

# Jawapan

## BAB 1 SUKATAN MEMBULAT

### Aktiviti Penerokaan 1 (Halaman 2)

3. Satu radian ialah sudut yang tercangkum pada pusat bulatan oleh lengkok yang sama panjang dengan jejari bulatan.  
 $\pi \text{ rad} = 180^\circ$
4.  $1 \text{ rad} = \frac{180^\circ}{\pi} \approx 57.29^\circ$  dan  $1^\circ = \frac{\pi}{180^\circ} \approx 0.01746 \text{ rad}$

### Perbincangan (Halaman 3)

Jawapan yang diperolehi lebih jitu dan tepat terutamanya dalam mengukur panjang lengkok atau menentukan perimeter tembereng suatu objek yang berbentuk bulatan.

### Latihan Kendiri 1.1

1. (a)  $\frac{\pi}{8} \text{ rad} = \frac{\pi}{8} \times \frac{180^\circ}{\pi}$   
 $= \frac{1}{8} \times 180^\circ$   
 $= 22.5^\circ$
- (b)  $\frac{3}{4} \pi \text{ rad} = \frac{3}{4} \pi \times \frac{180^\circ}{\pi}$   
 $= \frac{3}{4} \times 180^\circ$   
 $= 135^\circ$
- (c)  $0.5 \text{ rad} = 0.5 \times \frac{180^\circ}{3.142}$   
 $= 28^\circ 39'$
- (d)  $1.04 \text{ rad} = 1.04 \times \frac{180^\circ}{3.142}$   
 $= 59^\circ 35'$
2. (a)  $18^\circ = 18^\circ \times \frac{\pi}{180^\circ}$   
 $= \frac{1}{10} \pi \text{ rad}$
- (b)  $120^\circ = 120^\circ \times \frac{\pi}{180^\circ}$   
 $= \frac{2}{3} \pi \text{ rad}$
- (c)  $225^\circ = 225^\circ \times \frac{\pi}{180^\circ}$   
 $= 1\frac{1}{4} \pi \text{ rad}$
- (d)  $300^\circ = 300^\circ \times \frac{\pi}{180^\circ}$   
 $= 1\frac{2}{3} \pi \text{ rad}$

### Latihan Formatif 1.1

1. (a)  $\frac{7}{12} \pi \text{ rad} = \frac{7}{12} \pi \times \frac{180^\circ}{\pi}$   
 $= \frac{7}{12} \times 180^\circ$   
 $= 105^\circ$

$$\begin{aligned} \text{(b)} \quad 1\frac{1}{3}\pi \text{ rad} &= \frac{4}{3}\pi \times \frac{180^\circ}{\pi} \\ &= \frac{4}{3} \times 180^\circ \\ &= 240^\circ \end{aligned}$$

$$\begin{aligned} \text{(c)} \quad 2 \text{ rad} &= 2 \times \frac{180^\circ}{3.142} \\ &= 114^\circ 35' \end{aligned}$$

$$\begin{aligned} \text{(d)} \quad 4.8 \text{ rad} &= 4.8 \times \frac{180^\circ}{3.142} \\ &= 274^\circ 59' \end{aligned}$$

$$\begin{aligned} 2. \text{ (a)} \quad 76^\circ &= 76^\circ \times \frac{3.142}{180^\circ} \\ &= 1.327 \text{ rad} \end{aligned}$$

$$\begin{aligned} \text{(b)} \quad 139^\circ &= 139^\circ \times \frac{3.142}{180^\circ} \\ &= 2.426 \text{ rad} \end{aligned}$$

$$\begin{aligned} \text{(c)} \quad 202.5^\circ &= 202.5^\circ \times \frac{3.142}{180^\circ} \\ &= 3.535 \text{ rad} \end{aligned}$$

$$\begin{aligned} \text{(d)} \quad 320^\circ 10' &= 320^\circ 10' \times \frac{3.142}{180^\circ} \\ &= 5.589 \text{ rad} \end{aligned}$$

$$\begin{aligned} 3. \text{ (a)} \quad 73^\circ &= 73^\circ \times \frac{3.142}{180^\circ} \\ &= 1.274 \text{ rad} \end{aligned}$$

$$\begin{aligned} \text{(b)} \quad 118^\circ &= 118^\circ \times \frac{3.142}{180^\circ} \\ &= 2.060 \text{ rad} \end{aligned}$$

$$\begin{aligned} \text{(c)} \quad 150.5^\circ &= 150.5^\circ \times \frac{3.142}{180^\circ} \\ &= 2.627 \text{ rad} \end{aligned}$$

$$\begin{aligned} \text{(d)} \quad 220^\circ &= 220^\circ \times \frac{3.142}{180^\circ} \\ &= 3.840 \text{ rad} \end{aligned}$$

#### Aktiviti Penerokaan 2 (Halaman 5)

4. Nilai kedua-duanya adalah sama.

5. Masih sama.

6. Jika  $\angle AOB = \theta$  diukur dalam radian, jadi

$$\frac{\text{Panjang lengkok minor } AB}{\theta} = \frac{\text{Lilitan bulatan}}{2\pi}$$

$$\frac{s}{\theta} = \frac{2\pi j}{2\pi}$$

$$s = \frac{2\pi j}{2\pi} \times \theta$$

$$s = j\theta$$

#### Perbincangan (Halaman 6)

Saiz sudut,  $\theta$  diberi oleh nisbah panjang lengkok,  $s$  kepada panjang jejari bulatan,  $j$ , iaitu:

$$\theta = \frac{s}{j}$$

Jadi,  $s = j\theta$ , dengan  $\theta$  ialah sudut dalam radian.

### Latihan Kendiri 1.2

1. (a) Panjang lengkok  $MN = j\theta$   
 $= 12(1.1)$   
 $= 13.2 \text{ cm}$
- (b) Panjang lengkok  $MN = j\theta$   
 $= 8(2)$   
 $= 16 \text{ cm}$
- (c) Panjang lengkok  $MN = j\theta$   
 $= 5\left(\frac{5}{6}\pi\right)$   
 $= 13.09 \text{ cm}$
- (d) Panjang lengkok  $MN = j\theta$   
 $= 10(3.142 - 2.45)$   
 $= 10(0.692)$   
 $= 6.92 \text{ cm}$
2. (a)  $s_{EF} = 25$   
 $j(6.284 - 1.284) = 25$   
 $5j = 25$   
 $j = \frac{25}{5}$   
 $= 5 \text{ cm}$

(b)  $s_{EF} = j\theta$   
 $= 5(1.284)$   
 $= 6.42 \text{ cm}$

3. (a)  $s_{QR} = 5.7$   
 $5\theta' = 5.7$   
 $\theta' = \frac{5.7}{5}$   
 $= 1.14 \text{ rad}$   
 $\therefore \theta = 3.142 - 1.14$   
 $= 2.002 \text{ rad}$
- (b)  $s_{PQ} = j\theta$   
 $= 5(2.002)$   
 $= 10.01 \text{ cm}$

### Kuiz Pantas (Halaman 8)

Boleh, iaitu:

$$\frac{AC}{\sin 114^\circ} = \frac{10}{\sin 33^\circ}$$
$$AC = \frac{10 \times \sin 114^\circ}{\sin 33^\circ}$$
$$= 16.77 \text{ cm}$$

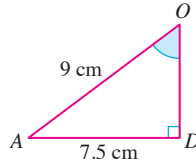
### Latihan Kendiri 1.3

1. (a)  $s_{ABC} = 6(2.5)$   
 $= 15 \text{ cm}$
- $$2.5 \text{ rad} = 2.5 \times \frac{180^\circ}{3.142}$$
- $$= 143^\circ 13'$$
- $$AC^2 = 6^2 + 6^2 - 2(6)(6)(\cos 143^\circ 13')$$
- $$AC = \sqrt{129.6652}$$
- $$= 11.39 \text{ cm}$$
- $\therefore$  Perimeter tembereng berlorek  $ABC = 15 + 11.39$   
 $= 26.39 \text{ cm}$

$$\begin{aligned}
 \text{(b)} \quad s_{ABC} &= 10\left(\frac{\pi}{3}\right) \\
 &= 10.47 \text{ cm} \\
 AC^2 &= 10^2 + 10^2 - 2(10)(10)(\cos 60^\circ) \\
 &= 100 \\
 AC &= \sqrt{100} \\
 &= 10 \text{ cm} \\
 \therefore \text{Perimeter tembereng berlorek } ABC &= 10.47 + 10 \\
 &= 20.47 \text{ cm}
 \end{aligned}$$

$$\begin{aligned}
 \text{(c)} \quad 120^\circ &= 120^\circ \times \frac{3.142}{180^\circ} \\
 &= 2.095 \text{ rad} \\
 s_{ABC} &= 8(2.095) \\
 &= 16.76 \text{ cm} \\
 AC^2 &= 8^2 + 8^2 - 2(8)(8)(\cos 120^\circ) \\
 &= 192 \\
 AC &= \sqrt{192} \\
 &= 13.86 \text{ cm} \\
 \therefore \text{Perimeter tembereng berlorek } ABC &= 16.76 + 13.86 \\
 &= 30.62 \text{ cm}
 \end{aligned}$$

$$\begin{aligned}
 \text{(d)} \quad \sin \angle AOD &= \frac{7.5}{9} \\
 \angle AOD &= 56^\circ 27' \\
 \angle AOC &= 2(56^\circ 27') \times \frac{3.142}{180^\circ} \\
 &= 112^\circ 54' \times \frac{3.142}{180^\circ} \\
 &= 1.971 \text{ rad} \\
 s_{ABC} &= 9(1.971) \\
 &= 17.739 \text{ cm} \\
 AC^2 &= 9^2 + 9^2 - 2(9)(9)(\cos 112^\circ 54') \\
 &= 225.0381 \\
 AC &= \sqrt{225.0381} \\
 &= 15.001 \text{ cm} \\
 \therefore \text{Perimeter tembereng berlorek } ABC &= 17.739 + 15.001 \\
 &= 32.74 \text{ cm}
 \end{aligned}$$



$$\begin{aligned}
 2. \text{ (a)} \quad s_{PQ} &= 14 \\
 7\theta &= 14 \\
 \theta &= \frac{14}{7} \\
 &= 2 \text{ rad} \\
 2 \text{ rad} &= 2 \times \frac{180^\circ}{3.142} \\
 &= 114^\circ 35' \\
 \text{(b)} \quad PQ^2 &= 7^2 + 7^2 - 2(7)(7)(\cos 114^\circ 35') \\
 &= 138.7696 \\
 PQ &= \sqrt{138.7696} \\
 &= 11.78 \text{ cm} \\
 \therefore \text{Perimeter tembereng berlorek} &= 11.78 + 14 \\
 &= 25.78 \text{ cm}
 \end{aligned}$$

#### Latihan Kendiri 1.4

$$\begin{aligned}
 1. \text{ (a)} \quad 110^\circ &= 110^\circ \times \frac{3.142}{180^\circ} \\
 &= 1.92 \text{ rad}
 \end{aligned}$$

$$\begin{aligned}
 s_{AB} &= 4(1.92) \\
 &= 7.68 \text{ cm} \\
 s_{CD} &= 9(1.92) \\
 &= 17.28 \text{ cm}
 \end{aligned}$$

$$\begin{aligned}
 \therefore \text{Perimeter kawasan berlorek} &= 2(5) + 7.68 + 17.28 \\
 &= 34.96 \text{ cm}
 \end{aligned}$$

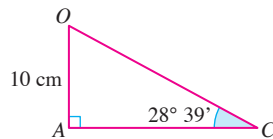
$$\begin{aligned}
 \text{(b) } s_{CD} &= 3 \\
 4\theta &= 3 \\
 \theta &= \frac{3}{4} \text{ rad} \\
 s_{AB} &= 3\left(\frac{3}{4}\right) \\
 &= 2.25 \text{ cm} \\
 s_{CD} &= 4\left(\frac{3}{4}\right) \\
 &= 3 \text{ cm}
 \end{aligned}$$

$$\begin{aligned}
 \therefore \text{Perimeter kawasan berlorek} &= 2(1) + 2.25 + 3 \\
 &= 7.25 \text{ cm}
 \end{aligned}$$

$$\begin{aligned}
 \text{(c) } \angle AOB &= \pi - \frac{\pi}{2} - 0.5 \\
 &= 1.071 \text{ rad} \\
 0.5 \text{ rad} &= 0.5 \times \frac{180^\circ}{3.142} \\
 &= 28^\circ 39'
 \end{aligned}$$

$$\begin{aligned}
 \frac{10}{AC} &= \tan 28^\circ 39' \\
 AC &= \frac{10}{\tan 28^\circ 39'} \\
 &= 18.303 \text{ cm} \\
 OC &= \sqrt{10^2 + 18.303^2} \\
 &= 20.857 \text{ cm} \\
 BC &= 20.857 - 10 \\
 &= 10.857 \text{ cm} \\
 s_{AB} &= 10(1.071) \\
 &= 10.71 \text{ cm}
 \end{aligned}$$

$$\begin{aligned}
 \therefore \text{Perimeter kawasan berlorek} &= 10.71 + 18.303 + 10.857 \\
 &= 39.87 \text{ cm}
 \end{aligned}$$



$$\begin{aligned}
 2. \text{ Sudut antara Washington dan Lima} &= (38.88^\circ + 12.04^\circ) \times \frac{3.142}{180^\circ} \\
 &= 50.92^\circ \times \frac{3.142}{180^\circ} \\
 &= 0.889 \text{ rad}
 \end{aligned}$$

$$\begin{aligned}
 \text{Jarak antara Washington dan Lima} &= 6\,371(0.889) \\
 &= 5\,663.819 \text{ km}
 \end{aligned}$$

$$\begin{aligned}
 3. \quad 85^\circ &= 85^\circ \times \frac{3.142}{180^\circ} \\
 &= 1.484 \text{ rad}
 \end{aligned}$$

$$\begin{aligned}
 \text{Jarak} &= 25(1.484) \\
 &= 37.1 \text{ m}
 \end{aligned}$$

$$\begin{aligned}
 4. \text{ (a) } s &= 35(\pi) \\
 &= 35(3.142) \\
 &= 109.97 \text{ cm}
 \end{aligned}$$

$$\begin{aligned}
 \text{(b) Perimeter} &= 70 + 2(100) + 109.97 \\
 &= 379.97 \text{ cm}
 \end{aligned}$$

$$5. 2\pi j = 50.8$$

$$j = \frac{50.8}{2\pi}$$

$$= \frac{50.8}{2(3.142)}$$

$$= 8.084 \text{ cm}$$

$$185^\circ = 185^\circ \times \frac{3.142}{180^\circ}$$

$$= 3.229 \text{ rad}$$

$$\text{Panjang lengkok} = 8.084(3.229)$$

$$= 26.103 \text{ cm}$$

$$2\pi j = 30.5$$

$$j = \frac{30.5}{2\pi}$$

$$= \frac{30.5}{2(3.142)}$$

$$= 4.854 \text{ cm}$$

$$160^\circ = 160^\circ \times \frac{3.142}{180^\circ}$$

$$= 2.793 \text{ rad}$$

$$\text{Panjang lengkok} = 4.854(2.793)$$

$$= 13.557$$

$$\therefore \text{Panjang rantai} = 2(25) + 26.103 + 13.557$$

$$= 89.66 \text{ cm}$$

### Latihan Formatif 1.2

$$1. (a) \angle ROS = (360^\circ - 275^\circ) \times \frac{3.142}{180^\circ}$$

$$= 85^\circ \times \frac{3.142}{180^\circ}$$

$$= 1.484 \text{ rad}$$

$$(b) s_{RS} = 15$$

$$j(1.484) = 15$$

$$j = \frac{15}{1.484}$$

$$= 10.11 \text{ cm}$$

$$2. s_{UV} = 5$$

$$j\theta = 5 \dots \textcircled{1}$$

$$\text{Perimeter sektor } UOV = 18 \text{ cm}$$

$$2j + j\theta = 18 \dots \textcircled{2}$$

$$\text{Gantikan } \textcircled{1} \text{ ke dalam } \textcircled{2}: 2j + 5 = 18$$

$$2j = 13$$

$$j = \frac{13}{2}$$

$$= 6.5$$

$$\text{Gantikan } j = 6.5 \text{ cm ke dalam } \textcircled{1}: 6.5\theta = 5$$

$$\theta = 0.7692 \text{ rad}$$

$$3. (a) \cos \theta = \frac{4}{5}$$

$$\theta = 36^\circ 52'$$

$$= 36^\circ 52' \times \frac{3.142}{180^\circ}$$

$$= 0.6435 \text{ rad}$$

$$(b) EG = \sqrt{5^2 - 4^2}$$

$$= \sqrt{9}$$

$$= 3 \text{ cm}$$

$$s_{EF} = 5(0.6435) \\ = 3.218 \text{ cm}$$

$$\therefore \text{Perimeter kawasan berlorek} = (5 - 4) + 3 + 3.218 \\ = 7.218 \text{ cm}$$

4. (a) Perimeter kawasan berlorek = 18 cm

$$2h(0.5) + 2h + 3h(0.5) = 18$$

$$4.5h = 18$$

$$h = \frac{18}{4.5} \\ = 4 \text{ cm}$$

(b)  $s_{RS} = 12(0.5) \\ = 6 \text{ cm}$

$$s_{PQ} = 8(0.5) \\ = 4 \text{ cm}$$

$$\therefore \text{Beza panjang lengkok} = 6 - 4 \\ = 2 \text{ cm}$$

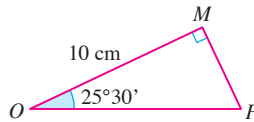
5. (a)  $51^\circ = 51^\circ \times \frac{3.142}{180^\circ} \\ = 0.8902 \text{ rad}$

$$s_{MN} = 10(0.8902) \\ = 8.902 \text{ cm}$$

(b)  $\frac{51^\circ}{2} = 25^\circ 30'$

$$\frac{MP}{10} = \tan 25^\circ 30'$$

$$MP = 10(\tan 25^\circ 30') \\ = 4.770 \text{ cm}$$



$$\therefore \text{Perimeter kawasan berlorek} = 2(4.770) + 8.902 \\ = 18.44 \text{ cm}$$

6.  $s = j\theta$

$$= 36\left(21^\circ \times \frac{3.142}{180^\circ}\right) \\ = 13.1964 \text{ cm}$$

$$\therefore \text{Jumlah jarak} = 2(13.1964) \\ = 26.39 \text{ cm}$$

7. Lilitan tayar =  $2\pi j$

$$= 2(3.142)(33) \\ = 207.372 \text{ cm}$$

(a) 50 pusingan lengkap =  $50 \times 207.372 \\ = 10\,368.6 \text{ cm} \\ = 103.686 \text{ m}$

(b) 1 000 pusingan lengkap =  $1\,000 \times 207.372 \\ = 207\,372 \text{ cm} \\ = 2\,073.72 \text{ m}$

### Aktiviti Penerokaan 3 (Halaman 12)

4. Nilai kedua-dua nisbah adalah sama.

5. Masih sama.

6. Jika  $\angle AOB = \theta$  diukur dalam radian, jadi

$$\frac{\text{Luas sektor minor } AOB}{\theta} = \frac{\text{Luas bulatan}}{2\pi}$$

$$\frac{L}{\theta} = \frac{\pi j^2}{2\pi}$$

$$L = \frac{\pi j^2}{2\pi} \times \theta$$

$$L = \frac{1}{2} j^2 \theta$$

### Latihan Kendiri 1.5

1. (a) Luas sektor  $AOB = \frac{1}{2}(6^2)(1.1)$   
 $= 19.8 \text{ cm}^2$

(b) Luas sektor  $AOB = \frac{1}{2}(10^2)(2.15)$   
 $= 107.5 \text{ cm}^2$

(c)  $\angle AOB = 2\pi - \frac{5}{3}\pi$   
 $= 1.047 \text{ rad}$

Luas sektor  $AOB = \frac{1}{2}(5^2)(1.047)$   
 $= 13.09 \text{ cm}^2$

(d)  $135^\circ = 135^\circ \times \frac{3.142}{180^\circ}$   
 $= 2.357 \text{ rad}$

Luas sektor  $AOB = \frac{1}{2}(20^2)(2.357)$   
 $= 471.4 \text{ cm}^2$

2. Panjang lengkok,  $s = 6 \text{ cm}$

$$5\theta = 6$$

$$\theta = \frac{6}{5}$$

$$= 1.2 \text{ rad}$$

Luas,  $L = \frac{1}{2} j^2 \theta$

$$= \frac{1}{2}(5)^2(1.2)$$

$$= \frac{1}{2}(25)(1.2)$$

$$= 15 \text{ cm}^2$$

3. (a) Luas =  $195 \text{ cm}^2$

$$\frac{1}{2} j^2(3.9) = 195$$

$$1.95j^2 = 195$$

$$j^2 = \frac{195}{1.95}$$

$$= 100$$

$$j = \sqrt{100}$$

$$= 10 \text{ cm}$$

(b)  $s_{EF} = j\theta$

$$= 10(3.9)$$

$$= 39 \text{ cm}$$

(c) Perimeter sektor major  $EOF = 2(10) + 39$   
 $= 59 \text{ cm}$



4. (a) Luas sektor  $VOW = 60 \text{ cm}^2$

$$\begin{aligned}\frac{1}{2}(10^2)\theta &= 60 \\ 50\theta &= \frac{60}{50} \\ &= 1.2 \text{ rad}\end{aligned}$$

$$\begin{aligned}\text{(b) } s_{VW} &= 10(1.2) \\ &= 12 \text{ cm}\end{aligned}$$

$$\begin{aligned}\text{(c) Perimeter sektor } VOW &= 2(10) + 12 \\ &= 32 \text{ cm}\end{aligned}$$

### Latihan Kendiri 1.6

$$\begin{aligned}\text{1. (a) } 1.5 \text{ rad} &= 1.5 \times \frac{180^\circ}{3.142} \\ &= 85^\circ 56'\end{aligned}$$

$$\begin{aligned}\text{Luas sektor } AOB &= \frac{1}{2}(7^2)(1.5) \\ &= 36.75 \text{ cm}^2\end{aligned}$$

$$\begin{aligned}\text{Luas } \triangle AOB &= \frac{1}{2}(7)(7)(\sin 85^\circ 56') \\ &= 24.44 \text{ cm}^2\end{aligned}$$

$$\begin{aligned}\therefore \text{Luas tembereng } ACB &= 36.75 - 24.44 \\ &= 12.31 \text{ cm}^2\end{aligned}$$

$$\begin{aligned}\text{(b) Luas sektor } AOB &= \frac{1}{2}(10^2)\left(\frac{2}{3}\pi\right) \\ &= 104.73 \text{ cm}^2\end{aligned}$$

$$\begin{aligned}\text{Luas } \triangle AOB &= \frac{1}{2}(10)(10)(\sin 120^\circ) \\ &= 43.30 \text{ cm}^2\end{aligned}$$

$$\begin{aligned}\therefore \text{Luas tembereng } ACB &= 104.73 - 43.30 \\ &= 61.43 \text{ cm}^2\end{aligned}$$

$$\begin{aligned}\text{(c) } 58^\circ &= 58^\circ \times \frac{3.142}{180^\circ} \\ &= 1.012 \text{ rad}\end{aligned}$$

$$\begin{aligned}\text{Luas sektor } AOB &= \frac{1}{2}(5^2)(1.012) \\ &= 12.65 \text{ cm}^2\end{aligned}$$

$$\begin{aligned}\text{Luas } \triangle AOB &= \frac{1}{2}(5)(5)(\sin 58^\circ) \\ &= 10.601 \text{ cm}^2\end{aligned}$$

$$\begin{aligned}\therefore \text{Luas tembereng } ACB &= 12.65 - 10.601 \\ &= 2.049 \text{ cm}^2\end{aligned}$$

$$\text{(d) } \sin \theta = \frac{7.5}{9}$$

$$\theta = 56^\circ 27'$$

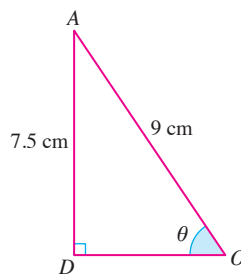
$$\angle AOB = 2(56^\circ 27') \times \frac{3.142}{180^\circ}$$

$$= 112^\circ 54' \times \frac{3.142}{180^\circ}$$

$$= 1.971 \text{ rad}$$

$$\begin{aligned}\text{Luas sektor } AOB &= \frac{1}{2}(9^2)(1.971) \\ &= 79.83 \text{ cm}^2\end{aligned}$$

$$\begin{aligned}\text{Luas } \triangle AOB &= \frac{1}{2}(9)(9)(\sin 112^\circ 54') \\ &= 37.31 \text{ cm}^2\end{aligned}$$



$$\begin{aligned}\therefore \text{Luas tembereng } ACB &= 79.83 - 37.31 \\ &= 42.52 \text{ cm}^2\end{aligned}$$

2. (a)  $s_{MN} = 5 \text{ cm}$

$$3\theta = 5$$

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

$$= 1.667 \text{ rad}$$

$$\begin{aligned}1.667 \text{ rad} &= 1.667 \times \frac{180^\circ}{3.142} \\ &= 95^\circ 30'\end{aligned}$$

$$\therefore \angle MON = 95^\circ 30'$$

(b) Luas sektor  $MON = \frac{1}{2}(3^2)(1.667)$   
 $= 7.502 \text{ cm}^2$

$$\begin{aligned}\text{Luas } \triangle MON &= \frac{1}{2}(3)(3)(\sin 95^\circ 30') \\ &= 4.479 \text{ cm}^2\end{aligned}$$

$$\begin{aligned}\therefore \text{Luas tembereng} &= 7.502 - 4.479 \\ &= 3.023 \text{ cm}^2\end{aligned}$$

3. (a)  $60^\circ = 60^\circ \times \frac{3.142}{180^\circ}$   
 $= 1.047 \text{ rad}$

(b) Luas sektor  $HOK = \frac{1}{2}(4^2)(1.047)$   
 $= 8.376 \text{ cm}^2$

$$\begin{aligned}\text{Luas } \triangle HOK &= \frac{1}{2}(4)(4)(\sin 60^\circ) \\ &= 6.928 \text{ cm}^2\end{aligned}$$

$$\begin{aligned}\therefore \text{Luas tembereng} &= 8.376 - 6.928 \\ &= 1.448 \text{ cm}^2\end{aligned}$$

### Latihan Kendiri 1.7

1. (a)  $s_{SRT} = 12\pi$   
 $= 37.70 \text{ m}$

$$\begin{aligned}SP + QT &= 24 - 16 \\ &= 8 \text{ m}\end{aligned}$$

$$\begin{aligned}\therefore \text{Panjang pagar} &= 37.70 + 8 + 14 + 16 \\ &= 75.70 \text{ m}\end{aligned}$$

(b)  $s_{PR} = 14$

$$16\theta = 14$$

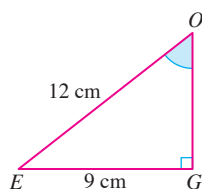
$$\theta = 0.875 \text{ rad}$$

$$\begin{aligned}\text{Luas sektor } PQR &= \frac{1}{2}(16^2)(0.875) \\ &= 112 \text{ m}^2\end{aligned}$$

$$\begin{aligned}\text{Luas semibulatan } SRT &= \frac{1}{2}(12^2)(\pi) \\ &= 226.22 \text{ m}^2\end{aligned}$$

$$\begin{aligned}\therefore \text{Luas kawasan tanaman pokok bunga} &= 226.22 - 112 \\ &= 114.22 \text{ m}^2\end{aligned}$$

2. (a)  $OG = \sqrt{12^2 - 9^2}$   
 $= 7.937 \text{ cm}$   
 $\therefore h = 12 - 7.937$   
 $= 4.063 \text{ cm}$



$$(b) \sin \angle EOG = \frac{9}{12}$$

$$\angle EOG = 48^\circ 35'$$

$$\angle EOF = 2(48^\circ 35') \times \frac{3.142}{180^\circ}$$

$$= 97^\circ 10' \times \frac{3.142}{180^\circ}$$

$$= 1.696 \text{ rad}$$

$$\text{Luas sektor } EOF = \frac{1}{2}(12^2)(1.696)$$

$$= 122.11 \text{ cm}^2$$

$$\text{Luas } \triangle EOF = \frac{1}{2}(12)(12)(\sin 97^\circ 10')$$

$$= 71.44 \text{ cm}^2$$

$$\therefore \text{Luas keratan rentas yang mengandungi air} = 122.11 - 71.44 \\ = 50.67 \text{ cm}^2$$

$$3. (a) \cos \angle BAE = \frac{4}{18}$$

$$\angle BAE = 77^\circ 10'$$

$$\therefore \angle BAD = 77^\circ 10'$$

$$(b) \angle BAD = 77^\circ 10' \times \frac{3.142}{180^\circ}$$

$$= 1.347 \text{ rad}$$

$$\angle CBR = 2\pi - \frac{\pi}{2} - \frac{\pi}{2} - 1.347$$

$$= 1.795 \text{ rad}$$

$$CD = BE = \sqrt{18^2 - 4^2}$$

$$= 17.55 \text{ cm}$$

$$\text{Luas trapezium } ABCD = \frac{1}{2}(17.55)(7 + 11)$$

$$= 157.95 \text{ cm}^2$$

$$\text{Luas sektor } DAR = \frac{1}{2}(11^2)(1.347)$$

$$= 81.49 \text{ cm}^2$$

$$\text{Luas sektor } CBR = \frac{1}{2}(7^2)(1.795)$$

$$= 43.98 \text{ cm}^2$$

$$\therefore \text{Luas kawasan berlorek} = 157.95 - 81.49 - 43.98 \\ = 32.48 \text{ cm}^2$$

$$4. (a) \theta = \left(\frac{20}{60} \times 360^\circ\right) \times \frac{3.142}{180^\circ}$$

$$= 120^\circ \times \frac{3.142}{180^\circ}$$

$$= 2.095 \text{ rad}$$

$$\text{Luas sektor yang disurih} = \frac{1}{2}(8^2)(2.095)$$

$$= 67.04 \text{ cm}^2$$

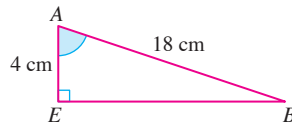
$$(b) L = 80 \text{ cm}^2$$

$$\frac{1}{2}(8^2)\theta = 80$$

$$32\theta = 80$$

$$\theta = \frac{80}{32}$$

$$= 2.5 \text{ rad}$$



### Latihan Formatif 1.3

1. (a)  $s_{AB} = 4.2 \text{ cm}$

$$6\theta = 4.2$$

$$\theta = \frac{4.2}{6}$$

$$= 0.7 \text{ rad}$$

(b) Luas sektor  $AOB = \frac{1}{2}(6^2)(0.7)$   
 $= 12.6 \text{ cm}^2$

Luas sektor  $PAQ = \frac{1}{2}(3^2)(0.5)$   
 $= 2.25 \text{ cm}^2$

$\therefore$  Luas kawasan berlorek  $= 12.6 - 2.25$   
 $= 10.35 \text{ cm}^2$

2. (a)  $60^\circ = 60^\circ \times \frac{3.142}{180^\circ}$   
 $= 1.047 \text{ rad}$

(b) Luas sektor  $VOW = \frac{1}{2}(5^2)(1.047)$   
 $= 13.088 \text{ cm}^2$

Luas  $\Delta VOW = \frac{1}{2}(5)(5)(\sin 60^\circ)$   
 $= 10.825 \text{ cm}^2$

$\therefore$  Luas tembereng berlorek  $VW = 13.088 - 10.825$   
 $= 2.263 \text{ cm}^2$

3. (a)  $s_{PQ} = 2\pi j$   
 $= 2(3.142)(3)$   
 $= 18.852 \text{ cm}$

$$OP = \sqrt{3^2 + 4^2}$$

$$= \sqrt{25}$$

$$= 5 \text{ cm}$$

$$5\theta = 18.852$$

$$\theta = \frac{18.852}{5}$$

$$= 3.77 \text{ rad}$$

(b) Luas sektor  $POQ = \frac{1}{2}(5^2)(3.77)$   
 $= 47.13 \text{ cm}^2$

4. (a)  $s_{KL} = 7 \text{ cm}$

$$4\theta = 7$$

$$\theta = \frac{7}{4}$$

$$= 1.75 \text{ rad}$$

(b) Sudut major  $KOL = 2\pi - 1.75$   
 $= 4.534 \text{ rad}$

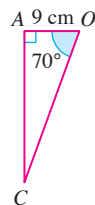
$\therefore$  Luas sektor major  $KOL = \frac{1}{2}(4^2)(4.534)$   
 $= 36.27 \text{ cm}^2$

5. (a)  $\frac{AC}{9} = \tan 70^\circ$

$$AC = 9(\tan 70^\circ)$$

$$= 24.73 \text{ cm}$$

(b) Luas  $\Delta AOC = \frac{1}{2}(24.73)(9)$   
 $= 111.285 \text{ cm}^2$



$$\begin{aligned}\therefore \text{Luas } OACB &= 2(111.285) \\ &= 222.57 \text{ cm}^2\end{aligned}$$

$$\begin{aligned}\text{(c) } 140^\circ &= 140^\circ \times \frac{3.142}{180^\circ} \\ &= 2.444 \text{ rad}\end{aligned}$$

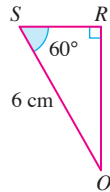
$$\begin{aligned}\therefore \text{Luas sektor minor } OAB &= \frac{1}{2}(9^2)(2.444) \\ &= 98.98 \text{ cm}^2\end{aligned}$$

$$\begin{aligned}\text{(d) Luas kawasan berlerek} &= 222.57 - 98.98 \\ &= 123.59 \text{ cm}^2\end{aligned}$$

$$6. \text{ (a) } \frac{RS}{6} = \cos 60^\circ$$

$$\begin{aligned}RS &= 6(\cos 60^\circ) \\ &= 3 \text{ cm (tertunjuk)}\end{aligned}$$

$$\begin{aligned}\text{(b) } OR &= \sqrt{6^2 - 3^2} \\ &= \sqrt{27} \\ &= 5.196 \text{ cm}\end{aligned}$$



$$\begin{aligned}\text{Luas } \triangle OSR &= \frac{1}{2}(3)(5.196) \\ &= 7.794 \text{ cm}^2\end{aligned}$$

$$\begin{aligned}\text{Luas } OPSR &= 2(7.794) \\ &= 15.59 \text{ cm}^2\end{aligned}$$

$$\begin{aligned}\text{Sudut major } PSR &= (360^\circ - 120^\circ) \times \frac{3.142}{180^\circ} \\ &= 240^\circ \times \frac{3.142}{180^\circ} \\ &= 4.189 \text{ rad}\end{aligned}$$

$$\begin{aligned}\text{Luas sektor major } PQRS &= \frac{1}{2}(3^2)(4.189) \\ &= 18.85 \text{ cm}^2\end{aligned}$$

$$\begin{aligned}\therefore \text{Luas panel } OPQR &= 15.59 + 18.85 \\ &= 34.44 \text{ cm}^2\end{aligned}$$

$$\text{(c) } n = 5$$

$$\begin{aligned}\text{Luas bulatan} &= 3.142(9^2) \\ &= 254.502 \text{ cm}^2\end{aligned}$$

$$\begin{aligned}\text{Luas kawasan bukan panel} &= 254.502 - 5(34.44) \\ &= 82.302 \text{ cm}^2\end{aligned}$$

$$\begin{aligned}\therefore \text{Luas kawasan berlabel } T &= \frac{82.302}{5} \\ &= 16.46 \text{ cm}^2\end{aligned}$$

### Latihan Kendiri 1.8

$$1. \text{ (a) } \sin \angle AOP = \frac{16}{20}$$

$$\angle AOP = 53^\circ 8'$$

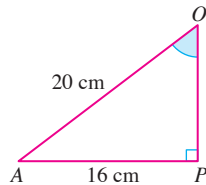
$$\begin{aligned}\therefore \angle AOB &= 2(53^\circ 8') \times \frac{3.142}{180^\circ} \\ &= 106^\circ 16' \times \frac{3.142}{180^\circ} \\ &= 1.855 \text{ rad}\end{aligned}$$

$$12\theta = 21$$

$$\theta = \frac{21}{12}$$

$$= 1.75 \text{ rad}$$

$$\therefore \angle TSU = 1.75 \text{ rad}$$

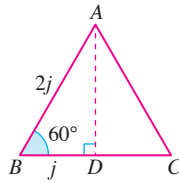


$$\begin{aligned}
 \text{(b) } s_{AQB} &= 20(1.855) \\
 &= 37.1 \text{ cm} \\
 s_{ARB} &= 16(3.142) \\
 &= 50.27 \text{ cm} \\
 \therefore \text{ Perimeter wau bulan} &= 37.1 + 50.27 + 21 + 2(12) \\
 &= 132.37 \text{ cm}
 \end{aligned}$$

$$\begin{aligned}
 \text{(c) Luas sektor } AOBQ &= \frac{1}{2}(20^2)(1.855) \\
 &= 371 \text{ cm}^2 \\
 \text{Luas } \triangle AOB &= \frac{1}{2} \times 32 \times 12 \\
 &= 192 \text{ cm}^2 \\
 \text{Luas tembereng } AQB &= 371 - 192 \\
 &= 179 \text{ cm}^2 \\
 \text{Luas semibulatan } APBR &= \frac{1}{2}(16^2)(3.142) \\
 &= 402.18 \text{ cm}^2 \\
 \text{Luas kawasan berlorek } AQBR &= 402.18 - 179 \\
 &= 223.18 \text{ cm}^2 \\
 \text{Luas sektor } TSUR &= \frac{1}{2}(12^2)(1.75) \\
 &= 126 \text{ cm}^2 \\
 \therefore \text{ Luas wau bulan} &= 223.18 + 126 \\
 &= 349.18 \text{ cm}^2
 \end{aligned}$$

2. Katakan jejari duit syiling ialah  $j$  cm.

$$\begin{aligned}
 \text{Luas } \triangle ABC &= \frac{1}{2}(2j)^2(\sin 60^\circ) \\
 &= \frac{1}{2}(4j^2)(0.866) \\
 &= 1.732j^2 \\
 60^\circ &= 60^\circ \times \frac{3.142}{180^\circ} \\
 &= 1.047 \text{ rad}
 \end{aligned}$$



$$\begin{aligned}
 \text{Luas tiga sektor duit syiling} &= 3\left[\frac{1}{2}j^2(1.047)\right] \\
 &= 1.571j^2 \\
 \text{Luas kawasan berwarna biru} &= 12.842 \text{ mm}^2 \\
 1.732j^2 - 1.571j^2 &= 12.842 \\
 0.161j^2 &= 12.842 \\
 j^2 &= \frac{12.842}{0.161} \\
 &= 79.764 \\
 j &= \sqrt{79.764} \\
 &= 8.931 \text{ mm}
 \end{aligned}$$

#### Latihan Formatif 1.4

$$\begin{aligned}
 \text{1. (a) (i) } 40^\circ &= 40^\circ \times \frac{3.142}{180^\circ} \\
 &= 0.698 \text{ rad} \\
 s_{PQ} &= 11(0.698) \\
 &= 7.678 \text{ cm} \\
 \therefore \text{ Perimeter sektor } POQ &= 2(11) + 7.678 \\
 &= 29.68 \text{ cm} \\
 \text{(ii) Luas sektor } POQ &= \frac{1}{2}(11^2)(0.698) \\
 &= 42.23 \text{ cm}^2
 \end{aligned}$$

$$\begin{aligned} \text{(iii) Isi padu sepotong kek} &= 8(42.23) \\ &= 337.84 \text{ cm}^3 \end{aligned}$$

$$\begin{aligned} \text{(b) Jisim sebiji kek} &= 9 \times 150 \\ &= 1\,350 \text{ gram} \end{aligned}$$

$$2. \text{ (a) } \tan \angle BEF = \frac{6}{4}$$

$$\angle BEF = 56^\circ 19'$$

$$\begin{aligned} \angle AEB &= 2(56^\circ 19') \\ &= 112^\circ 38' \end{aligned}$$

$$\begin{aligned} \angle AED = \angle BEC &= \frac{360^\circ - 2(112^\circ 38')}{2} \times \frac{3.142}{180^\circ} \\ &= 67^\circ 22' \times \frac{3.142}{180^\circ} \\ &= 1.176 \text{ rad} \end{aligned}$$

$$\begin{aligned} BE &= \sqrt{4^2 + 6^2} \\ &= \sqrt{52} \\ &= 7.211 \text{ m} \end{aligned}$$

$$\begin{aligned} s_{AD} = s_{BC} &= 7.211(1.176) \\ &= 8.48 \text{ m} \end{aligned}$$

$$\begin{aligned} \therefore \text{ Perimeter kolam renang} &= 2(12) + 2(8.48) \\ &= 40.96 \text{ m} \end{aligned}$$

$$\begin{aligned} \text{(b) Luas segi empat tepat } ABCD &= 12(8) \\ &= 96 \text{ m}^2 \end{aligned}$$

$$\begin{aligned} \text{Luas tembereng } AD &= \text{Luas sektor } AED - \text{Luas } \triangle AED \\ &= \frac{1}{2}(7.211^2)(1.176) - \frac{1}{2}(7.211)(7.211)(\sin 67^\circ 22') \\ &= 30.575 - 23.997 \\ &= 6.578 \text{ m}^2 \end{aligned}$$

$$\begin{aligned} \therefore \text{ Luas lantai kolam renang} &= 96 + 2(6.578) \\ &= 109.156 \text{ m}^2 \end{aligned}$$

$$\begin{aligned} \text{(c) Isi padu air} &= 109.156(1.5) \\ &= 163.734 \text{ m}^3 \end{aligned}$$

$$3. \text{ (a) } \cos \angle POS = \frac{36}{46}$$

$$\angle POS = 38^\circ 30'$$

$$\begin{aligned} \angle POQ &= 2(38^\circ 30') \\ &= 77^\circ \end{aligned}$$

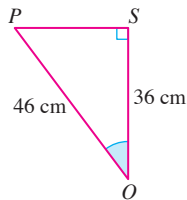
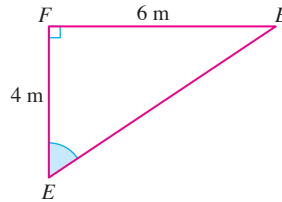
$$\begin{aligned} \theta &= 77^\circ \times \frac{3.142}{180^\circ} \\ &= 1.344 \text{ rad} \end{aligned}$$

$$\begin{aligned} \text{(b) } s_{PRQ} &= 46(1.344) \\ &= 61.824 \text{ cm} \end{aligned}$$

$$\begin{aligned} \text{(c) Luas sektor } POQ &= \frac{1}{2}(46^2)(1.344) \\ &= 1\,421.952 \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} \text{Luas } \triangle POQ &= \frac{1}{2}(46)(46)(\sin 77^\circ) \\ &= 1\,030.884 \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} \therefore \text{ Luas keratan rentas kayu} &= 1\,421.952 - 1\,030.884 \\ &= 391.068 \text{ cm}^2 \end{aligned}$$



4. (a) (i)  $60^\circ = 60^\circ \times \frac{3.142}{180^\circ}$   
 $= 1.047 \text{ rad}$   
 $s_{AB} = 30(1.047)$   
 $= 31.41 \text{ cm}$
- (ii) Luas sektor  $COD = \frac{1}{2}(30^2)(1.047)$   
 $= 471.15 \text{ cm}^2$
- (iii) Perimeter tembereng  $EF = 31.41 + 30$   
 $= 61.41 \text{ cm}$
- (iv) Luas  $\triangle EOF = \frac{1}{2}(30)(30)(\sin 60^\circ)$   
 $= 389.71 \text{ cm}^2$   
 Luas tembereng  $EF = 471.15 - 389.71$   
 $= 81.44 \text{ cm}^2$
- (b) Isi padu konkrit  $= 3(471.15)(5)$   
 $= 7\,067.25 \text{ cm}^3$
- (c) Jumlah kos konkrit  $= 7\,067.25(0.50)$   
 $= \text{RM}3\,533.63$

#### Latihan Sumatif

1. (a) Luas  $= 60 \text{ cm}^2$   
 $\frac{1}{2}(10^2)\theta = 60$   
 $50\theta = 60$   
 $\theta = \frac{60}{50}$   
 $= 1.2 \text{ rad}$
- (b)  $s_{KL} = 10(1.2)$   
 $= 12 \text{ cm}$   
 $\therefore$  Perimeter sektor  $KOL = 12 + 2(10)$   
 $= 32 \text{ cm}$
2. (a)  $2 \text{ rad} = 2 \times \frac{180^\circ}{3.142}$   
 $= 114^\circ 35'$   
 $CD^2 = 3^2 + 3^2 - 2(3)(3)(\cos 114^\circ 35')$   
 $CD = 5.049 \text{ cm}$   
 $s_{AB} = 6(2)$   
 $= 12 \text{ cm}$   
 $\therefore$  Perimeter kawasan berlorek  $= 2(3) + 5.049 + 12$   
 $= 23.049 \text{ cm}$
- (b) Luas sektor  $AOB = \frac{1}{2}(6^2)(2)$   
 $= 36 \text{ cm}^2$   
 Luas  $\triangle COD = \frac{1}{2}(3)(3)(\sin 114^\circ 35')$   
 $= 4.092 \text{ cm}^2$   
 $\therefore$  Luas kawasan berlorek  $= 36 - 4.092$   
 $= 31.908 \text{ cm}^2$
3. (a) Luas kawasan berlorek  $= 10.8 \text{ cm}^2$   
 $\frac{1}{2}(6^2)\theta - \frac{1}{2}(4^2)\theta = 10.8$   
 $18\theta - 8\theta = 10.8$   
 $10\theta = 10.8$   
 $\theta = \frac{10.8}{10}$   
 $= 1.08 \text{ rad}$



$$(b) \ s_{PQ} = 4(1.08) \\ = 4.32 \text{ cm}$$

$$\frac{OP}{PR} = \frac{2}{1} = \frac{4}{2}$$

$$PR = 2 \text{ cm}$$

$$OR = 2 + 4 \\ = 6 \text{ cm}$$

$$s_{RS} = 6(1.08) \\ = 6.48 \text{ cm}$$

$$\therefore \text{Perimeter kawasan berlorek} = 2(2) + 4.32 + 6.48 \\ = 14.8 \text{ cm}$$

4. (a) Perimeter = 18 cm

$$2j + j\theta = 18$$

$$\text{Luas} = 8 \text{ cm}^2$$

$$\frac{1}{2}j^2\theta = 8$$

- (b)  $2j + j\theta = 18$

$$j(2 + \theta) = 18$$

$$j = \frac{18}{2 + \theta} \dots \textcircled{1}$$

$$\frac{1}{2}j^2\theta = 8 \dots \textcircled{2}$$

Gantikan  $\textcircled{1}$  ke dalam  $\textcircled{2}$ :

$$\frac{1}{2}\theta\left(\frac{18}{2 + \theta}\right)^2 = 8$$

$$\frac{1}{2}\theta\left(\frac{324}{4 + 4\theta + \theta^2}\right) = 8$$

$$162\theta = 8(4 + 4\theta + \theta^2)$$

$$162\theta = 32 + 32\theta + 8\theta^2$$

$$8\theta^2 - 130\theta + 32 = 0$$

$$4\theta^2 - 65\theta + 16 = 0$$

$$(4\theta - 1)(\theta - 16) = 0$$

$$\theta = \frac{1}{4} \text{ atau } \theta = 16 \text{ (abaikan)}$$

$$\text{Apabila } \theta = \frac{1}{4}, j = \frac{18}{2 + \frac{1}{4}}$$

$$= \frac{18}{\left(\frac{9}{4}\right)}$$

$$= 8$$

$$\therefore j = 8 \text{ cm dan } \theta = \frac{1}{4} \text{ rad}$$

5. (a)  $\sin \angle PCR = \frac{4}{5}$

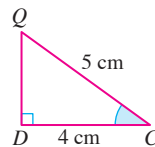
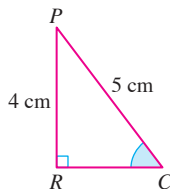
$$\angle PCR = 53^\circ 8'$$

$$\cos \angle DCQ = \frac{4}{5}$$

$$\angle DCQ = 36^\circ 52'$$

$$\therefore \angle PCQ = 53^\circ 8' - 36^\circ 52' \\ = 16^\circ 16'$$

$$(b) \ DQ = PB = \sqrt{5^2 - 4^2} \\ = \sqrt{9} \\ = 3 \text{ cm}$$



$$\begin{aligned}\angle PCQ &= 16^\circ 16' \times \frac{3.142}{180^\circ} \\ &= 0.2839 \text{ rad}\end{aligned}$$

$$\begin{aligned}s_{PQ} &= 5(0.2839) \\ &= 1.42 \text{ cm}\end{aligned}$$

$$\begin{aligned}\therefore \text{Perimeter kawasan berlorek } APQ &= 2(4 - 3) + 1.42 \\ &= 3.42 \text{ cm}\end{aligned}$$

$$\begin{aligned}\text{(c) Luas segi empat sama } ABCD &= 4(4) \\ &= 16 \text{ cm}^2\end{aligned}$$

$$\begin{aligned}\text{Luas } \triangle DCQ &= \text{Luas } \triangle CBP \\ &= \frac{1}{2}(3)(4) \\ &= 6 \text{ cm}^2\end{aligned}$$

$$\begin{aligned}\text{Luas sektor } PCQ &= \frac{1}{2}(5^2)(0.2839) \\ &= 3.55 \text{ cm}^2\end{aligned}$$

$$\begin{aligned}\therefore \text{Luas kawasan berlorek } APQ &= 16 - 2(6) - 3.55 \\ &= 0.45 \text{ cm}^2\end{aligned}$$

$$\begin{aligned}6. \text{ (a) } s_{PR} &= 10\left(\frac{\pi}{2}\right) \\ &= 15.71 \text{ cm} \\ s_{PQ} &= \frac{2}{5} \times 15.71 \\ 10\theta &= 6.284 \\ \theta &= \frac{6.284}{10} \\ &= 0.6284 \text{ rad}\end{aligned}$$

$$\begin{aligned}\text{(b) } \angle QOR &= \left(\frac{\pi}{2} - 0.6284\right) \times \frac{180^\circ}{3.142} \\ &= 0.9426 \times \frac{180^\circ}{3.142} \\ &= 54^\circ\end{aligned}$$

$$\begin{aligned}\text{Luas sektor } POQ &= \frac{1}{2}(10^2)(0.6284) \\ &= 31.42 \text{ cm}^2\end{aligned}$$

$$\begin{aligned}\text{Luas } \triangle QOR &= \frac{1}{2}(10)(10)(\sin 54^\circ) \\ &= 40.45 \text{ cm}^2\end{aligned}$$

$$\begin{aligned}\therefore \text{Luas kawasan berwarna} &= 31.42 + 40.45 \\ &= 71.87 \text{ cm}^2\end{aligned}$$

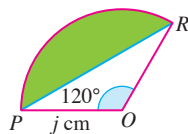
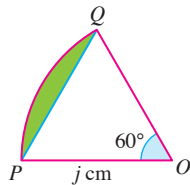
$$\begin{aligned}7. \quad 60^\circ &= 60^\circ \times \frac{3.142}{180^\circ} \\ &= 1.047 \text{ rad}\end{aligned}$$

$$\begin{aligned}\text{Luas sektor } POQ &= \frac{1}{2}j^2(1.047) \\ &= 0.524j^2\end{aligned}$$

$$\begin{aligned}\text{Luas } \triangle POQ &= \frac{1}{2}j^2(\sin 60^\circ) \\ &= 0.433j^2\end{aligned}$$

$$\begin{aligned}\text{Luas tembereng } PQ &= 0.524j^2 - 0.433j^2 \\ &= 0.091j^2\end{aligned}$$

$$\begin{aligned}120^\circ &= 120^\circ \times \frac{3.142}{180^\circ} \\ &= 2.095 \text{ rad}\end{aligned}$$



$$\begin{aligned}\text{Luas sektor } POR &= \frac{1}{2}j^2(2.095) \\ &= 1.048j^2\end{aligned}$$

$$\begin{aligned}\text{Luas } \triangle POR &= \frac{1}{2}j^2(\sin 120^\circ) \\ &= \frac{1}{2}j^2(0.866) \\ &= 0.433j^2\end{aligned}$$

$$\begin{aligned}\therefore \text{Luas kawasan berlorek} &= 1.048j^2 - 0.433j^2 - 2(0.091j^2) \\ &= 0.433j^2\end{aligned}$$

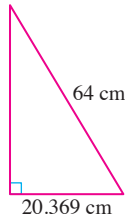
$$\begin{aligned}8. \quad s_{vw} &= 64(2) \\ &= 128 \text{ cm}\end{aligned}$$

$$2\pi j = 128$$

$$j = \frac{128}{2\pi}$$

$$\begin{aligned}&= \frac{128}{2(3.142)} \\ &= 20.369 \text{ cm}\end{aligned}$$

$$\begin{aligned}\therefore \text{Tinggi kon} &= \sqrt{64^2 - 20.369^2} \\ &= 60.67 \text{ cm}\end{aligned}$$



$$\begin{aligned}9. \quad (a) \quad \frac{AP}{16} &= \sin 30^\circ \\ AP &= 16(\sin 30^\circ) \\ &= 8 \text{ cm}\end{aligned}$$

$$\begin{aligned}(b) \quad BP &= \sqrt{16^2 - 8^2} \\ &= 13.86 \text{ cm}\end{aligned}$$

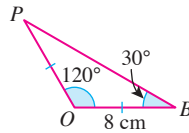
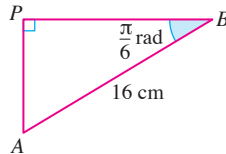
$$\begin{aligned}\text{Luas } \triangle ABP &= \frac{1}{2}(13.86)(8) \\ &= 55.44 \text{ cm}^2\end{aligned}$$

$$\begin{aligned}(c) \quad \angle AOP &= (180^\circ - 120^\circ) \times \frac{3.142}{180^\circ} \\ &= 60^\circ \times \frac{3.142}{180^\circ} \\ &= 1.047 \text{ rad}\end{aligned}$$

$$\begin{aligned}\text{Luas sektor } AOP &= \frac{1}{2}(8^2)(1.047) \\ &= 33.504 \text{ cm}^2\end{aligned}$$

$$\begin{aligned}\text{Luas } \triangle AOP &= \frac{1}{2}(8)(8)(\sin 60^\circ) \\ &= 27.713 \text{ cm}^2\end{aligned}$$

$$\begin{aligned}\therefore \text{Luas kawasan berlorek} &= 33.504 - 27.713 \\ &= 5.791 \text{ cm}^2\end{aligned}$$



$$10. \quad (a) \quad A(0, 8), B(6, 0), C(7, 7)$$

$$\begin{aligned}\text{Luas } \triangle ABC &= \frac{1}{2} \begin{vmatrix} 0 & 6 & 7 & 0 \\ 8 & 0 & 7 & 8 \end{vmatrix} \\ &= \frac{1}{2}(42 + 56 - 48) \\ &= 25 \text{ unit}^2\end{aligned}$$

$$\begin{aligned}(b) \quad d_{AC} &= \sqrt{(7-0)^2 + (7-8)^2} \\ &= \sqrt{50} \text{ unit}\end{aligned}$$

$$\begin{aligned}d_{BC} &= \sqrt{(7-6)^2 + (7-0)^2} \\ &= \sqrt{50} \text{ unit}\end{aligned}$$

$$d_{AB} = \sqrt{(0-8)^2 + (6-0)^2}$$

$$= \sqrt{100}$$

$$= 10 \text{ unit}$$

$$10^2 = (\sqrt{50})^2 + (\sqrt{50})^2 - 2(\sqrt{50})(\sqrt{50})(\cos \angle ACB)$$

$$\cos \angle ACB = \frac{(\sqrt{50})^2 + (\sqrt{50})^2 - 10^2}{2(\sqrt{50})(\sqrt{50})}$$

$$\cos \angle ACB = 0$$

$$\angle ACB = 90^\circ$$

$$(c) \angle ACB = \frac{\pi}{2} \text{ rad}$$

$$\text{Luas sektor } ACB = \frac{1}{2}(\sqrt{50})^2\left(\frac{\pi}{2}\right)$$

$$= 39.275 \text{ unit}^2$$

$$\text{Luas } \triangle ACB = \frac{1}{2}(\sqrt{50})(\sqrt{50})(\sin 90^\circ)$$

$$= 25 \text{ unit}^2$$

$$\text{Luas tembereng } AEB = 39.275 - 25$$

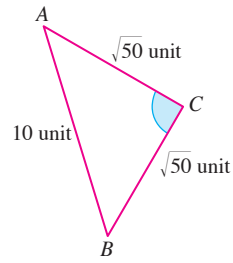
$$= 14.275 \text{ unit}^2$$

$$\text{Luas semibulatan} = \frac{1}{2}(5^2)(3.142)$$

$$= 39.275 \text{ unit}^2$$

$$\therefore \text{Luas kawasan berlerek} = 39.275 - 14.275$$

$$= 25 \text{ unit}^2$$



$$11. (a) \cos \angle DFH = \frac{1}{4}$$

$$\angle DFH = 75^\circ 31'$$

$$\angle BOD = 2(75^\circ 31') \times \frac{3.142}{180^\circ}$$

$$= 151^\circ 2' \times \frac{3.142}{180^\circ}$$

$$= 2.636 \text{ rad}$$

$$\therefore \theta = 2.636 \text{ rad}$$

$$(b) \text{Luas sektor } BFD = \frac{1}{2}(4^2)(2.636)$$

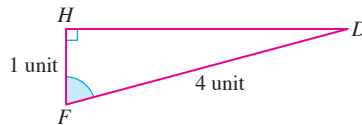
$$= 21.09 \text{ unit}^2$$

$$(c) \text{Luas } \triangle BFD = \frac{1}{2}(4)(4)(\sin 151^\circ 2')$$

$$= 3.874 \text{ unit}^2$$

$$\therefore \text{Luas kawasan berlerek} = 21.09 - 2(3.874)$$

$$= 13.34 \text{ unit}^2$$



$$12. (a) 1 \text{ rad} = 1 \times \frac{180^\circ}{3.142}$$

$$= 57^\circ 17'$$

$$JM^2 = 7^2 + 7^2 - 2(7)(7)(\cos 57^\circ 17')$$

$$JM = 6.711 \text{ cm}$$

$\therefore$  Jejari bagi sektor bulatan JKLM ialah 6.711 cm.

$$(b) s_{JM} = 7(1)$$

$$= 7 \text{ cm}$$

$$s_{JKL} = 6.711(3.8)$$

$$= 25.50 \text{ cm}$$

$$\therefore \text{Perimeter rantau berlerek} = 2(7) + 25.50$$

$$= 39.50 \text{ cm}$$

$$(c) \text{Luas sektor } JAM = \frac{1}{2}(7^2)(1)$$

$$= 24.5 \text{ cm}^2$$

$$(d) \text{ Luas sektor } JKL = \frac{1}{2}(6.711^2)(3.8) \\ = 85.571 \text{ cm}^2$$

$$\text{Luas tembereng } JM = 24.5 - \frac{1}{2}(7)(7)(\sin 57^\circ 17') \\ = 24.5 - 20.613 \\ = 3.887 \text{ cm}^2$$

$$\therefore \text{ Luas rantau berlorek} = 85.571 - 2(3.887) \\ = 77.80 \text{ cm}^2$$

$$13. (a) \frac{2}{OP} = \sin 30^\circ$$

$$OP = \frac{2}{\sin 30^\circ} \\ = 4 \text{ cm}$$

$$\text{Jejari sektor } PQR = 4 + 2 \\ = 6 \text{ cm}$$

$$s_{QR} = r\theta \\ = 6(1.047) \\ = 6.282 \text{ cm}$$

$$(b) AP = \sqrt{4^2 - 2^2} \\ = 3.464 \text{ cm}$$

$$\text{Luas } \triangle APO = \frac{1}{2}(3.464)(2) \\ = 3.464 \text{ cm}^2$$

$$\text{Sudut sektor major } AOB = (360^\circ - 120^\circ) \times \frac{3.142}{180^\circ} \\ = 240^\circ \times \frac{3.142}{180^\circ} \\ = 4.189 \text{ rad}$$

$$\text{Luas sektor major } AOB = \frac{1}{2}(2^2)(4.189) \\ = 8.378 \text{ cm}^2$$

$$\text{Luas sektor } PQR = \frac{1}{2}(6^2)(1.047) \\ = 18.846 \text{ cm}^2$$

$$\therefore \text{ Luas kawasan berlorek} = 18.846 - 2(3.464) - 8.378 \\ = 3.54 \text{ cm}^2$$

$$14. (a) \text{ Luas sektor } AOB = 243 \text{ m}^2$$

$$\frac{1}{2}(18^2)\theta = 243$$

$$162\theta = 243$$

$$\theta = \frac{243}{162}$$

$$= 1.5 \text{ rad}$$

$$(b) 1.5 \text{ rad} = 1.5 \times \frac{180^\circ}{3.142} \\ = 85^\circ 56'$$

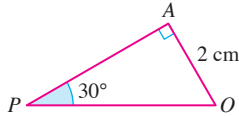
$$AB^2 = 18^2 + 18^2 - 2(18)(18)(\cos 85^\circ 56')$$

$$AB = 24.537 \text{ m}$$

$$s_{ACB} = 12.269(\pi) \\ = 38.55 \text{ m}$$

$$s_{AB} = 18(1.5) \\ = 27 \text{ m}$$

$$\therefore \text{ Panjang pagar} = 38.55 + 27 \\ = 65.55 \text{ m}$$



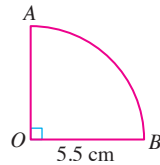
$$\begin{aligned}
 \text{(c) Luas tembereng } AB &= 243 - \frac{1}{2}(18)(18)(\sin 85^\circ 56') \\
 &= 243 - 161.592 \\
 &= 81.41 \text{ m}^2
 \end{aligned}$$

$$\begin{aligned}
 \text{Luas semibulatan } ACB &= \frac{1}{2}(12.269^2)(\pi) \\
 &= 236.48 \text{ m}^2
 \end{aligned}$$

$$\begin{aligned}
 \therefore \text{Luas kawasan pokok bunga} &= 236.48 - 81.41 \\
 &= 155.07 \text{ m}^2
 \end{aligned}$$

$$\begin{aligned}
 15. \quad s_{AB} &= j\theta \\
 &= 5.5\left(\frac{\pi}{2}\right) \\
 &= 8.641 \text{ cm}
 \end{aligned}$$

$$\begin{aligned}
 \therefore \text{Panjang tali} &= 4(11) + 4(8.641) \\
 &= 44 + 34.564 \\
 &= 78.564 \text{ cm}
 \end{aligned}$$



$$16. \text{ (a) } \pi j = 110$$

$$\begin{aligned}
 j &= \frac{110}{3.142} \\
 &= 35 \text{ cm (tertunjuk)}
 \end{aligned}$$

$$\begin{aligned}
 \text{(b) (i) } 118^\circ &= 118^\circ \times \frac{3.142}{180^\circ} \\
 &= 2.06 \text{ rad}
 \end{aligned}$$

$$\begin{aligned}
 \text{Luas sektor } POQ &= \frac{1}{2}(35^2)(2.06) \\
 &= 1\,261.75 \text{ cm}^2
 \end{aligned}$$

$$\begin{aligned}
 \text{(ii) Luas } \triangle POQ &= \frac{1}{2}(35)(35)(\sin 118^\circ) \\
 &= 540.805 \text{ cm}^2
 \end{aligned}$$

$$\begin{aligned}
 \therefore \text{Luas tembereng berlorek} &= 1\,261.75 - 540.805 \\
 &= 720.945 \text{ cm}^2
 \end{aligned}$$

$$\begin{aligned}
 \text{(iii) Isi padu air} &= 720.945(200) \\
 &= 144\,189 \text{ cm}^3 \\
 &= 144.189 \text{ liter}
 \end{aligned}$$

$$\begin{aligned}
 17. \text{ (a) } 40^\circ &= 40^\circ \times \frac{3.142}{180^\circ} \\
 &= 0.698 \text{ rad}
 \end{aligned}$$

$$\begin{aligned}
 s_{AB} &= 3(0.698) \\
 &= 2.094 \text{ cm}
 \end{aligned}$$

$$\begin{aligned}
 \text{(b) Luas sektor } AOB &= \frac{1}{2}(3^2)(0.698) \\
 &= 3.141 \text{ cm}^2
 \end{aligned}$$

$$\begin{aligned}
 \text{(c) Isi padu prisma} &= 3.141(4) \\
 &= 12.564 \text{ cm}^3
 \end{aligned}$$

$$\begin{aligned}
 \text{(d) Luas satah } ACEO &= 3(4) \\
 &= 12 \text{ cm}^2
 \end{aligned}$$

$$\begin{aligned}
 \text{Luas permukaan melengkung } ABDC &= 2.094(4) \\
 &= 8.376 \text{ cm}^2
 \end{aligned}$$

$$\begin{aligned}
 \therefore \text{Jumlah luas permukaan} &= 2(12) + 8.376 + 2(3.141) \\
 &= 38.658 \text{ cm}^2
 \end{aligned}$$

18. (a)  $60^\circ = 60^\circ \times \frac{3.142}{180^\circ}$   
 $= 1.047 \text{ rad}$   
 Panjang setiap lengkok  $= 5(1.047)$   
 $= 5.235 \text{ cm}$   
 $\therefore$  Perimeter kawasan berwarna  $= 12(5.235)$   
 $= 62.82 \text{ cm}$

(b) Luas satu sektor  $= \frac{1}{2}(5^2)(1.047)$   
 $= 13.09 \text{ cm}^2$   
 Luas satu segi tiga  $= \frac{1}{2}(5)(5)(\sin 60^\circ)$   
 $= 10.83 \text{ cm}^2$   
 Luas satu tembereng  $= 13.09 - 10.83$   
 $= 2.26 \text{ cm}^2$   
 $\therefore$  Luas kawasan berwarna  $= 12(2.26)$   
 $= 27.12 \text{ cm}^2$