5.

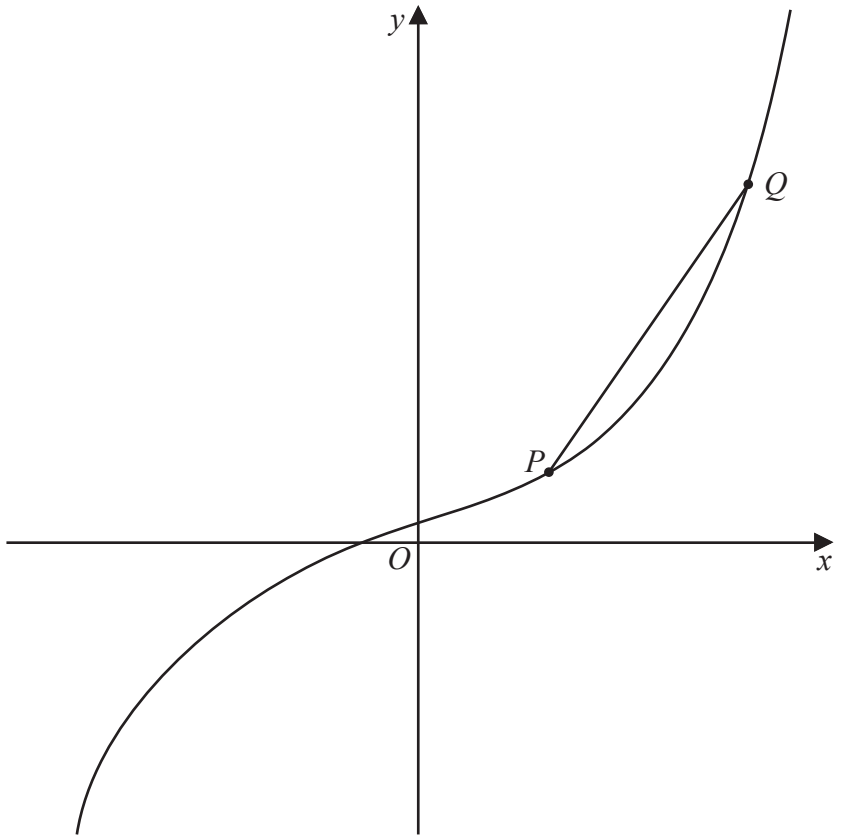

Figure 1

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)

6.

Diagrams Not to scale

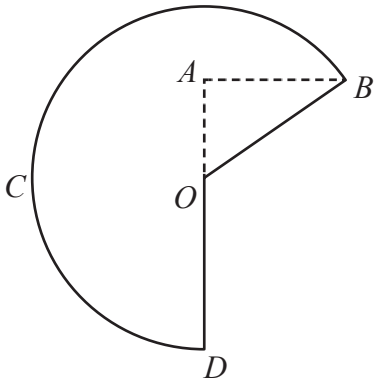

Figure 2

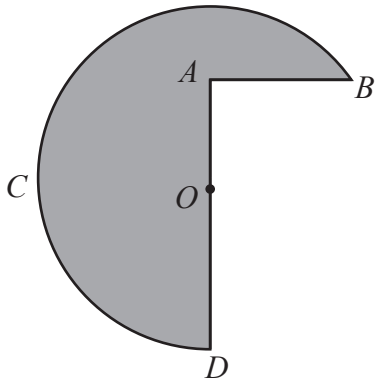

Figure 3

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

Figure 2 shows

- a sector $DOBCD$ of a circle with centre O
- a right-angled triangle OAB with the right angle at A

A company's logo, shown shaded in Figure 3, is formed when the right-angled triangle is removed from the sector of the circle.

Given that

- $OB = OD = 9$ cm
- $AB = 7.3$ cm

(a) find the size of angle BOA, in radians, to 3 decimal places,

(2)

(b) find the area of the logo, in cm^2, to 3 significant figures,

(3)

(c) find the perimeter of the logo, in cm, to one decimal place.

(3)

(Total for Question 6 is 8 marks)