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IB Exam Revision - Online

Topic Exam

# Trigonometry

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[www.revisionvillage.com/trigonometry-exam](http://www.revisionvillage.com/trigonometry-exam)

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Our aim is to simplify the process of revising for IB Exams

Topic Exam – Trigonometry

**Question 1**

[Maximum mark: 6]



The following diagram shows a circle with the centre O and radius 8 cm.

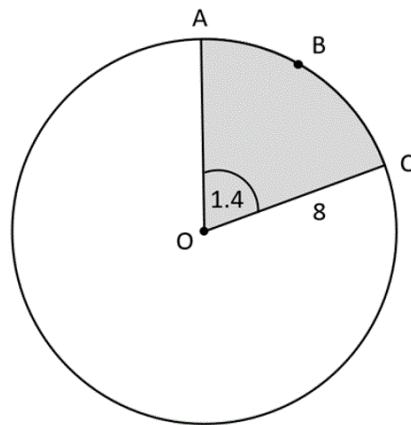


diagram not to scale

Points A, B and C lie on the circle,  $\widehat{AOC} = 1.4$  radians

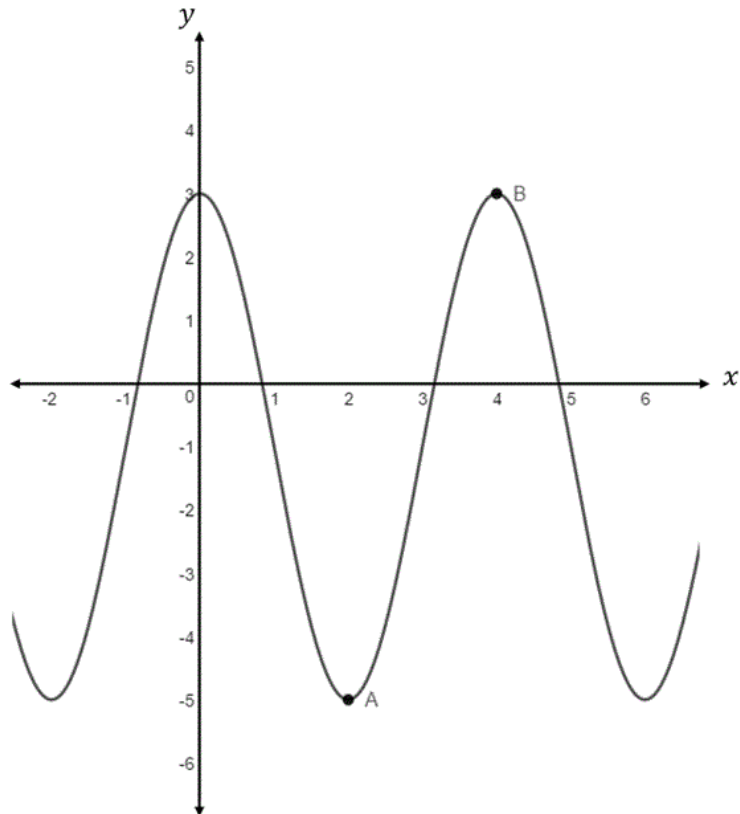
- (a) Find the length of the arc ABC [3]
- (b) Find the area of the shaded region [3]

## Question 2

[Maximum mark: 6]



The following diagram shows part of the graph of  $f$ .



The graph has a minimum at  $A(2, -5)$  and a maximum at  $B(4, 3)$

The function can be written in the form  $f(x) = a \cos bx + d$ . Find the value of

- (a)  $a$ ; [2]
- (b)  $b$ ; [2]
- (c)  $d$ . [2]

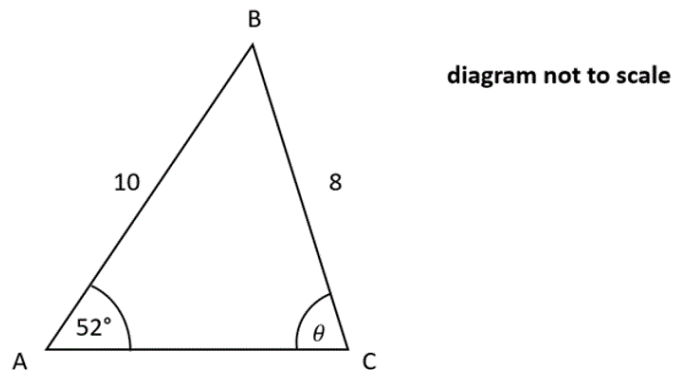
Topic Exam – Trigonometry

**Question 3**

[Maximum mark: 7]



The following diagram shows triangle ABC.



$AB = 10$  cm,  $BC = 8$  cm, and  $\widehat{BAC} = 52^\circ$ .

- (a) Find  $\widehat{ACB}$ . [3]
- (b) Find AC. [4]

Topic Exam – Trigonometry

**Question 4**

[Maximum mark: 8]



Given that  $\sin x = \frac{2}{3}$ ,  $\frac{\pi}{2} \leq x \leq \pi$

(a)  $\cos x$ . [3]

(b)  $\tan 2x$ . [5]

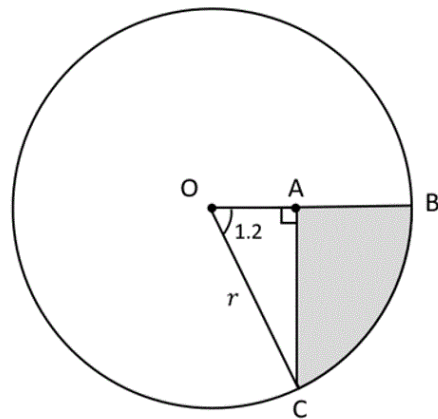
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**Question 5**

[Maximum mark: 7]



The following diagram shows a circle with centre O and radius  $r$  cm.



**diagram not to scale**

Points B and C lie on the circumference of the circle, and  $\widehat{BOC} = 1.2$  radians.

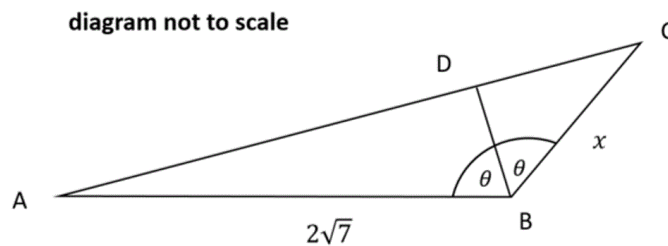
- (a) Show that  $OA = r \cos 1.2$  [1]
- (b) The area of the shaded region is  $35\text{cm}^2$ . Find  $r$ . [6]

### Question 6

[Maximum mark: 7]



The following diagram shows triangle ABC. Point D lies on AC so that DB bisects  $\widehat{ABC}$ .



$AB = 2\sqrt{7}$  cm,  $BC = x$  cm, and  $\widehat{DBC} = \theta$ , where  $\sin\theta = \frac{3}{4}$

The area of the triangle ABC is  $3 \text{ cm}^2$ . Find the value of  $x$  in the form of  $\frac{a}{b}$  where  $a$  and  $b$  are positive integers.

Topic Exam – Trigonometry

**Question 7**


[Maximum mark: 8]



Solve  $\cos 2x - \sin^2 x = \cos^2 x + 3\cos x$ ,  $0 \leq x \leq 2\pi$



## Topic Exam – Trigonometry

**Question 8**[Maximum mark: 15] Consider the function  $f(x) = \sin x$ .

- (a) (i) Write down the maximum value of  $f$ .
- (ii) Find the smallest value of  $x$  in radians for which the maximum of  $f$  occurs. [3]

Let  $g(x) = 2\sin\left(x + \frac{\pi}{4}\right)$ .

- (b) (i) Describe the two transformations  $f(x)$  undergoes to form the graph of  $g(x)$ .
- (ii) Hence, write down the maximum value of the function  $g$  and the smallest value of  $x$  for which this maximum occurs. [4]

Let  $h(x) = \frac{4}{2\sin\left(x + \frac{\pi}{4}\right) - 3}$ .

- (c) Does the graph of  $h$  have a vertical asymptote? Justify your answer. [4]
- (d) Find the range of  $h(x)$ . [4]

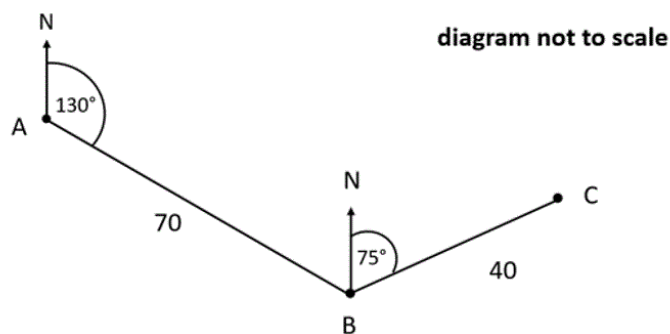
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**Question 9**

[Maximum mark: 15] 

The following diagram shows three cities A, B and C.

City B is 70 km from A, on a bearing of  $130^\circ$ . City C is 40 km from City B, on a bearing of  $075^\circ$ .



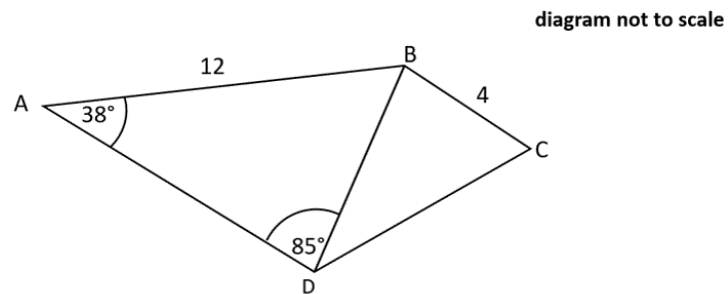
- (a) Find  $\widehat{ABC}$ . [2]
- (b) Find the distance from City A to C. [4]
- (c) If you wanted to travel from city A directly to City C, find the bearing you would need to travel. [5]
- (d) Find the area enclosed by connecting the three cities in a triangle ABC. [4]

### Question 10

[Maximum mark: 15]



The following diagram shows the quadrilateral ABCD



$$AB = 12 \text{ cm}, \quad BC = 4 \text{ cm}, \quad \widehat{BAD} = 38^\circ, \quad \widehat{ADB} = 85^\circ$$

(a) Find BD. [3]

(b) Find the area of triangle ABD. [4]

The area of the triangle ABD is three times bigger than triangle BCD.

(c) Find the acute angle  $\widehat{DBC}$ . [5]

(d) Find DC. [3]