**3.**

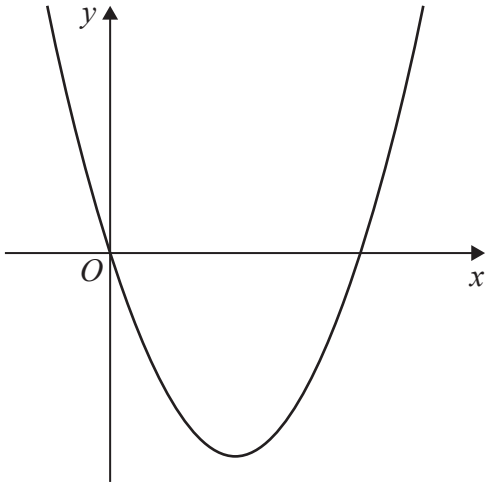



**Figure 2**

**In this question you must show all stages of your working.**

**Solutions relying entirely on calculator technology are not acceptable.**

Figure 2 shows a sketch of the curve with equation $y = \mathrm{f}(x)$, where

$$\mathrm{f}(x) = 2x^2 - 10x \qquad x \in \mathbb{R}$$

(a) Solve the equation

$$\mathrm{f}(|x|) = 48$$

**(3)**

(b) Find the set of values of $x$ for which

$$|\mathrm{f}(x)| \geqslant \frac{5}{2}x$$

**(4)**

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**Question 3 continued**

**Question 3 continued**

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**Question 3 continued**

**(Total for Question 3 is 7 marks)**

**4.** The number of bacteria on a surface is being monitored.

The number of bacteria, $N$, on the surface, $t$ hours after monitoring began is modelled by the equation

$$\log_{10} N = 0.35t + 2$$

**Use the equation of the model to answer parts (a) to (c).**

(a) Find the initial number of bacteria on the surface.

**(1)**

(b) Show that the equation of the model can be written in the form

$$N = ab^t$$

where $a$ and $b$ are constants to be found. Give the value of $b$ to 2 decimal places.

**(3)**

(c) Hence find the rate of growth of bacteria on the surface exactly 5 hours after monitoring began.

**(2)**

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