

**Tingkatan 5 Bab 1
Sukatan Membulat
Penyelesaian Lengkap**

Praktis Formatif 1.1

- 1 (a) $53.6^\circ = 53.6 \times \frac{3.142}{180} = 0.9356 \text{ rad}$
 (b) $126.4^\circ = 126.4 \times \frac{3.142}{180} = 2.2064 \text{ rad}$
 (c) $37^\circ 38' = 37 \frac{38}{60} \times \frac{3.142}{180} = 0.6569 \text{ rad}$
 (d) $93^\circ 20' = 93 \frac{20}{60} \times \frac{3.142}{180} = 1.6292 \text{ rad}$
 (e) $176^\circ 30' = 176 \frac{30}{60} \times \frac{3.142}{180} = 3.0809 \text{ rad}$
- 2 (a) $30^\circ = 30 \times \frac{\pi}{180} = \frac{\pi}{6} \text{ rad}$
 (b) $45^\circ = 45 \times \frac{\pi}{180} = \frac{\pi}{4} \text{ rad}$
 (c) $60^\circ = 60 \times \frac{\pi}{180} = \frac{\pi}{3} \text{ rad}$
 (d) $120^\circ = 120 \times \frac{\pi}{180} = \frac{2}{3} \pi \text{ rad}$
 (e) $300^\circ = 300 \times \frac{\pi}{180} = \frac{5}{3} \pi \text{ rad}$
- 3 (a) $0.3574 \text{ rad} = 0.3574 \times \frac{180}{3.142} = 20.47^\circ$
 (b) $0.8121 \text{ rad} = 0.8121 \times \frac{180}{3.142} = 46.52^\circ$
 (c) $1.0438 \text{ rad} = 1.0438 \times \frac{180}{3.142} = 59.80^\circ$
 (d) $1.1693 \text{ rad} = 1.1693 \times \frac{180}{3.142} = 66.99^\circ$
 (e) $1.2325 \text{ rad} = 1.2325 \times \frac{180}{3.142} = 70.61^\circ$
- 4 (a) $\frac{5}{12} \pi = \frac{5}{12} \pi \times \frac{180}{\pi} = 75^\circ$
 (b) $\frac{7}{4} \pi = \frac{7}{4} \pi \times \frac{180}{\pi} = 315^\circ$
 (c) $\frac{28}{9} \pi = \frac{28}{9} \pi \times \frac{180}{\pi} = 560^\circ$
 (d) $\frac{13}{4} \pi = \frac{13}{4} \pi \times \frac{180}{\pi} = 585^\circ$
 (e) $\frac{18}{5} \pi = \frac{18}{5} \pi \times \frac{180}{\pi} = 648^\circ$

Praktis Formatif 1.2a

- 1 (a) $s = 11 \times 2 = 22 \text{ cm}$
 (b) $s = 7 \times \left(160 \times \frac{3.142}{180} \right) = 19.55 \text{ cm}$
 (c) $\theta = 2 \times 3.142 - 1.2 = 5.084 \text{ rad}$
 $s = 8 \times 5.084 = 40.672 \text{ cm}$
 (d) $\theta = 2 \times 3.142 - 4.5 = 1.784 \text{ rad}$
 $s = 4 \times 1.784 = 7.136 \text{ cm}$
- 2 (a) $\theta = \frac{15}{4} \text{ rad}$
 $\alpha = 2 \times 3.142 - \frac{15}{4} = 2.534 \text{ rad}$
 (b) $\alpha = 2 \times 3.142 - 4.2 = 2.084 \text{ rad}$
 $r = \frac{10.42}{2.084} = 5 \text{ cm}$
- 3 Perimeter $ABCD = 40$
 $6 + 6 + \frac{2}{3}OA + \frac{2}{3}(OA + 6) = 40$
 $12 + \frac{4}{3}OA + 4 = 40$
 $\frac{4}{3}OA = 40 - 16$
 $\frac{4}{3}OA = 24$
 $OA = 24 \times \frac{3}{4}$
 $OA = 18 \text{ cm}$
- 4 (a) $r = \frac{s}{\theta}$
 $r = \frac{12}{1.2}$
 $r = 10 \text{ cm}$

$$(b) \angle HOK = \frac{s}{r}$$

$$\angle HOK = \frac{36}{10} = 3.6 \text{ rad}$$

5 (a) Katakan $PS = x$ cm

$$\frac{\text{Panjang lengkok } SR}{\text{Panjang lengkok } PQ} = \frac{3}{2}$$

$$\frac{\frac{\pi}{3}(14+x)}{\frac{\pi}{3}(14)} = \frac{3}{2}$$

$$14+x = \frac{3}{2} \times 14$$

$$x = 21 - 14$$

$$RS = 7 \text{ cm}$$

(b) Panjang lengkok RS

$$= 21 \times \frac{3.142}{3}$$

$$= 21.994 \text{ cm}$$

$$6 (a) \angle AOM = \frac{12}{18} = \frac{2}{3} \text{ rad}$$

(b) Perimeter rantau berlorek

$$= 18 + 18 + \left(\frac{\pi}{2} - \frac{2}{3}\right)(18)$$

$$= (24 + 9\pi) \text{ cm}$$

7 Perimeter sektor minor POQ = Panjang lengkok minor PQ

$$r + r + r\alpha = (2\pi - \alpha)r$$

$$2r + r\alpha = (2\pi r - \alpha r)$$

$$2 + \alpha = 2\pi - \alpha$$

$$2\alpha = 2\pi - 2$$

$$\alpha = \pi - 1 \text{ [Tertunjuk]}$$

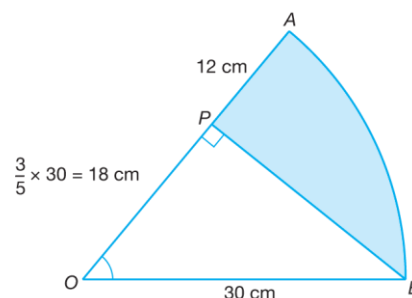
$$\angle POQ = 3.142 - 1 = 2.142 \text{ rad}$$

$$= 2.142 \times \frac{180}{3.142}$$

$$= 122.71^\circ$$

$$= 122^\circ 43'$$

8



$$\cos \theta = \frac{18}{30}$$

$$\theta = 53.13^\circ = 53.13 \times \frac{3.142}{180}$$

$$= 0.9274 \text{ rad}$$

$$\text{Panjang lengkok } AB = 30 (0.9274)$$

$$= 27.822 \text{ cm}$$

$$PB = \sqrt{30^2 - 18^2} = 24 \text{ cm}$$

Perimeter rantau berlorek

$$= PB + AP + \text{Panjang lengkok } AB$$

$$= 24 + 12 + 27.822$$

$$= 63.82 \text{ cm}$$

$$9 \quad PQ = \sqrt{14^2 + 14^2} = 19.7990 \text{ cm}$$

Panjang lengkok QS

$$= \frac{3.142}{4} \times 19.7990$$

$$= 15.5521 \text{ cm}$$

Panjang OS

$$= 19.7990 - 14$$

$$= 5.799 \text{ cm}$$

Perimeter rantau berlorek

$$= OQ + OS + \text{Panjang lengkok } QS$$

$$= 14 + 5.799 + 15.5521$$

$$= 35.35 \text{ cm}$$

$$10 \text{ (a) } \cos \angle PBA = \frac{24}{30}$$

$$\angle PBA = 36.87^\circ = 36.87 \times \frac{3.142}{180}$$

$$= 0.6436 \text{ rad}$$

$$\angle PBQ = 2 \times 0.6436 = 1.2872 \text{ rad}$$

$$(b) AP = AQ = \sqrt{30^2 - 24^2} = 18 \text{ cm}$$

Panjang lengkok $PQ = 24 \times 1.2872$

$$= 30.8928 \text{ cm}$$

Perimeter rantau berlorek

$$= 18 + 18 + 30.8928$$

$$= 66.90 \text{ cm}$$

Praktis Formatif 1.2b

$$1 \text{ (a) Panjang perentas } PR = 12 \text{ cm}$$

$$2r \sin \frac{\theta}{2} = 12$$

$$2(10) \sin \frac{\theta}{2} = 12$$

$$\sin \frac{\theta}{2} = \frac{3}{5}$$

$$\frac{\theta}{2} = 36.87^\circ$$

$$\theta = 73.74^\circ$$

$$\theta = 73.74 \times \frac{3.142}{180} = 1.2872 \text{ rad}$$

$$(b) \text{ Perimeter tembereng berlorek}$$

$$= 10 \times 1.287 + 12 = 24.87 \text{ cm}$$

$$2 \text{ (a) Panjang perentas } PQ = 10 \text{ cm}$$

$$2r \sin \frac{\theta}{2} = 10$$

$$2r \sin \frac{120^\circ}{2} = 10$$

$$2r \times 0.8660 = 10$$

$$r = 5.774 \text{ cm}$$

$$(b) \text{ Panjang lengkok major } PRQ$$

$$= 5.774 \times \left(240 \times \frac{3.142}{180} \right) = 24.19 \text{ cm}$$

$$3 \text{ (a) (i) } \angle POT = 2(3.142) - 5 = 1.284 \text{ rad}$$

$$(ii) 1.284 \text{ rad} = 1.284 \times \frac{180}{3.142} = 73.56^\circ$$

$$(b) \text{ Perimeter tembereng berlorek}$$

$$= 2(10) \sin \left(\frac{73.56}{2} \right)^\circ + (10 \times 1.284)$$

$$= 24.81 \text{ cm}$$

Praktis Formatif 1.2c

$$1 \text{ (a) Dengan menggunakan petua kosinus,}$$

$$4^2 = 7^2 + 5^2 - 2(7)(5) \cos \angle PRQ$$

$$\cos \angle PRQ = \frac{7^2 + 5^2 - 4^2}{2(7)(5)}$$

$$\cos \angle PRQ = \frac{7^2 + 5^2 - 4^2}{2(7)(5)}$$

$$\cos \angle PRQ = 0.82857$$

$$\angle PRQ = 34.05^\circ$$

$$\angle PRQ = 34.05 \times \frac{3.142}{180}$$

$$\angle PRQ = 0.5944 \text{ rad}$$

$$(b) \text{ Perimeter rantau berlorek}$$

$$= PS + PQ + \text{Panjang lengkok } SQ$$

$$= 2 + 4 + 5(0.5944)$$

$$= 8.972 \text{ cm}$$

Praktis Formatif 1.3a

1 (a) $A = \frac{1}{2}(12)^2(3) = 216 \text{ cm}^2$

(b) $A = \frac{1}{2}(10)^2\left(120 \times \frac{3.142}{180}\right)$

$$A = \frac{1}{2}(100)(2.09467)$$

$$A = 104.73 \text{ cm}^2$$

(c) $\theta = 2 \times 3.142 - 5 = 1.284 \text{ rad}$

$$A = \frac{1}{2}(12)^2(1.284)$$

$$A = 92.448 \text{ cm}^2$$

2 (a) $A = \frac{1}{2}r^2\theta$

$$48 = \frac{1}{2}(12)^2\theta$$

$$48 = 72\theta$$

$$\theta = \frac{2}{3} \text{ rad}$$

(b) $A = \frac{1}{2}r^2\theta$

$$\frac{27}{2}\pi = \frac{1}{2}r^2\left(\frac{\pi}{3}\right)$$

$$\frac{27}{2} = \frac{1}{2}r^2\left(\frac{1}{3}\right)$$

$$r^2 = 81$$

$$r = 9 \text{ cm}$$

3 $\angle POQ = \frac{7}{10} = 0.7 \text{ rad}$

$$\angle QOR = 3.142 - 0.7 = 2.442 \text{ rad}$$

Luas rantau berlorek

$$= \frac{1}{2}(10)^2(2.442)$$

$$= 122.1 \text{ cm}^2$$

4 (a) $\frac{\text{Panjang lengkok } BC}{\text{Panjang lengkok } AD} = \frac{3}{2}$

$$\frac{9}{6\theta} = \frac{3}{2}$$

$$\theta = 1 \text{ rad}$$

(b) $OB = \frac{9}{1} = 9 \text{ cm}$

Luas rantau berlorek

$$= \frac{1}{2}(9)^2(1) - \frac{1}{2}(6)^2(1)$$

$$= 22.5 \text{ cm}^2$$

5 Luas sektor ORS – Luas sektor $OPQ = 24$

$$\frac{1}{2}(5k)^2\left(\frac{3}{4}\right) - \frac{1}{2}(3k)^2\left(\frac{3}{4}\right) = 24$$

$$75k^2 - 27k^2 = 192$$

$$48k^2 = 192$$

$$k^2 = 4$$

$$k = 2$$

6 $\frac{\frac{1}{2}(18)^2\left(\frac{2}{3}\right)}{\frac{1}{2}r^2\left(\frac{2}{3}\right) - \frac{1}{2}(18)^2\left(\frac{2}{3}\right)} = \frac{9}{7}$

$$\frac{(18)^2(2)}{r^2(2) - (18)^2(2)} = \frac{9}{7}$$

$$\frac{648}{2r^2 - 648} = \frac{9}{7}$$

$$9(2r^2 - 648) = 4536$$

$$18r^2 - 5832 = 4536$$

$$r^2 = 576$$

$$r = 24$$

7 (a) $\tan \angle XOT = \frac{14}{4}$

$$\angle XOT = 74.05^\circ$$

$$\angle XOT = 74.05 \times \frac{3.142}{180}$$

$$\angle XOT = 1.29266$$

$$\angle XOT = 1.2927$$

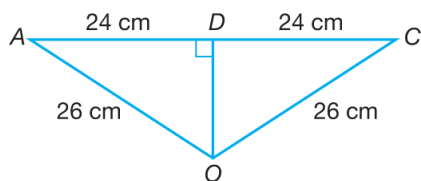
$$\therefore \angle XOY = 2 \times 1.29270 = 2.5853 \text{ rad}$$

(b) Luas rantau berlorek

$$= 2 \times \left(\frac{1}{2} \times 4 \times 14\right) - \frac{1}{2}(4)^2(2.5853)$$

$$= 35.32 \text{ cm}^2$$

8 (a)



$$\sin \angle AOD = \frac{24}{26}$$

$$\angle AOD = 67.38^\circ$$

$$\angle AOC = 67.38^\circ \times 2$$

$$\angle AOC = 134.76^\circ$$

$$\angle AOC = 134.76^\circ \times \frac{3.142}{180}$$

$$\angle AOC = 2.3523 \text{ rad}$$

(b) Luas rantau berlorek

$$= \frac{1}{2} (26)^2 (2 \times 3.142 - 2.3523)$$

$$= 1\,328.91 \text{ cm}^2$$

Praktis Formatif 1.3b

1 (a) Luas tembereng berlorek

$$= \frac{1}{2} r^2 (\theta - \sin \theta)$$

$$= \frac{1}{2} (20)^2 (1.5 - \sin 85.93^\circ)$$

$$= 100.5 \text{ cm}^2$$

(b) $\theta = 2 \times 3.142 - 4.9 = 1.384 \text{ rad}$

$$\theta = 1.384 \times \frac{180}{3.142} = 79.29^\circ$$

Luas tembereng berlorek

$$= \frac{1}{2} r^2 (\theta - \sin \theta)$$

$$= \frac{1}{2} (12)^2 (1.384 - \sin 79.29^\circ)$$

$$= 28.90 \text{ cm}^2$$

Praktis Formatif 1.3c

$$1 \text{ (a)} \quad \frac{\pi}{3} = \frac{3.142}{180} = 1.04733 \text{ rad} = 60^\circ$$

$$\cos 60^\circ = \frac{r}{20}$$

$$r = 10$$

(b) Panjang lengkok major PAT

$$= 10 \left(3.142 - \frac{3.142}{3} \right)$$

$$= 20.95 \text{ cm}$$

(c) $\sin 60^\circ = \frac{PR}{20}$

$$PR = 20 \times \sin 60^\circ = 17.3205 \text{ cm}$$

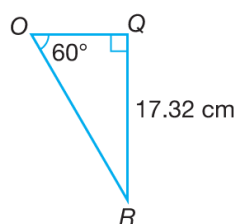
Luas rantau berlorek

$$= \frac{1}{2} \times 20^2 \times 1.04733 - \frac{1}{2} \times 10 \times 17.3205$$

$$= 209.466 - 86.6025$$

$$= 122.86 \text{ cm}^2$$

2 (a)



$$PR = 2(20) \sin \frac{120^\circ}{2} = 34.6410 \text{ cm}$$

$$QR = \frac{34.6410}{2} = 17.32 \text{ cm}$$

$$\tan 60^\circ = \frac{17.32}{r}$$

$$r = \frac{17.32}{\tan 60^\circ}$$

$$r = 10$$

(b) $\angle PQR = 120^\circ \times \frac{3.142}{180} = 2.094667 \text{ rad}$

Luas rantau berlorek

$$= \frac{1}{2} (20)^2 \left(120^\circ \times \frac{3.142}{180} - \sin 120^\circ \right)$$

$$= 245.7 \text{ cm}^2$$

(c) Perimeter rantau berlorek

$$= 2 \times 20 \times \sin \frac{120^\circ}{2} + 20 \left(120^\circ \times \frac{3.142}{180} \right)$$

$$= 34.6410 + 41.8933$$

$$= 76.53 \text{ cm}$$

$$\begin{aligned} 3 \text{ (a) } 0.9 \text{ rad} &= 0.9 \times \frac{180}{3.142} \\ &= 51.56^\circ \end{aligned}$$

$$\begin{aligned} \cos 51.56^\circ &= \frac{OD}{16} \\ OD &= 9.9471 \text{ cm} \end{aligned}$$

$$\begin{aligned} \sin 51.56^\circ &= \frac{AD}{16} \\ AD &= 12.5322 \text{ cm} \end{aligned}$$

Perimeter rantau X

$$\begin{aligned} &= (16 - 9.9471) + 12.5322 + 16(0.9) \\ &= 32.99 \text{ cm} \end{aligned}$$

$$\text{(b) } \tan 51.56^\circ = \frac{AC}{16}$$

$$AC = 20.1581 \text{ cm}$$

Luas rantau Y

$$\begin{aligned} &= \frac{1}{2} \times 16 \times 20.1581 - \frac{1}{2} \times 16^2 \times 0.9 \\ &= 46.06 \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} 4 \text{ (a) Luas sektor } KOL &= \frac{1}{2} \times (2 \times \sqrt{3})^2 \times \frac{3.142}{3} \\ &= 6.284 \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} \text{(b) Luas sektor } PAQB &= \frac{1}{2} \times (\sqrt{3})^2 \times \left(\frac{2}{3} \times 3.142 \right) \\ &= 3.142 \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} \text{(c) Luas sisi empat } OAPB &= \text{Luas } \triangle OPA \times 2 \\ &= 2 \left(\frac{1}{2} \times \sqrt{3} \times \sqrt{3} \times \sin 120^\circ \right) \times 2 \\ &= 2.59808 \text{ cm}^2 \end{aligned}$$

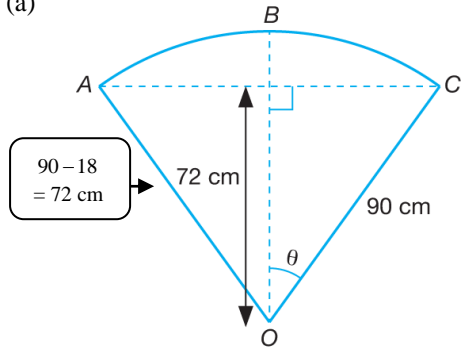
$$\begin{aligned} \text{(d) Luas sektor } OKL &= \frac{1}{2} \times (2\sqrt{3})^2 \times \frac{3.142}{3} \\ &= 6.284 \text{ cm}^2 \end{aligned}$$

Luas rantau berlerek

$$\begin{aligned} &= \text{Luas sektor } OKL - \text{Luas sisi empat} \\ &\quad OAPB - \text{Luas sektor } PAQB \\ &= 6.284 - 2.59808 - 3.142 \\ &= 0.5439 \text{ cm}^2 \end{aligned}$$

Praktis Formatif 1.4

1 (a)



$$\cos \theta = \frac{72}{90} = 0.8$$

$$\theta = 36.87^\circ$$

$$\theta = 36.87 \times \frac{3.142}{180}$$

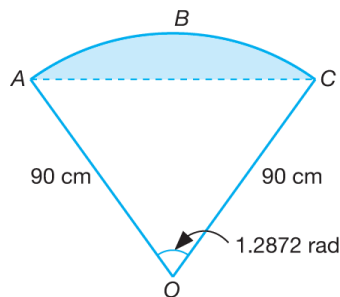
$$\theta = 0.6436 \text{ rad}$$

$$\angle AOC = 2\theta = 2 \times 0.6436 = 1.2872 \text{ rad}$$

$$= 1.2872 \times \frac{180}{3.142}$$

$$= 73.74^\circ$$

(b)



Luas keratan rentas di atas permukaan air

$$= \frac{1}{2}(90)^2(1.2872 - \sin 73.74^\circ)$$

$$= 1\,325.16 \text{ cm}^2$$

2 (a) Jejari sektor $OAPB$

= Tinggi sendeng kon

$$= \sqrt{6^2 + 5^2}$$

$$= \sqrt{61}$$

$$= 7.8102 \text{ cm}$$

(b) Panjang lengkok APB

= Lilitan tapak membulat kon

$$= 2 \times 3.142 \times 5$$

$$= 31.42 \text{ cm}$$

$$(c) \theta = \frac{s}{r} = \frac{31.42}{7.8102} = 4.0229 \text{ rad}$$

(d) Luas sektor $OAPB$

$$= \frac{1}{2}(7.8102)^2(4.0229)$$

$$= 122.7 \text{ cm}^2$$

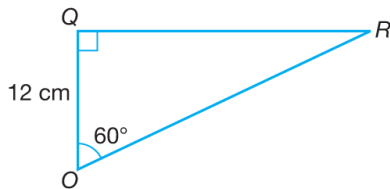
Praktis Sumatif 1

- 1 (a) Oleh sebab jejari sebuah bulatan sentiasa sama, $OP = OQ = OR = 12$ cm
 Oleh sebab sisi bertentangan sebuah rombus adalah sama, maka $PQ = OR$ dan $RQ = OP$.
 Oleh itu, $\triangle OPQ$ dan $\triangle OQR$ ialah segi tiga sama sisi dengan keadaan
 $\angle POR = \angle POQ + \angle QOR = 60^\circ + 60^\circ = 120^\circ$

$$\text{Maka, } \angle POR = 120 \times \frac{\pi}{180} = \frac{2}{3}\pi \text{ rad}$$

$$\angle POR = \frac{2}{3} \times 3.142 = 2.09467 \text{ rad}$$

(b)



$$\cos 60^\circ = \frac{12}{OR}$$

$$\frac{1}{2} = \frac{12}{OR}$$

$$OR = 12 \times 2$$

$$OR = 24 \text{ cm}$$

Maka, panjang lengkok JKL

$$= 24 \times \frac{2}{3} (3.142)$$

$$= 50.27 \text{ cm}$$

(c) Luas tembereng berlorek

$$= \frac{1}{2} (24)^2 (2.09467 - \sin 120^\circ)$$

$$= 353.8 \text{ cm}^2$$

$$2 \text{ (a) } 1 \text{ rad} = \frac{180}{3.142} = 57.29^\circ$$

Dalam $\triangle OQR$,

$$\cos 57.29^\circ = \frac{10}{OR}$$

$$OR = \frac{10}{\cos 57.29^\circ} \\ = 18.50525 \text{ cm}$$

$$\sin 57.29^\circ = \frac{RQ}{18.50525}$$

$$RQ = 18.52525 \times \sin 57.29^\circ \\ = 15.5875 \text{ cm}$$

Perimeter rantau berlorek A

$$= \text{Panjang lengkok } PQ + PR + QR$$

$$= 10(1) + (18.50525 - 10) + 15.5872$$

$$= 10 + 8.50525 + 15.5872$$

$$= 34.09 \text{ cm}$$

(b) Luas rantau berlorek B

$$= \text{Luas sektor } ORS - \text{Luas } \triangle OQR$$

$$= \frac{1}{2} \times (18.50535)^2 \times 1 - \frac{1}{2} \times 10 \times 15.57062$$

$$= 93.37 \text{ cm}^2$$

$$3 \text{ (a) } \angle COQ = 1.982 \text{ rad} = 1.982 \times \frac{180}{3.142}$$

$$= 113.55^\circ$$

$$\angle CAO = \angle COA = 3.142 - 1.982$$

$$= 1.16 \text{ rad}$$

$$(b) \angle CAO = \angle COA = 180^\circ - 113.55^\circ \\ = 66.45^\circ$$

$$\angle ACO = 180^\circ - 66.45^\circ - 66.45^\circ = 47.10^\circ$$

Dalam $\triangle ACO$, dengan menggunakan petua sinus,

$$\frac{AO}{\sin 47.10^\circ} = \frac{5}{\sin 66.45^\circ}$$

$$AO = \frac{5}{\sin 66.45^\circ} \times \sin 47.10^\circ$$

$$AO = 3.9955 \text{ cm}$$

$$AR = AQ = 5 + 3.9955 = 8.996 \text{ cm}$$

(c) $CR = AR - AC = 8.996 - 5 = 3.996 \text{ cm}$

$$\text{Panjang lengkok } CQ = 1.982 \times 5$$

$$= 9.91 \text{ cm}$$

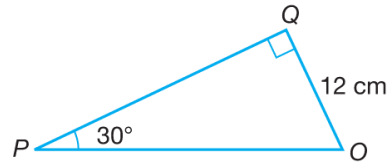
$$\text{Panjang lengkok } RQ = 8.996 \times 1.16$$

$$= 10.4354 \text{ cm}$$

$$\begin{aligned}
& \text{Perimeter rantau berlorek} \\
& = CR + \text{Panjang lengkok } CQ + \text{Panjang} \\
& \quad \text{lengkok } RQ \\
& = 3.996 + 9.91 + 10.4354 \\
& = 24.34 \text{ cm}
\end{aligned}$$

$$\begin{aligned}
\text{(d) Oleh itu, luas rantau berlorek} \\
& = \text{Luas sektor } ARQ - \text{Luas sektor } OCQ - \\
& \quad \text{Luas } \triangle ACO \\
& = \frac{1}{2}(8.996)^2(1.16) - \frac{1}{2}(5)^2(1.982) - \\
& \quad \frac{1}{2}(5)(5)\sin 47.10^\circ \\
& = 46.9385 - 24.775 - 9.1568 \\
& = 13.01 \text{ cm}^2
\end{aligned}$$

4 (a)



$$\sin 30^\circ = \frac{12}{PO}$$

$$PO = \frac{12}{\sin 30^\circ} = 24 \text{ cm}$$

$$\begin{aligned} \text{Panjang } POM &= 24 + 12 \\ &= 36 \text{ cm} \end{aligned}$$

Panjang lengkok AMB

$$= 36 \times \frac{3.142}{3}$$

$$= 37.70 \text{ cm}$$

$$\text{(b) In } \triangle POQ, \tan 30^\circ = \frac{12}{PQ}$$

$$PQ = \frac{12}{\tan 30^\circ}$$

$$= 20.78 \text{ cm}$$

Luas rantau berlorek

$$= \text{Luas sektor } PAMB - 2 \times \text{Luas } \triangle POQ -$$

Luas sektor major QMR

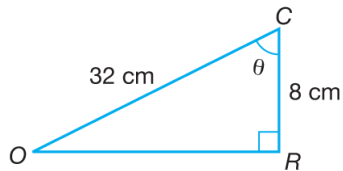
$$= \frac{1}{2}(36)^2 \left(\frac{3.142}{3} \right) - 2 \left(\frac{1}{2} \times 12 \times 20.7846 \right)$$

$$- \frac{1}{2}(12)^2 \left(240 \times \frac{3.142}{180} \right)$$

$$= 678.672 - 249.4152 - 301.632$$

$$= 127.62 \text{ cm}^2$$

5 (a)



$$\cos \theta = \frac{8}{32}$$

$$\theta = 75.5225^\circ$$

$$\theta = 75.5225 \times \frac{3.142}{180}$$

$$\theta = 1.318 \text{ [Tertunjuk]}$$

(b) $OR = \sqrt{32^2 - 8^2} = 30.9839 \text{ cm}$

$$\sin \angle COR = \frac{8}{32}$$

$$\angle COR = 14.48^\circ$$

Oleh itu, $\angle ROP = 90^\circ + 14.48^\circ = 104.48^\circ$

$$104.48^\circ = 104.48 \times \frac{3.142}{180} = 1.8238 \text{ rad}$$

Maka, panjang lengkok PR
 $= 12(1.8238) = 21.89 \text{ cm}$

(c) Luas rantau berlerek

$$= \text{Luas trapezium } POCQ - \text{Luas sektor } POR - \text{Luas sektor } CRQ$$

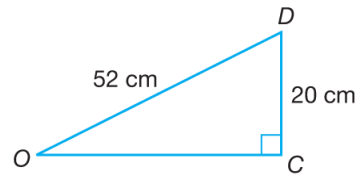
$$= \frac{1}{2}(12 + 20)(30.9839) - \frac{1}{2}(12)^2(1.8238) -$$

$$\frac{1}{2}(20)^2(1.318)$$

$$= 495.7424 - 131.3136 - 263.6$$

$$= 100.83 \text{ cm}^2$$

6 (a)



$$\sin \angle AOB = \sin \angle DCO = \frac{20}{52}$$

$$\angle AOB = 22.62^\circ$$

$$\angle AOB = 22.62 \times \frac{3.142}{180}$$

$$\angle AOB = 0.3948 \text{ rad}$$

(b) $\tan \angle DCO = \frac{20}{OC}$

$$OC = \frac{20}{\tan 22.62^\circ}$$

$$OC = \frac{20}{0.41667}$$

$$OC = 47.9996$$

Perimeter rantau berlerek

$$= \text{Panjang lengkok } DT + DA + TB + \text{Panjang lengkok } AB$$

$$= 20 \left(90 \times \frac{3.142}{180} \right) + 52 + (104 - 20 - 48)$$

$$104(0.3948)$$

$$= 31.42 + 52 + 36 + 41.06$$

$$= 160.48 \text{ cm}$$

(c) Luas rantau berlerek

$$= \text{Luas sektor } OAB - \text{Luas } \triangle OCD - \text{Luas sukuan bulatan } CDT$$

$$= \frac{1}{2}(104)^2(0.3948) - \frac{1}{2}(48)(20) -$$

$$\frac{1}{2}(20)^2 \left(90 \times \frac{3.142}{180} \right)$$

$$= 2135.08 - 480 - 314.2$$

$$= 1340.88 \text{ cm}^2$$

7 (a) $\theta = 360^\circ - 80^\circ = 280^\circ$

$$280^\circ = 280 \times \frac{3.142}{180}$$

$$= 4.888 \text{ rad}$$

(b) Luas sektor major berlorek OAC

$$= 244 \frac{17}{45} \text{ cm}^2$$

$$\frac{1}{2} r^2 (4.88755) = 244 \frac{17}{45}$$

$$r^2 = 100$$

$$r = 10$$

Maka, jejari bulatan ialah 10 cm.

(c) Perimeter tembereng berlorek

$$= 10 + 10 + 10(4.888)$$

$$= 68.88 \text{ cm}$$

(d) Sudut tirus $AOC = 80^\circ \times \frac{3.142}{180}$

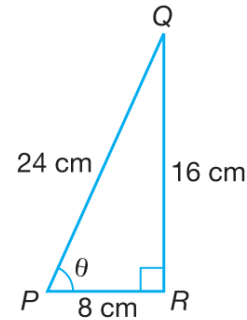
$$= 1.3964 \text{ rad}$$

Luas tembereng berlorek ABC

$$= \frac{1}{2} (10)^2 (1.3964 - \sin 80^\circ)$$

$$= 20.58 \text{ cm}^2$$

8 (a)



$$\tan \theta = \frac{16}{8}$$

$$\theta = 63.43^\circ$$

$$\theta = 63.43 \times \frac{3.142}{180}$$

$$\theta = 1.1072 \text{ rad}$$

(b) $\sin 63.43^\circ = \frac{16}{PQ}$

$$PQ = \frac{16}{\sin 63.43^\circ} = 17.8893 \text{ cm}$$

Perimeter rantau berlorek

= Panjang lengkok CB + Panjang lengkok $QB + QC$

$$= 24(1.1072) + 16 \left(\frac{3.142}{2} \right) + (24 -$$

$$17.8893)$$

$$= 26.5728 + 25.136 + 6.1107$$

$$= 57.82 \text{ cm}$$

(c) Luas rantau berlorek

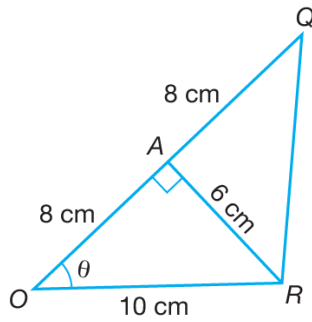
= Luas sektor PCB - Luas $\triangle POQ$ - Luas sukuan bulatan QOB

$$= \frac{1}{2} (24)^2 (1.1072) - \frac{1}{2} (8)(16) - \frac{1}{2} \times 16^2 \times \left(\frac{3.142}{2} \right)$$

$$= 318.87 - 64 - 201.088$$

$$= 53.78 \text{ cm}^2$$

9 (a)



$$\cos \theta = \frac{8}{10}$$

$$\theta = 36.87^\circ$$

$$\theta = 36.87 \times \frac{3.142}{180}$$

$$\theta = 36.87 \times \frac{3.142}{180}$$

$$\theta = 0.6436 \text{ rad}$$

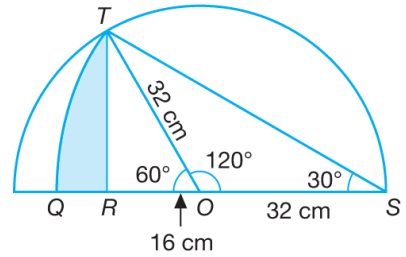
(b) Perimeter rantau berlorek

$$\begin{aligned} &= QR + RP + \text{Panjang lengkok } PQ \\ &= 10 + 6 + 16(0.6436) \\ &= 26.30 \text{ cm} \end{aligned}$$

(c) Luas rantau berlorek

$$\begin{aligned} &= \text{Luas sektor } OPQ - \text{Luas } \triangle ORQ \\ &= \frac{1}{2}(16)^2(0.6436) - \frac{1}{2} \times 16 \times 6 \\ &= 34.38 \text{ cm}^2 \end{aligned}$$

10 (a)



$$\cos \angle TOR = \frac{16}{32}$$

$$\angle TOR = 60^\circ$$

$$\angle TOR = \frac{3.142}{3} = 1.0473 \text{ rad}$$

$$(b) TS^2 = 32^2 + 32^2 - 2(32)(32) \cos 120^\circ$$

$$TS^2 = 3072$$

$$TS = 55.4256 \text{ cm}$$

Panjang lengkok TQ

$$= 55.4256 \left(\frac{3.142}{6} \right)$$

$$= 29.02455$$

$$= 29.02 \text{ cm}$$

(c) Luas rantau berlorek

$$= \text{Luas sektor } STR - \text{Luas } \triangle TOS - \text{Luas } \triangle TRO$$

$$= \frac{1}{2}(55.4256)^2 \left(\frac{3.142}{6} \right) -$$

$$\frac{1}{2}(32)(32) \sin 120^\circ - \frac{1}{2}(32)(16) \sin 60^\circ$$

$$= 804.3512 - 443.4050 - 221.7025$$

$$= 139.2 \text{ cm}^2$$

11 (a) Panjang lengkok $BE = \frac{4}{3}\pi$

$$2 \times \angle BAE = \frac{4}{3} \times \pi$$

$$\angle BAE = \frac{1}{2} \times \frac{4}{3} \times \pi$$

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

$$= \frac{2}{3} (3.142)$$

$$= 2.0947 \text{ rad}$$

(b) $\angle BAE = 120^\circ$
 $\angle OAE = 180^\circ - 120^\circ$
 $= 60^\circ$
 $\angle AOE = \angle AEO = 60^\circ = 1.0473 \text{ rad}$

Luas sektor BOD

$$= \frac{1}{2} \times 8^2 \times 1.0473$$

$$= 33.51 \text{ cm}^2$$

(c) Luas sektor BAE

$$= \frac{1}{2} \times 4^2 \times 2.0947$$

$$= 16.7576 \text{ cm}^2$$

Luas $\triangle AOE$

$$= \frac{1}{2} \times 4(4) \times \sin 60^\circ$$

$$= 6.9282 \text{ cm}^2$$

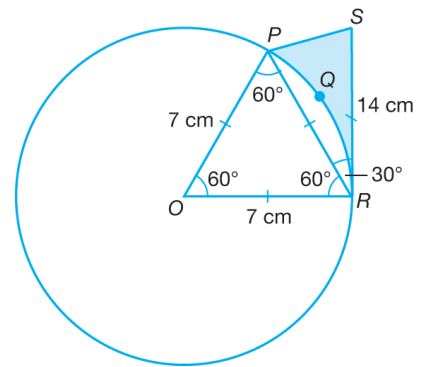
Luas rantau berlorek

$$= \text{Luas sektor } BOD - \text{Luas sektor } BAE - \text{Luas } \triangle AOE$$

$$= 33.5136 - 16.7576 - 6.9282$$

$$= 9.828 \text{ cm}^2$$

12 (a)



$$\angle PQR = \frac{3.142}{3} = 1.0473 \text{ cm}$$

Luas tembereng POR

$$= \frac{1}{2} (7)^2 (1.0473 - \sin 60^\circ)$$

$$= 4.441 \text{ cm}^2$$

(b) Luas $\triangle PRS$

$$= \frac{1}{2} \times 7 \times 7 \times \sin 30^\circ$$

$$= 12.25 \text{ cm}^2$$

Luas rantau berlorek

$$= \text{Luas } \triangle PRS - \text{Luas tembereng } PQR$$

$$= 12.25 - 4.4412$$

$$= 7.809 \text{ cm}^2$$