

Uji Pemahaman Halaman 247

A. Pilihan Ganda

1. Berdasarkan aturan sinus

$$\frac{BC}{\sin(\angle BAC)} = \frac{AC}{\sin(\angle ABC)}$$

$$\Rightarrow AC = \frac{BC}{\sin(\angle BAC)} \times \sin(\angle ABC)$$

$$= \frac{18}{\sin 110^\circ} \times \sin 20^\circ$$

$$= \frac{18}{\sin(180^\circ - 70^\circ)} \times \sin 20^\circ$$

$$= \frac{18}{\sin 70^\circ} \times \sin 20^\circ$$

$$= \frac{18}{\sin(90^\circ - 20^\circ)} \times \sin 20^\circ$$

$$= \frac{18}{\cos 20^\circ} \times \sin 20^\circ =$$

$$= 18 \tan 20^\circ$$

Jawaban: A.

2. Berdasarkan aturan sinus

$$\frac{a}{\sin 30^\circ} = \frac{b}{\sin \alpha}$$

$$\Rightarrow \sin \alpha = b \times \frac{\sin 30^\circ}{a}$$

$$= \frac{b}{a} \times \sin 30^\circ$$

$$= \frac{b}{a} \times \frac{1}{2}$$

$$= \frac{b}{2a}$$

Jawaban: E.

3. Berdasarkan aturan sinus

$$\frac{PQ}{\sin(\angle R)} = \frac{QR}{\sin(\angle P)}$$

$$\Rightarrow QR = \frac{PQ}{\sin(\angle R)} \times \sin(\angle P)$$

$$= \frac{10\sqrt{2}}{\sin 45^\circ} \times \sin(180^\circ - (45^\circ + 105^\circ))$$

$$= \frac{10\sqrt{2}}{\frac{1}{2}\sqrt{2}} \times \sin 30^\circ$$

$$= \frac{10}{\frac{1}{2}} \times \frac{1}{2}$$

$$= 10 \text{ cm}$$

Jawaban: C

4. Berdasarkan aturan sinus

$$\frac{PR}{\sin(\angle Q)} = \frac{QR}{\sin(\angle P)}$$

$$\Rightarrow \sin(\angle P) = \frac{QR \times \sin(\angle Q)}{PR}$$

$$= \frac{8 \times \sin 60^\circ}{4\sqrt{6}}$$

$$= \frac{4\sqrt{6}}{4\sqrt{6} \times \sqrt{3}} \times \frac{1}{2}\sqrt{3}$$

$$= \frac{1}{2}\sqrt{2}$$

$$\text{karena } QR = 8 = 4\sqrt{4} < 4\sqrt{6} = PR$$

$$\Rightarrow \angle P = 45^\circ$$

$$\Rightarrow \sin \angle P + \cos \angle P = \frac{1}{2}\sqrt{2} + \frac{1}{2}\sqrt{2} = \sqrt{2}$$

① Jawaban: B.

5. Sudut ACB lancip

Berdasarkan aturan sinus

$$\frac{AB}{\sin \angle ACB} = \frac{BC}{\sin \angle BAC}$$

$$\Rightarrow \sin \angle ACB = \frac{AB}{BC} \times \sin \angle BAC$$

$$= \frac{5\sqrt{2}}{6} \times \sin 45^\circ$$

$$= \frac{5\sqrt{2}}{6} \times \frac{1}{2} \sqrt{2} = \frac{5}{6}$$

$$\Rightarrow \cos \angle ACB = \frac{\sqrt{6^2 - 5^2}}{6} = \frac{\sqrt{11}}{6} = \frac{1}{6} \sqrt{11}$$

Jawaban: C

B. Isian

1. Berdasarkan aturan sinus

$$\frac{BC}{\sin \angle BAC} = \frac{AC}{\sin \angle ABC}$$

$$\Leftrightarrow \sin \angle ABC = \frac{AC}{BC} \times \sin \angle BAC$$

$$= \frac{10}{6} \times \sin 30^\circ$$

$$= \frac{5}{3} \times \frac{1}{2} = \frac{5}{6} = \frac{\sqrt{25}}{6}$$

• Untuk membuktikan ada 2 solusi dari besaran sudut $\angle ABC$, maka perlu membuktikan

□ $AC > BC$ ✓ (dari soal).

□ $\angle ABC + \angle BAC < 180^\circ$

$$\text{Karena } \sin 45^\circ = \sin 135^\circ = \frac{1}{2} \sqrt{2} = \frac{\sqrt{18}}{6} < \frac{\sqrt{25}}{6}$$

$$\Rightarrow \angle ABC + \angle BAC < 135^\circ + 30^\circ = 165^\circ$$

$$\Rightarrow \angle ABC + \angle BAC < 180^\circ \checkmark$$

(2)

2. $\angle NMB = 63^\circ$ dan $\angle BNM = 90^\circ$

$$\Rightarrow \angle MBN = 180^\circ - (63 + 90)^\circ = 27^\circ$$

$$\circ \angle MBN = \angle MBA = 27^\circ \text{ dan } \angle BAM = 75^\circ$$

$$\Rightarrow \angle AMB = 180^\circ - (27 + 75)^\circ = 78^\circ$$

• Berdasarkan aturan sinus

$$\frac{AB}{\sin \angle AMB} = \frac{MA}{\sin \angle MBA}$$

$$MA = \frac{\sin \angle MBA}{\sin \angle AMB} \times AB$$

$$= \left(330 \times \frac{\sin 27^\circ}{\sin 78^\circ} \right) \text{ m}$$

3. Jarak tempuh Agus = $AC = 8 \times t$, dan jarak tempuh Bimo = $BC = v \times t$, dimana v = kecepatan Bimo (m/menit), dan t = waktu tempuh keduanya (.....).

• Berdasarkan aturan sinus

$$\frac{AC}{\sin \angle ABC} = \frac{BC}{\sin \angle BAC}$$

$$\Leftrightarrow \frac{8t}{\sin 45^\circ} = \frac{vt}{\sin 60^\circ}$$

$$\Leftrightarrow v = \frac{\sin 60^\circ}{\sin 45^\circ} \times 8 = \frac{\frac{1}{2} \sqrt{3}}{\frac{1}{2} \sqrt{2}} \times 8 = \sqrt{6} \text{ m/menit}$$

$$= \sqrt{6} \text{ m/menit}$$

4. misalkan kecepatan untuk naik dan kecepatan turun samadengan :
3 km/jam.

$$\begin{aligned} \Rightarrow TE &= 3 \text{ km/jam} \times 2,5 \text{ jam} \\ &= 7,5 \text{ km, dan} \\ TD &= 3 \text{ km/jam} \times 2 \text{ jam} \\ &= 6 \text{ km} \end{aligned}$$

• Berdasarkan aturan sinus

$$\Rightarrow \frac{TE}{\sin \angle D} = \frac{TD}{\sin \angle E}$$

$$\begin{aligned} \Rightarrow \sin \angle E &= \frac{TD}{TE} \times \sin \angle D \\ &= \frac{6}{7,5} \times \sin 21^\circ \\ &= \frac{2 \times 3}{2,5 \times 3} \times \frac{4}{4} \times \sin 21^\circ \\ &= \frac{8}{10} \times \sin 21^\circ \\ &= 0,8 \sin 21^\circ \end{aligned}$$

$$\begin{aligned} \Rightarrow \angle E &= \sin^{-1}(0,8 \sin 21^\circ) \\ &= 16,66^\circ \text{ (kalkulator)} \end{aligned}$$

$$5. \angle OBA = \angle BAO = x$$

$$\Rightarrow \angle AOB + \angle OBA + \angle BAO = 180^\circ$$

$$\Rightarrow 120^\circ + 2x = 180^\circ$$

$$\Rightarrow x = \frac{(180 - 120)^\circ}{2} = \frac{60^\circ}{2} = 30^\circ$$

• Aturan sinus

$$\frac{AB}{\sin \angle AOB} = \frac{OA}{\sin \angle OBA}$$

$$\Rightarrow OA = \frac{\sin \angle OBA}{\sin \angle AOB} \times AB = \frac{\sin 30^\circ}{\sin 120^\circ} \times 6$$

$$\Rightarrow OA = \frac{\frac{1}{2} \times 1}{\frac{1}{2} \sqrt{3}} \times 2 \times \sqrt{3} \times \sqrt{3} = 2\sqrt{3}$$

• Perhatikan

$$\cos \angle BAO = \cos 30^\circ = \frac{1}{2} \sqrt{3} = \frac{2\sqrt{3}}{4}$$

$$\text{dan } \frac{OA}{AB} = \frac{2\sqrt{3}}{4}$$

$$\therefore \angle BAO = 90^\circ$$

Uji Pemahaman Halaman 256

A. Pilihan Ganda

1. Sudut terbesar (θ) diapit oleh 2 sisi terkecil (12 cm dan 12 cm)

⇒ Aturan Kosinus di θ

$$(12\sqrt{3})^2 = 12^2 + 12^2 - 2 \cdot 12 \cdot 12 \cdot \cos \theta$$

$$\Leftrightarrow 3 \cdot 12^2 = 2 \cdot 12^2 - 2 \cdot 12^2 \cdot \cos \theta$$

$$\Leftrightarrow 2 \cdot 12^2 \cdot \cos \theta = (3-2) \cdot 12^2$$

$$\Leftrightarrow \cos \theta = \frac{12^2}{2 \cdot 12^2} = \frac{1}{2}$$

$$\therefore \theta = 60^\circ$$

Jawaban: A.

2. Aturan kosinus di $\angle A$

$$\Rightarrow BC^2 = AC^2 + AB^2 - 2 \cdot AC \cdot AB \cdot \cos A$$

$$\Leftrightarrow 7^2 = 8^2 + 9^2 - 2 \cdot 8 \cdot 9 \cdot \cos A$$

$$\Leftrightarrow 49 = 64 + 81 - 144 \cos A$$

$$\Leftrightarrow 144 \cos A = 64 + 81 - 49 = 96$$

$$\Leftrightarrow \cos A = \frac{96}{144} = \frac{8 \times 12}{12 \times 12} = \frac{8}{12} = \frac{2}{3}$$

$$\Rightarrow \sin A = \frac{\sqrt{3^2 - 2^2}}{3} = \frac{\sqrt{5}}{3} = \frac{1}{3} \sqrt{5}$$

Jawaban: B.

3. $\angle PQR = \alpha$

$$\Rightarrow PR^2 = PQ^2 + QR^2 - 2 \cdot PQ \cdot QR \cdot \cos \angle PQR$$

$$\Leftrightarrow 8^2 = 12^2 + (4\sqrt{7})^2 - 2 \cdot 12 \cdot 4\sqrt{7} \cdot \cos \alpha$$

$$\Leftrightarrow 64 = 144 + 102 - 96\sqrt{7} \cos \alpha$$

$$\Leftrightarrow 96\sqrt{7} \cos \alpha = 182$$

$$\Leftrightarrow \cos \alpha = \frac{182}{96\sqrt{7}} = \frac{96\sqrt{4}}{96\sqrt{7}} = \frac{\sqrt{4}}{\sqrt{7}}$$

$$\Rightarrow \tan \alpha = \frac{\sqrt{7-4}}{\sqrt{7}} = \frac{\sqrt{3}}{\sqrt{4}} = \frac{1}{2} \sqrt{3}$$

Jawaban: B

$$\begin{aligned} 4. BC^2 &= AB^2 + AC^2 - 2 \cdot AB \cdot AC \cdot \cos \angle A \\ &= 6^2 + 10^2 - 2 \cdot 6 \cdot 10 \cdot \cos 60^\circ \\ &= 136 - 2 \cdot 60 \cdot \frac{1}{2} \end{aligned}$$

$$BC^2 = 76$$

$$\Rightarrow BC = \sqrt{76} = \sqrt{4 \times 19} = 2\sqrt{19} \text{ cm}$$

Jawaban: A.

5. Tempat berangkat = titik O

Posisi mobil A setelah 2 jam = titik A.

Posisi mobil B setelah 2 jam = titik B.

⇒ Jarak mobil A & B setelah 2 jam = AB

$$\begin{aligned} a. AB^2 &= OA^2 + OB^2 - 2 \cdot OA \cdot OB \cdot \cos \angle AOB \\ &= (50 \times 2)^2 + (60 \times 2)^2 \end{aligned}$$

$$- 2 \times (50 \times 2) \times (60 \times 2) \cdot \cos 120^\circ$$

$$= 10.000 + 14.400$$

$$- 2 \times 100 \times 120 \times \left(-\frac{1}{2}\right)$$

$$= 24.400 + 12.000$$

$$= 36.400$$

$$AB^2 = 100 \times 4 \times 91$$

$$\Rightarrow AB = 10 \times 2 \times \sqrt{91} = 20\sqrt{91}$$

Jawaban: A.

B. Uraian

1). Berdasarkan aturan kosinus

$$\begin{aligned} a). c^2 &= a^2 + b^2 - 2 \cdot a \cdot b \cdot \cos \angle C \\ &= 5^2 + 6^2 - 2 \cdot 5 \cdot 6 \cdot \cos 45^\circ \\ &= 25 + 36 - 2 \cdot 30 \cdot \frac{1}{2} \sqrt{2} \\ c^2 &= 61 - 30\sqrt{2} \\ c &= \sqrt{61 - 30\sqrt{2}} = 4,3 \text{ (kalkulator)} \end{aligned}$$

$$\begin{aligned} b). a^2 &= b^2 + c^2 - 2 \cdot b \cdot c \cdot \cos \angle A \\ &= 8^2 + 6^2 - 2 \cdot 8 \cdot 6 \cdot \cos 30^\circ \\ &= 64 + 36 - 2 \cdot 48 \cdot \frac{1}{2} \sqrt{3} \\ a^2 &= 100 - 48\sqrt{3} \\ a &= \sqrt{100 - 48\sqrt{3}} = 4,1 \text{ (kalkulator)} \end{aligned}$$

$$\begin{aligned} c). k^2 &= m^2 + l^2 - 2 \cdot m \cdot l \cdot \cos \angle K \\ &= 4^2 + 4^2 - 2 \cdot 4 \cdot 4 \cdot \cos 120^\circ \\ &= 32 - 2 \cdot 16 \cdot \left(-\frac{1}{2}\right) \\ &= 16 \\ k &= 4. \end{aligned}$$

2). Berdasarkan aturan kosinus

$$\begin{aligned} a). c^2 &= a^2 + b^2 - 2 \cdot a \cdot b \cdot \cos \angle C \\ (5\sqrt{2})^2 &= 4^2 + 5^2 - 2 \cdot 4 \cdot 5 \cdot \cos \angle C \\ 50 &= 41 - 40 \cos \angle C \\ \cos \angle C &= \frac{50 - 41}{40} = \frac{9}{40} \\ \Rightarrow \angle C &= 77^\circ \text{ (kalkulator)} \end{aligned}$$

b). sudut terkecil = $\angle A$
karena diapit oleh c dan b
(2 sisi terpanjang)

$$\begin{aligned} a^2 &= c^2 + b^2 - 2 \cdot c \cdot b \cdot \cos \angle A \\ 6^2 &= 8^2 + 6^2 - 2 \cdot 8 \cdot 6 \cdot \cos \angle A \\ \cos \angle A &= \frac{8^2}{2 \cdot 8 \cdot 6} = \frac{8 \times 4 \times 2}{8 \times 4 \times 3} = \frac{2}{3} \end{aligned}$$

$$\angle A = \cos^{-1}\left(\frac{2}{3}\right) = 48,19^\circ \text{ (kalkulator)}$$

c). sudut terbesar = $\angle P$

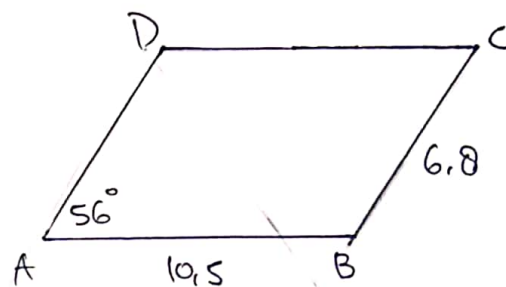
karena di hadapan sisi terbesar (p)

$$\begin{aligned} p^2 &= q^2 + r^2 - 2 \cdot q \cdot r \cdot \cos \angle P \\ q^2 &= 8^2 + 6^2 - 2 \cdot 8 \cdot 6 \cdot \cos \angle P \\ 81 &= 100 - 96 \cdot \cos \angle P \end{aligned}$$

$$\cos \angle P = \frac{100 - 81}{96} = \frac{19}{96}$$

$$\angle P = \cos^{-1}\left(\frac{19}{96}\right) = 78,58^\circ \text{ (kalkulator)}$$

3).



$$\angle B = 180^\circ - 56^\circ =$$

$$\begin{aligned} \bullet BD^2 &= AB^2 + AD^2 - 2 \cdot AB \cdot AD \cdot \cos \angle A \\ &= 10,5^2 + 6,8^2 - 2 \cdot 10,5 \cdot 6,8 \cdot \cos 56^\circ \end{aligned}$$

$$BD^2 = 76,64 \Rightarrow BD = 8,8 \text{ cm (kalkulator)}$$

$$\begin{aligned} \bullet AC^2 &= AB^2 + BC^2 - 2 \cdot AB \cdot BC \cdot \cos \angle B \\ &= 10,5^2 + 6,8^2 - 2 \cdot 10,5 \cdot 6,8 \cdot \cos (180 - 56^\circ) \\ &= 10,5^2 + 6,8^2 + 2 \cdot 10,5 \cdot 6,8 \cdot \cos 56^\circ \end{aligned}$$

$$AC^2 = 236,34 \Rightarrow AC = 15,37 \text{ cm (kalkulator)}$$

Uji Pemahaman Halaman 256

4. $AB = 40 \text{ m}$, $\angle B = 60^\circ$, $BC = 50 \text{ m}$
misalkan bentuk danau buatan
berbentuk segitiga ABC

$$\begin{aligned} \Rightarrow AC^2 &= AB^2 + BC^2 - 2 \cdot AB \cdot BC \cdot \cos \angle B \\ &= 40^2 + 50^2 - 2 \cdot 40 \cdot 50 \cdot \cos 60^\circ \\ &= 1.600 + 2.500 - 2 \cdot 2.000 \cdot \frac{1}{2} \\ &= 2.100 \text{ m}^2 \end{aligned}$$

$$\Rightarrow AC = \sqrt{2.100 \text{ m}^2} = 10\sqrt{21} \text{ m}$$

\therefore Panjang dari danau buatan

$$= \begin{cases} AB = 40 \text{ m} \\ AC = 10\sqrt{21} \text{ m} \\ BC = 50 \text{ m} \end{cases}$$

5. Karena permasalahannya adalah segi lima beraturan

\Rightarrow Ada 5 buah segitiga samakaki yang saling identik, dimana

• sisi yang sama panjang adalah jari-jari, dan

• sudut yang diapit kedua sisi tersebut akan berbentuk sudut

$$\frac{360^\circ}{5} = 72^\circ$$

$$\Rightarrow r = \frac{1}{2} \text{ diameter} = \frac{1}{2} \times 20 = 10 \text{ cm}$$

\Rightarrow panjang sisi segitima = s , dimana

$$\begin{aligned} s^2 &= r^2 + r^2 - 2 \cdot r \cdot r \cdot \cos 72^\circ \\ &= 10^2 + 10^2 - 2 \cdot 10 \cdot 10 \cdot \cos 72^\circ \end{aligned}$$

$$s^2 = 200 - 200 \cdot \cos 72^\circ$$

$$\begin{aligned} \Rightarrow s &= \sqrt{200 - 200 \cdot \cos 72^\circ} \\ &= 11,76 \text{ (kalkulator)} \end{aligned}$$

6. Berdasarkan aturan kosinus di sudut D dari segitiga ACD

$$\begin{aligned} AC^2 &= AD^2 + DC^2 - 2 \cdot AD \cdot DC \cdot \cos \angle D \\ &= 5^2 + 21^2 - 2 \cdot 5 \cdot 21 \cdot \cos 60^\circ \\ &= 25 + 441 - 2 \cdot 105 \cdot \frac{1}{2} \\ &= 466 - 105 \\ &= 361. \end{aligned}$$

$$\Rightarrow AC = \sqrt{361} = 19 \text{ cm}$$

- Berdasarkan aturan kosinus di sudut BAC pada segitiga ABC

$$\begin{aligned} BC^2 &= AB^2 + AC^2 - 2 \cdot AB \cdot AC \cdot \cos \angle BAC \\ &= 10^2 + 19^2 - 2 \cdot 10 \cdot 19 \cdot \cos 13^\circ \\ &= 461 - 380 \cdot \cos 13^\circ \end{aligned}$$

$$BC = \sqrt{461 - 380 \cdot \cos 13^\circ}$$

$$= 9,53 \text{ cm (kalkulator)}$$

7. $AB = 90 \text{ m}$; $BC = 50 \text{ m}$; $\angle B = 120^\circ$

$$\begin{aligned} \Rightarrow AC^2 &= AB^2 + BC^2 - 2 \cdot AB \cdot BC \cdot \cos \angle B \\ &= 90^2 + 50^2 - 2 \cdot 90 \cdot 50 \cdot \cos 120^\circ \\ &= 8.100 + 2.500 - 2 \cdot 4.500 \cdot \left(-\frac{1}{2}\right) \\ &= 10.600 + 4.500 \\ &= 15.100 \text{ m}^2 \end{aligned}$$

$$\begin{aligned} \Rightarrow AC &= \sqrt{15.100} = 10\sqrt{151} \text{ m} \\ &= 122,88 \text{ (kalkulator)}. \end{aligned}$$

Uji Pemahaman Hakman 256

8. Sudut di depan diagonal terpendek.

$$= \theta$$

⇒ Sudut di depan diagonal yang panjang.

$$= 180^\circ - \theta$$

⇒ Aturan kosinus menggunkan yang pendek

$$\Rightarrow 7^2 = 10^2 + 12^2 - 2 \cdot 10 \cdot 12 \cdot \cos \theta$$

$$\Leftrightarrow 49 = 100 + 144 - 240 \cos \theta$$

$$\Leftrightarrow 240 \cos \theta = 100 + 144 - 49$$

$$\Leftrightarrow 240 \cos \theta = 195$$

⇒ misalkan diagonal yang panjang = D

$$\Rightarrow D^2 = 10^2 + 12^2 - 2 \cdot 10 \cdot 12 \cdot \cos(180^\circ - \theta)$$

$$= 100 + 144 - 240 \cdot \cos(180^\circ - \theta)$$

$$= 244 - 240 \cdot (-\cos \theta)$$

$$= 244 + 240 \cdot \cos \theta$$

$$= 244 + 195$$

$$= 439$$

$$\Rightarrow D = \sqrt{439} = 20,95 \text{ cm (kalkulator)}$$

Uji Pemahaman Halaman 263

A. Pilihan Ganda

$$1. \text{Luas segitiga} = \frac{1}{2} \cdot b \cdot c \cdot \sin LA$$

$$12 = \frac{1}{2} \cdot 8 \cdot 6 \cdot \sin LA$$

$$\sin LA = \frac{12}{24} = \frac{1}{2}$$

$$\angle A = 30^\circ$$

Jawaban: E.

$$2. S = \frac{1}{2} (8\sqrt{3} + 8 + 8) = 4\sqrt{3} + 8$$

Luas $\triangle ABC$

$$= \sqrt{(4\sqrt{3} + 8)(4\sqrt{3} + 8 - 8\sqrt{3})(4\sqrt{3} + 8 - 8)^2}$$

$$= \sqrt{(4\sqrt{3} + 8)(-4\sqrt{3} + 8)(4\sqrt{3})^2}$$

$$= \sqrt{4^2 \cdot 3 (8^2 - (4\sqrt{3})^2)}$$

$$= 4\sqrt{3(64 - 48)}$$

$$= 4\sqrt{3 \cdot 16}$$

$$= 4 \cdot 4\sqrt{3}$$

$$= 16\sqrt{3} \text{ cm}^2$$

Jawaban: E.

$$3. \text{Luas } \triangle PQR = \frac{1}{2} \cdot PQ \cdot PR \cdot \sin \angle P$$

$$= \frac{1}{2} \cdot 15 \cdot 20 \cdot \sin 60^\circ$$

$$= 150 \cdot \frac{1}{2} \sqrt{3}$$

$$= 75\sqrt{3}$$

$$= 129,90 \text{ (kalkulator)}$$

$$4. \text{Luas } \triangle PQR = \frac{1}{2} \cdot PR \cdot PQ \cdot \sin \angle P$$

$$= \frac{1}{2} \cdot 12 \cdot 13 \cdot \sin 120^\circ$$

$$= 78 \cdot \frac{1}{2} \sqrt{3}$$

$$= 39\sqrt{3} \text{ cm}^2$$

Jawaban: D

$$5. \text{Luas } \triangle ABC = \frac{1}{2} a \cdot b \cdot \sin \angle C$$

$$6 = \frac{1}{2} \cdot 4 \cdot 3 \cdot \sin \angle C$$

$$\sin \angle C = 1$$

$$\angle C = 90^\circ$$

Jawaban: B

$$6. \text{Luas } \triangle PQR = \frac{1}{2} \cdot PQ \cdot PR \cdot \sin \angle P$$

$$= \frac{1}{2} \cdot 7 \cdot 8 \cdot \sin 120^\circ$$

$$= \frac{1}{2} \cdot 7 \cdot 8 \cdot \frac{1}{2} \sqrt{3}$$

$$= 14\sqrt{3} \text{ cm}^2$$

Jawaban: D

$$7. S = \frac{1}{2} (13 + 14 + 15) = \frac{1}{2} (42) = 21$$

$$\text{Luas } \triangle ABD = \sqrt{21 \cdot (21 - 13) (21 - 14) (21 - 15)}$$

$$= \sqrt{21 \cdot 8 \cdot 7 \cdot 6}$$

$$= \sqrt{3 \cdot 7 \cdot 4 \cdot 2 \cdot 7 \cdot 2 \cdot 3}$$

$$= \sqrt{3^2 \cdot 7^2 \cdot 4 \cdot 2^2}$$

$$= 3 \cdot 7 \cdot 2 \cdot 2$$

$$= 84 \text{ cm}^2$$

$$\Rightarrow \text{Luas } \triangle BCD = \text{Luas } ABCD - \text{Luas } \triangle ABD$$

$$= (84 + 35\sqrt{3}) - 84$$

$$= 35\sqrt{3} \text{ cm}^2$$

$$\Rightarrow \text{Luas } \triangle BCD = \frac{1}{2} \cdot BC \cdot BD \cdot \sin \angle B$$

$$\Rightarrow BC = (2 \cdot \text{Luas } \triangle BCD) \div (BD \cdot \sin \angle B)$$

$$= (2 \cdot 35\sqrt{3}) \div (14 \cdot \frac{1}{2} \sqrt{3}) = 10 \text{ cm}$$

8

Jawaban: C.

Uji Pemahaman Halaman 263

$$\begin{aligned} 8. \cdot \sin 105^\circ &= \sin (60^\circ + 45^\circ) \\ &= \sin 60^\circ \cos 45^\circ + \cos 60^\circ \sin 45^\circ \\ &= \frac{1}{2} \sqrt{3} \cdot \frac{1}{2} \sqrt{2} + \frac{1}{2} \cdot \frac{1}{2} \sqrt{2} \\ &= \frac{1}{2} \sqrt{2} \left(\frac{1}{2} \sqrt{3} + \frac{1}{2} \right) \end{aligned}$$

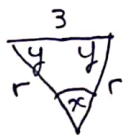
$$\cdot \frac{4}{\sin 105^\circ} = \frac{BC}{\sin 45^\circ}$$

$$\begin{aligned} \Rightarrow BC &= \frac{\sin 45^\circ}{\sin 105^\circ} \times 4 = \frac{\frac{1}{2} \sqrt{2} \times 1}{\frac{1}{2} \sqrt{2} \left(\frac{1}{2} \sqrt{3} + \frac{1}{2} \right)} \times 4 \\ &= \frac{4}{\frac{1}{2} (\sqrt{3} + 1)} \times \frac{\sqrt{3} - 1}{\sqrt{3} - 1} \\ &= \frac{4\sqrt{3} - 4}{\frac{1}{2} (3 - 1)} = 4\sqrt{3} - 4 \end{aligned}$$

$$\begin{aligned} \cdot \text{Luas } \triangle ABC &= \frac{1}{2} \cdot AC \cdot BC \cdot \sin \angle C \\ &= \frac{1}{2} \cdot 4 \cdot (4\sqrt{3} - 4) \cdot \sin 30^\circ \\ &= 2 \cdot (4\sqrt{3} - 4) \cdot \frac{1}{2} \\ &= 4\sqrt{3} - 4 \\ &= 4(\sqrt{3} - 1) \text{ cm}^2 \end{aligned}$$

Jawaban: B

9. Salah satu bagian (dari enam bagian)



$$x = \frac{360^\circ}{6} = 60^\circ$$

$$y = \frac{180^\circ - x}{2} = \frac{180^\circ - 60^\circ}{2} = 60^\circ$$

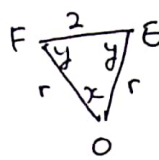
$$\therefore r = 3 \text{ cm} \Rightarrow \text{diameter} = 6 \text{ cm}$$

karena yang dibahas segi enam
(jumlah sisinya genap yakni 6 buah)

$$\Rightarrow \text{Panjang diagonal} = \text{diameter} = 6 \text{ cm}$$

Jawaban: A.

10. Salah 1 bagian dari 6 bagian



$$x = \frac{360^\circ}{6} = 60^\circ$$

$$y = \frac{180^\circ - x}{2} = \frac{180^\circ - 60^\circ}{2} = 60^\circ$$

$$\Rightarrow r = FE = 2 \text{ cm} \Rightarrow S_{\triangle EOF} = \frac{2+2+2}{2} = 3$$

$$\therefore \text{Luas } \triangle EOF = \sqrt{3} (3 - 2)^3 = \sqrt{3}$$

$$\Rightarrow \text{Luas } ABCDEF = 6 \times \text{Luas } \triangle EOF = 6\sqrt{3}$$

$$\cdot \text{Luas lingkaran} = \pi r^2 = \pi \cdot 2^2 = 4\pi$$

\Rightarrow Luas yang diarsir

$$\cdot \text{Luas lingkaran} - \text{Luas } ABCDEF$$

$$= 4\pi - 6\sqrt{3}$$

Jawaban: D

B. Uraiah

$$1. a. \text{Luas} = \frac{1}{2} \cdot p \cdot r \cdot \sin \angle Q$$

$$= \frac{1}{2} \cdot 35 \cdot 18 \cdot \sin 60^\circ$$

$$= 35 \cdot 9 \cdot \frac{1}{2} \sqrt{3}$$

$$= 157,5\sqrt{3}$$

$$= 272,79 \text{ cm}^2$$

$$b. \angle C = 180^\circ - (\angle A + \angle B)$$

$$= 180^\circ - (57,3^\circ + 70^\circ) = 52,7^\circ$$

$$\frac{a}{\sin \angle A} = \frac{c}{\sin \angle C}$$

$$\Rightarrow a = \frac{\sin \angle A}{\sin \angle C} \times c = \frac{\sin 57,3^\circ}{\sin 52,7^\circ} \times 12 \approx 12,69 \text{ cm} \quad (\text{kalkulator})$$

$$\text{Luas} = \frac{1}{2} \cdot a \cdot c \cdot \sin \angle B$$

$$= \frac{1}{2} \cdot 12,69 \cdot 12 \cdot \sin 70^\circ$$

$$= 76,14 \cdot \sin 70^\circ$$

$$= 71,55 \text{ cm}^2 \quad (\text{kalkulator})$$

9

Uji Pemahaman Halaman 263

$$c. s = \frac{3+4+3}{2} = 5$$

$$\begin{aligned} \text{Luas} &= \sqrt{5(5-3)^2(5-4)} \\ &= \sqrt{5 \cdot 2^2} = 2\sqrt{5} \text{ cm}^2 \end{aligned}$$

$$d. \text{ panjang } \frac{1}{2} \text{ keliling} = \frac{39+42+32}{2} = 56,5$$

$$\begin{aligned} \text{Luas} &= \sqrt{56,5(56,5-39)(56,5-42)} \\ &= \sqrt{(56,5-32)} \\ &= \sqrt{56,5 \cdot 17,5 \cdot 14,5 \cdot 24,5} \\ &= \sqrt{\frac{113}{2} \cdot \frac{35}{2} \cdot \frac{29}{2} \cdot \frac{49}{2}} \\ &= \frac{7}{4} \sqrt{113 \cdot 35 \cdot 29} \\ &= \frac{7}{4} \cdot \sqrt{114.695} \approx 592,667 \text{ cm}^2 \end{aligned}$$

$$2. \text{ Luas} = \frac{1}{2} \cdot BC \cdot AC \cdot \sin \angle C$$

$$60 = \frac{1}{2} \cdot 12 \cdot 20 \cdot \sin \angle C$$

$$12 \cdot 5 = 12 \cdot 10 \cdot \sin \angle C$$

$$\sin \angle C = \frac{5}{10} = \frac{1}{2} \Rightarrow \angle C = 30^\circ \text{ atau } 150^\circ$$

$$3. AB = 12 \text{ cm}; AD = 5 \text{ cm}; \angle BAD = 90^\circ$$

$$a. BD = \sqrt{12^2 + 5^2} = 13$$

$$b. \text{ Luas ABD} = \frac{1}{2} \cdot 5 \cdot 12 \cdot \sin 90^\circ = 30 \text{ cm}^2$$

$$\begin{aligned} \text{Luas BCD} &= \frac{1}{2} \cdot 13 \cdot 10 \cdot \sin 62^\circ \\ &= 65 \cdot \sin 62^\circ \\ &\approx 57,39 \text{ cm}^2 (\text{kalkulator}) \end{aligned}$$

$$\begin{aligned} \Rightarrow \text{Luas ABCD} &= \text{Luas ABC} + \text{Luas BCD} \\ &= 30 + 57,39 \\ &= 87,39 \text{ cm}^2 \end{aligned}$$

$$4. a. s = \frac{4+5+7}{2} = 8$$

$$\begin{aligned} \text{Luas} &= \sqrt{8(8-4)(8-5)(8-7)} \\ &= \sqrt{8 \cdot 4 \cdot 3 \cdot 1} = \sqrt{4 \cdot 4 \cdot 2 \cdot 3} \\ &= 4\sqrt{6} \approx 9,80 \text{ cm}^2 (\text{kalkulator}) \end{aligned}$$

$$b. s = \frac{3+6+7}{2} = 8$$

$$\begin{aligned} \text{Luas} &= \sqrt{8(8-3)(8-6)(8-7)} \\ &= \sqrt{8 \cdot 5 \cdot 2 \cdot 1} \\ &= 4\sqrt{5} \approx 8,94 \text{ cm}^2 (\text{kalkulator}) \end{aligned}$$

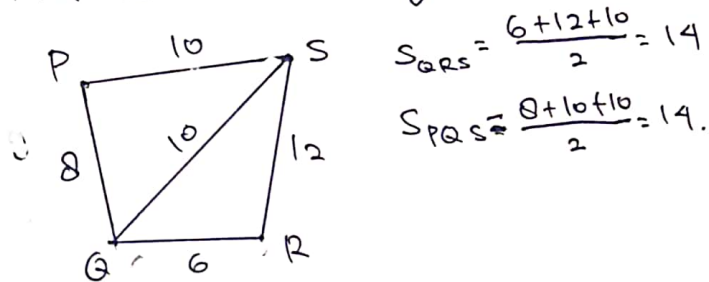
$$c. s = \frac{5+7+8}{2} = 10$$

$$\begin{aligned} \text{Luas} &= \sqrt{10(10-5)(10-7)(10-8)} \\ &= \sqrt{(2 \cdot 5) \cdot 5 \cdot 3 \cdot 2} \\ &= 10\sqrt{3} \approx 17,32 \text{ cm}^2 (\text{kalkulator}) \end{aligned}$$

$$d. s = \frac{4+5+6}{2} = 7,5$$

$$\begin{aligned} \text{Luas} &= \sqrt{7,5(7,5-4)(7,5-5)(7,5-6)} \\ &= \sqrt{\frac{15}{2} \cdot 3,5 \cdot 2,5 \cdot 0,5} \\ &= \sqrt{\frac{15}{2} \cdot \frac{7}{2} \cdot \frac{5}{2} \cdot \frac{1}{2}} \\ &= \frac{1}{4} \cdot 5 \sqrt{21} \\ &\approx 5,73 \text{ cm}^2 (\text{kalkulator}) \end{aligned}$$

5. Gambar kasar (kemungkinan bentuk tidak sesuai seharusnya) untuk tanah.



$$\bullet \text{ Luas tanah} = \text{Luas PQRS} \checkmark$$

$$\begin{aligned} \bullet \text{ Luas PQS} &= \sqrt{14(14-8)(14-10)^2} \\ &= \sqrt{7 \cdot 2 \cdot 6 \cdot 4^2} = \sqrt{7 \cdot 2 \cdot 2 \cdot 4^2} \\ &= 4 \cdot 2 \sqrt{21} = 8\sqrt{21} \end{aligned}$$

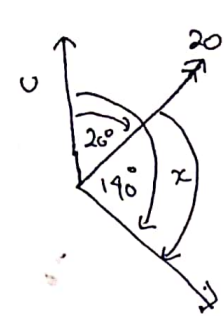
$$\begin{aligned} \bullet \text{ Luas PQR} &= \sqrt{14(14-6)(14-12)(14-10)} \\ &= \sqrt{7 \cdot 2 \cdot 8 \cdot 2 \cdot 4} \\ &= \sqrt{16 \cdot 4 \cdot 7 \cdot 2} \\ &= 8\sqrt{14} \end{aligned}$$

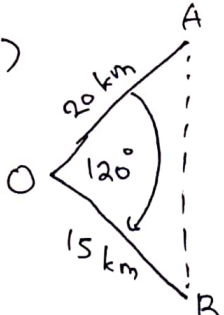
$$\begin{aligned} \bullet \text{ Luas tanah} &= 8\sqrt{21} + 8\sqrt{14} = 8\sqrt{7}(\sqrt{3} + \sqrt{2}) \\ &= 66,59 \text{ cm}^2 (\text{kalkulator}) \end{aligned}$$

10

Uji Pemahaman Halaman 267

A. Pilihan Ganda

1. 

\Rightarrow 

Jarak Andi dan Budi = AB

$$AB^2 = OA^2 + OB^2 - 2 \cdot OA \cdot OB \cdot \cos 120^\circ$$

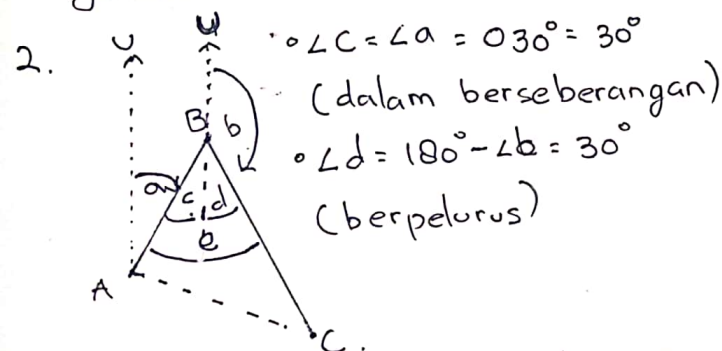
$$= 20^2 + 15^2 - 2 \cdot 20 \cdot 15 \cdot \frac{1}{2}$$

$$= 400 + 225 - 300$$

$$= 325 = 25 \cdot 13$$

\therefore Jarak Andi dan budi = $5\sqrt{13}$ km

Jawaban: D



Jika berfokus pada ΔABC dan informasi tentang AB, BC, dan $\angle ABC$, maka dengan menggunakan teorema kosinus

$$\Rightarrow AC^2 = AB^2 + BC^2 - 2 \cdot AB \cdot BC \cdot \cos \angle ABC$$

$$= 20^2 + 30^2 - 2 \cdot 20 \cdot 30 \cdot \cos (\angle C + \angle d)$$

$$= 400 + 900 - 2 \cdot 600 \cdot \cos 60^\circ$$

$$= 1.300 - 2 \cdot 600 \cdot \frac{1}{2}$$

$$= 1.300 - 600$$

$$= 700 = 100 \cdot 7 \text{ mil}^2$$

$\Rightarrow AC = 10\sqrt{7} \text{ mil}$

Jawaban: C.

3. Sudut yang terbentuk antara

perjalanan dari P ke Q, dan

perjalanan dari Q ke R.

adalah (ilustrasi serupa dengan no.2).

$\angle PQR =$ Besaran arah dari P ke Q
 $+ (180^\circ - \text{Besaran arah dari Q ke R})$
 $= 40^\circ + 180^\circ - 160^\circ$
 $= 60^\circ$

$\Rightarrow PR^2 = PQ^2 + QR^2 - 2 \cdot PQ \cdot QR \cdot \cos \angle PQR$

$$= 30^2 + 45^2 - 2 \cdot 30 \cdot 45 \cdot \cos 60^\circ$$

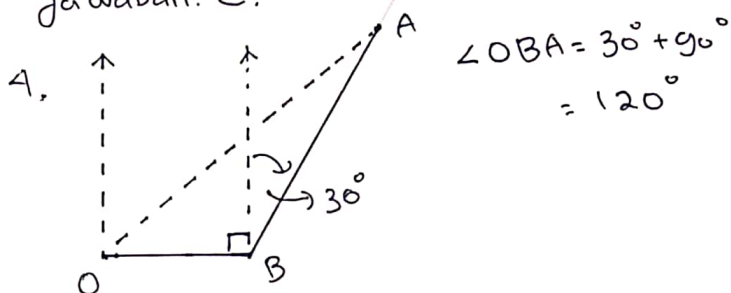
$$= 900 + 2025 - 2 \cdot 1350 \cdot \frac{1}{2}$$

$$= 2.925 - 1.350$$

$$= 1.575 = 25 \cdot 63 = 25 \cdot 9 \cdot 7$$

$\Rightarrow PR = 5 \cdot 3\sqrt{7} = 15\sqrt{7} \text{ mil}$

Jawaban: C.



menggunakan teorema kosinus

Jarak kapal terhadap posisi kapal awal

$= OA = ?$

$$OA^2 = OB^2 + BA^2 - 2 \cdot OB \cdot BA \cdot \cos 120^\circ$$

$$= 20^2 + 40^2 - 2 \cdot 20 \cdot 40 \cdot \left(-\frac{1}{2}\sqrt{3}\right)$$

$$= 2.000 - (-800\sqrt{3})$$

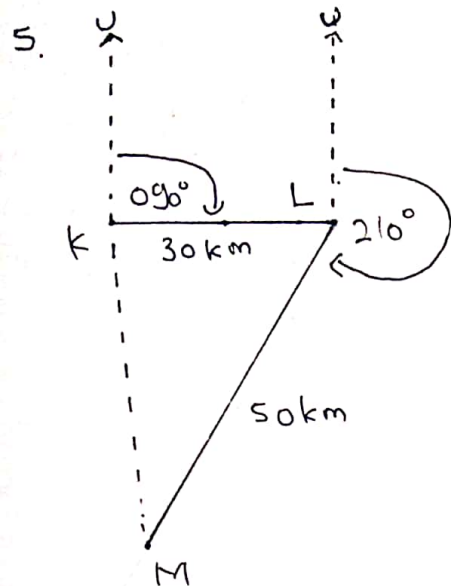
$$= 400 \cdot 5 + 400 \cdot 2\sqrt{3}$$

$$= 400 (5 + 2\sqrt{3}) = 20^2 (5 + 2\sqrt{3})$$

$\Rightarrow OA = 20\sqrt{5+2\sqrt{3}} \text{ mil}$

Jawaban: D.

Uji Pemahaman Halaman 267



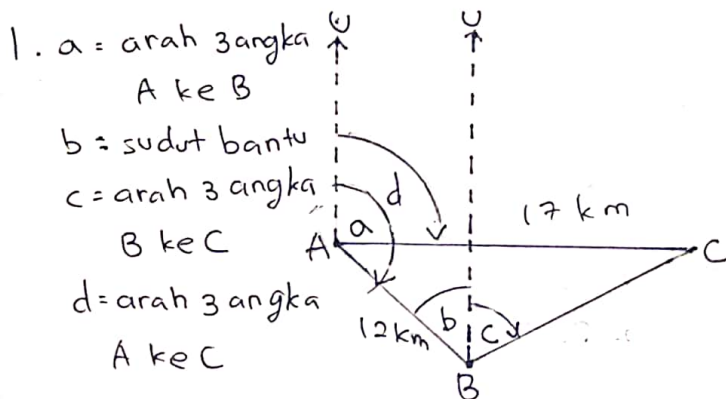
Jarak antar pelabuhan K dan M = KM

$$\begin{aligned} KM^2 &= KL^2 + LM^2 - 2 \cdot KL \cdot LM \cdot \cos \angle KLM \\ &= 30^2 + 50^2 - 2 \cdot 30 \cdot 50 \cdot \cos 210^\circ \\ &= 900 + 2500 - 2 \cdot 1500 \cdot (-\frac{\sqrt{3}}{2}) \\ &= 3400 + 1500\sqrt{3} \end{aligned}$$

$$\Rightarrow KM = 10\sqrt{19} \text{ km}$$

Jawaban: E

B. Uraian



$$\bullet b = 180^\circ - a = 180^\circ - 132^\circ = 48^\circ$$

(Sudut saling dalam sepihak)

Berdasarkan aturan sinus

$$\Rightarrow \frac{AC}{\sin \angle B} = \frac{AB}{\sin \angle C}$$

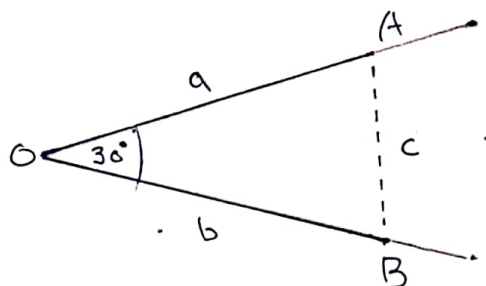
$$\begin{aligned} \Rightarrow \sin \angle C &= \frac{AB}{AC} \times \sin \angle B \\ &= \frac{12}{17} \times \sin (48 + 63)^\circ \end{aligned}$$

$$\Rightarrow \angle C = \sin^{-1} \left(\frac{12}{17} \times \sin 111^\circ \right) = 41^\circ \text{ (kalkulator)}$$

$$\begin{aligned} \angle A &= 180^\circ - (\angle B + \angle C) = 180^\circ - (111^\circ + 41^\circ) \\ &= 28^\circ \end{aligned}$$

$$\Rightarrow \angle d = \angle a - \angle A = (132 - 28)^\circ = 104^\circ$$

2.



• Jarak kapal A dari tempat ke berangkat

$$= a = 15 \text{ km/jam} \times 2 \text{ jam} = 30 \text{ km.}$$

• Jarak kapal B dari tempat keberangkatan

$$= b = 18 \text{ km/jam} \times 2 \text{ jam} = 36 \text{ km.}$$

• Jarak kapal A dan kapal B = c

$$c^2 = a^2 + b^2 - 2 \cdot a \cdot b \cdot \cos 30^\circ$$

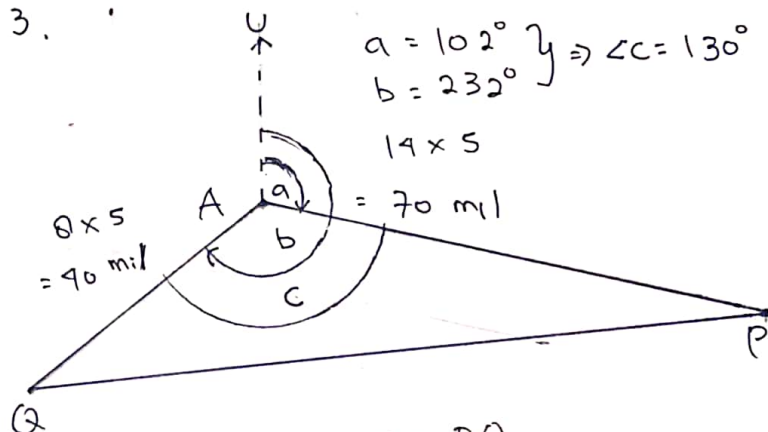
$$= 30^2 + 36^2 - 2 \cdot 30 \cdot 36 \cdot \frac{1}{2} \sqrt{3}$$

$$= 900 + 1296 - 1080\sqrt{3}$$

$$= 2196 - 1080\sqrt{3}$$

$$\Rightarrow C = \dots$$

3.



Q

Jarak kapal P dan Q = PQ.

$$\bullet PQ^2 = AP^2 + AQ^2 - 2 \cdot AP \cdot AQ \cdot \cos \angle C$$

$$= 40^2 + 70^2 - 2 \cdot 40 \cdot 70 \cdot \cos 130^\circ$$

$$= 6500 - 5600 \cos 130^\circ$$

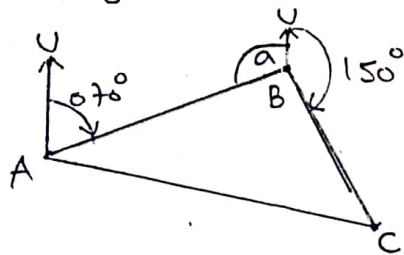
$$\Rightarrow PQ = \sqrt{6500 - 5600 \cos 130^\circ}$$

$$= 100,50 \text{ mil (kalkulator)}$$

(12)

Uji Pemahaman Halaman 267

4. Misalkan titik keberangkatan dari A dilanjut ke B, C, ...



$$AB = 17 \text{ km/jam} \times 2 \text{ jam} = 34 \text{ km}$$

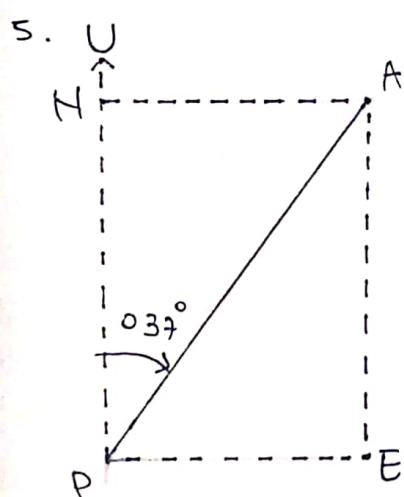
$$BC = 8 \text{ km/jam} \times 3 \text{ jam} = 24 \text{ km}$$

$$\begin{aligned} \angle ABC &= 360^\circ - (a + 150^\circ) \\ &= 360^\circ - ((180^\circ - 70^\circ) + 150^\circ) \dots * \\ &= 360^\circ - (110^\circ + 150^\circ) \\ &= 100^\circ \end{aligned}$$

* Sudut dalam sepihak.

$$\begin{aligned} AC^2 &= AB^2 + BC^2 - 2 \cdot AB \cdot BC \cdot \cos \angle ABC \\ &= 34^2 + 24^2 - 2 \cdot 34 \cdot 24 \cdot \cos 100^\circ \\ &= 1.156 + 576 - 1.632 \cdot \cos 100^\circ \\ &= 1.732 - 1.632 \cdot \cos 100^\circ \end{aligned}$$

$$\Rightarrow AC = 44,89 \text{ km (kalkulator)}$$



a) Jarak perahu dari pelabuhan
 $= 12 \text{ km/jam} \times 5 \text{ jam}$
 $= 60 \text{ km}.$

b) Jarak perahu dari timur pelabuhan
 $= AE = PA \cdot \cos 37^\circ = 60 \cdot 0,8 = 48 \text{ km}$

c) Jarak perahu dari utara pelabuhan
 $= NA = PA \cdot \sin 37^\circ = 60 \cdot 0,6 = 36 \text{ km}$

6. $\angle BAC = (360^\circ - 270^\circ)$ [sudut dalam bersebetangan]
 $= 90^\circ$

• Berdasarkan aturan kosinus

$$\begin{aligned} BC^2 &= AC^2 + AB^2 - 2 \cdot AC \cdot AB \cdot \cos \angle BAC \\ &= 65^2 + 42^2 - 2 \cdot 65 \cdot 42 \cdot \cos 90^\circ \\ &= 4.225 + 1.764 - \\ &= 5.989 = (\sqrt{5.989})^2 \end{aligned}$$

$$\Rightarrow BC = 77,38 \text{ km (kalkulator)}.$$

• Berdasarkan aturan sinus

$$\frac{AB}{\sin \angle ACB} = \frac{BC}{\sin 90^\circ}$$

$$\Rightarrow \sin \angle ACB = \frac{AB}{BC} = \frac{42}{77,38} \approx 0,54$$

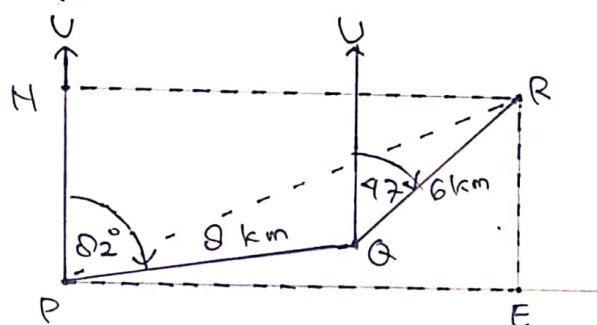
$$\Rightarrow \angle ACB = \sin^{-1} 0,54 \approx 33^\circ$$

$$\Rightarrow \angle ABC = 180^\circ - (90^\circ + 33^\circ) = 57^\circ$$

$$\therefore \text{Arah C dari B} = 270^\circ - 57^\circ = 213^\circ, \text{ dan}$$

$$\text{Jarak C dari B} = BC = 77,38 \text{ km}.$$

7. Titik Q dan R adalah titik yang dilalui Faizal
 N: titik utara dari P; E: titik timurnya



$$\begin{aligned} PR^2 &= 8^2 + 6^2 - 2 \cdot 8 \cdot 6 \cos (47^\circ + (180^\circ - 82^\circ)) \\ &= 64 + 36 - 96 \cdot \cos 145^\circ \end{aligned}$$

$$\begin{aligned} &= 100 - 96 \cdot \cos 145^\circ \\ \Rightarrow PR &= \sqrt{100 - 96 \cdot \cos 145^\circ} = 13,37 \text{ km} \end{aligned}$$

$$\frac{6}{\sin \angle QPR} = \frac{13,37}{\sin 145^\circ}$$

$$\Rightarrow \angle QPR = \sin^{-1} \left(\frac{6}{13,37} \cdot \sin 145^\circ \right) \approx 15^\circ$$

$$\Rightarrow \angle EPR = (90^\circ - 82^\circ) + 15^\circ = 23^\circ$$

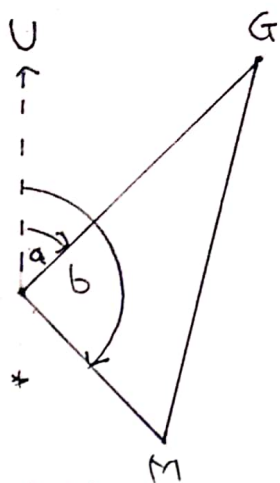
Uji Pemahaman Halaman 267

8. B: Bandara

G: Posisi
pesawat
Garuda

M: Posisi
pesawat
Mandiri

$$a = 45^\circ; b = 135^\circ$$



Jarak pesawat setelah 1 jam

$$\square \text{ Garuda: } BG = 450 \text{ km/jam} \times 1 \text{ jam} = 450 \text{ km}$$

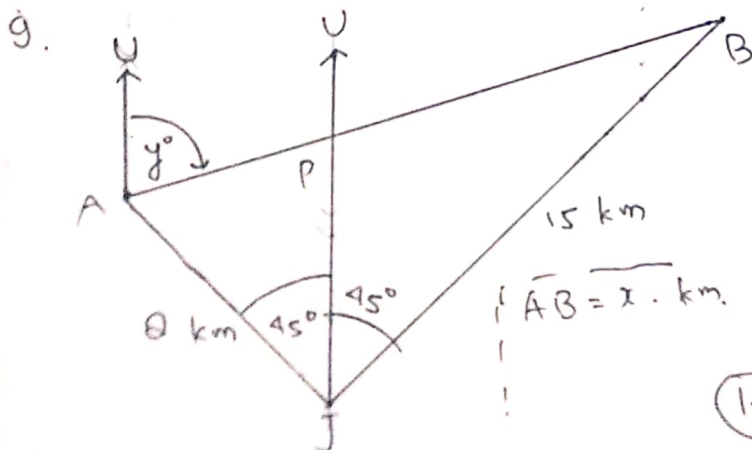
$$\square \text{ Mandiri: } BM = 280 \text{ km/jam} \times 1 \text{ jam} = 280 \text{ km}$$

$$\square \angle GBM = \angle b - \angle a = 135^\circ - 45^\circ = 90^\circ$$

$$\begin{aligned} \square GM^2 &= BG^2 + BM^2 - 2 \cdot BG \cdot BM \cdot \cos \angle B \\ &= (450)^2 + (280)^2 - 2 \cdot 450 \cdot 280 \cdot 0 \\ &= (45 \cdot 10)^2 + (28 \cdot 10)^2 \\ &= 10^2 (45^2 + 28^2) \\ &= 10^2 (2025 + 784) \\ &= 10^2 (2809) \\ &= 10^2 \cdot 53^2 \end{aligned}$$

$$\Rightarrow GM = 530 \text{ km}$$

* arah timur laut = arah 45°



$$\text{Karena } \angle AJB = 45^\circ + 45^\circ = 90^\circ$$

$$\begin{aligned} \text{maka } AB &= \sqrt{AJ^2 + BJ^2} \\ &= \sqrt{8^2 + 15^2} \\ &= \sqrt{17^2} = 17 \text{ km} \end{aligned}$$

Berdasarkan aturan sinus

$$\Rightarrow \frac{15}{\sin \angle A} = \frac{17}{\sin 90^\circ}$$

$$\Leftrightarrow \sin \angle A = \frac{15}{17}$$

$$\Leftrightarrow \angle A = \sin^{-1} \left(\frac{15}{17} \right) \approx 62^\circ$$

$$\Rightarrow \angle P = 180^\circ - (62^\circ + 45^\circ) = 73^\circ$$

$$\Rightarrow y^\circ = p = 73^\circ \text{ [dalam berseberangan]}$$

$$\Rightarrow y = 73$$

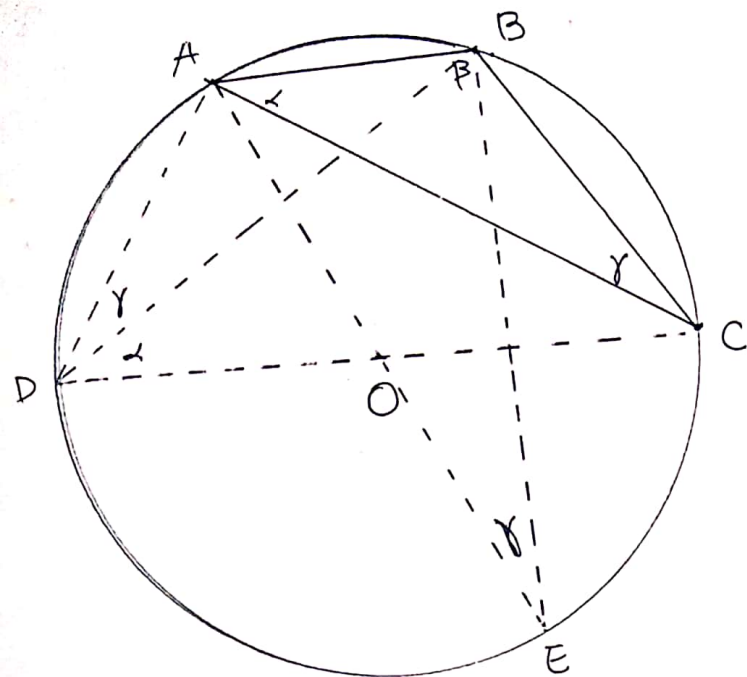
$$\therefore \text{nilai } x = 17, y = 73$$

10. Panjang tali = 30 cm.

besar sudut = 35°

$$\begin{aligned} \text{a). } BA &= \text{panjang tali} \cdot \sin 35^\circ \\ &= 30 \sin 35^\circ \\ &= 17,21 \text{ cm} \end{aligned}$$

$$\begin{aligned} \text{b). } BC &= \text{panjang tali} \cdot \cos 35^\circ \\ &= 30 \cos 35^\circ \\ &= 24,57 \end{aligned}$$



• $\angle BDC = \angle BAC = \alpha$

↳ karena menghadap busur BC.

$$\Rightarrow \sin \alpha = \frac{BC}{CD} = \frac{BC}{2r} \Rightarrow 2r = \frac{BC}{\sin \alpha}$$

• $\angle BCA = \angle BDA = \gamma$

↳ karena menghadap busur BA

$$\Rightarrow \sin \beta = \sin (180^\circ - (\alpha + \gamma))$$

$$= \sin(\alpha + \gamma) =$$

$$= \frac{AC}{CD} = \frac{AC}{2r}$$

$$\Rightarrow 2r = \frac{AC}{\sin \beta}$$

• $\angle ACB = \angle AEB = \gamma$

↳ karena menghadap busur AB

$$\Rightarrow \sin \gamma = \frac{AB}{AE} = \frac{AB}{2r} \Rightarrow 2r = \frac{AB}{\sin \gamma}$$

$$\therefore 2r = \frac{BC}{\sin \alpha} = \frac{AC}{\sin \beta} = \frac{AB}{\sin \gamma}$$

Soal Pendalaman Halaman 246

Jarak antara titik P dan Q = PQ = QP = 200 m

Sudut PQR = 30° dan sudut QRP = 45°

\Rightarrow Jarak antara titik P dan R = PR

dimana

$$\frac{QP}{\sin(\angle QRP)} = \frac{PR}{\sin(\angle PQR)}$$

$$\Rightarrow PR = \frac{QP}{\sin(\angle QRP)} \times \sin(\angle PQR)$$

$$= \frac{200}{\sin 45^\circ} \times \sin 30^\circ$$

$$= \frac{200}{\frac{1}{2}\sqrt{2}} \times \frac{1}{2}$$

$$= 100\sqrt{2} \text{ m}$$

Jawaban: D

Soal Pendalaman Halaman 247

$\angle A = 45^\circ$; BC = 4 cm; AC = $2\sqrt{6}$ cm.

$$\Rightarrow \frac{BC}{\sin(\angle A)} = \frac{AC}{\sin(\angle B)}$$

$$\begin{aligned}\Rightarrow \sin(\angle B) &= \frac{AC}{BC} \times \sin(\angle A) \\ &= \frac{2\sqrt{6}}{4} \times \sin 45^\circ \\ &= \frac{\sqrt{6}}{2} \times \frac{1}{2}\sqrt{2} \\ &= \frac{1}{2}\sqrt{3}\end{aligned}$$

$$\Rightarrow \sin(\angle B) = \frac{1}{2}\sqrt{3} = \sin 60^\circ$$

$$\Rightarrow \angle B = 60^\circ$$

Jawaban: A.

Soal Pendalaman Halaman 251

Sudut terkecil adalah sudut yang diapit oleh 2 sisi terpanjang

misalkan sudut terkecil dari segitiga dengan sisi 5 cm, 6 cm, dan $\sqrt{21}$ cm = θ

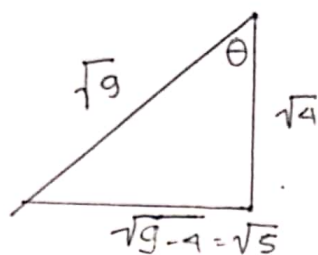
$$\Rightarrow (\sqrt{21})^2 = 6^2 + 5^2 - 2 \cdot 6 \cdot 5 \cdot \cos \theta$$

$$21 = 36 + 25 - 60 \cos \theta$$

$$60 \cos \theta = 36 + 25 - 21$$

$$60 \cos \theta = 40$$

$$\Rightarrow \cos \theta = \frac{40}{60} = \frac{2 \times 20}{3 \times 20} = \frac{2}{3} = \frac{\sqrt{4}}{\sqrt{9}}$$



$$\Rightarrow \sin \theta = \frac{\sqrt{5}}{\sqrt{9}} = \frac{1}{3} \sqrt{5}$$

Jawaban: E.

Soal Pendalaman Halaman 261

$$\begin{aligned} AC^2 &= CD^2 + AD^2 - 2 \cdot CD \cdot AD \cdot \cos \angle ADC \\ &= 8^2 + 3^2 - 2 \cdot 8 \cdot 3 \cdot \cos 60^\circ \\ &= 64 + 9 - 2 \cdot 24 \cdot \frac{1}{2} \end{aligned}$$

$$\Rightarrow AC^2 = 49$$

$$\Rightarrow AC = 7$$

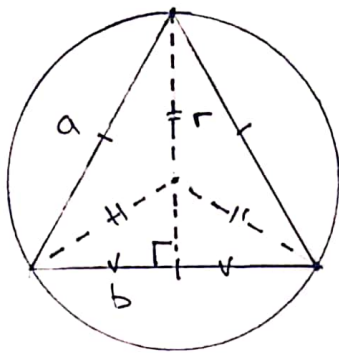
$$\Rightarrow S = \frac{1}{2} (7 + 12 + 13) = 16$$

$$\begin{aligned} \Rightarrow \text{Luas } \triangle ABC &= \sqrt{16(16-7)(16-12)(16-13)} \\ &= \sqrt{16 \cdot 9 \cdot 4 \cdot 3} \\ &= 4 \cdot 3 \cdot 2 \sqrt{3} \\ &= 24\sqrt{3} \text{ cm}^2 \end{aligned}$$

Jawaban: A.

Soal Pendalaman Halaman 263

a). Segi tiga beraturan



o Aturan sinus

$$\Rightarrow \frac{r}{\sin\left(\frac{60^\circ}{2}\right)} = \frac{a}{\sin\left(180^\circ - 2 \times \frac{60^\circ}{2}\right)}$$

$$\Rightarrow \frac{r}{\sin 30^\circ} = \frac{a}{\sin(180^\circ - 60^\circ)}$$

$$\Rightarrow a = \frac{r}{\frac{1}{2}} \times \sin(180^\circ - 60^\circ)$$

$$= \frac{r}{\frac{1}{2}} \times \sin 60^\circ$$

$$= \frac{r}{\frac{1}{2}} \times \frac{1}{2} \sqrt{3}$$

$$= r \sqrt{3}$$

$$\Rightarrow S = \frac{ka}{2} = \frac{3a}{2} = \frac{3}{2} r \sqrt{3}$$

o) Luas segitiga beraturan

$$= \sqrt{\frac{3}{2} r \sqrt{3} \left(\frac{3}{2} r \sqrt{3} - r \sqrt{3} \right)^3}$$

$$= \sqrt{\frac{3}{2} r \sqrt{3} \left(\frac{3}{2} r \sqrt{3} - \frac{2}{2} r \sqrt{3} \right)^3}$$

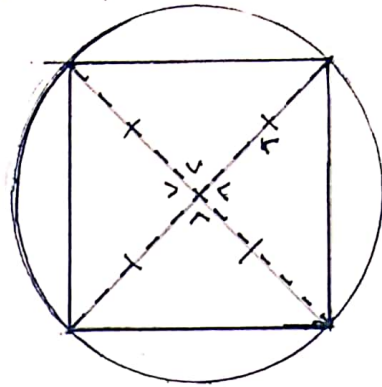
$$= \sqrt{\frac{3}{2} r \sqrt{3} \left(\frac{1}{2} r \sqrt{3} \right)^3}$$

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

$$= \sqrt{3 \times \left(\frac{1}{2} r \sqrt{3} \right)^4}$$

$$= \left(\frac{1}{2} r \sqrt{3} \right)^2 \sqrt{3} = \frac{3}{4} \sqrt{3} r^2$$

b). Segi empat beraturan



diagonal segi empat = diameter

\Rightarrow Luas segi empat beraturan

= Luas belah ketupat

$$= \frac{1}{2} \times d_1 \times d_2$$

$$= \frac{1}{2} \times 2r \times 2r$$

$$= 2r^2$$

c). Segi enam beraturan

o terdapat 6 buah segitiga dengan salah satu sudutnya (yang berimpit dengan titik pusat) memiliki sudut sebesar

$$\frac{360^\circ}{6} = 60^\circ, \text{ dan}$$

o sisi-sisi yang samapanjang yaitu r (jari-jari).

\Rightarrow Luas segi enam beraturan.

$$= 6 \times \frac{1}{2} \times r \times r \times \sin 60^\circ = 3 \times r^2 \times \frac{1}{2} \sqrt{3}$$

$$= \frac{3}{2} \sqrt{3} r^2$$

d). Segi dua belas beraturan

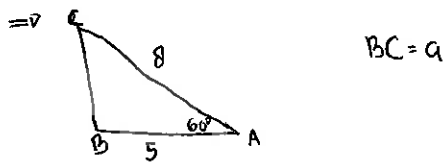
$$= 12 \times \frac{1}{2} \times r \times r \times \sin \frac{360^\circ}{12}$$

$$= 6 \times r^2 \times \sin 30^\circ$$

$$= 6 \times r^2 \times \frac{1}{2} = 3r^2$$

Lathhan Akhir Bab 5

11) $\triangle ABC$, $\angle BAC = 60^\circ$, $AB = 5$, $AC = 8$, $BC = \dots$?



$$\begin{aligned} \Rightarrow a^2 &= b^2 + c^2 - 2bc \cos A \\ &= 8^2 + 5^2 - 2 \cdot 8 \cdot 5 \cdot \cos 60^\circ \\ &= 64 + 25 - 80 \cdot \frac{1}{2} \\ &= 49 \end{aligned}$$

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

Jawaban : E

12) $\triangle PQR$, $\angle Q = 105^\circ$, $\angle R = 45^\circ$, $PQ = 10\sqrt{2}$

$$\Rightarrow \angle P = 180^\circ - (105^\circ + 45^\circ) = 30^\circ$$

$$\frac{QR}{\sin P} = \frac{PQ}{\sin R}$$

$$\frac{QR}{\frac{1}{2}} = \frac{10\sqrt{2}}{\frac{1}{2}\sqrt{2}}$$

$$QR = 10$$

Jawaban : C

13) \rightarrow misal $PQ = r$

$$\Rightarrow (5\sqrt{3})^2 = 10^2 + r^2 - 2 \cdot 10 \cdot r \cdot \cos 60^\circ$$

$$25(3) = 100 + r^2 - 20r \cdot \frac{1}{2}$$

$$0 = r^2 - 10r + 25$$

$$0 = (r - 5)^2$$

$$\therefore r = 5$$

Jawaban : A

4) $\triangle ABC$, $\angle A = 75^\circ$, $\angle B = 45^\circ$, $AB = 12\sqrt{6}$, $AC = \dots$?

$$\Rightarrow \angle C = 180^\circ - (75^\circ + 45^\circ) = 60^\circ$$

$$\Rightarrow \frac{AC}{\sin B} = \frac{AB}{\sin C} \Rightarrow \frac{AC}{\sin 45^\circ} = \frac{12\sqrt{6}}{\sin 60^\circ}$$

$$AC = \frac{12 \cdot \sqrt{6} \cdot \frac{1}{2}\sqrt{2}}{\frac{1}{2}\sqrt{3}}$$

$$= 12 \cdot \sqrt{4}$$

$$= 24$$

Jawaban : D

5) $\triangle ABC$, $AB = 12$, $AC = 10$, $\angle ABC = 150^\circ$

$$\cos C = \dots?$$

$$\Rightarrow \frac{AC}{\sin B} = \frac{AB}{\sin C}$$

$$= \frac{10}{\sin 150^\circ} = \frac{12}{\sin C}$$

$$\begin{aligned} \sin C &= \frac{12 \times \frac{1}{2}}{10} \\ &= \frac{3}{5} \end{aligned}$$

$$\Rightarrow \sin C = \frac{3}{5}$$

$$C = 37^\circ$$

$$\Rightarrow \cos C = \cos 37^\circ = \frac{4}{5}$$

Jawaban : D

6) $\triangle ABC$, $AB = 5\sqrt{2}$, $BC = 6$, $\angle A = 45^\circ$

$$\cos C = \dots? \text{ (c lancip)}$$

$$\Rightarrow \frac{BC}{\sin A} = \frac{AB}{\sin C}$$

$$\frac{6}{\sin 45^\circ} = \frac{5\sqrt{2}}{\sin C}$$

$$\sin C = \frac{5\sqrt{2} \cdot \frac{1}{2}\sqrt{2}}{6}$$

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

$$\Rightarrow \sin C = \frac{5}{6}$$

$$C = 56,443^\circ$$

$$\begin{aligned} \Rightarrow \cos C &= 0,5527 \\ &= \frac{1}{\sqrt{11}} \end{aligned}$$

Jawaban : C

7. ΔPQR , $PQ = 420$, $\angle Q = 45^\circ$, $\angle R = 60^\circ$

$PR = \dots?$

$$\Rightarrow \frac{PR}{\sin Q} = \frac{PQ}{\sin R}$$

$$\frac{PR}{\sin 45^\circ} = \frac{420}{\sin 60^\circ}$$

$$PR = \frac{420 \times \frac{1}{2}\sqrt{2}}{\frac{1}{2}\sqrt{3}}$$

$$PR = \frac{420\sqrt{2}}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}}$$

$$= 140\sqrt{6}$$

Jawaban: D

8. ΔABC , $BC = 10$, $\angle A = 130^\circ$, $\angle B = 40^\circ$, $AC = \dots?$

$$\Rightarrow \frac{AC}{\sin B} = \frac{BC}{\sin A}$$

$$\frac{AC}{\sin 40^\circ} = \frac{10}{\sin 130^\circ}$$

$$AC = \frac{10 \cdot \sin 40^\circ}{\sin (90^\circ + 40^\circ)}$$

$$= \frac{10 \cdot \sin 40^\circ}{\cos 40^\circ} = 10 \tan 40^\circ$$

Jawaban: A

9. Segitiga dengan sisi, 8 cm, 10 cm, 12 cm.

Cos sudut terbesar adalah:

$$\Rightarrow \text{misal } \angle \text{terbesar} = \angle A, a = 12 \text{ cm}$$

$$a^2 = b^2 + c^2 - 2bc \cos A$$

$$\cos A = \frac{b^2 + c^2 - a^2}{2bc}$$

$$= \frac{8^2 + 10^2 - 12^2}{2 \cdot 8 \cdot 10} = \frac{64 + 100 - 144}{160}$$

$$= \frac{20}{160} = \frac{1}{8} = 0,125$$

Jawaban: C

10. ΔABC , $AB = 15$, $BC = 14$, $AC = 13$, $\tan C = \dots?$

$$\Rightarrow \cos C = \frac{BC^2 + AC^2 - AB^2}{2 \cdot BC \cdot AC}$$

$$= \frac{14^2 + 13^2 - 15^2}{2 \cdot 14 \cdot 13}$$

$$= \frac{140}{364}$$

$$= \frac{5}{13}$$

$$\Rightarrow \sin^2 C = 1 - \cos^2 C$$

$$= 1 - \left(\frac{5}{13}\right)^2$$

$$= 1 - \frac{25}{169}$$

$$= \frac{144}{169}$$

$$\sin C = \frac{12}{13}$$

$$\Rightarrow \tan C = \frac{\sin C}{\cos C} = \frac{\frac{12}{13}}{\frac{5}{13}}$$

$$= \frac{12}{13} \times \frac{13}{5} = \frac{12}{5}$$

Jawaban: D

11. ΔPQR , $PQ = 21$, $\angle P = 53^\circ$, $\angle Q = 37^\circ$

$$\Rightarrow \frac{PR}{\sin Q} = \frac{PQ}{\sin R}$$

$$\angle R = 180^\circ - (53^\circ + 37^\circ)$$

$$= 90^\circ$$

$$\sin R = 1$$

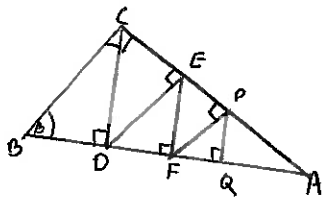
$$PR = 21 \sin 37^\circ$$

$$\Rightarrow \frac{QR}{\sin P} = \frac{PQ}{\sin R}$$

$$QR = 21 \sin 53^\circ$$

Jawaban: D

12



$$\Rightarrow BC = AB \cdot \cos \beta$$

$$= x \cos \beta$$

$$CD = BC \sin \beta$$

$$= x \cos \beta \sin \beta$$

$$DE = CD \sin \beta$$

$$= x \cos \beta \sin \beta \cdot \sin \beta$$

$$= x \cos \beta \sin^2 \beta$$

$$EF = DE \sin \beta$$

$$= x \cos \beta \sin^2 \beta \cdot \sin \beta$$

$$= x \cos \beta \sin^3 \beta$$

$$PF = EF \sin \beta$$

$$= x \cos \beta \sin^3 \beta \cdot \sin \beta$$

$$= x \cos \beta \sin^4 \beta$$

$$\Rightarrow PQ = PF \sin \beta$$

$$= x \cos \beta \sin^4 \beta \cdot \sin \beta$$

$$= x \cos \beta \sin^5 \beta$$

Jawaban : E

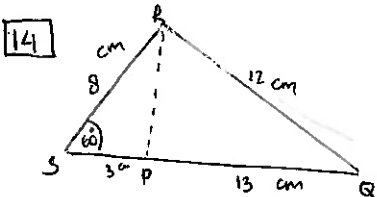
13 Sudut segitiga = 60° , dua sisi apit 20 & 18

$$\Rightarrow L\Delta = \frac{1}{2} \times 20 \times 18 \times \sin 60$$

$$= 10 \times 18 \times \frac{1}{2} \sqrt{3}$$

$$= 90\sqrt{3} \text{ m}^2$$

Jawaban : C



$$PR^2 = 3^2 + 8^2 - 2 \cdot 3 \cdot 8 \cos 60$$

$$= 9 + 64 - 48 \cdot \frac{1}{2}$$

$$= 49$$

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

$$\Rightarrow \cos Q = \frac{12^2 + 13^2 - 7^2}{2 \cdot 12 \cdot 13}$$

$$= \frac{144 + 169 - 49}{312}$$

$$= \frac{11}{13}$$

$$\Rightarrow \sin^2 Q = 1 - \cos^2 Q$$

$$= 1 - \left(\frac{11}{13}\right)^2$$

$$= 1 - \frac{121}{169}$$

$$= \frac{48}{169}$$

$$\sin Q = \frac{\sqrt{48}}{13} = \frac{4\sqrt{3}}{13}$$

$$\Rightarrow L\Delta PQR = \frac{1}{2} \times 12 \times 13 \times \sin Q$$

$$= 6 \times 13 \times \frac{4\sqrt{3}}{13}$$

$$= 24\sqrt{3}$$

Jawaban : A

$$15 \quad S = \frac{13 + 14 + 15}{2} = 21$$

$$L\Delta BD = \sqrt{21(21-13)(21-14)(21-15)}$$

$$= \sqrt{21 \cdot 8 \cdot 7 \cdot 6}$$

$$= \sqrt{7056} = 84$$

$$L\Delta DC = \frac{1}{2} \cdot c \cdot d \cdot \sin B$$

$$= \frac{1}{2} \cdot 14 \cdot BC \cdot \sin 60$$

$$= \frac{7\sqrt{3}}{2} BC$$

$$\Rightarrow L\Delta BD + L\Delta DC = L\Delta BCD$$

$$84 + \frac{7\sqrt{3}}{2} BC = 84 + 35\sqrt{3}$$

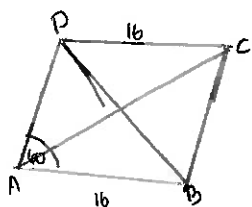
$$\frac{7\sqrt{3}}{2} BC = 35\sqrt{3}$$

$$BC = \frac{35 \times 2}{7} = 10$$

3

Jawaban : C

16



$$\angle A = \angle C = 60^\circ$$

$$\angle B = 180^\circ - 60^\circ$$

$$= 120^\circ$$

$$L_{ABCD} = AB \cdot AD \sin 60$$

$$80\sqrt{3} = 16 \cdot AD \cdot \frac{1}{2}\sqrt{3}$$

$$80\sqrt{3} = 8\sqrt{3} \cdot AD$$

$$10 = AD$$

$$BD^2 = 16^2 + 10^2 - 2 \cdot 16 \cdot 10 \cos 60$$

$$= 256 + 100 - 320 \cdot \frac{1}{2}$$

$$= 196$$

$$BD = 14$$

∴ diagonal terpendek adalah 14

Jawaban : C

17

$$AC^2 = BC^2 + AB^2 - 2BC \cdot AB \cos B$$

$$(PF)^2 = BC^2 + P^2 - 2 \cdot BC \cdot P \left(-\frac{1}{2}\right)$$

$$7P^2 = BC^2 + P^2 + P \cdot BC$$

$$BC^2 + P \cdot BC - 6P^2 = 0$$

$$(BC + 3P)(BC - 2P) = 0$$

$$BC = 2P$$

↳ dari A ke C melalui B

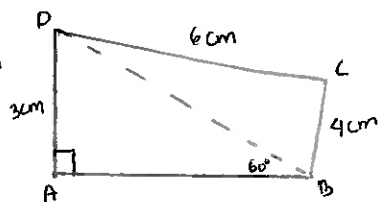
$$= AB + BC$$

$$= P + 2P$$

$$= 3P$$

Jawaban : B

18



$$\sin B = \frac{AD}{BD} \quad \Rightarrow \quad BD = \frac{3}{\frac{1}{2}\sqrt{3}} = \frac{6}{\sqrt{3}} = \frac{6}{3}\sqrt{3}$$

$$\sin 60 = \frac{3}{BD} \quad \Rightarrow \quad = 2\sqrt{3}$$

$$\Rightarrow \cos C = \frac{CD^2 + BC^2 - BD^2}{2 \cdot CD \cdot BC}$$

$$= \frac{6^2 + 4^2 - (2\sqrt{3})^2}{2 \cdot 6 \cdot 4}$$

$$= \frac{36 + 16 - 12}{48} = \frac{40}{48} = \frac{5}{6}$$

$$\Rightarrow \begin{array}{c} \text{triangle with sides } x, 5, 6 \\ \text{angle } \alpha \text{ opposite side } x \end{array} \quad \Rightarrow \quad x = \sqrt{6^2 - 5^2} = \sqrt{11}$$

$$\sin C = \frac{\sqrt{11}}{6}$$

Jawaban : B

19 (i) $\triangle ABD$, misal $\angle BAD = \alpha$

$$BD^2 = AB^2 + AD^2 - 2AB \cdot AD \cdot \cos \alpha$$

$$= 1 + 4^2 - 2 \cdot 1 \cdot 4 \cos \alpha$$

$$= 1 + 16 - 8 \cos \alpha$$

$$= 17 - 8 \cos \alpha$$

(ii) $\triangle BCD$, $\angle C = 180^\circ - \alpha$ (karena sudut berhadapan pada segiempat tali busur berjumlah 180°)

$$BD^2 = BC^2 + CD^2 - 2BC \cdot CD \cdot \cos (180^\circ - \alpha)$$

$$= 2^2 + 3^2 - 2 \cdot 2 \cdot 3 (-\cos \alpha)$$

$$= 4 + 9 + 12 \cos \alpha$$

$$= 13 + 12 \cos \alpha$$

dari (i) dan (ii) maka

$$17 - 8 \cos \alpha = 13 + 12 \cos \alpha$$

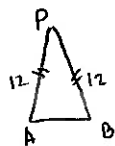
$$4 = 20 \cos \alpha$$

$$\frac{4}{20} = \cos \alpha$$

$$\frac{1}{5} = \cos \alpha$$

Jawaban : C

20.

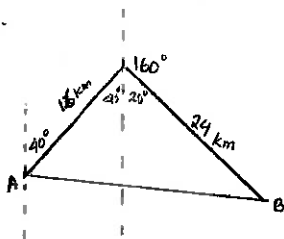


$$\angle P = 360^\circ : 8 \\ = 45^\circ$$

$$\begin{aligned} \Rightarrow P^2 &= 12^2 + 12^2 - 2 \cdot 12 \cdot 12 \cos 45^\circ \\ &= 144 + 144 - 144 \cdot 2 \cdot \frac{1}{2} \sqrt{2} \\ &= 288 - 144\sqrt{2} \\ &= 144(2 - \sqrt{2}) \\ P &= \sqrt{144(2 - \sqrt{2})} \\ &= 12\sqrt{2 - \sqrt{2}} \end{aligned}$$

Jawaban : C

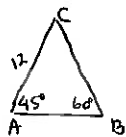
21.



$$\begin{aligned} AB^2 &= 16^2 + 24^2 - 2 \cdot 16 \cdot 24 \cos 60^\circ \\ &= 256 + 576 - 768 \cdot \frac{1}{2} \\ &= 448 \\ AB &= \sqrt{448} = 8\sqrt{7} \text{ km} \end{aligned}$$

Jawaban : B

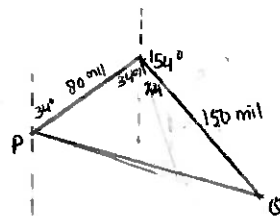
22.



$$\begin{aligned} \Rightarrow \frac{BC}{\sin 45^\circ} &= \frac{12}{\sin 60^\circ} \\ BC &= \frac{12 \times \frac{1}{2} \sqrt{2}}{\frac{1}{2} \sqrt{3}} \\ &= \frac{12\sqrt{2}}{\sqrt{3}} \\ &= \frac{12}{3} \sqrt{6} = 4\sqrt{6} \end{aligned}$$

Jawaban : C

23.



$$\begin{aligned} \Rightarrow PQ^2 &= 80^2 + 150^2 - 2 \cdot 80 \cdot 150 \cos 60^\circ \\ &= 6400 + 22500 - 2 \cdot 12000 \cdot \frac{1}{2} \\ &= 28900 - 12000 \\ &= 16900 \\ PQ &= 130 \text{ mil} \end{aligned}$$

Jawaban : E

$$[24] \quad A \rightarrow B = AB = 360 \text{ km/jam} \times 2 \text{ jam}$$

$$= 600 \text{ km}$$

$$B \rightarrow C = BC = 150 \text{ km/jam} \times 2 \text{ jam}$$

$$= 300 \text{ km}$$

$$\begin{aligned} \Rightarrow m^2 &= 600^2 + 300^2 - 2 \cdot 600 \cdot 300 \cos 120^\circ \\ &= 360000 + 90000 - 180000 \cdot 2 \cdot \left(-\frac{1}{2}\right) \\ &= 450000 + 180000 \\ &= 630000 \end{aligned}$$

Jawaban : C

$$[25] \quad KL = 1000 \text{ m/jam} \times \frac{1}{5} \text{ jam} = 200 \text{ m}$$

$$LM = 1000 \text{ m/jam} \times \frac{1}{4} \text{ jam} = 250 \text{ m}$$

$$\angle L = (180^\circ - 150^\circ) + 30^\circ = 60^\circ$$

$$\begin{aligned} \Rightarrow P^2 &= 200^2 + 250^2 - 2 \cdot 200 \cdot 250 \cos 60^\circ \\ &= 40000 + 62500 - 50000 \\ &= 52500 \end{aligned}$$

Jawaban : B

B. Uraian

- 1) $\triangle ABC$ sama kaki, $AB = AC = 18$ cm
 $\angle A = 60^\circ$

$$\begin{aligned} a) BC^2 &= AC^2 + AB^2 - 2 AC \cdot AB \cos A \\ &= 18^2 + 18^2 - 2 \cdot 18 \cdot 18 \cdot \cos 60 \\ &= 324 + 324 - 324 \\ &= 324 \\ BC &= \sqrt{324} = 18 \text{ cm} \end{aligned}$$

$$b) \angle B = \angle C = \frac{180^\circ - 60^\circ}{2} = 60^\circ$$

$$\Rightarrow \frac{BC}{\sin A} = \frac{AB}{\sin C}$$

$$\frac{BC}{\sin 60} = \frac{18}{\sin 60}$$

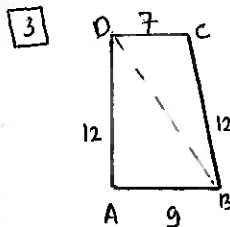
$$BC = 18 \text{ cm}$$

- 2) $\triangle ABC$, $a = 8$, $b = 10$, $\angle C = 60^\circ$

$$\begin{aligned} a) c^2 &= a^2 + b^2 - 2ab \cos 60^\circ \\ &= 8^2 + 10^2 - 2(8)(10) \left(\frac{1}{2}\right) \\ &= 64 + 100 - 80 \\ &= 84 \end{aligned}$$

$$c = \sqrt{84} = 2\sqrt{21} \text{ cm}$$

$$\begin{aligned} b) L \triangle ABC &= \frac{1}{2} \cdot 8 \cdot 10 \cdot \sin 60^\circ \\ &= 40 \cdot \frac{1}{2} \sqrt{3} \\ &= 20\sqrt{3} \text{ cm}^2 \end{aligned}$$



$$\begin{aligned} a) BD^2 &= AD^2 + AB^2 \\ &= 12^2 + 9^2 \\ &= 144 + 81 \\ &= 225 \\ BD &= 15 \text{ cm} \end{aligned}$$

$$\begin{aligned} b) \cos C &= \frac{CD^2 + BC^2 - BD^2}{2 \cdot CD \cdot BC} \\ &= \frac{7^2 + 12^2 - 15^2}{2 \cdot 7 \cdot 12} \\ &= \frac{49 + 144 - 225}{168} \\ &= \frac{-32}{168} \\ &= -\frac{4}{21} \end{aligned}$$

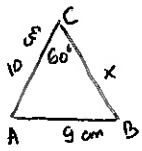
$$\angle C = 100,98^\circ$$

$$c) L \triangle ABD = \frac{1}{2} \cdot 9 \cdot 12 = 54 \text{ cm}^2$$

$$\begin{aligned} L \triangle BCD &= \frac{1}{2} \cdot 7 \cdot 12 \cdot \sin 100,98^\circ \\ &= 42 (0,98) \\ &= 41,16 \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} \Rightarrow L \text{ ABCD} &= L \triangle ABD + L \triangle BCD \\ &= 54 + 41,16 \\ &= 95,16 \text{ cm}^2 \end{aligned}$$

4



$$\Rightarrow \frac{x}{\sin A} = \frac{9}{\sin 60}$$

$$\begin{aligned} \sin A &= \frac{x \cdot \frac{1}{2}\sqrt{3}}{9} \\ &= \frac{x\sqrt{3}}{18} \end{aligned}$$

$$\Rightarrow g^2 = 10^2 + x^2 - 2 \cdot 10 \cdot x \cos 60^\circ$$

$$81 = 100 + x^2 - 10x$$

$$0 = x^2 - 10x + 19$$

$$\begin{aligned} x_{1,2} &= \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \frac{-(-10) \pm \sqrt{100 - 4(1)(19)}}{2} \\ &= \frac{10 \pm \sqrt{24}}{2} \\ &= \frac{10 \pm 2\sqrt{6}}{2} \\ &= 5 \pm \sqrt{6} \end{aligned}$$

$$a.) \quad x_1 = 5 + \sqrt{6} \quad \text{dan} \quad x_2 = 5 - \sqrt{6}$$

nilai yang mungkin untuk BC adalah

$$5 + \sqrt{6} \quad \text{atau} \quad 5 - \sqrt{6}$$

$$b.) \quad \sin A = \frac{x\sqrt{3}}{18}$$

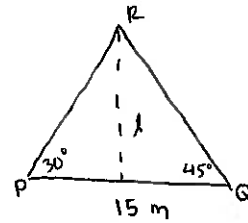
$$x_1 = 5 + \sqrt{6} \rightarrow \sin A = \frac{(5 + \sqrt{6})\sqrt{3}}{18}$$

$$A = 45,8^\circ$$

$$x = 5 - \sqrt{6} \rightarrow \sin A = \frac{(5 - \sqrt{6})\sqrt{3}}{18}$$

$$A = 14,20^\circ$$

5



$$\Rightarrow \angle R = 180^\circ - (30^\circ + 45^\circ) = 105^\circ$$

$$a.) \quad \frac{PR}{\sin Q} = \frac{PQ}{\sin R}$$

$$\frac{PR}{\sin 45} = \frac{15}{\sin 105}$$

$$PR = \frac{15 \times \frac{1}{2}\sqrt{2}}{0,966} \approx 10,98 \text{ m}$$

$$b.) \quad \frac{RQ}{\sin P} = \frac{PQ}{\sin R}$$

$$\frac{RQ}{\sin 30^\circ} = \frac{15}{\sin 105}$$

$$RQ = \frac{15 \cdot \frac{1}{2}}{0,966} \approx 7,77 \text{ m}$$

$$L_{\triangle PQR} = L_{\triangle PQR}$$

$$\frac{1}{2} \cdot PQ \cdot l = \frac{1}{2} \cdot RQ \cdot PR \cdot \sin 30^\circ$$

$$l = PR \cdot \sin 30^\circ$$

$$= 10,98 \left(\frac{1}{2} \right)$$

$$= 5,49 \text{ m}$$

\therefore lebar Sungai adalah 5,49 m

7

6

$$\begin{aligned} BD^2 &= AB^2 + AD^2 - 2 AB AD \cos A \\ &= 2^2 + 3^2 - 2 \cdot 2 \cdot 3 \cos 60^\circ \\ &= 4 + 9 - 12 \cdot \frac{1}{2} \\ &= 13 - 6 \\ &= 7 \end{aligned}$$

$$\Rightarrow BD^2 = BC^2 + CD^2 - 2 \cdot BC \cdot CD \cos C$$

$$7 = x^2 + (2x)^2 - 2 \cdot x \cdot 2x \cos 60^\circ$$

$$7 = x^2 + 4x^2 - 2x^2$$

$$7 = 3x^2$$

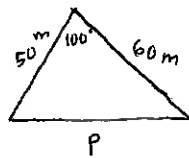
$$\frac{7}{3} = x^2$$

$$\sqrt{\frac{7}{3}} = x$$

$$\frac{1}{3} \sqrt{21} = x$$

$$\therefore BC = x = \frac{1}{3} \sqrt{21}$$

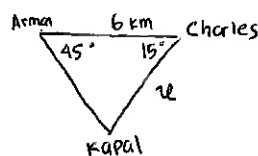
8



$$\begin{aligned} \Rightarrow P^2 &= 50^2 + 60^2 - 2 \cdot 50 \cdot 60 \cos 100^\circ \\ &= 2500 + 3600 - 6000 (-0,174) \\ &= 6100 + 1.044 \\ &= 7144 \\ P &= 84,52 \text{ m} \end{aligned}$$

\therefore Panjang kapal adalah 84,52 m

9



$$\angle \text{Kapal} = 180^\circ - (45^\circ + 15^\circ) = 120^\circ$$

$$\Rightarrow \frac{6}{\sin 120^\circ} = \frac{12}{\sin 45^\circ}$$

$$12 = \frac{6 \times \frac{1}{2} \sqrt{2}}{\frac{1}{2} \sqrt{3}} = \frac{6\sqrt{2}}{\sqrt{3}} = \frac{6}{3} \sqrt{6} = 2\sqrt{6} \text{ km}$$

\therefore Jarak Kapal dan Charles adalah $2\sqrt{6}$ km

10

$$PQ = 400 \text{ km/jam} \times 2 \text{ jam} = 800 \text{ km}$$

$$QR = 450 \text{ km/jam} \times 2 \text{ jam} = 900 \text{ km}$$

$$\angle Q = 40^\circ + (180^\circ - 100^\circ) = 120^\circ$$

$$PR = n$$

$$\begin{aligned} \Rightarrow n^2 &= 800^2 + 900^2 - 2 \cdot 800 \cdot 900 \cos 120^\circ \\ &= 640.000 + 810.000 + 720.000 \\ &= 2.170.000 \end{aligned}$$

8

7 a) $AB = 10 \text{ cm}$, $AC = 12 \text{ cm}$, $\angle A = 60^\circ$

$$L_{ABC} = \frac{1}{2} \times 10 \times 12 \times \sin 60^\circ$$

$$= 5 \times 12 \times \frac{1}{2} \sqrt{3}$$

$$= 30\sqrt{3} \text{ cm}^2$$

b) $AB = 6 \text{ cm}$, $AC = 6\sqrt{3} \text{ cm}$, $\angle B = 120^\circ$

$$L_{ABC} = \frac{1}{2} \times 6 \times 6\sqrt{3} \times \sin 120^\circ$$

$$= 3 \times 6\sqrt{3} \times \frac{1}{2}$$

$$= 9\sqrt{3} \text{ cm}^2$$

c) $AB = 15 \text{ cm}$, $BC = 14 \text{ cm}$, $AC = 13 \text{ cm}$

$$s = \frac{15+14+13}{2} = 21$$

$$L_{ABC} = \sqrt{21(21-15)(21-14)(21-13)}$$

$$= \sqrt{21 \cdot 6 \cdot 7 \cdot 8}$$

$$= \sqrt{7056} = 84 \text{ cm}^2$$