TRIGONOMETRY (Q 4 & 5, PAPER 2)

LESSON NO. 3: CIRCLES

2001

4 (a) The length of an arc of a circle is 10 cm. The radius of the circle is 4 cm. The measure of the angle at the centre of the circle subtended by the arc is θ.

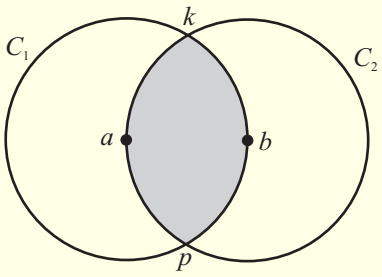
(i) Find θ in radians.

(ii) Find θ in degrees, correct to the nearest degree.

2003

4 (a) The circumference of a circle is 30π cm. The area of a sector of the circle is 75 cm^2. Find, in radians, the angle in this sector.

4 (c) C_1 is a circle with centre a and radius r. C_2 is a circle with centre b and radius r. C_1 and C_2 intersect at k and p. $a \in C_2$. $b \in C_1$.

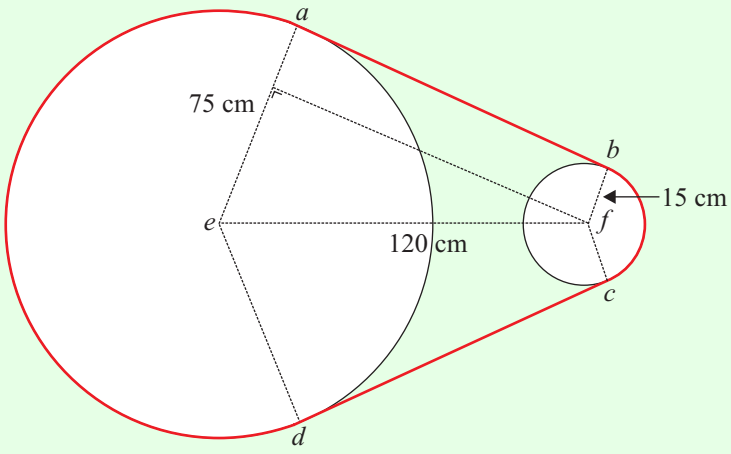


(i) Find, in radians, the measure of angle kap.

(ii) Calculate the area of the shaded region. Give your answer in terms of r and π.

2002

4 (c) A chain passes around two circular wheels as shown. One wheel has a radius 75 cm and the other has radius 15 cm. The centres, e and f, of the wheels are 120 cm apart. The chain consists of the common tangent $[ab]$, the minor arc bc, the common tangent $[cd]$ and the major arc da.



(i) Find the measure of $\angle aef$.

(ii) Find $|ab|$ in surd form.

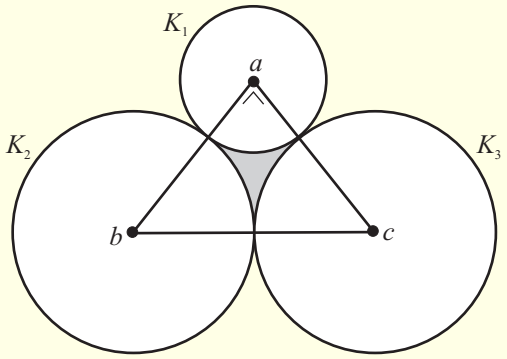
(iii) Find the length of the chain, giving your answer in the form $k\pi + l\sqrt{3}$ where $k, l \in \mathbf{Z}$.

2004

4 (c) a, b and c are the centres of the circles K_1, K_2 and K_3 repectively. The three circles touch externally and $ab \perp ac$. K_2 and K_3 each have radius $2\sqrt{2}$ cm.

(i) Find, in surd form, the length of the radius of K_1.

(ii) Find the area of the shaded region in terms of π.

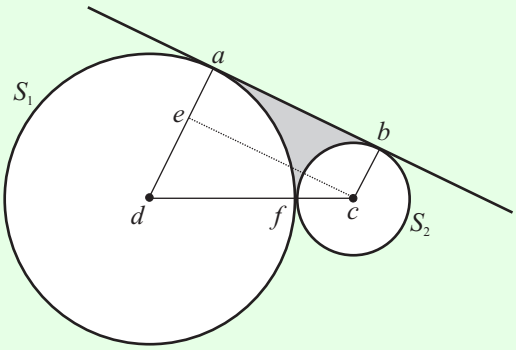


2005

4 (c) S_1 is a circle of radius 9 cm and S_2 is a circle of radius 3 cm. S_1 and S_2 touch externally at f. A common tangent touches S_1 at point a and S_2 at b.

(i) Find the area of the quadrilateral $abcd$. Give your answer in surd form.

(ii) Find the area of the shaded region, which is bounded by $[ab]$ and the monor arcs af and bf.



ANSWERS

2001 4 (a) (i) 2·5 rad (ii) 143^o

2003 4 (a) $\frac{2}{3}$ rad

4 (c) (i) $\frac{2\pi}{3}$ (ii) $2r^2(\frac{\pi}{3}-\frac{\sqrt{3}}{4})$

2002 4 (c) (i) 60^o (ii) $60\sqrt{3}$ (iii) $110\pi+120\sqrt{3}$

2004 4 (c) (i) $4-2\sqrt{2}$ (ii) $8-8\pi+4\sqrt{2}\pi$

2005 4 (c) (i) $36\sqrt{3}$ (ii) $36\sqrt{3}-\frac{33\pi}{2}$