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VCE Specialist Mathematics ½
Trigonometry I [3.1]
Test Solutions

20 Marks. 20 Minutes Writing.

Results:

Test Questions	_____ / 20

Section A: Test Questions (20 Marks)

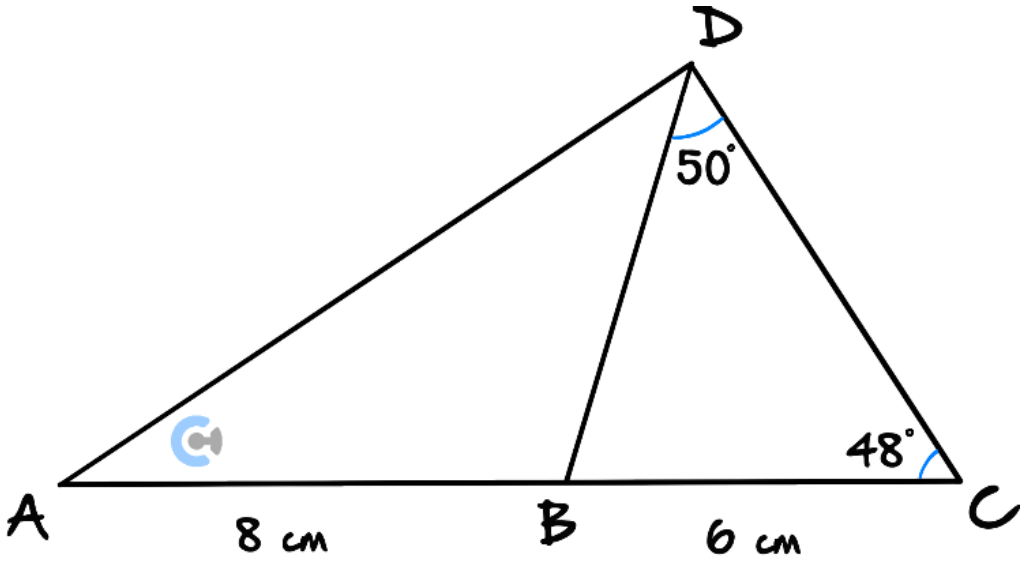
Question 1 (3 marks)

Tick whether the following statements are **true** or **false**.

Statement	True	False
a. $\sin(a) = \cos(90 - a)$ as the opposite and adjacent length flips.	✓	
b. When the angle is 90°, the sine rule changes to Pythagoras theorem.		✓
c. Cosine rule can be used to find the 3rd length when you have angle OAB and two lengths OA and OB in the triangle OAB.	✓	
d. There are two possible angles for OAB if the length of OA is 5 metres and OB is 6 metres and they are supplementary angles.	✓	
e. Angle of depression is when the angle is measured downwards.	✓	
f. Bearing of 300° is the same as $N\ 30°\ W$.		✓

Space for Personal Notes

Question 2 (6 marks) **Tech-Active.**



ACD is a triangle and B is a point on AC. $AB = 8\ cm$ and $BC\ is\ 6\ cm$. Angle $BCD = 48°$ and angle $BDC = 50°$.

a. Find the length of BD. Give your answer correct to two decimal places. (2 marks)

$$\frac{x}{\sin 48} = \frac{6}{\sin 50}$$

$5.82\ cm$

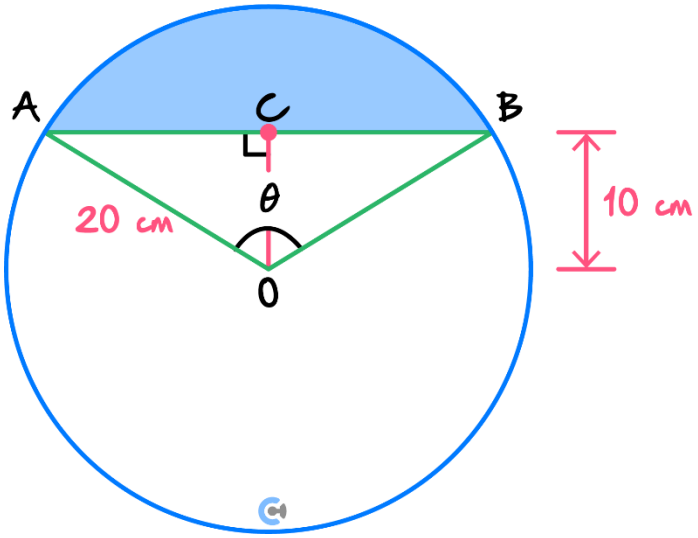
b. Find the length of AD. Give your answer correct to two decimal places. (2 marks)

$$AD^2 = 8^2 + 5.82^2 - 2 \times 8 \times 5.82 \times \cos 98$$
$$AD^2 = 110.83$$
$10.53\ cm$

c. Find the area of triangle ABD. Give your answer correct to two decimal places. (2 marks)

$$\frac{1}{2} \times 8 \times 5.82 \times \sin 98$$
$23.05\ cm^2$

Question 3 (8 marks) **Tech-Active.**



a. The length of chord AB. (2 marks)

$2 \cdot \sqrt{20^2 - 10^2} = 20 \cdot \sqrt{3}$

b. The length of the major arc AB. (2 marks)

$\theta = \frac{2\pi}{3}$,

Thus, major arc $AB = 20\left(2\pi - \frac{2\pi}{3}\right) = \frac{80\pi}{3}$

c. The area of the major sector AOB. (2 marks)

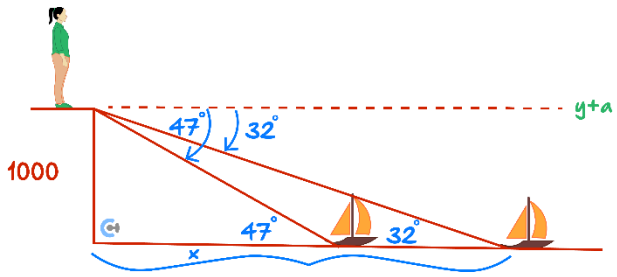
$\frac{\frac{4 \cdot \pi}{3} \cdot 1}{2} \cdot 20^2 = \frac{800 \cdot \pi}{3}$

d. The area of the minor segment formed by chord AB. (2 marks)

$$\text{Area of segment} = \frac{1}{2} \times 20^2 \left(\frac{2\pi}{3} - \sin\left(\frac{2\pi}{3}\right) \right)$$
$$= 200 \left(\frac{2\pi}{3} - \frac{\sqrt{3}}{2} \right)$$
$$= 200 \left(\frac{4\pi - 3\sqrt{3}}{6} \right)$$
$$= \frac{100(4\pi - 3\sqrt{3})}{3} \text{ cm}^2$$

Question 4 (3 marks)

An observer on a cliff 100 m above sea level sights two ships due east. The angles of depression of the ships are 47° and 32°. Find in metres correct to one decimal places, the distance between the two ships.



$$\tan 32 = \frac{1000}{y}$$
$$y \tan 32 = 1000$$
$$y = \frac{1000}{\tan 32}$$

$$\tan 47 = \frac{1000}{x}$$
$$x \tan 47 = 1000$$
$$x = \frac{1000}{\tan 47}$$

Ans : 66.8 m

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