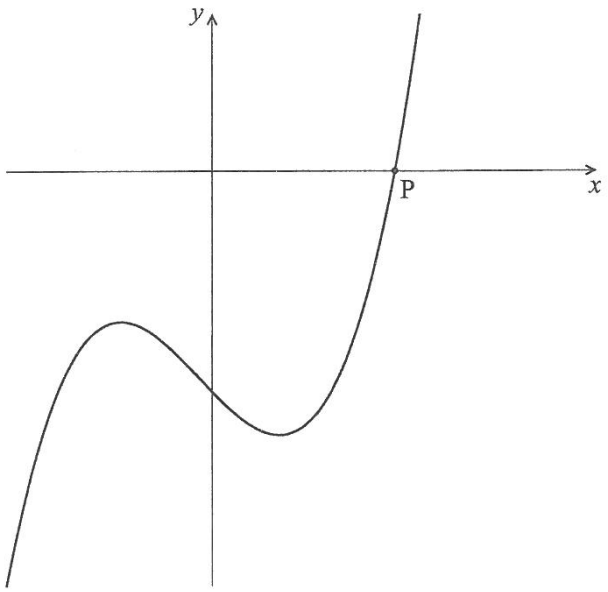
3. *[Maximum mark: 6]*

Let $f(x) = x^3 - 2x - 4$. The following diagram shows part of the curve of f.



The curve crosses the x-axis at the point P.

(a) Write down the x-coordinate of P. *[1 mark]*

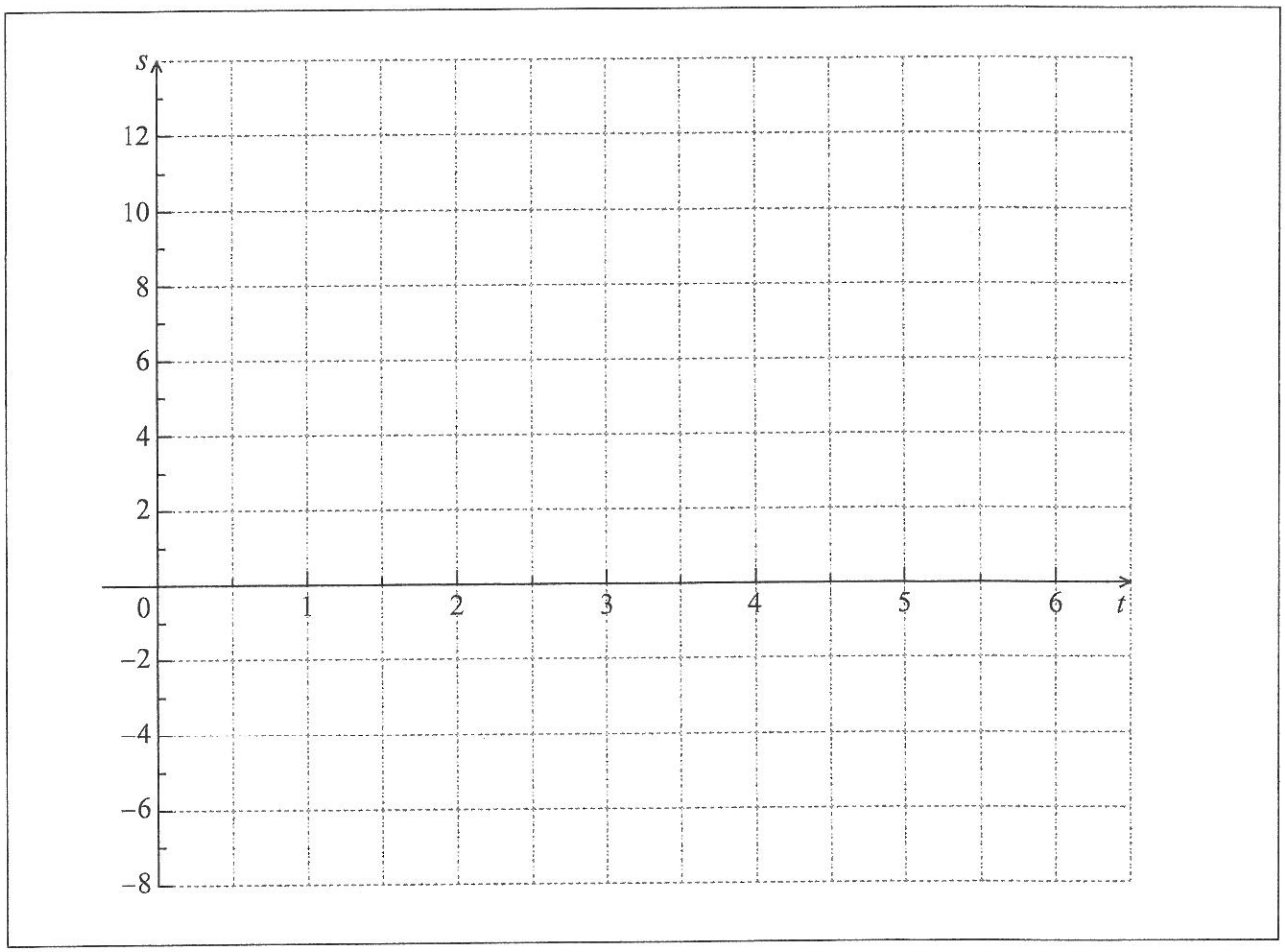
(b) Write down the gradient of the curve at P. *[2 marks]*

(c) Find the equation of the normal to the curve at P, giving your equation in the form $y = ax + b$. *[3 marks]*

7. *[Maximum mark: 7]*

A particle's displacement, in metres, is given by $s(t) = 2t\cos t$, for $0 \le t \le 6$, where t is the time in seconds.

(a) On the grid below, sketch the graph of s. *[4 marks]*



(This question continues on the following page)

(Question 7 continued)

(b) Find the maximum velocity of the particle. *[3 marks]*

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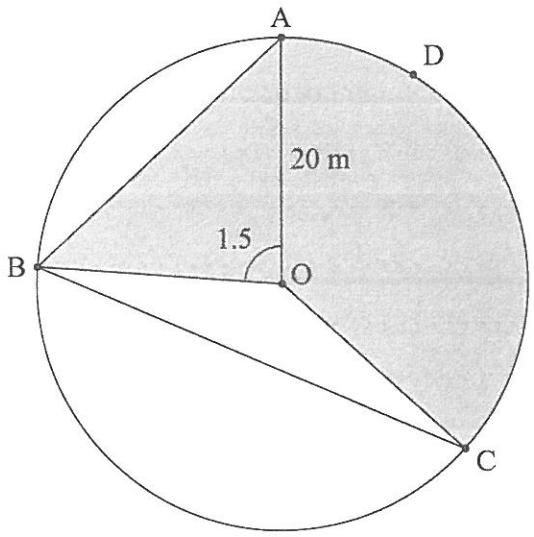
*Do **NOT** write solutions on this page.*

SECTION B

*Answer **all** questions on the answer sheets provided. Please start each question on a new page.*

8. *[Maximum mark: 15]*

The following diagram shows a circular play area for children.



The circle has centre O and a radius of 20 m, and the points A, B, C and D lie on the circle. Angle AOB is 1.5 radians.

(a) Find the length of the chord [AB]. *[3 marks]*

(b) Find the area of triangle AOB. *[2 marks]*

Angle BOC is 2.4 radians.

(c) Find the length of arc ADC. *[3 marks]*

(d) Find the area of the shaded region. *[3 marks]*

(e) The shaded region is to be painted red. Red paint is sold in cans which cost \$32 each. One can covers 140 m^2. How much does it cost to buy the paint? *[4 marks]*