第5回答え

$15^2 + 8^2 = 225 + 64$

$= 289$

$= 17^2$

1. (1) $\sin\alpha = \dfrac{8}{17}$, $\cos\alpha = \dfrac{15}{17}$, $\tan\alpha = \dfrac{8}{15}$

$\sin\beta = \dfrac{15}{17}$, $\cos\beta = \dfrac{8}{17}$, $\tan\beta = \dfrac{15}{8}$

(2) $\sin\alpha = \dfrac{1}{\sqrt{2}}$, $\cos\alpha = \dfrac{1}{\sqrt{2}}$, $\tan\alpha = 1$

$\sin\beta = \dfrac{1}{\sqrt{2}}$, $\cos\beta = \dfrac{1}{\sqrt{2}}$, $\tan\beta = 1$

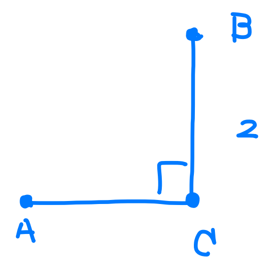
2. (1) $x \approx 0.5736$ ← 「≈」は「≒」と同じイミ

(2) $\theta \approx 14^\circ$

(3) $\theta \approx 26^\circ$

(4) $\theta \approx 76^\circ$

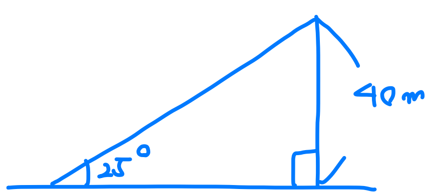
3. $CA = 2$, $AB = 2\sqrt{2}$ //



4. $x \tan 25^\circ = 40$

$x = \dfrac{40}{0.4663}$

≈ 86 [m] //



5. (1) $\cos\theta = \frac{3}{5}$, $\tan\theta = \frac{4}{3}$

(2) $\tan\theta = \dfrac{\frac{3}{\sqrt{10}}}{\frac{1}{\sqrt{10}}}$, $\therefore \cos\theta = \frac{1}{\sqrt{10}}$, $\sin\theta = \frac{3}{\sqrt{10}}$ //

6. $\cos 50^\circ = \sin 40^\circ$ //

7. (1) 1

(2) $\sin 90^\circ = 1$ //

8. $\sin\frac{A}{2}\cos\frac{B+C}{2} + \cos\frac{A}{2}\sin\frac{B+C}{2}$

$= \sin\frac{A+B+C}{2}$

$= 1 \quad (\because \underline{A+B+C = 180^\circ})$

斜体のA, B, Cは，それぞれ
△ABCにおける ∠A, ∠B, ∠C
とP.3で断った。

9. $(1-\sin\theta)(1+\sin\theta) - \dfrac{1}{1+\tan^2\theta}$

$= 1 - \sin^2\theta - \cos^2\theta$

$= 0$ //

$1+\tan^2\theta$

$= \frac{1}{\cos^2\theta}\ (\cos^2\theta + \sin^2\theta)$

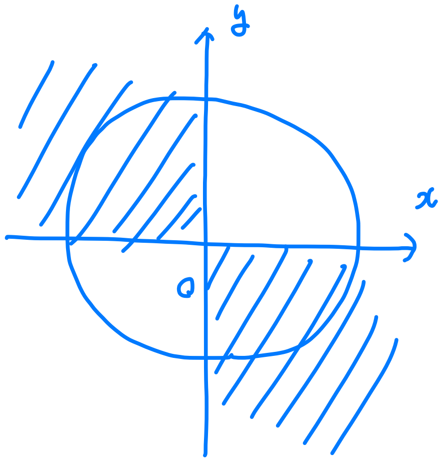
10.

θ	0°	30°	45°	60°	90°	120°	135°	150°	180°
$\sin\theta$	0	$\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{\sqrt{3}}{2}$	1	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$	0
$\cos\theta$	1	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	0	$-\frac{1}{2}$	$-\frac{\sqrt{2}}{2}$	$-\frac{\sqrt{3}}{2}$	-1
$\tan\theta$	0	$\frac{1}{\sqrt{3}}$	1	$\sqrt{3}$	定義できない	$-\sqrt{3}$	-1	$-\frac{1}{\sqrt{3}}$	0

Ⅱ1. $\sin\theta\cos\theta < 0$

$$\Longleftrightarrow \begin{cases} \sin\theta > 0 \\ \cos\theta < 0 \end{cases} \lor \begin{cases} \sin\theta < 0 \\ \cos\theta > 0 \end{cases}$$

または



$0^\circ < \theta < 180^\circ$ から、θ は鈍角 //

Ⅱ2. (1) $\sin 156^\circ = \sin(180^\circ - 156^\circ) = \sin 24^\circ$ //

(2) $\cos 93^\circ = \sin(90^\circ - 93^\circ) = \sin(-3^\circ) = -\sin 3^\circ$ //

(3) $\tan 117^\circ = \dfrac{1}{\tan(90^\circ - 117^\circ)} = \dfrac{1}{\tan(-27^\circ)} = -\dfrac{1}{\tan 27^\circ}$ //

Ⅱ3. $\sin 165^\circ = \sin 15^\circ$

≈ 0.2588 //

$\cos 113^\circ = -\cos 67^\circ$

≈ -0.3907 //

$\tan 98^\circ = \dfrac{-1}{\tan 8^\circ} \approx \dfrac{-1}{0.1405} \approx 7\,1174$ //

II 4. $\sin 110^\circ + \cos 160^\circ + \tan 10^\circ + \tan 170^\circ$

$= \sin 70^\circ - \cos 20^\circ$

$= 0$ //

II 5. (1) $\theta = 45^\circ, 135^\circ$

(2) $\theta = 135^\circ$

(3) $\theta = 150^\circ$

II 6. (1) $\cos\theta = \pm\dfrac{\sqrt{21}}{5}$, $\tan\theta = \pm\dfrac{2}{\sqrt{21}}$ $25 - 4 = 21$

(複合同順)

(2) $\tan\theta = -\dfrac{\frac{3}{\sqrt{10}}}{\frac{1}{\sqrt{10}}}$

$\sin\theta = \dfrac{3}{\sqrt{10}}$, $\cos\theta = -\dfrac{1}{\sqrt{10}}$ //

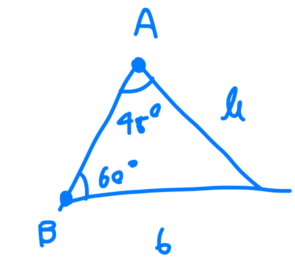
II 7. $\theta = 135^\circ$

II 8. (1) $-\sqrt{3}$

(2) -1

Ⅱ 解。

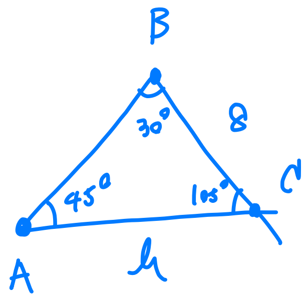
(1) $\dfrac{6}{1/\sqrt{2}} = \dfrac{b}{\sqrt{3}/2}$



$\therefore\ b = \overset{3}{\cancel{6}}\sqrt{2} \times \dfrac{\sqrt{3}}{\cancel{2}}$

$= 3\sqrt{6}$ //

(2) $2b = 8 \cdot \sqrt{2}$

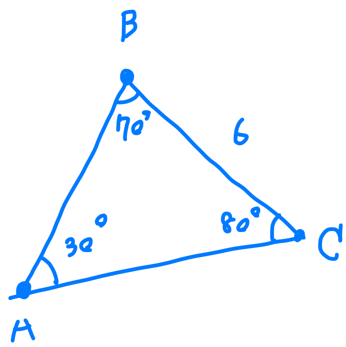


$\therefore\ b = 4\sqrt{2}$ //

(3) $\cancel{\sqrt{2}}a = \overset{4\sqrt{2}}{\cancel{8}}$

$\therefore\ a = 4\sqrt{2}$ //

(4) $2R = 6 \times 2$



$\therefore\ R = 6$ //

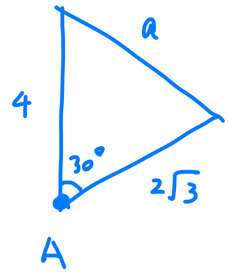
(5) $\dfrac{R}{\sin C} = 2R$

$\therefore\ C = 30°,\ 150°$ //

II 番。 (6) $a^2 = 16 + 12 - \cancel{16}^{\,8}\sqrt{3} \cdot \frac{\sqrt{3}}{\cancel{2}}$

$= 28 - 24$

$= 4$



$\therefore a = 2$ 〃

(7) $\cos C = \frac{225 + 49 - 169}{2 \cdot 15 \cdot 7}$

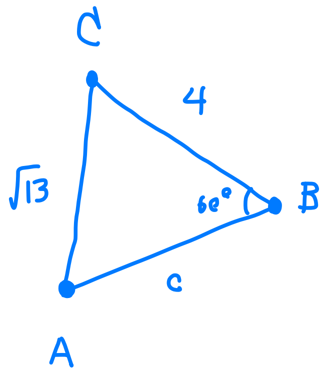
$= \frac{\cancel{105}\ \cancel{21}}{2 \cdot \cancel{3} \cdot \cancel{5} \cdot \cancel{7}}$

$225 - 169$

$= 56$

$56 + 49 = 105$

$\therefore C = 60°$ 〃

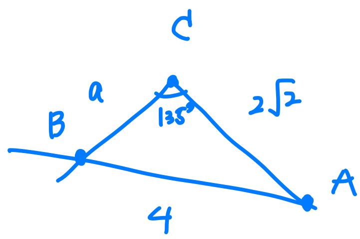


(8) $13 = 16 + c^2 - 8c \cdot \frac{1}{2}$

$c^2 - 4c + 3 = 0$

$(c-1)(c-3) = 0$

$\therefore c = 1, 3$ 〃



(9) $16 = a^2 + 8 + 4\sqrt{2}a \cdot \frac{1}{\sqrt{2}}$

$a^2 + 4a - 8 = 0$

$a = -2 \pm \sqrt{4 + 8}$

$\therefore a = -2 + 2\sqrt{3}$ 〃

R10。 (1) $121 > 16+81$

∴ どん角三角形 〃

(2) $144 < 81+100$

∴ えい角三角形 〃

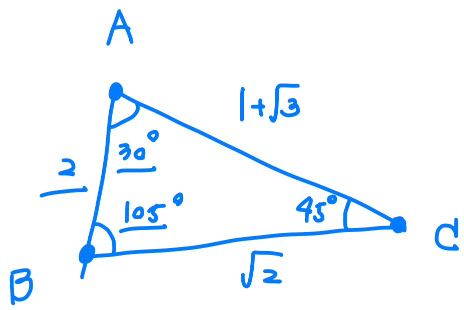
(3) $100 = 64+36$

∴ 直角三角形 〃

R11。 (1) $c^2 = 2+4+2\sqrt{3} - 2\cancel{\sqrt{2}}(1+\sqrt{3})\frac{1}{\cancel{\sqrt{2}}}$

$= 4$

$\therefore c = 2$

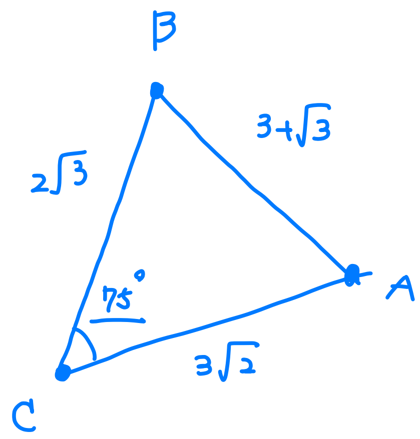


$2\sqrt{2} = \frac{\sqrt{2}}{\sin\angle A}$

$\therefore \angle A = 30°$

以上から、$c = 2$, $\angle A = 30°$, $\angle B = 105°$ 〃

2 II. (2) $\cos C = \dfrac{12+18-(12+6\sqrt{3})}{2\cdot 2\sqrt{3}\cdot 3\sqrt{2}}$



$$= \frac{\cancel{6}(3-\sqrt{3})}{\cancel{2}\ 2\sqrt{3}\ \cancel{3}\sqrt{2}}$$

$$= \frac{\cancel{3}\sqrt{3}-\cancel{3}\ 1}{2\cancel{6}\sqrt{2}}$$

$$= \frac{\sqrt{3}-1}{2\sqrt{2}}$$

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

$$= \cos(45^\circ+30^\circ)$$

$\therefore C = 75^\circ$

$$\sin 75^\circ = \frac{1}{\sqrt{2}}\frac{\sqrt{3}}{2} + \frac{1}{\sqrt{2}}\frac{1}{2}$$

$$= \frac{\sqrt{3}+1}{2\sqrt{2}}$$

$$\frac{2\sqrt{3}}{\sin A} = (3+\sqrt{3}) \times \frac{2\sqrt{2}}{\sqrt{3}+1}$$

$$\sin A = \cancel{2}\sqrt{3} \times \frac{1}{\cancel{2}\sqrt{2}} \times \frac{\sqrt{3}+1}{3+\sqrt{3}}$$

$$= \frac{1}{\sqrt{2}}\ \frac{3+\sqrt{3}}{3+\sqrt{3}}$$

$\therefore A = 45^\circ,\ B = 60^\circ$

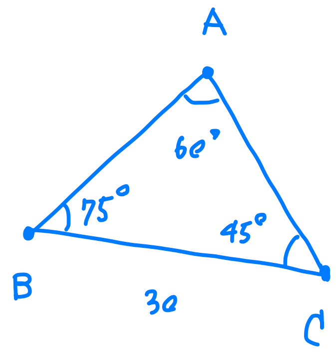
$C = 75^\circ$

//

22.

$$\sqrt{2}\,c = 30 \times \frac{2}{\sqrt{3}}$$

$$c = \frac{\cancel{60}^{\,10\sqrt{6}}}{\cancel{\sqrt{6}}} = 10\sqrt{6} \quad [m] \;/\!/$$



23. (1)

$$S = \frac{1}{\cancel{2}} \cdot 7 \cdot \cancel{8}^{\,\cancel{4}\,2\sqrt{2}} \cdot \frac{1}{\cancel{\sqrt{2}}}$$

$$= 14\sqrt{2} \;/\!/$$

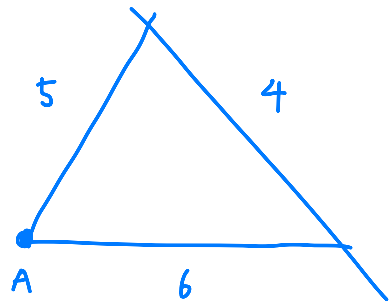
61-16 = 45

(2)

$$\cos\angle A = \frac{25+36-16}{2 \cdot 5 \cdot 6}$$

$$= \frac{\cancel{45}^{\,3}}{2 \cdot \cancel{5} \cdot \cancel{6}^{\,2}}$$

$$= \frac{3}{4}$$



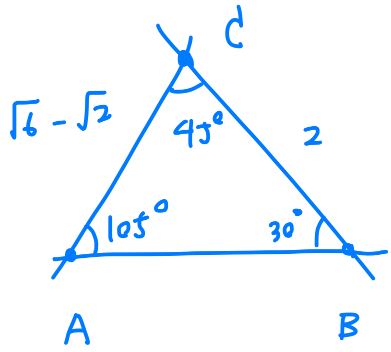
$$\sin\angle A = \frac{\sqrt{7}}{4}$$

$$\therefore S = \frac{1}{\cancel{2}}\, 5 \cdot \cancel{6}^{\,3} \cdot \frac{\sqrt{7}}{4}$$

$$= \frac{15\sqrt{7}}{4} \;/\!/$$

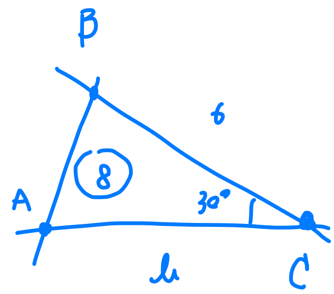
23. (3) $S = (\sqrt{6}-\sqrt{2})\,\dfrac{1}{\sqrt{2}}$

$= \sqrt{3} - 1$ //



24. (1) $8 = 3 \cdot h \cdot \dfrac{1}{2}$

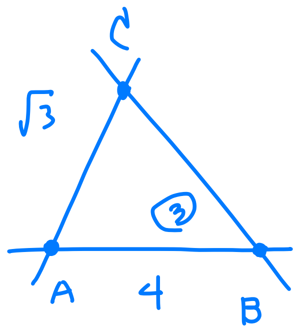
$\therefore\ h = \dfrac{16}{3}$ //



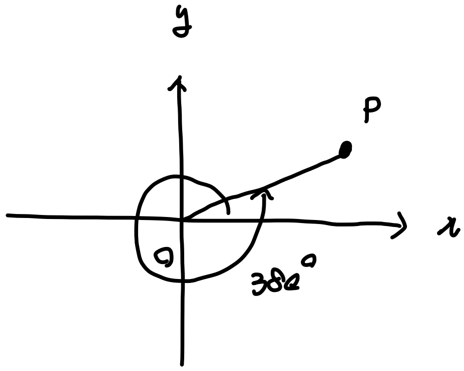
(2) $3 = 2\sqrt{3} \cdot \sin A$

$\sin A = \dfrac{\sqrt{3}}{2}$

$\therefore\ A = 60°,\ 120°$ //

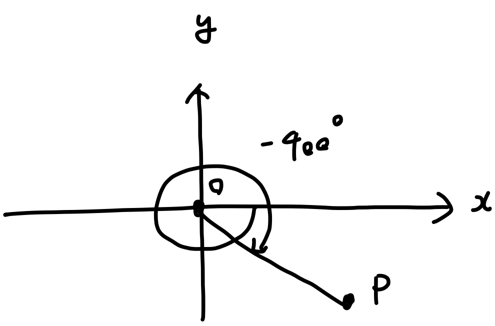


25. (1)



$20° + 360° \times 1$ //

(2)



$320° + 360° \times (-2)$

26. (1) $\frac{\pi}{6}$

(2) $\frac{\pi}{3}$

27. (1) 135°

(2) 360°

28. (1) 第3象限

(2) 第1象限

29. (1) 弧の長さ $\frac{5}{3}\pi$, 面積 $\frac{25}{6}\pi$

(2) 〃 3π, 〃 $\frac{{}^{2}\cancel{16}\ 3}{\cancel{2}\cdot\cancel{4}}\pi = 6\pi$ 〃

30. (1) $\sin\theta = \frac{\sqrt{3}}{2}$, $\cos\theta = -\frac{1}{2}$, $\tan\theta = -\sqrt{3}$

(2) $\sin\theta = -\frac{1}{2}$, $\cos\theta = -\frac{\sqrt{3}}{2}$, $\tan\theta = \frac{1}{\sqrt{3}}$

31. (1) $\sin\theta = -\frac{\sqrt{5}}{3}$, $\tan\theta = \frac{\sqrt{5}}{2}$

(2) $\sin\theta = -\frac{1}{\sqrt{2}}$, $\cos\theta = \frac{1}{\sqrt{2}}$

B2. (1) $(\sin\theta + \cos\theta)^2$

$$= \sin^2\theta + \cos^2\theta + 2\sin\theta\cos\theta$$

$$= 1 + 2\sin\theta\cos\theta \quad \blacksquare$$

(2) $\dfrac{1}{\tan^2\theta} - \cos^2\theta$

$$= \frac{1 - \sin^2\theta}{\tan^2\theta}$$

$$= \frac{\cos^2\theta}{\tan^2\theta} \quad \blacksquare$$

B3. (1) $1 + 2\sin\theta\cos\theta = \dfrac{1}{2}$

$$\sin\theta\cos\theta = -\frac{1}{2}\cdot\frac{1}{2}$$

$$= -\frac{1}{4} \quad //$$

(2) $\sin^3\theta + \cos^3\theta = (\sin\theta + \cos\theta)(\sin^2\theta - \sin\theta\cos\theta + \cos^2\theta)$

$$= \frac{\sqrt{2}}{2}\cdot\left(1 + \frac{1}{4}\right)$$

$$= \frac{\sqrt{2}}{2}\cdot\frac{5}{4}$$

$$= \frac{5\sqrt{2}}{8} \quad //$$

33. (3) $(\sin\theta - \cos\theta)^2 = 1 - 2\sin\theta\cos\theta$

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

$= \frac{3}{2}$

$\sin\theta\cos\theta < 0$

$\therefore \sin\theta - \cos\theta = \pm\sqrt{\frac{3}{2}}$ //

$\Leftrightarrow \begin{cases} \sin\theta > 0 \\ \cos\theta < 0 \end{cases} \vee \begin{cases} \sin\theta < 0 \\ \cos\theta > 0 \end{cases}$

(4) $\sin^3\theta - \cos^3\theta = (\sin\theta - \cos\theta)\left(1 - \frac{1}{4}\right)$

$= \pm\frac{\sqrt{6}}{2} \cdot \frac{3}{4}$

$= \pm\frac{3\sqrt{6}}{8}$ //

34. (1) $\sin\frac{5}{3}\pi = \underline{-\sin\frac{\pi}{3} = -\frac{\sqrt{3}}{2}}$ //

(2) $\cos\left(-\frac{7}{4}\pi\right) = \underline{\cos\frac{\pi}{4} = \frac{1}{\sqrt{2}}}$ //

(3) $\tan\left(-\frac{23}{6}\pi\right) = \underline{\tan\frac{\pi}{6} = \frac{1}{\sqrt{3}}}$ //