**7.** **In this question you must show all stages of your working.**
**Solutions relying entirely on calculator technology are not acceptable.**

(a) Sketch the curve $C$ with equation

$$y = \frac{1}{x + 6}$$

State on your sketch

- the equation of the vertical asymptote
- the coordinates of the point of intersection of $C$ with the $y$-axis

**(3)**

The straight line $l$ has equation $y = mx - 4$, where $m$ is a constant.

Given that $l$ cuts $C$ at least once,

(b) (i) show that

$$9m^2 + 13m + 4 \geqslant 0$$

(ii) find the range of values of $m$.

**(6)**

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**Question 7 continued**

**Question 7 continued**

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**Question 7 continued**

**(Total for Question 7 is 9 marks)**

**8.**

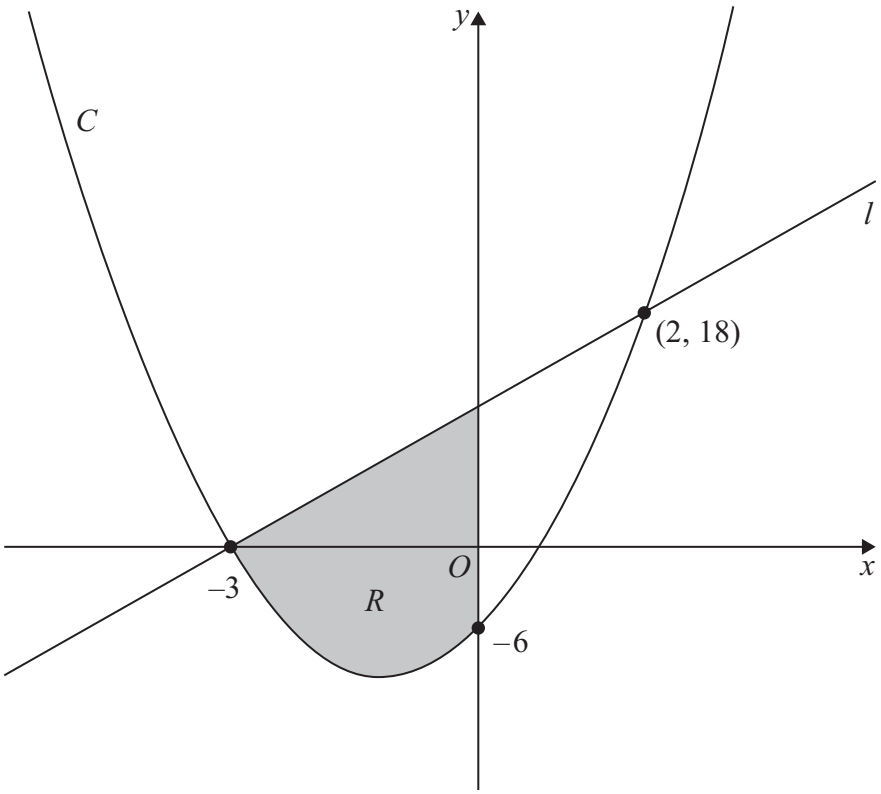


**Figure 3**

Figure 3 shows a sketch of a line $l$ and a quadratic curve $C$.

Given that $l$ passes through $(-3, 0)$ and $(2, 18)$

(a) find an equation for $l$ in the form $y = mx + c$ where $m$ and $c$ are constants.

**(3)**

Given that

- $C$ and $l$ intersect at the points $(-3, 0)$ and $(2, 18)$
- $C$ crosses the $y$-axis at $(0, -6)$

(b) find an equation for $C$.

**(4)**

The region $R$, shown shaded in Figure 3, is bounded by $C$, $l$ and the $y$-axis.

(c) Use inequalities to define $R$.

**(2)**

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