

10

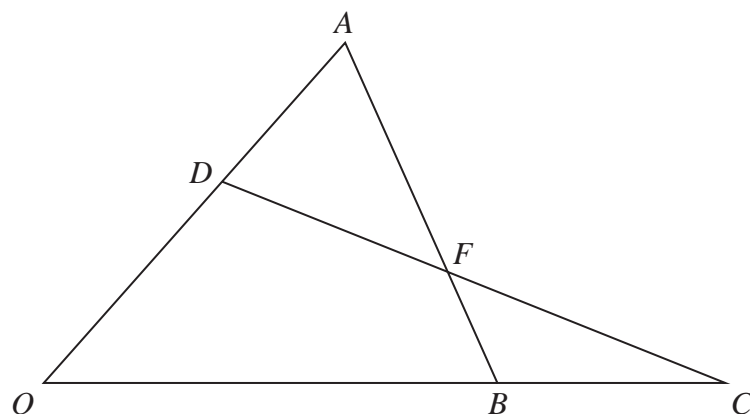


Figure 1

Diagram **NOT**
accurately drawn

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Figure 1 shows triangle OAB and triangle OCD .

$$\overrightarrow{OA} = 5\mathbf{p} \quad \overrightarrow{AB} = 3\mathbf{q} \quad \overrightarrow{OC} = \frac{3}{2}\overrightarrow{OB} \quad \overrightarrow{OD} = \frac{3}{5}\overrightarrow{OA}$$

- (a) Find \overrightarrow{DC} as a simplified expression in terms of \mathbf{p} and \mathbf{q} .

(3)

The line DC meets the line AB at F .

- (b) Using a vector method, find \overrightarrow{OF} as a simplified expression in terms of \mathbf{p} and \mathbf{q} .

(7)

The point G lies on OB such that FG is parallel to AO .

- (c) Using a vector method, find \overrightarrow{OG} as a simplified expression in terms of \mathbf{p} and \mathbf{q} .

(4)



Question 10 continued

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Area for writing answers, consisting of multiple horizontal dotted lines.



Question 10 continued

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Question 10 continued

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(Total for Question 10 is 14 marks)

P 6 6 0 2 4 A 0 3 1 3 6

11 (a) Using a formula from page 2, show that $\cos 2x = 1 - 2 \sin^2 x$

(3)

Diagram **NOT**
accurately drawn

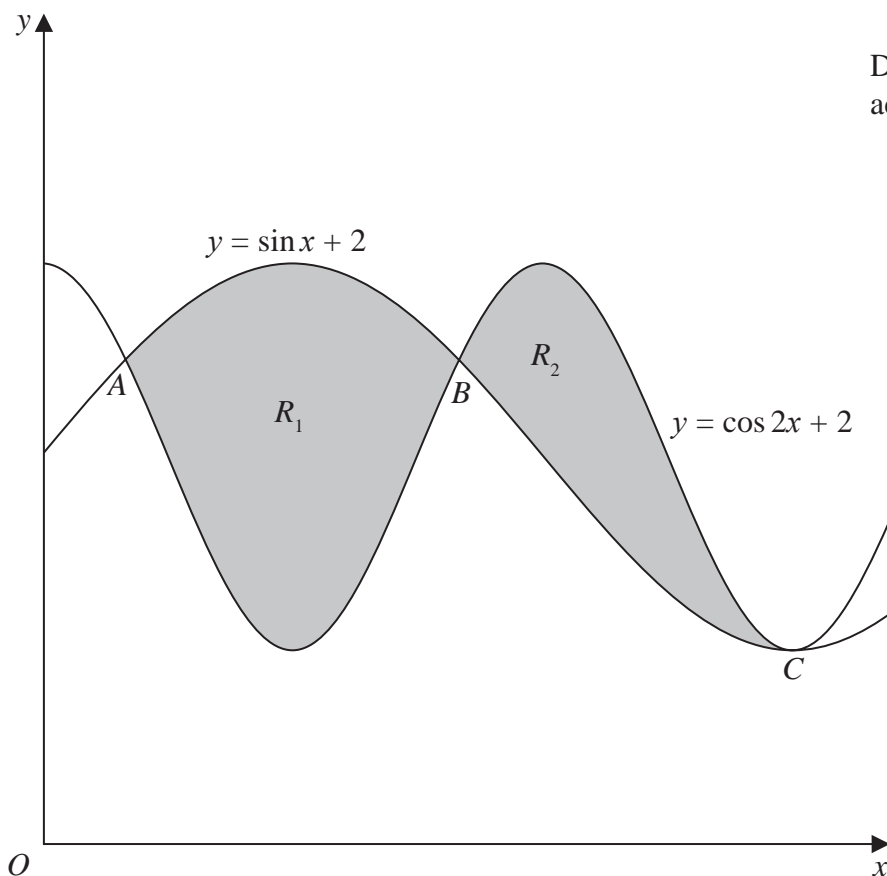


Figure 2

Figure 2 shows a sketch of part of the curves with equations $y = \sin x + 2$ and $y = \cos 2x + 2$

The points A , B and C , shown in Figure 2, are three points that are common to both curves.

(b) Find the coordinates of each of these points.

(4)

R_1 and R_2 , shown shaded in Figure 2, are two regions enclosed by the two curves.

(c) Use calculus to find, in its simplest form, the ratio

area of R_1 : area of R_2

(8)

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Question 11 continued

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Question 11 continued

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Question 11 continued

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(Total for Question 11 is 15 marks)**TOTAL FOR PAPER IS 100 MARKS**