

# IB Maths: AA HL

## Geometry Toolkit

### Topic Questions

**These practice questions can be used by students and teachers and is Suitable for IB Maths AA HL Topic Questions**

Course	IB Maths
Section	3. Geometry & Trigonometry
Topic	3.1 Geometry Toolkit
Difficulty	Medium

**Level: IB Maths**

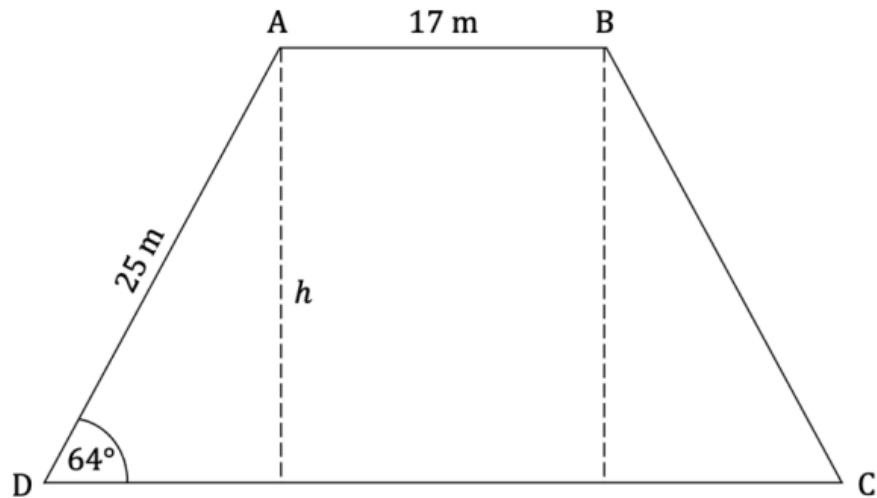
**Subject: IB Maths AA HL**

**Board: IB Maths**

**Topic: Geometry Toolkit**

### Question 1

ABCD is an isosceles trapezoid where  $AB = 17\text{ m}$  and  $AD = BC = 25\text{ m}$ , as shown in the diagram below.



(a) Find the height,  $h$ , of the trapezoid.

[2 marks]

(b) Find the area of the trapezoid.

[4 marks]

### Question 1

The distance between Ho Chi Minh City and Hong Kong is known to be 1500 km. The bearing of Hong Kong from Ho Chi Minh City is  $046^\circ$ . Another city, Brisbane, is 6500 km from Ho Chi Minh City on a bearing of  $136^\circ$ . Calculate the distance between Hong Kong and Brisbane.

[3 marks]

### Question 3

Point A has coordinates  $(4, -6)$  and point B has coordinates  $(8, 6)$ .

(a) Calculate the distance of the line segment AB.

[2 marks]

(b) Find the equation of the line connecting points A and B.

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

[2 marks]

(c) (i) Find the midpoint of [AB].

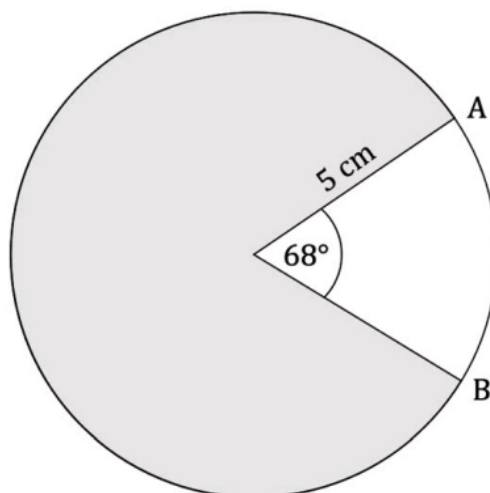
(ii) Find the equation of the perpendicular bisector to the line segment AB.

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

[4 marks]

### Question 4

The diagram below shows a circle with a  $68^\circ$  sector cut from it. The radius of the circle is 5 cm.



(a) Find the length of

- (i) the minor arc AB
- (ii) the major arc AB.

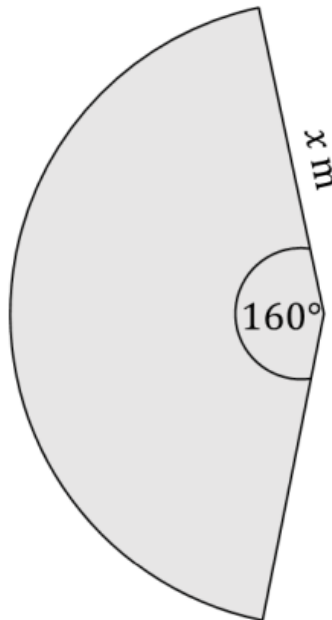
[3 marks]

(b) Find the area of the shaded region.

[3 marks]

### Question 5

A lawn sprinkler sprays water over a lawn covering an arc of  $160^\circ$  with a maximum spray distance of  $x$  m as shown in the diagram below. The lawn sprinkler waters  $20 \text{ m}^2$  of the lawn.



(a) Calculate the value of  $x$ .

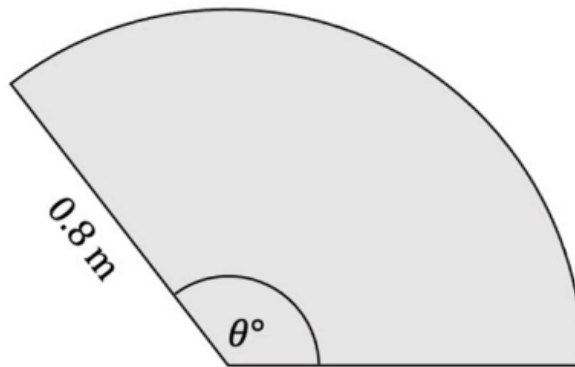
[4 marks]

(b) Calculate the length of the outer arc.

[3 marks]

### Question 6

A windscreen wiper blade is 0.8 m long. When in motion the blade moves through an arc of  $\theta^\circ$  and wipes an area of  $\frac{4}{15}\pi \text{ m}^2$ .



(a) Calculate the value of  $\theta$ .

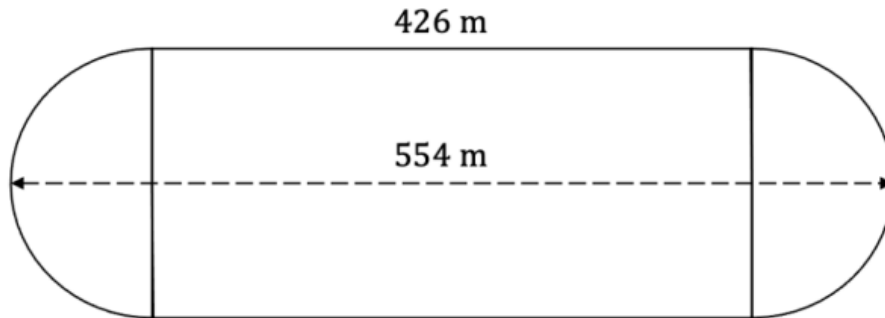
[4 marks]

(b) Calculate the length travelled by the outer edge of the blade.

[3 marks]

### Question 7

The diagram below shows a dirt racetrack where the straights are 426 m long and the longest distance from one end of the track to the other is 554m.



(a) Find the total distance around the racetrack.

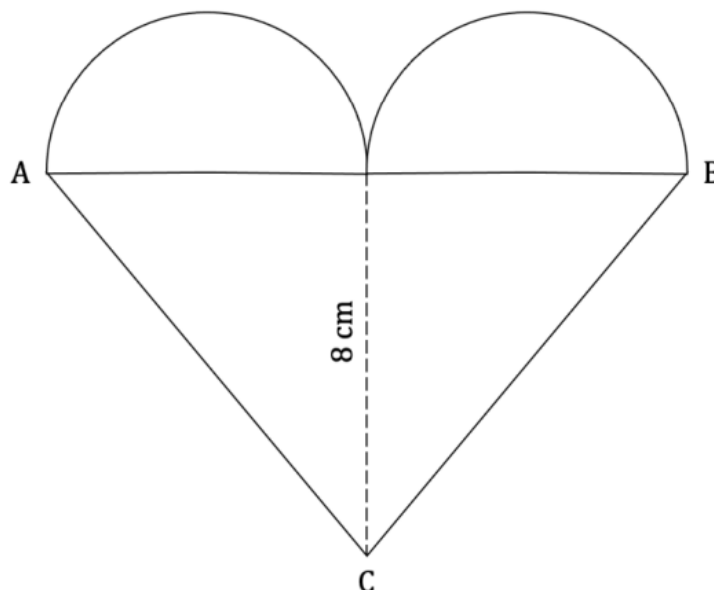
[3 marks]

(b) Find the total area enclosed by the racetrack.

[4 marks]

### Question 8

The diagram below shows a cookie cutter in the shape of a heart constructed from a triangle and two identical semi circles. The height of the triangle is 8 cm and its base AB is 13.34 cm.



(a) Find the length of the line AC.

[2 marks]

(b) Calculate the total area of the heart.

[4 marks]

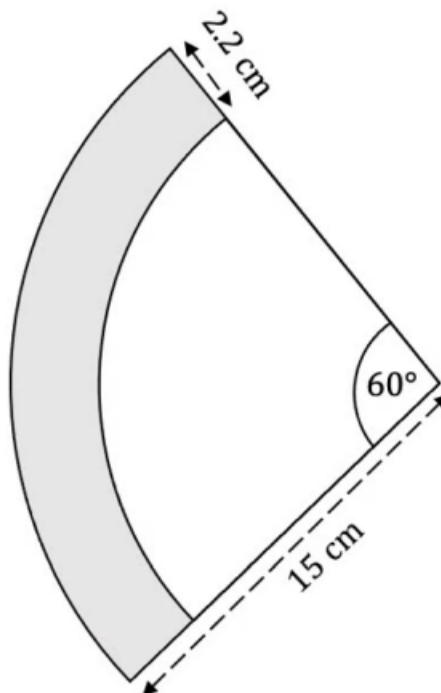
Bob makes some cookie dough and rolls it out on his kitchen bench. The cookie dough covers  $1314 \text{ cm}^2$ .

(c) Find the number of **full** cookies Bob can cut from the dough.

[2 marks]

### Question 9

The diagram below shows a slice of pizza that forms a sector of a circle with an arc of  $60^\circ$  and radius of  $15 \text{ cm}$ . The width of the crust is  $2.2 \text{ cm}$ .



(a) Find the perimeter of the slice of pizza.

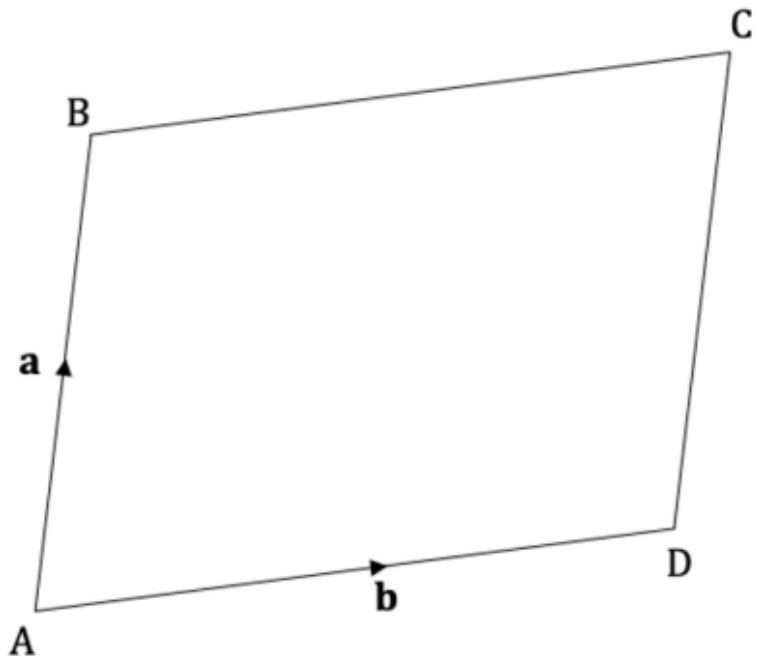
[3 marks]

(b) Find the area of the crust.

[3 marks]

### Question 10

A parallelogram ABCD is shown in the diagram below.



$$\overrightarrow{AB} = \mathbf{a} \text{ and } \overrightarrow{AD} = \mathbf{b}.$$

A new line is added to the diagram connecting B to D.

A point X lies  $\frac{2}{3}$  of the way along  $\overrightarrow{BD}$ .

(a) Express  $\overrightarrow{CX}$  in terms of  $\mathbf{a}$  and  $\mathbf{b}$ .

[4 marks]



A new point  $Y$  lies on the line  $CD$  such that  $AXY$  is a straight line.

(b) Express  $\overrightarrow{AY}$  in terms of  $\mathbf{a}$  and  $\mathbf{b}$ .

[3 marks]

### Question 11

Three points are located at  $A(0, 5)$ ,  $B(6, 4)$  and  $C(16, 8)$ .

(a) (i) Find the magnitude of vector  $\overrightarrow{AB}$ .

(ii) Find the magnitude of vector  $\overrightarrow{BC}$ .

[4 marks]

(b) Given that the angle  $\widehat{ABC}$  is a right angle, find the area of triangle  $ABC$ .

[2 marks]

### Question 12

The points  $A, B, C$  and  $D$  have position vectors  $\mathbf{a}, \mathbf{b}, \mathbf{c}$  and  $\mathbf{d}$ , relative to the origin  $O$ .

The position vectors are given by

$$\mathbf{a} = 2i + 4j - k$$

$$\mathbf{b} = -ri + j + 2k$$

$$\mathbf{c} = 3i + sj$$

$$\mathbf{d} = 2i - 2j - tk$$

where  $r, s$  and  $t$  are constants.

(a) Given that  $\overrightarrow{BA} = \overrightarrow{CD}$ , find  $r, s$  and  $t$

[5 marks]

A fifth point, E, has position vector  $\mathbf{e}$ , relative to the origin O.

(b) Given that  $\overrightarrow{AE} = 3\overrightarrow{CD}$ , find the position vector of E.

[5 marks]

(c) Find the unit vector that has the same direction as  $\mathbf{e}$ .

[2 marks]