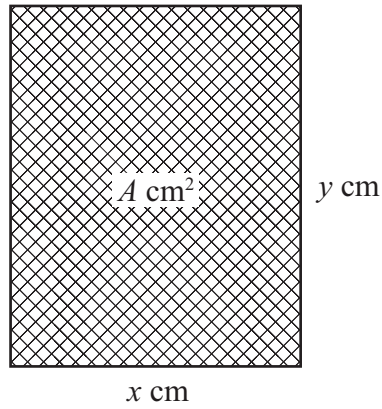


14



The diagram shows a rectangular photo frame of area  $A \text{ cm}^2$ .

The width of the photo frame is  $x \text{ cm}$ .

The height of the photo frame is  $y \text{ cm}$ .

The perimeter of the photo frame is  $72 \text{ cm}$ .

(a) Show that  $A = 36x - x^2$

(3)

(b) Find  $\frac{dA}{dx}$

(2)

(c) Find the maximum value of  $A$ .

$A = \dots\dots\dots$   
(3)

**(Total for Question 14 is 8 marks)**



14 A particle is moving along a straight line.

The fixed point  $O$  lies on this line.

The displacement of the particle from  $O$  at time  $t$  seconds is  $s$  metres where

$$s = 2t^3 - 12t^2 + 7t$$

(a) Find an expression for the velocity,  $v$  m/s, of the particle at time  $t$  seconds.

$$v = \dots\dots\dots \text{ (2)}$$

(b) Find the time at which the acceleration of the particle is instantaneously zero.

$$\dots\dots\dots \text{ seconds} \text{ (2)}$$

**(Total for Question 14 is 4 marks)**



17

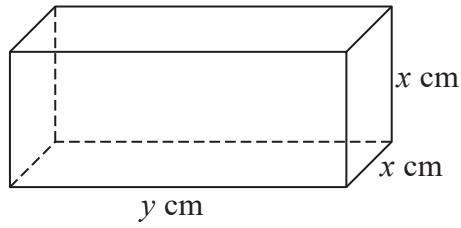


Diagram **NOT** accurately drawn

The diagram shows a cuboid of volume  $V \text{ cm}^3$   
 The length of the cuboid is  $y \text{ cm}$   
 The width and height of the cuboid are both  $x \text{ cm}$   
 The total length of all the edges of the cuboid is  $112 \text{ cm}$

(a) Show that  $V = 28x^2 - 2x^3$

(3)

(b) Find  $\frac{dV}{dx}$

$$\frac{dV}{dx} = \dots\dots\dots$$

(2)

(c) Find the maximum value of  $V$   
 Give your answer correct to 3 significant figures.

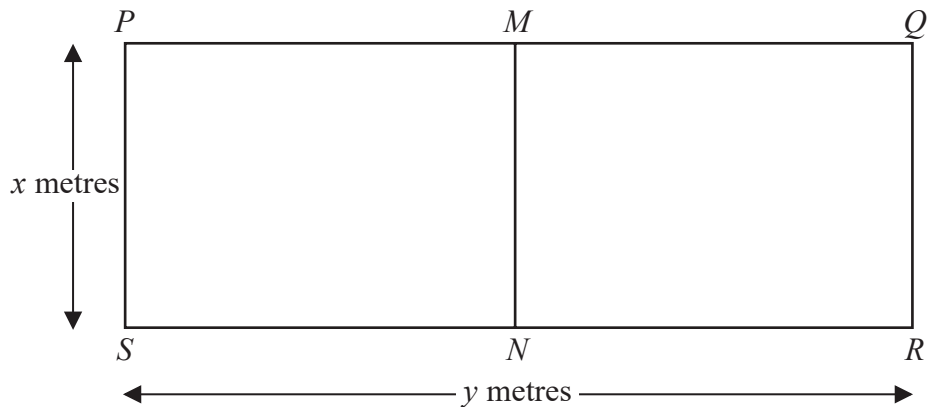
$$V = \dots\dots\dots$$

(3)

(Total for Question 17 is 8 marks)



- 15 A farmer has 120 metres of fencing.  
 He is going to make a rectangular enclosure  $PQRS$  with the fencing.  
 He is also going to divide the enclosure into two equal parts by fencing along  $MN$ .



The width of the enclosure is  $x$  metres.  
 The length of the enclosure is  $y$  metres.

- (a) (i) Show that  $y = 60 - 1.5x$

The area of the enclosure  $PQRS$  is  $A$  m<sup>2</sup>

- (ii) Show that  $A = 60x - 1.5x^2$

(3)

- (b) Find  $\frac{dA}{dx}$

.....  
 (2)

- (c) Find the maximum value of  $A$ .

$A =$  .....  
 (3)

(Total for Question 15 is 8 marks)

