

3.2 Radian Measure

Question Paper

Course	Edexcel IAL Maths: Pure 1
Section	3. Trigonometry
Topic	3.2 Radian Measure
Difficulty	V. Hard

Time allowed: 40

Score: /33

Percentage: /100

Question 1

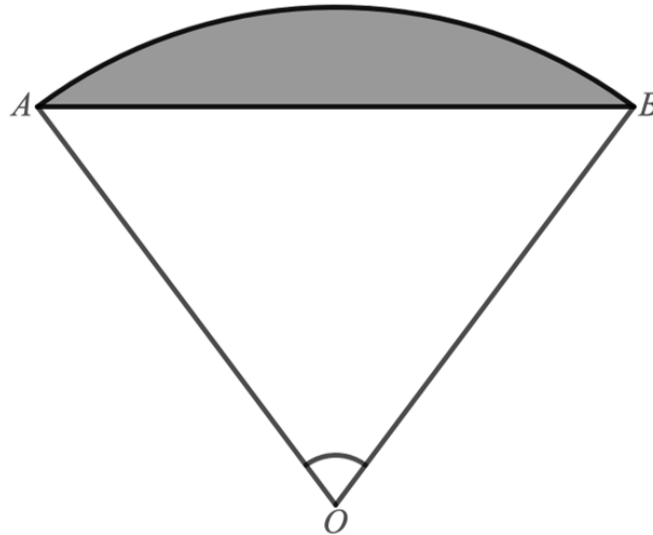
Complete the table.

Degrees	Radians	sin	cos	tan
45°	$\frac{\pi}{4}$			
150°		$\frac{1}{2}$		
	$\frac{7\pi}{4}$			-1

[3 marks]

Question 2

The canopy of a parachute and the outermost suspension lines (cords) form a sector of a circle as shown in the diagram below, with the parachutist modelled as a particle at point O .



The area of the sector OAB is $\frac{125\pi}{144} \text{ m}^2$.

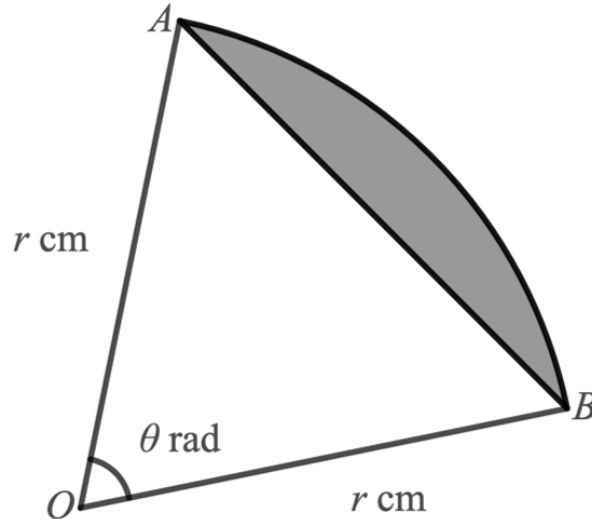
The length of the arc AB is $\frac{25\pi}{36} \text{ m}$.

Find the length of one suspension line and the angle AOB that the parachutist makes with the two outermost suspension lines.

[5 marks]

Question 3

The diagram below shows the sector of a circle OAB .



(a) Show that the area of the shaded segment is given by $\frac{1}{2}r^2(\theta - \sin \theta)$ cm².

[3 marks]

Question 3

(b) Find, in terms of θ , the percentage of the sector that the segment occupies.

[2 marks]

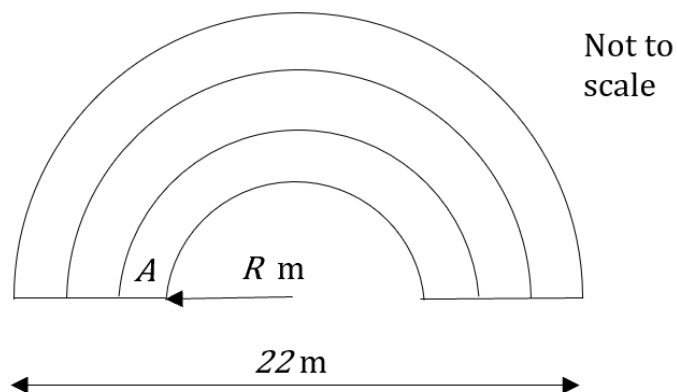
Question 4

An evil wizard has captured a unicorn, and is threatening to kill it unless you can answer the following question:

“I wish to create a rainbow-shaped mosaic for the floor of the throne room in my castle. The mosaic is to be formed from four semicircles as shown below.

The innermost semicircle is to have a radius of R metres, and each of the outer semicircles must have a radius that is a constant k metres greater than the radius of the next semicircle further in.

The rainbow mosaic must be exactly 22 metres across.



Moreover, I wish the inner part of the area (labelled A in the diagram) to take up exactly one quarter of the total area of the rainbow.

Find me the required values of R and k , or the unicorn dies. Bwah-ha-ha-ha-ha!”

Solve the wizard’s problem and save the unicorn.

[7 marks]

Question 5

A sector of a circle, OST , is such that it has radius r cm and the angle at its centre, O , is θ radians. The chord ST has length a cm.

(a) Show that $a^2 = 2r^2(1 - \cos \theta)$

[2 marks]

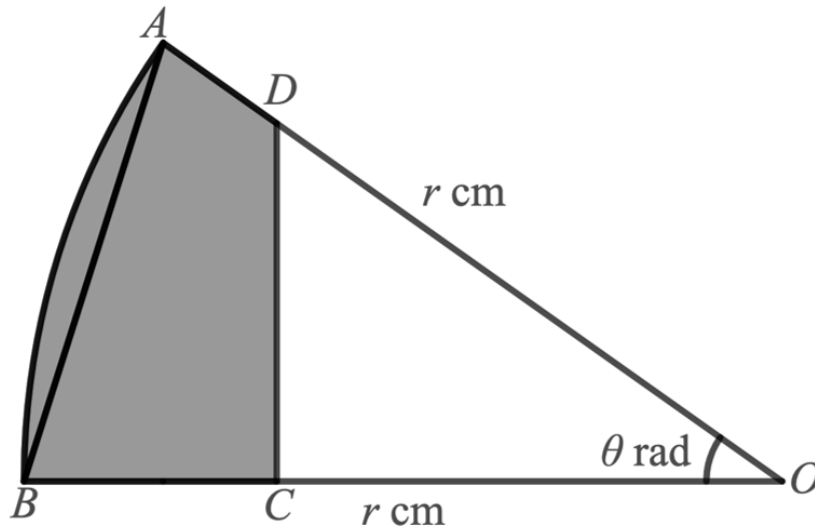
Question 5

(b) Given that $r = 4\theta$ and that the area of the sector is $\frac{8\pi^3}{27}$ cm², find the value of a .

[5 marks]

Question 6

The diagram below shows the sector of a circle with centre O . The radii OA and OB are each equal to r cm, and the angle at the centre, AOB , is equal to θ radians. The line DC is perpendicular to the line OB .



Given that $BC : CO = 2 : 3$, show that the area of the shaded shape $ABCD$ is given by

$$\frac{1}{50} r^2 (25\theta - 9 \tan \theta) \text{ cm}^2$$

[6 marks]