

20. (a) Differentiate with respect to x

Nov 08 4H

(i) $3x^2 - x$

.....

(ii) $\frac{1}{x}$

.....

(4)

(b) Find the coordinates of the points on the curve $y = x^3$ where the gradient is 12

(.....,))

(.....,))

(3)

Q20

(Total 7 marks)

20. A curve has equation $y = x^3 - 5x^2 + 8x - 7$

Nov 07 4H

(a) Find the gradient of the curve at (2, -3).

.....
(4)

(b) What does your answer to part (a) tell you about the point (2, -3)?

.....
(1)

Q20

(Total 5 marks)

May 05 44

14. A farmer wants to make a rectangular pen for keeping sheep. He uses a wall, AB , for one side. For the other three sides, he uses 28 m of fencing. He wants to make the area of the pen as large as possible.

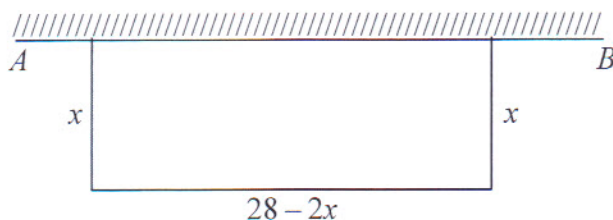


Diagram NOT accurately drawn

The width of the pen is x metres.
The length parallel to the wall is $(28 - 2x)$ metres.

- (a) The area of the pen is $y \text{ m}^2$.
Show that $y = 28x - 2x^2$.

(1)

- (b) For $y = 28x - 2x^2$

(i) find $\frac{dy}{dx}$,

.....

- (ii) find the value of x for which y is a maximum.

$x =$

- (iii) Explain how you know that this value gives a maximum.

.....

.....

(5)

- (c) Find the largest possible area of the pen.

..... m^2

(2)

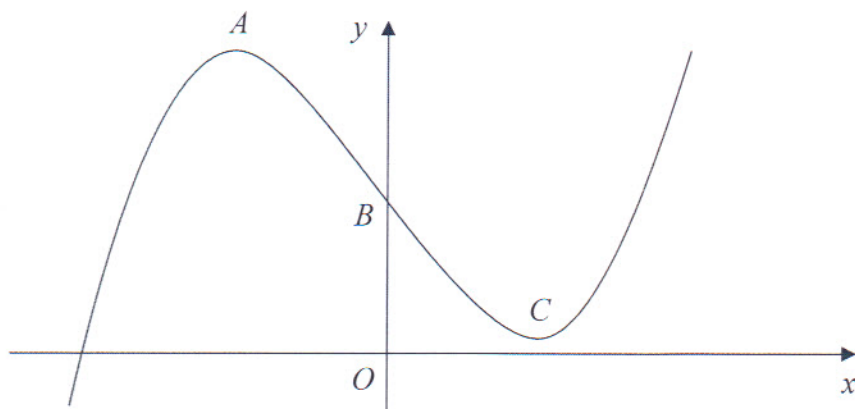
(Total 8 marks)

Q14



Nov 05 4H

15. The diagram shows the graph of $y = x^3 - 12x + 17$
 A is the maximum point on the curve.
 C is the minimum point on the curve.
 The curve crosses the y axis at B .



For the equation $y = x^3 - 12x + 17$

- (a) find $\frac{dy}{dx}$,

.....
 (2)

- (b) find the gradient of the curve at B ,

.....
 (2)

- (c) find the coordinates of A and C .

A (..... ,)

C (..... ,)

(4)

(Total 8 marks)

Q15



Nov 09 4H

19. A particle moves in a straight line through a fixed point O .
 The displacement, s metres, of the particle from O at time t seconds is given by

$$s = t^3 - 5t^2 + 8$$

- (a) Find an expression for the velocity, v m/s, of the particle after t seconds.

$v = \dots\dots\dots$ (2)

- (b) Find the time at which the acceleration of the particle is 20 m/s^2 .

$\dots\dots\dots$ seconds (2)

(Total 4 marks)

Q19

May 06 4H

18. A particle moves along a line.
 For $t \geq 1$, the distance of the particle from O at time t seconds is x metres, where

$$x = \frac{20}{t}$$

Find an expression for the acceleration of the particle.

$\dots\dots\dots$ m/s^2 (2)

(Total 3 marks)

Q18