Lesson 7

GCSE
Differentiation I

7.1 From the Exam

Marks Available : 52

Question 1

GCSE Examination Question from June 2019, Paper 2H, Q18

The diagram shows a solid cuboid

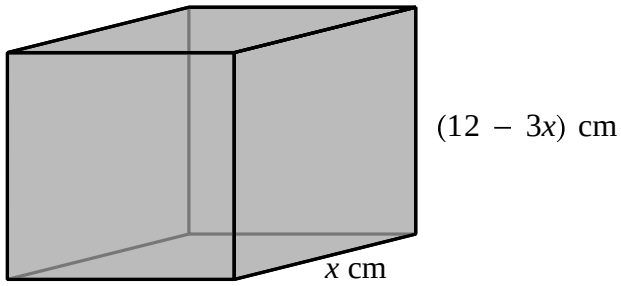


Diagram NOT accurately drawn

The total surface area of the cuboid is A cm^2
Find the maximum value of A

[5 marks]

Question 2

GCSE Examination Question from June 2009, 4H, Q17

A curve has equation

$$y = x^2 + 3x$$

(a) Find $\frac{dy}{dx}$

[2 marks]

(b) Find the gradient of the curve at the point where $x = -4$

[1 mark]

(c) The curve has a minimum point.
Find the coordinates of this minimum point.

[3 marks]

Question 3

GCSE Examination Question from November 2010, 3H, Q16

A curve has equation

$$y = x^3 + 3x^2 - 24x$$

(a) Find $\frac{dy}{dx}$

[3 marks]

(b) Find the coordinates of the turning points of the curve.

[5 marks]

Question 4

GCSE Examination Question from January 2019, Paper 1HR, Q13

A curve C has equation $y = x^3 - x^2 - 8x + 12$

(a) Find $\frac{dy}{dx}$

[2 marks]

The curve C has two turning points

(b) Work out the x coordinates of the two turning points
Show your working clearly

[3 marks]

(c) Show that the x-axis is a tangent to the curve, C

[2 marks]

Question 5

GCSE Examination Question from January 2013, 3H, Q18

(a) Differentiate with respect to x

(i) $8x^2$

(ii) $\frac{2}{x}$

(b) The curve with equation $y = 8x^2 + \frac{2}{x}$ has one turning point

Find the coordinates of this turning point.

Show your working clearly.

[4 marks]

Question 6

GCSE Examination Question from May 2007, 3H, Q17

A curve has equation $y = x^2 + \frac{16}{x}$

The curve has one turning point.

Find $\frac{dy}{dx}$ and use your answer to find the coordinates of this turning point

[4 marks]

Question 7

GCSE Examination Question from January 2020, Paper 1H, Q15

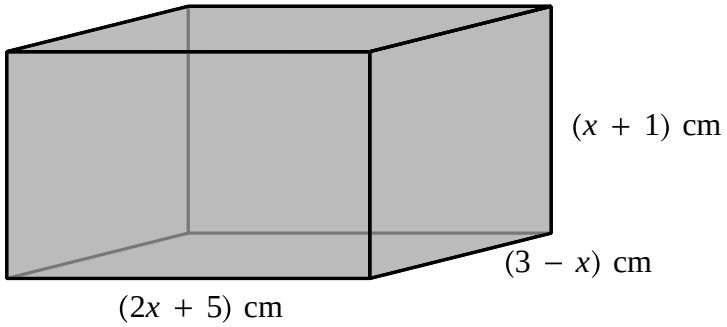


Diagram NOT accurately drawn

The diagram shows a cuboid of volume V cm^3

(a) Show that $V = 15 + 16x - x^2 - 2x^3$

[3 marks]

There is a value of x for which the volume of the cuboid is a maximum.

(b) Find this value of x

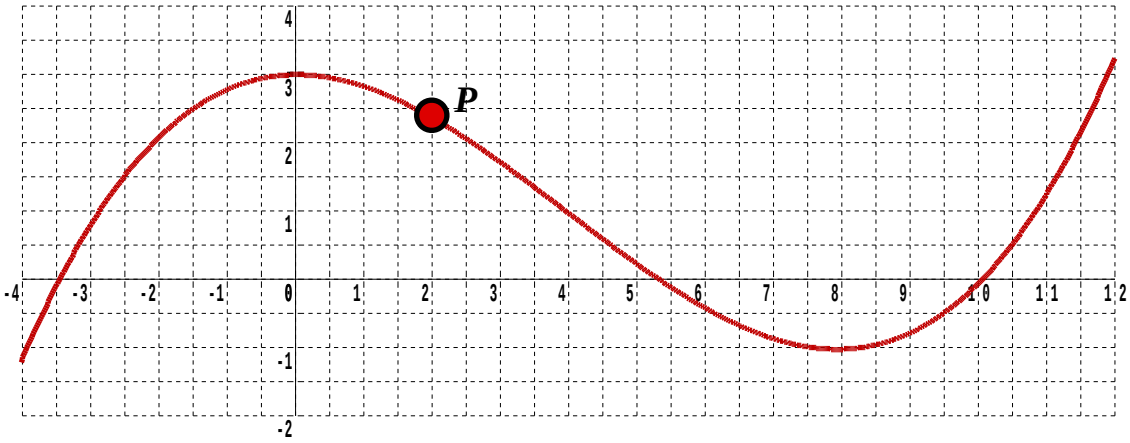
Show your working clearly

Give your answer correct to 3 significant figures

[5 marks]

Question 8

GCSE Examination Question from January 2020, Paper 1HR, Q18



The diagram shows the graph of $y = f(x)$ for $-4 \leqslant x \leqslant 12$

The point P on the curve has x coordinate 2

(a) **(i)** Use the graph to find an estimate for the gradient of the curve at P

[3 marks]

(ii) Hence find an equation of the tangent to the curve at P

Give your answer in the form $y = mx + c$

[2 marks]

The equation $f(x) = k$ has exactly two different solutions for $-4 \leqslant x \leqslant 12$

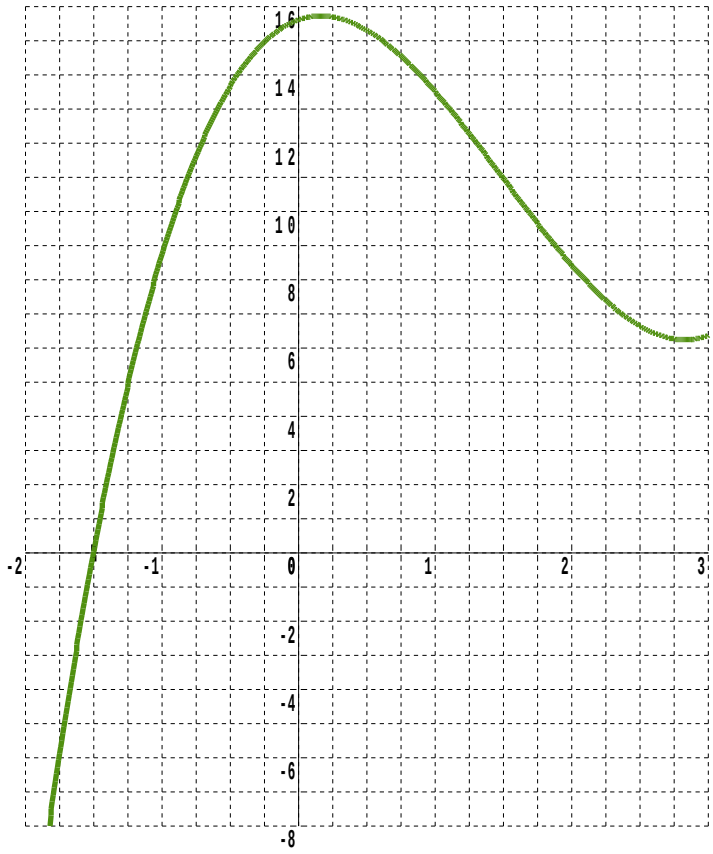
(b) Use the graph to find the two possible values of k

[2 marks]

Question 9

GCSE Examination Question from June 2019, Paper 2HR, Q18(d)

Part of the curve with equation $y = h(x)$ is shown on the grid



Find an estimate for the gradient of the curve at the point where $x = -0.5$
Show your working clearly.

[3 marks]