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(3)

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Pearson Edexcel Level 3 Advanced Subsidiary GCE in Further Mathematics – Sample Assessment Materials – Issue 1 – August 2017 © Pearson Education Limited 2017

2. The value, V hundred pounds, of a particular stock t hours after the opening of trading on a given day is modelled by the differential equation

$$\frac{dV}{dt} = \frac{V^2 - t}{t^2 + tV} \quad 0 < t < 8.5$$

A trader purchases £300 of the stock one hour after the opening of trading.

Use two iterations of the approximation formula $\left(\frac{dy}{dx}\right)_0 \approx \frac{y_1 - y_0}{h}$ to estimate, to the nearest £, the value of the trader's stock half an hour after it was purchased.

(6)

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3. Use algebra to find the set of values of x for which

$$\frac{1}{x} < \frac{x}{x+2}$$

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4.

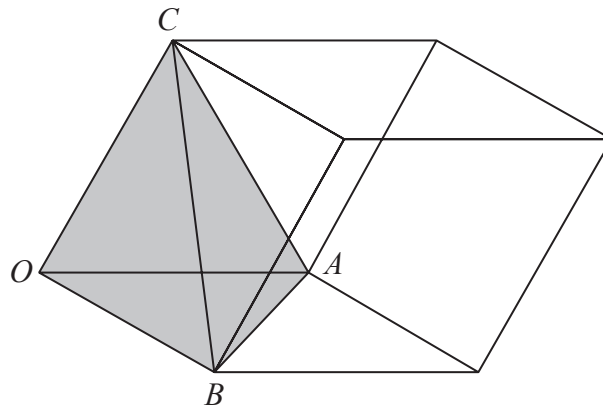


Figure 1

Figure 1 shows a sketch of a solid sculpture made of glass and concrete. The sculpture is modelled as a parallelepiped.

The sculpture is made up of a concrete solid in the shape of a tetrahedron, shown shaded in Figure 1, whose vertices are $O(0, 0, 0)$, $A(2, 0, 0)$, $B(0, 3, 1)$ and $C(1, 1, 2)$, where the units are in metres. The rest of the solid parallelepiped is made of glass which is glued to the concrete tetrahedron.

- (a) Find the surface area of the glued face of the tetrahedron. (4)
- (b) Find the volume of glass contained in this parallelepiped. (5)
- (c) Give a reason why the volume of concrete predicted by this model may not be an accurate value for the volume of concrete that was used to make the sculpture. (1)

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Question 4 continued

(Total for Question 4 is 10 marks)

5.

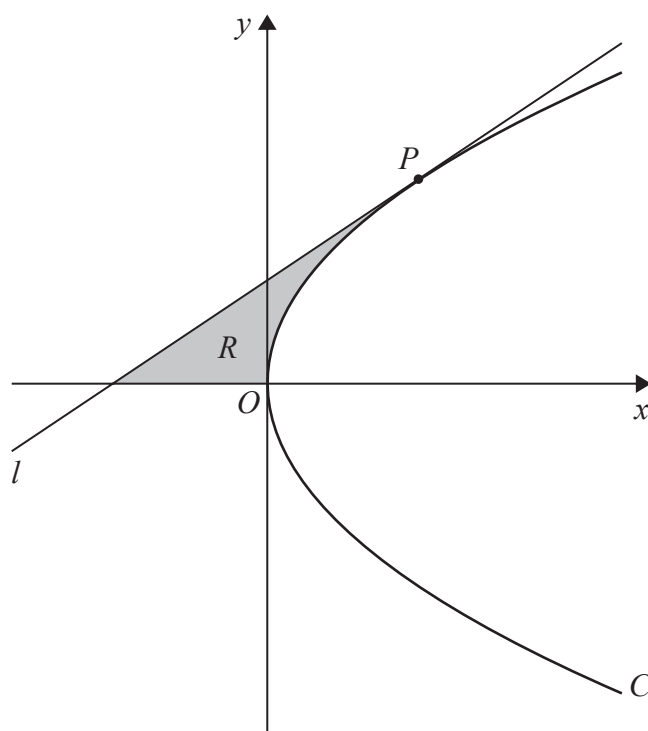
Diagram not
drawn to scale

Figure 2

[You may quote without proof that for the general parabola $y^2 = 4ax$, $\frac{dy}{dx} = \frac{2a}{y}$]

The parabola C has equation $y^2 = 16x$.

(a) Deduce that the point $P(4p^2, 8p)$ is a general point on C .

(1)

The line l is the tangent to C at the point P .

(b) Show that an equation for l is

$$py = x + 4p^2$$

(3)

The finite region R , shown shaded in Figure 2, is bounded by the line l , the x -axis and the parabola C .

The line l intersects the directrix of C at the point B , where the y coordinate of B is $\frac{10}{3}$

Given that $p > 0$

(c) show that the area of R is 36

(8)

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[illegible]

Question 5 continued

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(Total for Question 5 is 12 marks)

TOTAL FOR SECTION A IS 40 MARKS