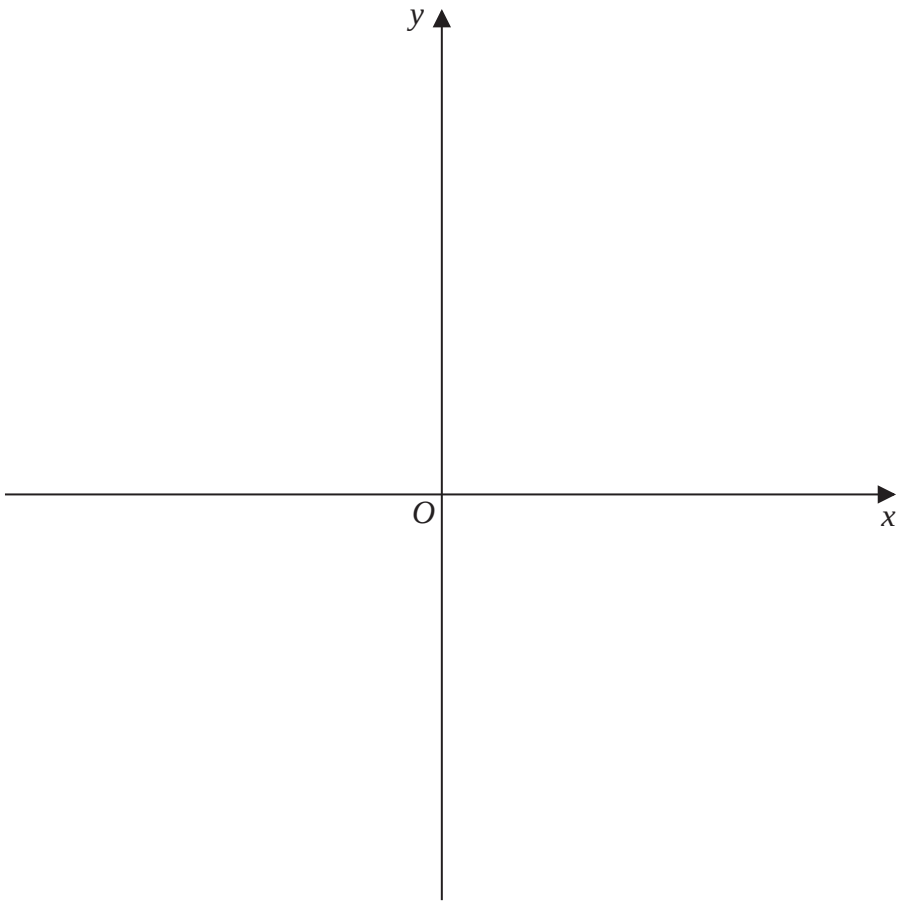


Turn over for spare axes if you need to redraw your sketch.

Question 10 continued

Question 10 continued

Only use these axes if you need to redraw your sketch.



Question 10 continued

(Total for Question 10 is 18 marks)

TOTAL FOR PAPER IS 100 MARKS