



1. Given  $y = x^3 + 4x + 1$ , find the value of  $\frac{dy}{dx}$  when  $x = 3$  (4)

Lined area for student response.

(Total 4 marks)

Q1

Small rectangular box for marking.











**Question 4 continued**

Handwriting lines for question response.

**(Total 5 marks)**

**Q4**









6. A sequence  $x_1, x_2, x_3, \dots$  is defined by

$$x_1 = 1$$

$$x_{n+1} = (x_n)^2 - kx_n, \quad n \geq 1$$

where  $k$  is a constant,  $k \neq 0$

(a) Find an expression for  $x_2$  in terms of  $k$ . (1)

(b) Show that  $x_3 = 1 - 3k + 2k^2$  (2)

Given also that  $x_3 = 1$ ,

(c) calculate the value of  $k$ . (3)

(d) Hence find the value of  $\sum_{n=1}^{100} x_n$  (3)

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**Question 6 continued**

Lined area for writing the answer to Question 6.

**(Total 9 marks)**

Q6





















9.

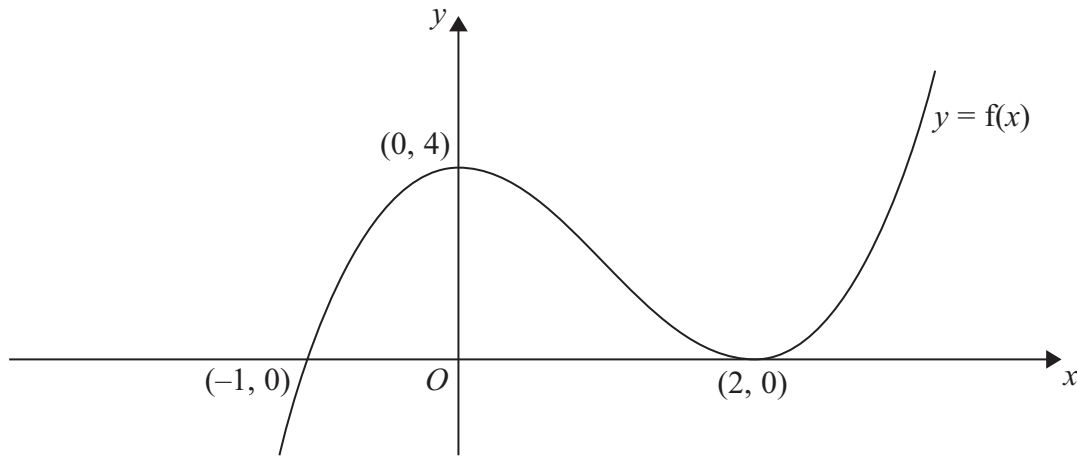


Figure 1

Figure 1 shows a sketch of the curve  $C$  with equation  $y = f(x)$ .

The curve  $C$  passes through the point  $(-1, 0)$  and touches the  $x$ -axis at the point  $(2, 0)$ .

The curve  $C$  has a maximum at the point  $(0, 4)$ .

(a) The equation of the curve  $C$  can be written in the form

$$y = x^3 + ax^2 + bx + c$$

where  $a$ ,  $b$  and  $c$  are integers.

Calculate the values of  $a$ ,  $b$  and  $c$ .

(5)

(b) Sketch the curve with equation  $y = f(\frac{1}{2}x)$  in the space provided on page 24

Show clearly the coordinates of all the points where the curve crosses or meets the coordinate axes.

(3)

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**Question 9 continued**







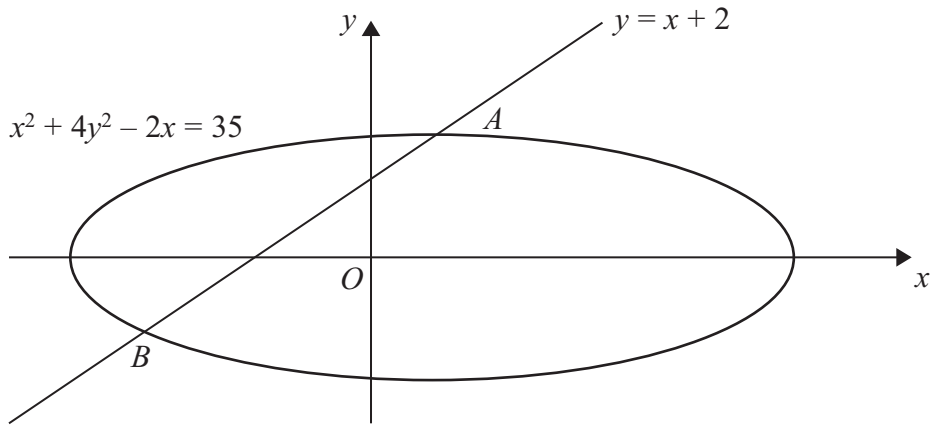








11.



**Figure 2**

The line  $y = x + 2$  meets the curve  $x^2 + 4y^2 - 2x = 35$  at the points  $A$  and  $B$  as shown in Figure 2.

- (a) Find the coordinates of  $A$  and the coordinates of  $B$ . **(6)**
- (b) Find the distance  $AB$  in the form  $r\sqrt{2}$  where  $r$  is a rational number. **(3)**

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