

Lesson 10

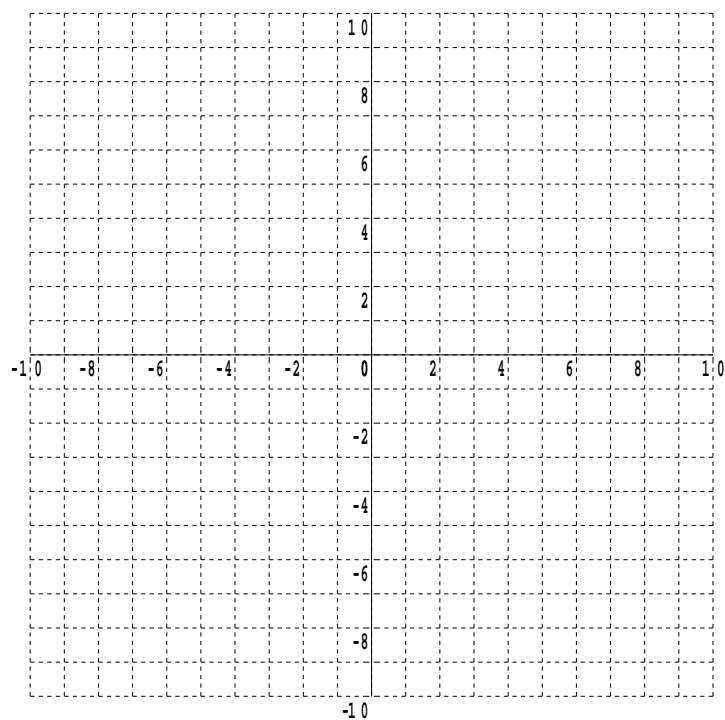
Further A-Level Pure Mathematics Complex Numbers : Core 1

10.1 Regions and Argand Diagrams

On the Argand diagram, shade in the region specified by,

$$\left\{ 3 < |z - 3 + 5i| \leq 5 \right\} \cap \left\{ -\frac{\pi}{2} \leq \arg(z - 3 + 5i) < \frac{3\pi}{4} \right\}$$

Teaching Video : [http://www.NumberWonder.co.uk/Video/v9085\(10\).mp4](http://www.NumberWonder.co.uk/Video/v9085(10).mp4)

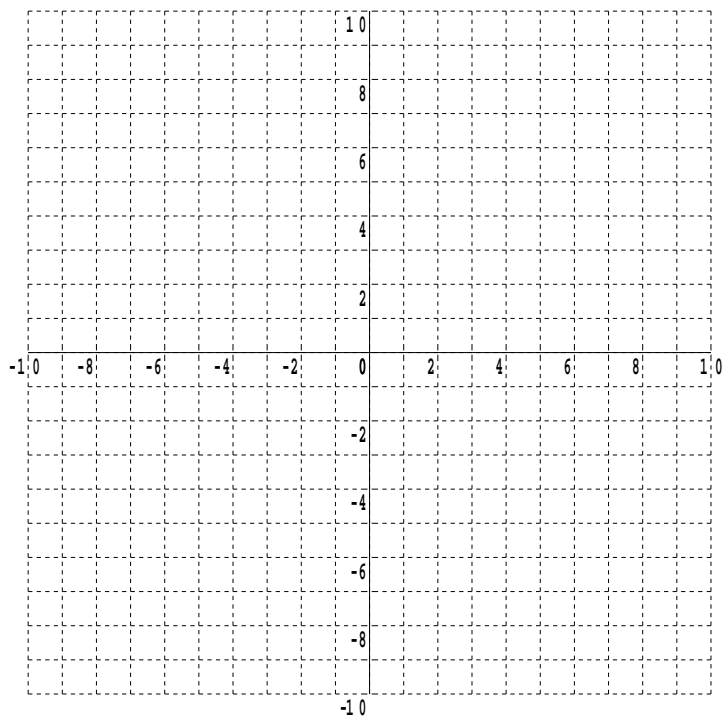


10.2 Exercise

Question 1

(i) On the Argand diagram, shade in the region, R , specified by,

$$\{ 3 \leq |z + 3 - 4i| < 5 \} \cap \left\{ -\frac{\pi}{3} < \arg(z + 3 - 4i) \leq \frac{\pi}{3} \right\}$$



(ii) Show how to use the formula $Arc\ length = r \theta^c$ to determine the *exact* perimeter of the region R

(iii) Show how to use the formula $Sector\ area = \frac{1}{2} r^2 \theta^c$ to determine the *exact* area of the region R

Question 2

Further A-Level SAM Question for Core Pure Mathematics 2, June 2020, Q6 (b) (i)

The set of points A is defined by

$$A = \left\{ z : 0 \leq \arg z \leq \frac{\pi}{3} \right\} \cap \left\{ z : |z - 4 - 3i| \leq 5 \right\}$$

Show, by shading on an Argand diagram, the set of points A

[2 marks]

Question 3

The complex number z is represented by a point P on an Argand diagram.

Given that $|z + 4 - 4i| \leq 4$ and $\frac{\pi}{2} \leq \arg(z) \leq \frac{3\pi}{4}$ shade the locus of P

[2 marks]

Question 4

Further A-Level Examination Question from June 2003, FP2, Q1 (edited)

- (a) On the same Argand diagram sketch the loci given by the following equations,

$$|z - 1| = 1 \quad \arg(z + 1) = \frac{\pi}{12} \quad \arg(z + 1) = \frac{\pi}{2}$$

[4 marks]

- (b) Shade on your diagram the region for which

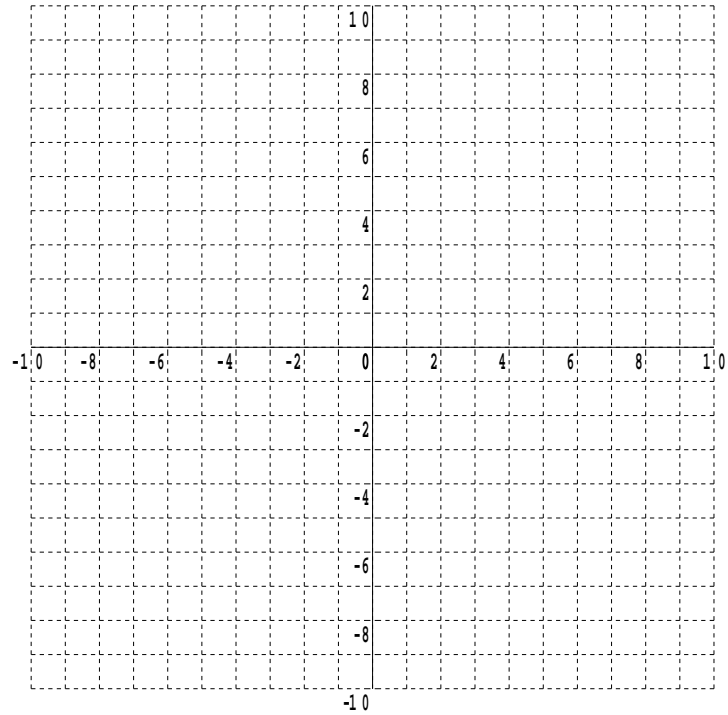
$$|z - 1| \leq 1 \quad \text{and} \quad \frac{\pi}{12} \leq \arg(z + 1) \leq \frac{\pi}{2}$$

[1 mark]

Question 5

(i) On the Argand diagram, shade in the region, R , specified by,

$$\{z \in \mathbb{C} : 3 < |z| \leq 5\} \cap \{z \in \mathbb{C} : |z| \leq |z - 6i|\}$$

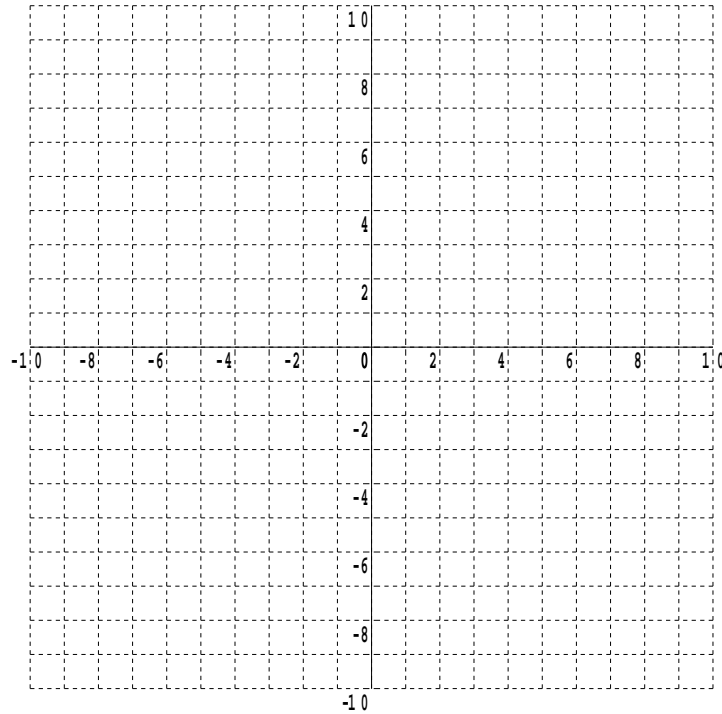


(ii) Determine the area of the region R , correct to three significant figures.

Question 6

(i) On the Argand diagram, shade in the region, R , specified by,

$$\left\{ z \in \mathbb{C} : |z| \leq 6 \right\} \cap \left\{ z \in \mathbb{C} : 0 \leq \arg(z + 6) \leq \frac{\pi}{4} \right\}$$



(ii) Determine the *exact* perimeter of the region R

(iii) Determine the *exact* area of the region R