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

(i) Using the laws of indices, solve

$$2^{3p-5} = \frac{1}{16}\sqrt{128}$$

(3)

(ii) Find the real roots of the equation

$$\left(x^2 - 2\right)^2 = x^2 + 18$$

(4)

(Total for Question 4 is 7 marks)



5.

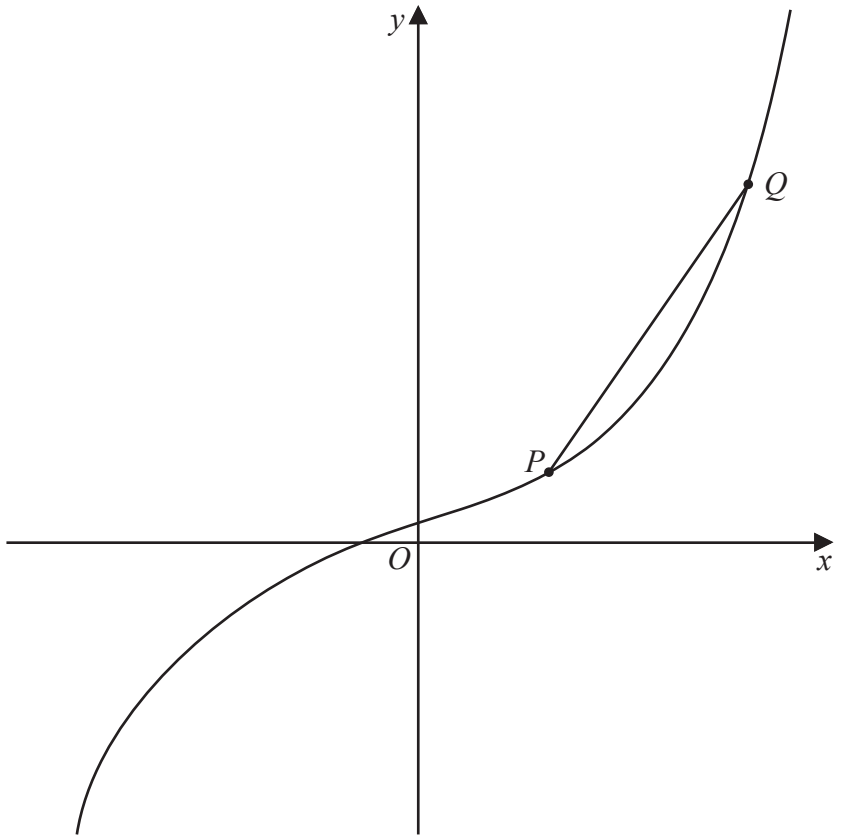

Figure 1

In this question you must show detailed reasoning.
Solutions relying on calculator technology are not acceptable.

Figure 1 shows a sketch of part of the curve with equation $y = x^3 + 2x + 3$

The point $P(2, 15)$ lies on the curve.

(a) Use calculus to find the gradient of the tangent to the curve at P.

(2)

The point Q with x coordinate $2 + h$ where $h > 0$ also lies on the curve.

(b) Find, in terms of h, the gradient of the straight line PQ.
Give the answer in simplest form.

(4)

(c) Explain briefly the relationship between the answer to part (b) and the answer to part (a).

(1)

(Total for Question 5 is 7 marks)