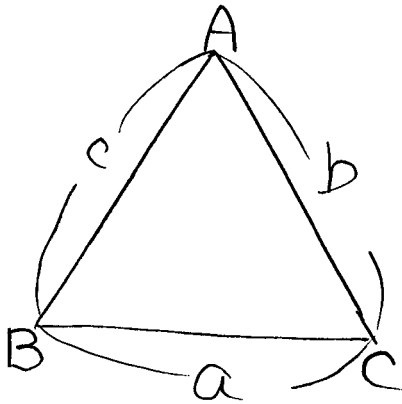


삼각함수



세각 A, B, C

$$A+B+C=\pi$$

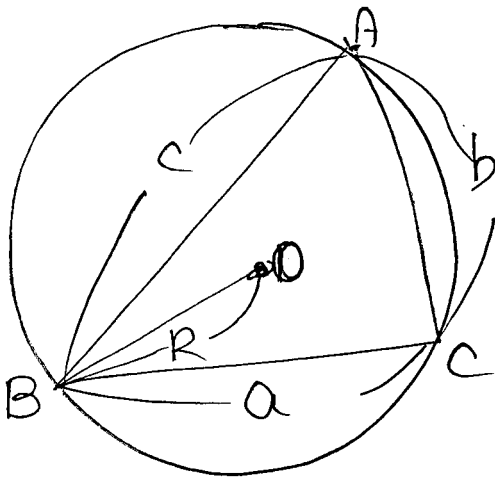
세변 a, b, c

$$a+b>c$$

$$b+c>a$$

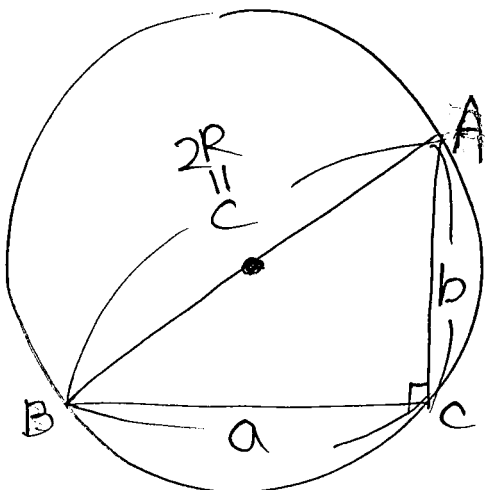
$$c+a>b$$

II 사인법칙



$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C} = 2R$$

(증명)



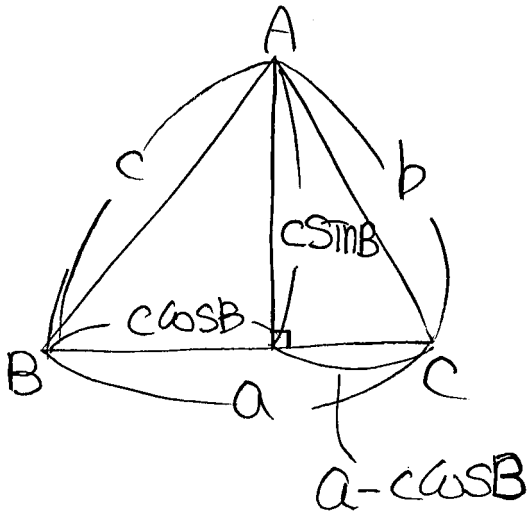
$$\sin A = \frac{a}{2R}$$

$$\sin B = \frac{b}{2R}$$

$$\sin C = \frac{c}{2R}$$

$$\therefore \frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C} = 2R$$

2 코사인 법칙



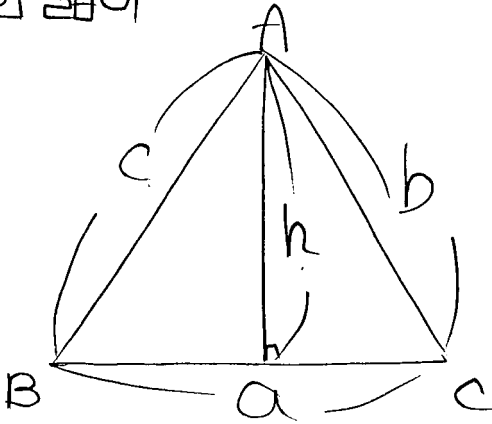
$$\begin{aligned} b^2 &= (c \sin B)^2 + (a - c \cos B)^2 \\ &= \underline{c^2 \sin^2 B} + a^2 - 2ca \cos B + \underline{c^2 \cos^2 B} \\ &= c^2 + a^2 - 2ca \cos B \end{aligned}$$

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

$$b^2 = c^2 + a^2 - 2ca \cos B$$

$$c^2 = a^2 + b^2 - 2ab \cos C$$

3 넓이



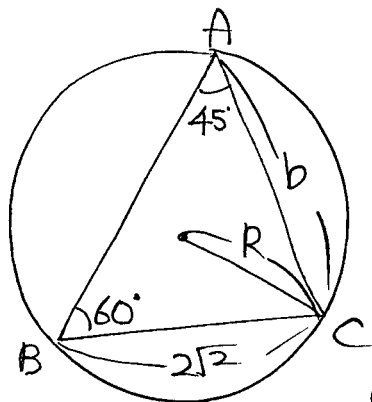
$$S = \frac{1}{2} ah$$

$$\frac{h}{c} = \sin B \quad h = c \sin B$$

$$S = \frac{1}{2} ac \sin B = \frac{1}{2} bc \sin A = \frac{1}{2} ab \sin C$$

P313

EX)



$$\frac{a}{\sin A} = \frac{b}{\sin B} = 2R$$

$$\frac{2\sqrt{2}}{\sin 45^\circ} = \frac{b}{\sin 60^\circ} = 2R$$

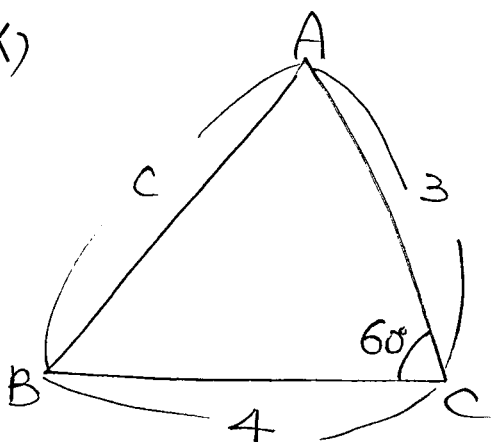
$$\textcircled{1} \quad 2\sqrt{2} = 2R \times \sin 45^\circ$$

$$2\sqrt{2} = \sqrt{2}R \quad \boxed{R=2}$$

$$\textcircled{2} \quad b = 2R \times \sin 60^\circ = 4 \times \frac{\sqrt{3}}{2} = 2\sqrt{3}$$

P314

EX)



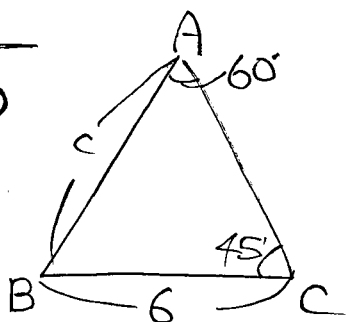
$$\begin{aligned} c^2 &= 4^2 + 3^2 - 2 \cdot 4 \cdot 3 \cdot \cos 60^\circ \\ &= 16 + 9 - 12 = 13 \end{aligned}$$

$$c = \sqrt{13}$$

P315

11

(1)

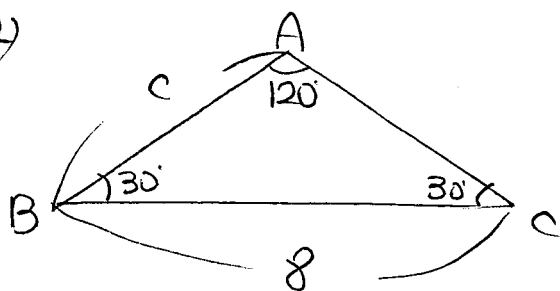


$$\frac{6}{\sin 60^\circ} = \frac{c}{\sin 45^\circ}$$

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

$$c = \frac{6\sqrt{2}}{\sqrt{3}} = \frac{6\sqrt{6}}{3} = 2\sqrt{6}$$

(2)



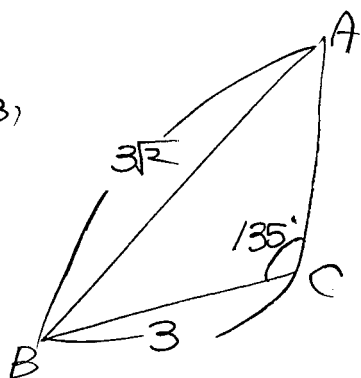
$$\boxed{\sin(\pi - \theta) = \sin \theta}$$

$$\frac{8}{\sin 120^\circ} = \frac{c}{\sin 30^\circ}$$

$$c \times \frac{\sqrt{3}}{2} = 8 \times \frac{1}{2}$$

$$c = \frac{8}{\sqrt{3}} = \frac{8\sqrt{3}}{3}$$

(3)

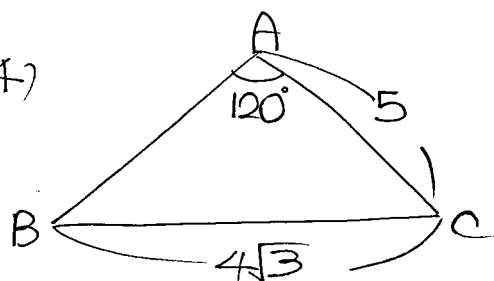


$$\frac{3}{\sin A} = \frac{3\sqrt{2}}{\sin 35^\circ}$$

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

$$\sin A = \frac{1}{2}$$

(4)



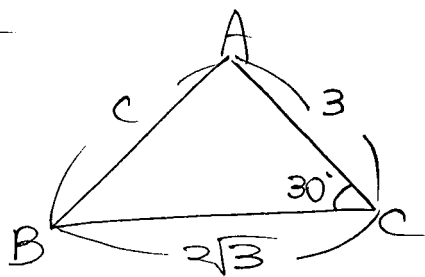
$$\frac{4\sqrt{3}}{\sin 120^\circ} = \frac{5}{\sin B}$$

$$4\sqrt{3} \times \sin B = 5 \times \frac{\sqrt{3}}{2}$$

$$\sin B = \frac{5}{8}$$

21

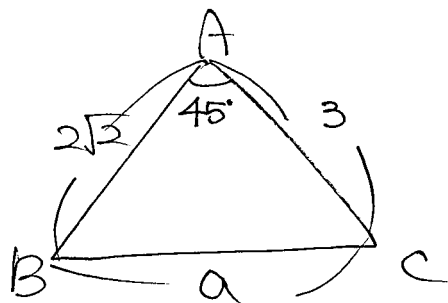
(1)



$$c^2 = 12 + 9 - 2 \cdot 2\sqrt{3} \cdot 3 \cdot \frac{\sqrt{3}}{2} = 3$$

$$\boxed{c = \sqrt{3}}$$

(2)

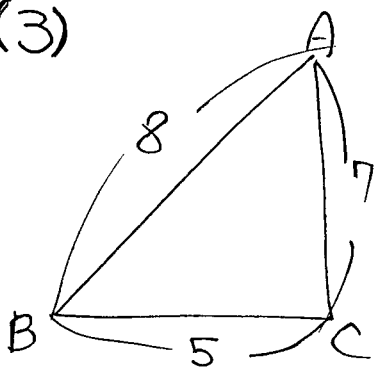


$$a^2 = 8 + 9 - 2 \cdot 2\sqrt{2} \cdot 3 \cdot \frac{\sqrt{2}}{2}$$

$$= 17 - 12 = 5$$

$$\boxed{a = \sqrt{5}}$$

(3)

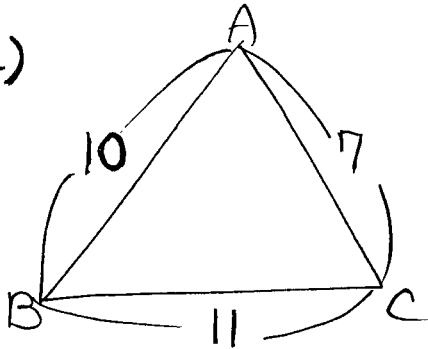


$$8^2 = 5^2 + 7^2 - 2 \cdot 5 \cdot 7 \cos C$$

$$70 \cos C = 25 + 49 - 64$$

$$70 \cos C = 10 \quad \cos C = \frac{1}{7}$$

(4)



$$11^2 = 10^2 + 7^2 - 2 \cdot 10 \cdot 7 \cos A$$

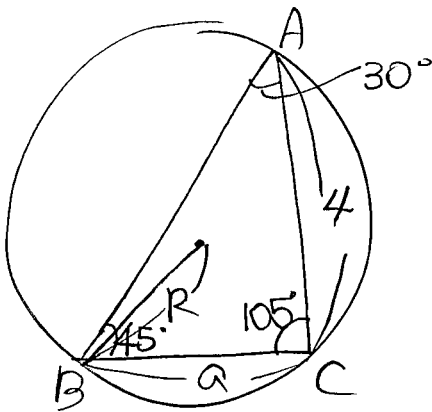
$$140 \cos A = 100 + 49 - 121$$

$$140 \cos A = 28 \quad \cos A = \frac{1}{5}$$

P317

1-11

(1)



$$\frac{a}{\sin 30^\circ} = \frac{4}{\sin 45^\circ} = 2R$$

$$a \times \frac{\sqrt{2}}{2} = 4 \times \frac{1}{2} \quad a = 2\sqrt{2}$$

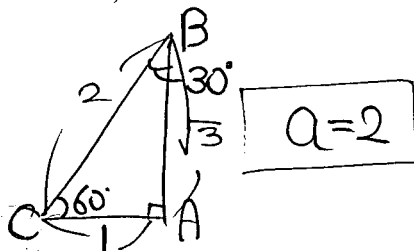
$$a = 2R \times \frac{1}{2} \quad R = 2\sqrt{2}$$

$$(2) \quad \frac{1}{\sin 30^\circ} = \frac{\sqrt{3}}{\sin C} = 2R$$

$$\sin C = \sqrt{3} \times \frac{1}{2} = \frac{\sqrt{3}}{2}, \quad 1 = 2R \times \frac{1}{2} \quad \boxed{R=1}$$

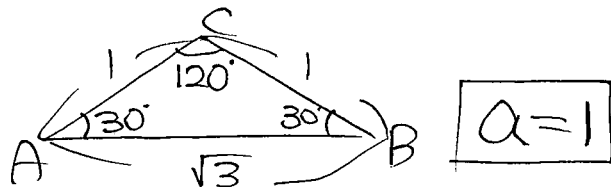
$$C = 60^\circ \text{ or } C = 120^\circ$$

$$\textcircled{1} C = 60^\circ, A = 90^\circ$$



$$\boxed{a=2}$$

$$\textcircled{2} C = 120^\circ, A = 30^\circ$$



$$\boxed{a=1}$$

1-2)

$$(1) \quad a+b=5k$$

$$b+c=6k$$

$$c+a=7k$$

$$a+b+c=9k$$

$$a=3k, b=2k, c=4k$$

$$\sin A : \sin B : \sin C$$

$$= a : b : c = 3 : 2 : 4$$

$$(2) \quad A=45^\circ, B=45^\circ, C=90^\circ$$

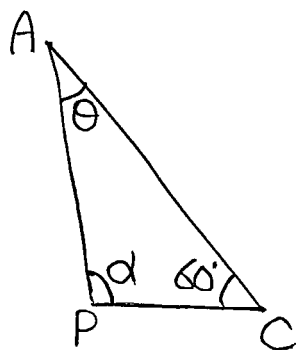
$$a:b:c = \sin A : \sin B : \sin C = \frac{\sqrt{2}}{2} : \frac{\sqrt{2}}{2} : 1$$

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

1-3) $4\sqrt{2}$

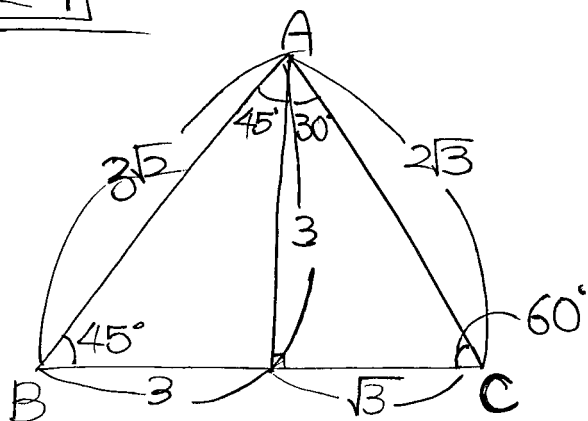
$$\frac{\overline{AC}}{\sin 45^\circ} = \frac{4\sqrt{3}}{\sin 60^\circ}$$

$$\overline{AC} \times \frac{\sqrt{3}}{2} = 4\sqrt{3} \times \frac{\sqrt{2}}{2} \quad \overline{AC} = 4\sqrt{2}$$



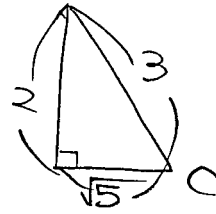
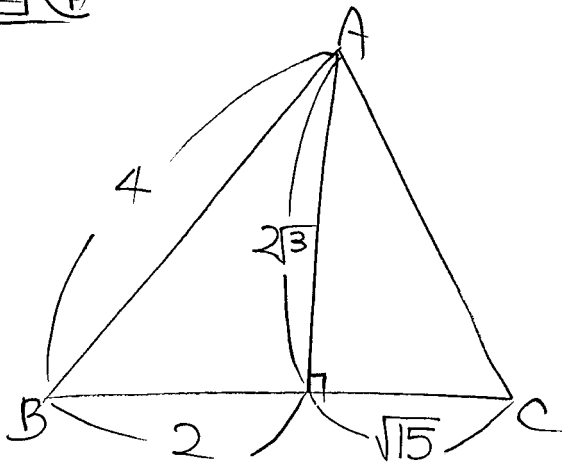
$$\frac{\overline{CP}}{\sin \theta} = \frac{4\sqrt{2}}{\sin \alpha} \geq 4\sqrt{2} \quad (\because \sin \alpha = 1)$$

2-1)



$$\overline{BC} = 3 + \sqrt{3}$$

2-2) ④

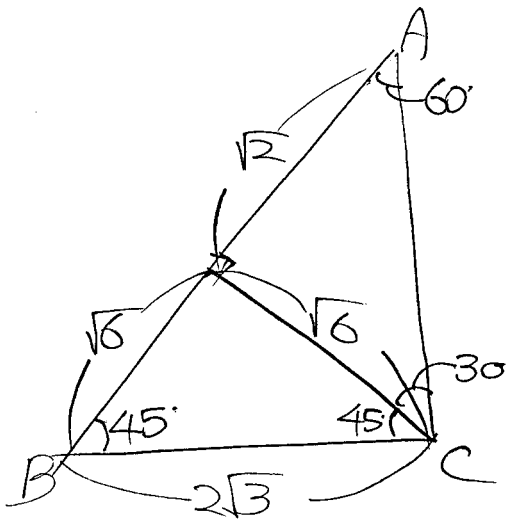


$$\overline{BC} = 2 + \sqrt{15}$$

2-3) $\sqrt{6} + \sqrt{2}$

$$\frac{\overline{BC}}{\sin 60^\circ} = 2 \cdot 2$$

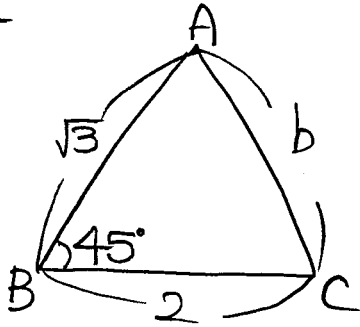
$$\overline{BC} = 4 \cdot \frac{\sqrt{3}}{2} = 2\sqrt{3}$$



$$\overline{AB} = \sqrt{6} + \sqrt{2}$$

3-11

(1)

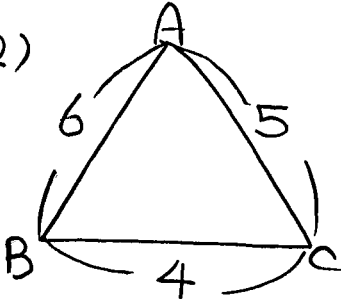


$$b^2 = 2^2 + (\sqrt{3})^2 - 2 \cdot 2 \cdot \sqrt{3} \cdot \cos 45^\circ$$

$$= 4 + 3 - 4\sqrt{3} \cdot \frac{\sqrt{2}}{2}$$

$$= 7 - 2\sqrt{6}$$

(2)



$$\textcircled{A} 4^2 = 5^2 + 6^2 - 2 \cdot 5 \cdot 6 \cdot \cos A$$

$$\cos A = \frac{5^2 + 6^2 - 4^2}{2 \cdot 5 \cdot 6} = \frac{25 + 36 - 16}{60} = \frac{45}{60} = \frac{3}{4}$$

$$\textcircled{B} 5^2 = 6^2 + 4^2 - 2 \cdot 6 \cdot 4 \cdot \cos B$$

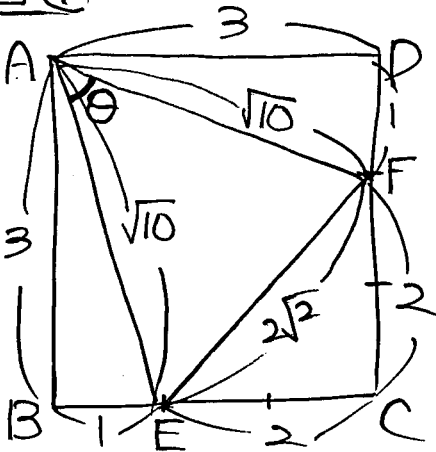
$$\cos B = \frac{6^2 + 4^2 - 5^2}{2 \cdot 6 \cdot 4} = \frac{36 + 16 - 25}{48} = \frac{27}{48} = \frac{9}{16}$$

$$\textcircled{C} 6^2 = 4^2 + 5^2 - 2 \cdot 4 \cdot 5 \cdot \cos C$$

$$\cos C = \frac{4^2 + 5^2 - 6^2}{2 \cdot 4 \cdot 5} = \frac{16 + 25 - 36}{40} = \frac{5}{40} = \frac{1}{8}$$

$$\cos A : \cos B : \cos C = 12 : 9 : 2$$

3-21④

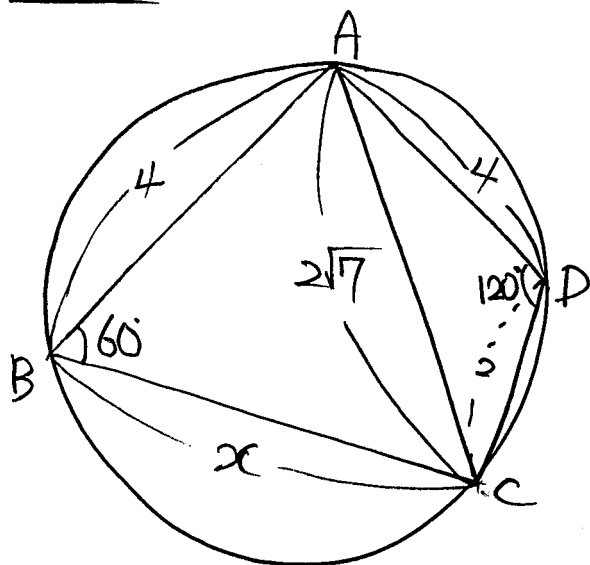


$$(2\sqrt{2})^2 = (\sqrt{10})^2 + (\sqrt{10})^2 - 2 \cdot \sqrt{10} \cdot \sqrt{10} \cos \theta$$

$$20 \cos \theta = 12$$

$$\cos \theta = \frac{12}{20} = \frac{3}{5}$$

3-316



$$\cos(\pi - \theta) = -\cos \theta$$

$$\cos 120^\circ = -\cos 60^\circ = -\frac{1}{2}$$

$$\overline{AC}^2 = 16 + 4 - 2 \cdot 4 \cdot 2 \cdot \left(-\frac{1}{2}\right) = 28$$

$$\overline{AC} = 2\sqrt{7}$$

$$28 = x^2 + 16 - 2 \cdot 4 \cdot x \cdot \frac{1}{2}$$

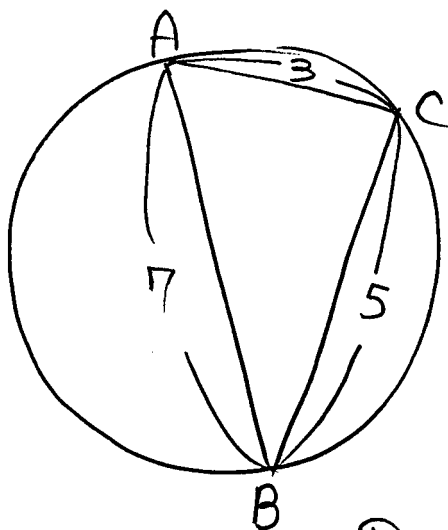
$$x^2 - 4x - 12 = 0$$

$$(x - 6)(x + 2) = 0$$

$$x > 0 \text{ 01022}$$

$$\therefore x = 6$$

4-11 $\frac{\sqrt{3}}{3}$

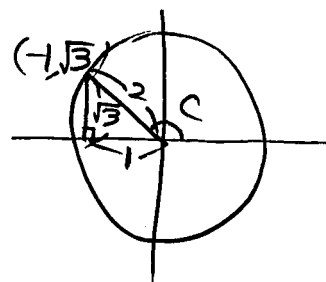


$$\textcircled{7} 49 = 9 + 25 - 2 \cdot 3 \cdot 5 \cdot \cos C$$

$$30 \cos C = -15$$

$$\cos C = -\frac{1}{2}$$

$$\sin C = \frac{\sqrt{3}}{2}$$

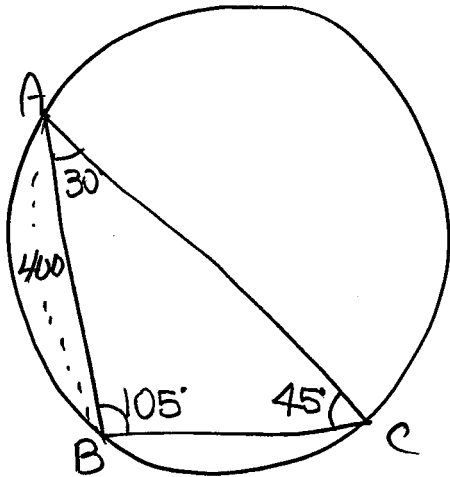


$$\textcircled{8} \frac{7}{\sin C} = 2R$$

$$7 = 2R \times \frac{\sqrt{3}}{2}$$

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

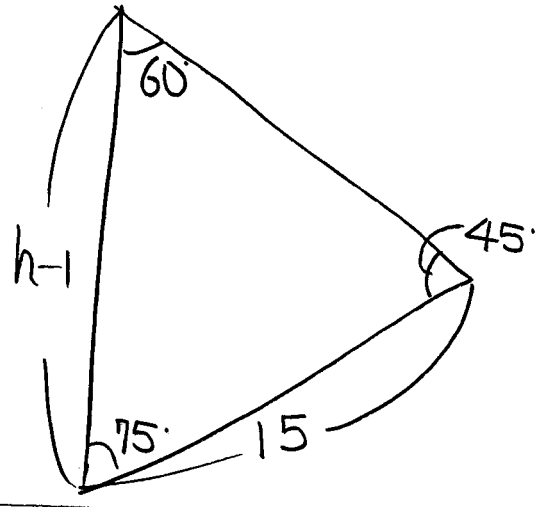
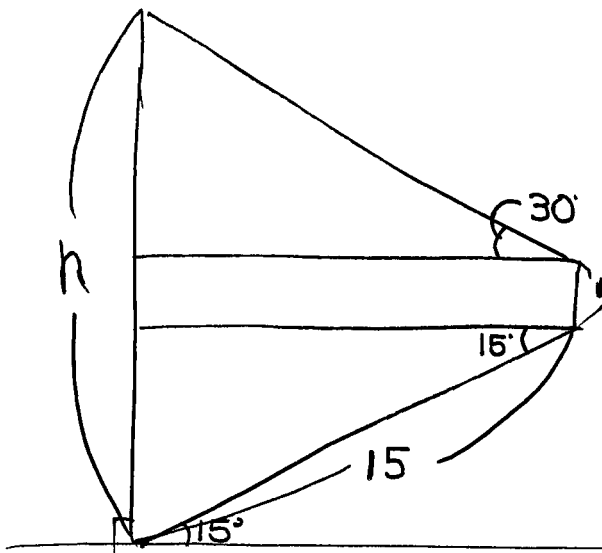
4-2 | 400√2



$$\frac{400}{\sin 45^\circ} = 2R$$

$$2R = 400 \times \frac{2}{\sqrt{2}} = 400\sqrt{2}$$

4-3 | 13.25



$$\frac{h-1}{\sin 45^\circ} = \frac{15}{\sin 60^\circ}$$

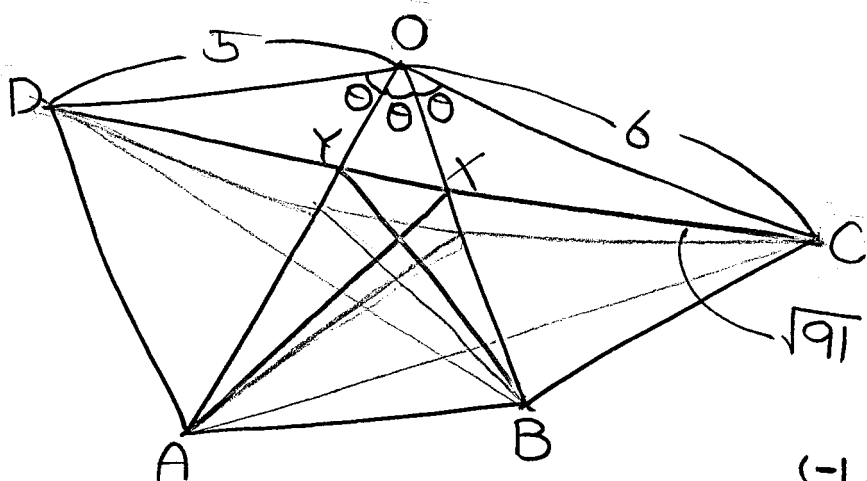
$$(h-1) \times \frac{\sqrt{3}}{2} = 15 \times \frac{\sqrt{2}}{2}$$

$$h-1 = \frac{15\sqrt{2}}{\sqrt{3}} = \frac{15\sqrt{6}}{3} = 5\sqrt{6} = 12.25$$

$$h = 13.25$$

$$\begin{array}{r} 2.45 \\ \times 5 \\ \hline 12.25 \end{array}$$

5-11 $\frac{2\pi}{9}$

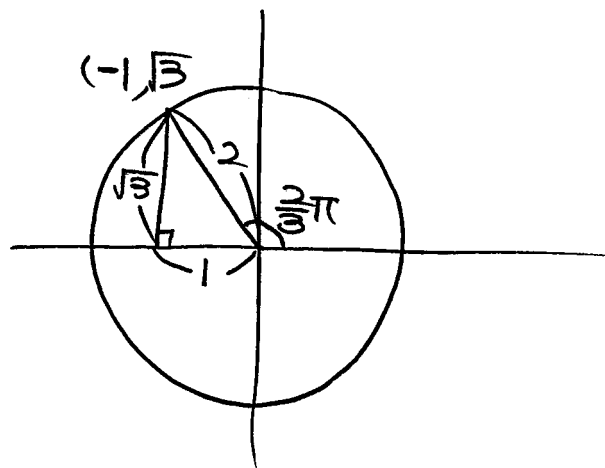


$$91 = 25 + 36 - 2 \cdot 5 \cdot 6 \cdot \cos(3\theta)$$

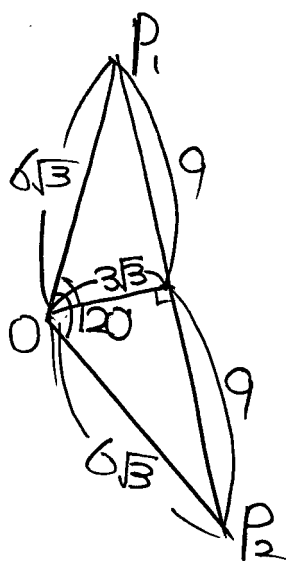
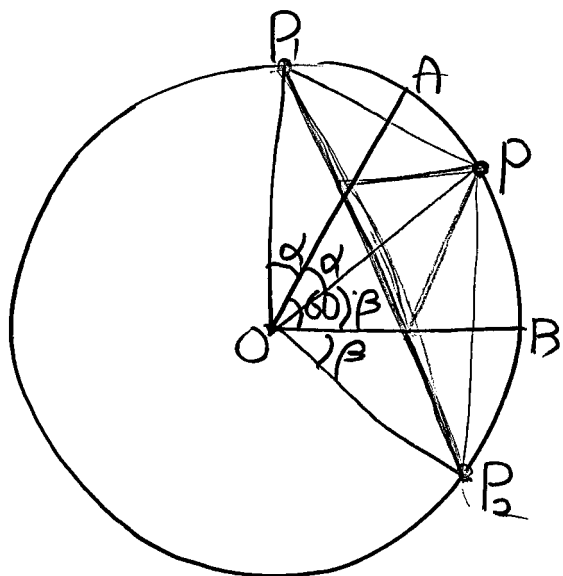
$$60 \cos(3\theta) = -30$$

$$\cos(3\theta) = -\frac{1}{2}$$

$$3\theta = \frac{2\pi}{3} \quad \theta = \frac{2\pi}{9}$$

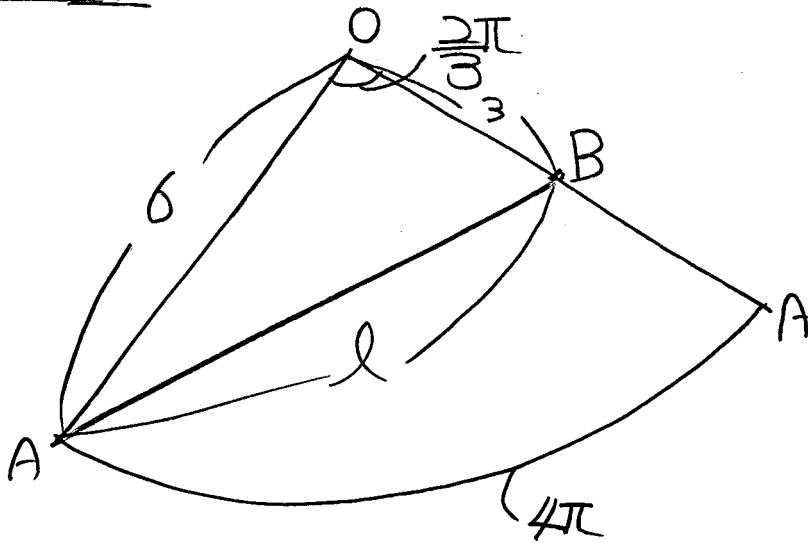


5-21 18



$\therefore 18$

5-313√7



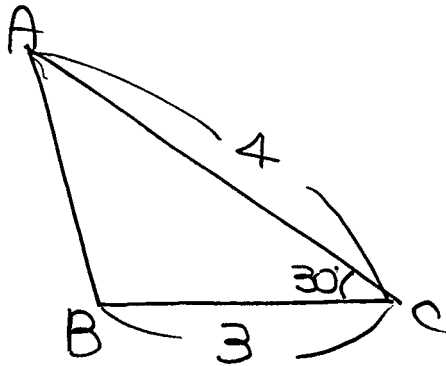
$$\cos \frac{2\pi}{3} = -\cos \frac{\pi}{3} = -\frac{1}{2}$$

$$l^2 = 36 + 9 - 2 \cdot 6 \cdot 3 \cdot \left(-\frac{1}{2}\right) = 45 + 18 = 63$$

$$l = 3\sqrt{7}$$

P326

EX)

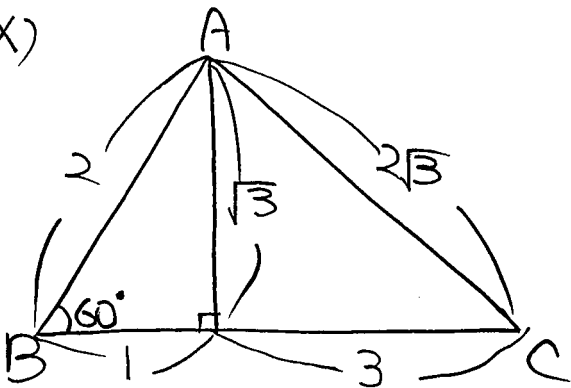


$$S = \frac{1}{2} \cdot 4 \cdot 3 \cdot \sin 30^\circ$$

$$= 6 \cdot \frac{1}{2} = 3$$

P327

EX)

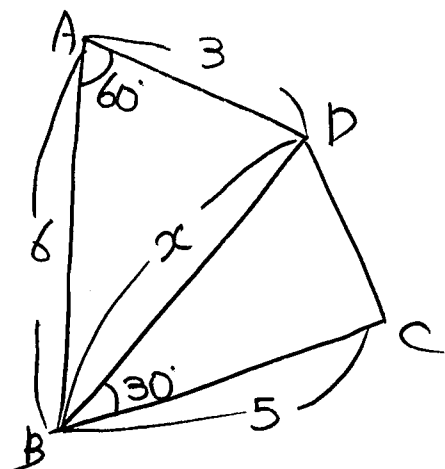


$$S = \frac{1}{2} \cdot 4 \cdot \sqrt{3}$$

$$= 2\sqrt{3}$$

P328

EX1)



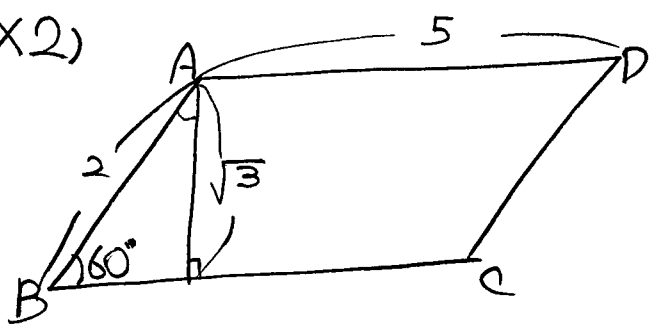
$$x^2 = 36 + 9 - 2 \cdot 6 \cdot 3 \cdot \frac{1}{2} = 27$$

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

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

$$= \frac{33\sqrt{3}}{4}$$

EX2)

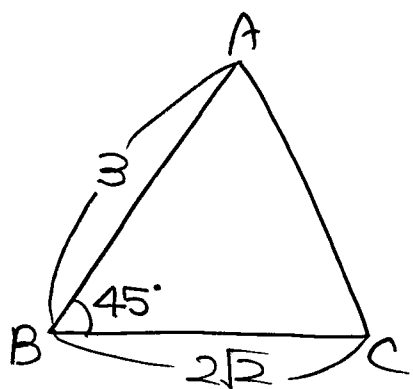


$$S = 5\sqrt{3}$$

P329

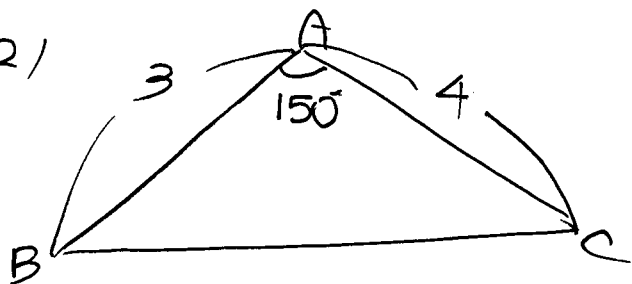
11

(1)



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

(2)



$$S = \frac{1}{2} \times 3 \times 4 \times \sin 150^\circ$$

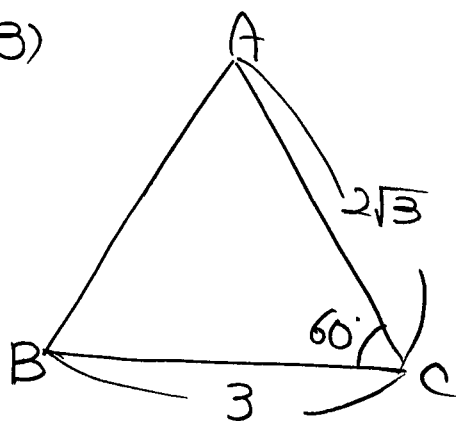
$$= 6 \times \frac{1}{2}$$

$$= 3$$

$$\sin(\pi - \theta) = \sin \theta$$

$$\sin 150^\circ = \sin 30^\circ = \frac{1}{2}$$

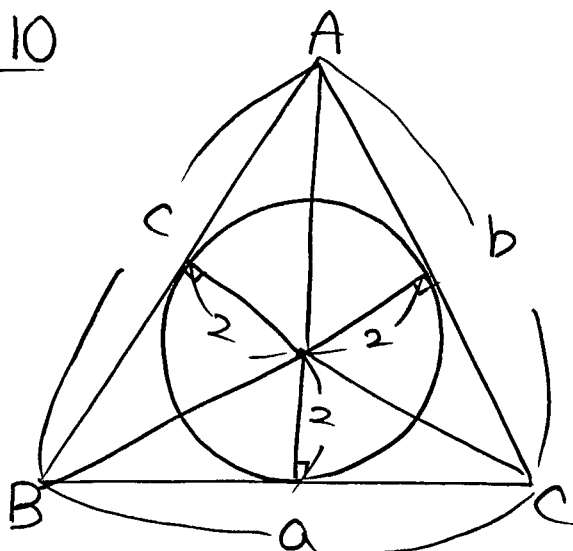
(3)



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

$$= \frac{9}{2}$$

2 | 10



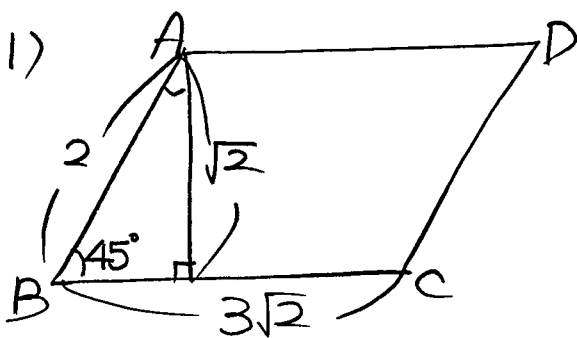
$$a + b + c = 10$$

$$S = \frac{1}{2} \times 2 \times (a + b + c)$$

$$= 10$$

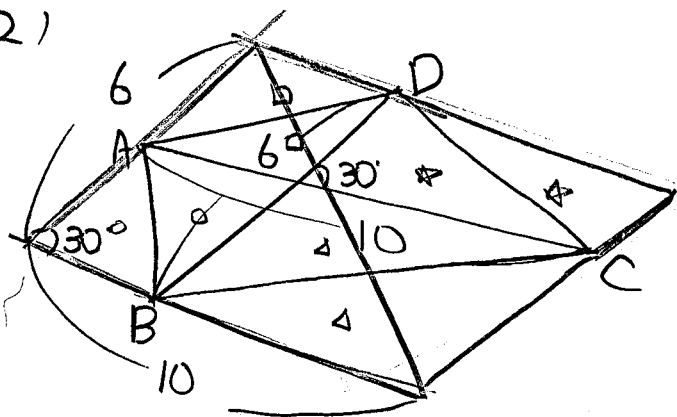
3 |

(1)



$$S = 3\sqrt{2} \times \sqrt{2} = 6$$

(2)

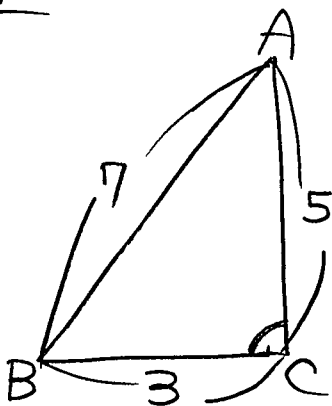


$$S = \frac{1}{2} \times 6 \times 10 \times \frac{1}{2}$$

$$= 15$$

6-11

(1)

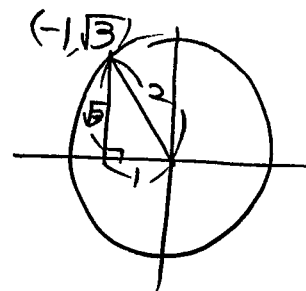


$$49 = 9 + 25 - 2 \cdot 3 \cdot 5 \cdot \cos C$$

$$30 \cos C = -15$$

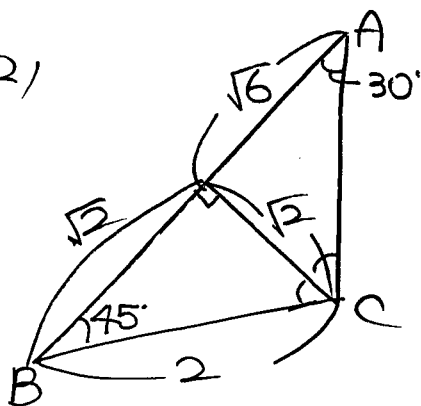
$$\cos C = -\frac{1}{2}$$

$$\sin C = \frac{\sqrt{3}}{2}$$



$$S = \frac{1}{2} \times 3 \times 5 \times \frac{\sqrt{3}}{2} = \frac{15\sqrt{3}}{4}$$

(2)

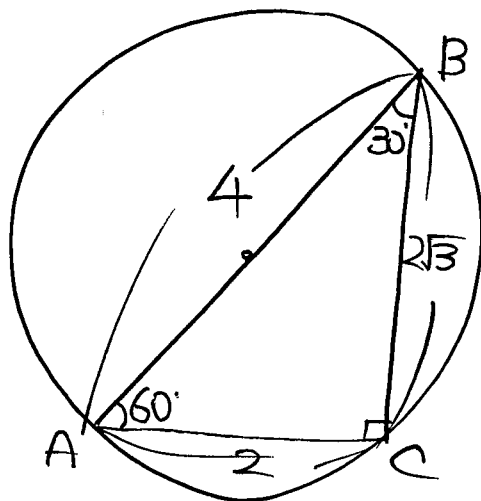


$$S = \frac{1}{2} \times (\sqrt{2} + \sqrt{6}) \times \sqrt{2}$$

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

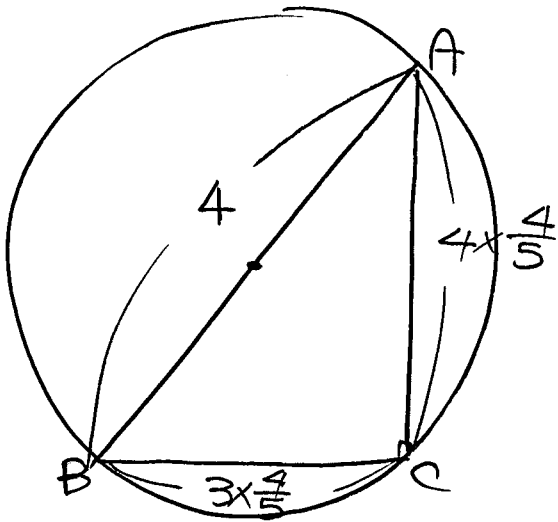
6-21

(1)



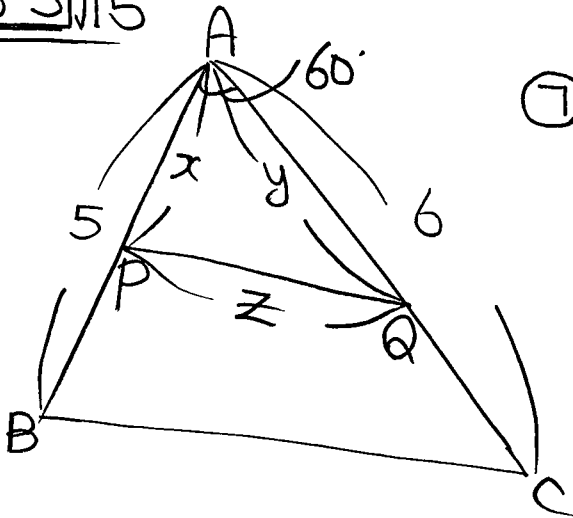
$$S = \frac{1}{2} \times 2 \times 2\sqrt{3} = 2\sqrt{3}$$

2)



$$S = \frac{1}{2} \times \frac{12}{5} \times \frac{16}{5} = \frac{96}{25}$$

6-3 $\sqrt{15}$



$$\textcircled{1} \frac{1}{2} \times 5 \times 6 \times \sin A = \frac{1}{2} \times x \times y \times \sin A \times 2$$

$$xy = 15$$

$$\textcircled{2} z^2 = x^2 + y^2 - 2 \cdot x \cdot y \cdot \frac{1}{2}$$

$$= x^2 + y^2 - 15$$

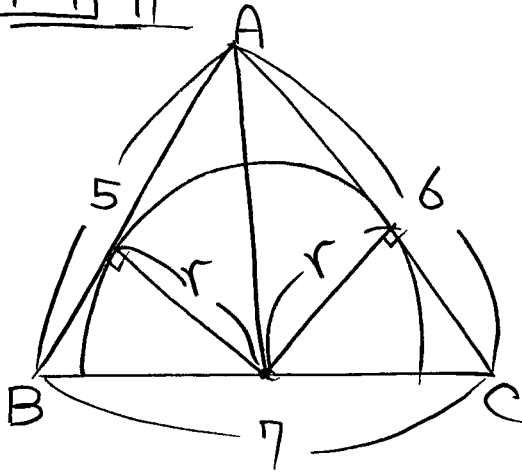
$$\geq 2\sqrt{x^2 y^2} - 15$$

$$= 2xy - 15$$

$$= 15$$

$$z = \sqrt{15}$$

$$\underline{7-11} \frac{12\sqrt{6}}{11}$$



$$49 = 36 + 25 - 2 \cdot 5 \cdot 6 \cdot \cos A$$

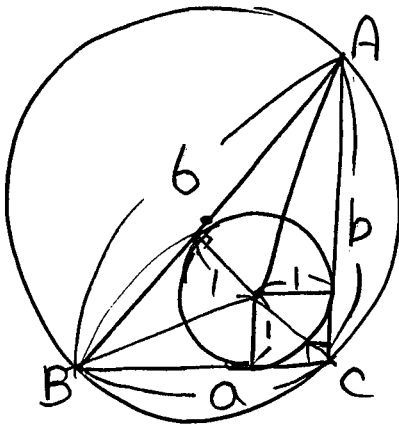
$$60 \cos A = 12$$

$$\cos A = \frac{1}{5}, \sin A = \frac{2\sqrt{6}}{5}$$

$$\frac{1}{2} \times 5 \times 6 \times \frac{2\sqrt{6}}{5} = \frac{1}{2} \times r \times (5+6)$$

$$r = \frac{12\sqrt{6}}{11}$$

$$\underline{7-21} 7$$



$$(a-1) + (b-1) = 6 \quad a+b=8$$

$$a^2 + b^2 = 36$$

$$S = \frac{1}{2}ab$$

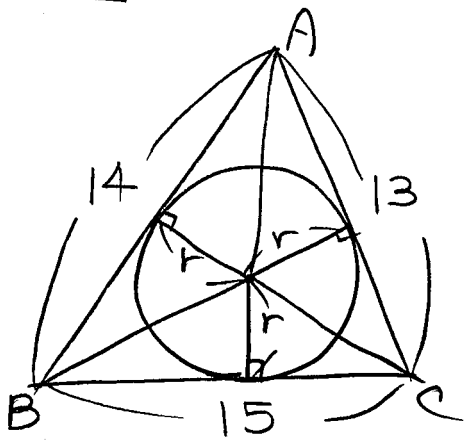
$$= 7$$

$$36 + 2ab = 64$$

$$2ab = 28$$

$$ab = 14$$

$$\underline{7-3} \frac{33}{8}$$



$$\textcircled{7} \quad 225 = 196 + 169 - 2 \cdot 14 \cdot 13 \cdot \cos A$$

$$2 \cdot 14 \cdot 13 \cdot \cos A = 140$$

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

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

$$\begin{array}{r} 196 \\ 169 \\ \hline 365 \end{array}$$

$$\textcircled{7} \quad \frac{15}{\sin A} = 2R$$

$$\frac{15}{\frac{5}{13}} = 2R \times \frac{12}{13}$$

$$R = \frac{65}{8}$$

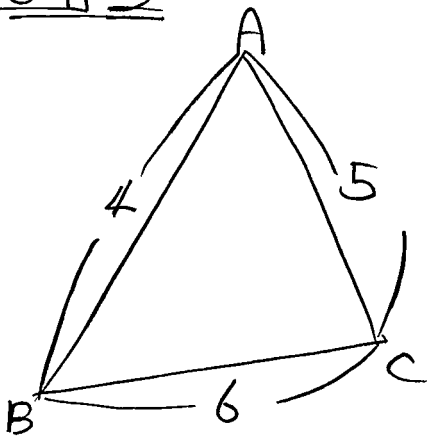
$$\textcircled{7} \quad \frac{1}{2} \times 14 \times 13 \times \frac{12}{13} = \frac{1}{2} \times r \times (14 + 13 + 15)$$

$$\cancel{14} \times 12 = r \cdot \cancel{40} \frac{3}{3}$$

$$r = 4$$

$$R - r = \frac{65 - 32}{8} = \frac{33}{8}$$

$$\underline{8-11} \frac{3}{2}$$

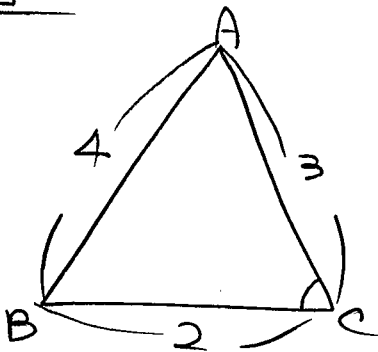


$$\frac{6}{\sin A} = \frac{4}{\sin C}$$

$$\frac{\sin A}{\sin C} = \frac{3}{2}$$

8-2)

(1)

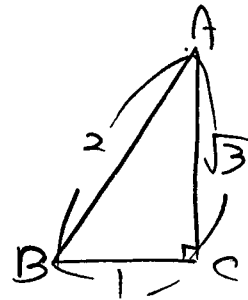


$$16 = 9 + 4 - 2 \cdot 2 \cdot 3 \cdot \cos C$$

$$12 \cos C = 3$$

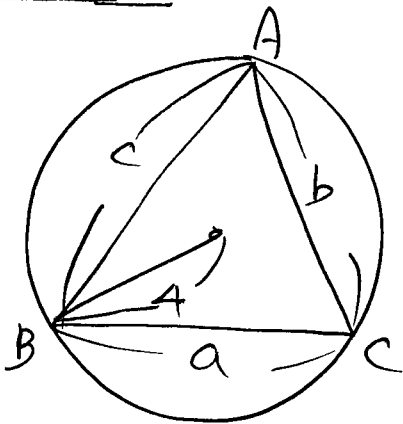
$$\cos C = \frac{1}{4}$$

(2) $\frac{\sin A}{1} = \frac{\sin B}{\sqrt{3}} = \frac{\sin C}{2}$



$$\cos A = \frac{\sqrt{3}}{2}$$

8-3) $\frac{3}{2}$

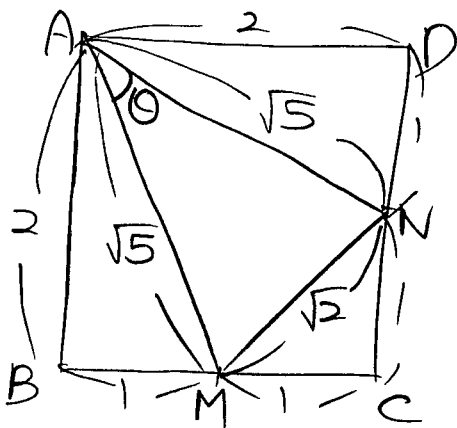


$$a + b + c = 12$$

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C} = 2 \cdot 4$$

$$\sin A + \sin B + \sin C = \frac{1}{8} (a + b + c) = \frac{3}{2}$$

8-4) $\frac{1}{5}$



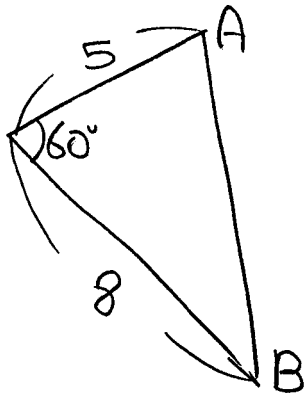
$$2 = 5 + 5 - 2 \cdot \sqrt{5} \cdot \sqrt{5} \cdot \cos \theta$$

$$\cos \theta = \frac{8}{10} = \frac{4}{5}$$

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

$$\cos \theta - \sin \theta = \frac{1}{5}$$

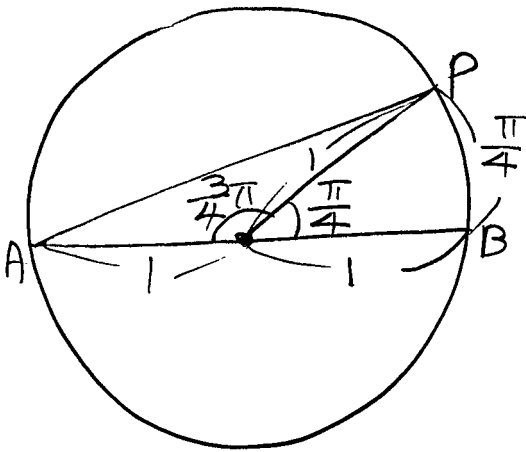
8-5 7



$$\begin{aligned}\overline{AB}^2 &= 25 + 64 - 2 \cdot 5 \cdot 8 \cdot \frac{1}{2} \\ &= 89 - 40 = 49\end{aligned}$$

$$\overline{AB} = 7$$

8-6 ④

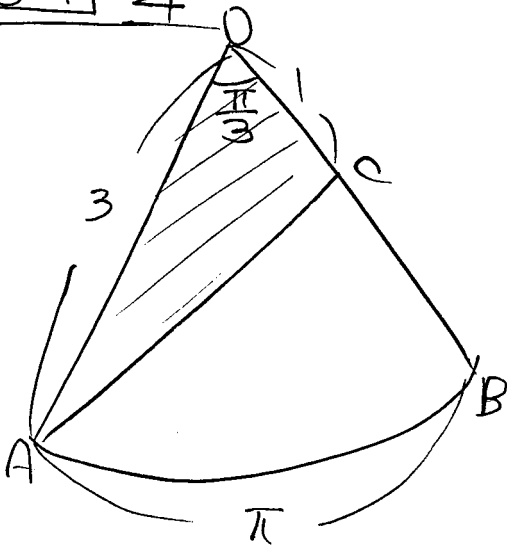


$$\cos(\pi - \theta) = -\cos \theta$$

$$\cos \frac{3\pi}{4} = -\cos \frac{\pi}{4} = -\frac{\sqrt{2}}{2}$$

$$\begin{aligned}\overline{AP}^2 &= 1 + 1 - 2 \cdot 1 \cdot 1 \cdot \left(-\frac{\sqrt{2}}{2}\right) \\ &= 2 + \sqrt{2}\end{aligned}$$

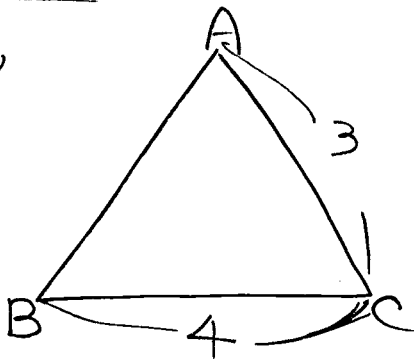
8-7 $\frac{3\sqrt{3}}{4}$



$$\begin{aligned}S &= \frac{1}{2} \times 3 \times 1 \times \frac{\sqrt{3}}{2} \\ &= \frac{3\sqrt{3}}{4}\end{aligned}$$

8-8]

(1)



$$A+B+C=\pi$$

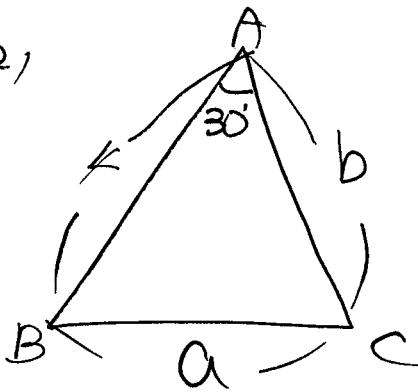
$$\sin(A+B) = \sin(\pi - C) = \sin C$$

$$\sin^2 C = \frac{1}{3}$$

$$\sin C = \frac{\sqrt{3}}{3}$$

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

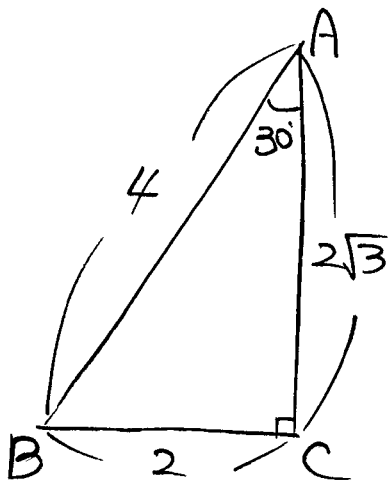
(2)



$$\frac{a}{\sin 30^\circ} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$a = \frac{2}{\sin C} \leftarrow \text{최대}$$

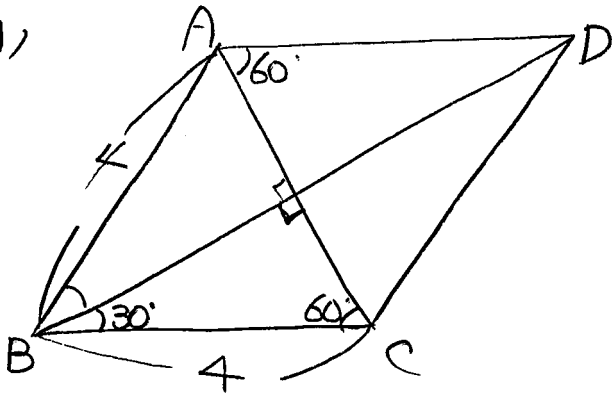
$$C = 90^\circ$$



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

8-9

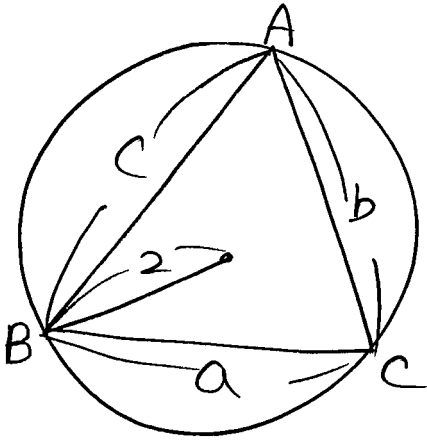
(1)



$$S = \frac{1}{2} \times 4 \times 4 \times \frac{\sqrt{3}}{2} \times 2 = 8\sqrt{3}$$

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

8-10 24

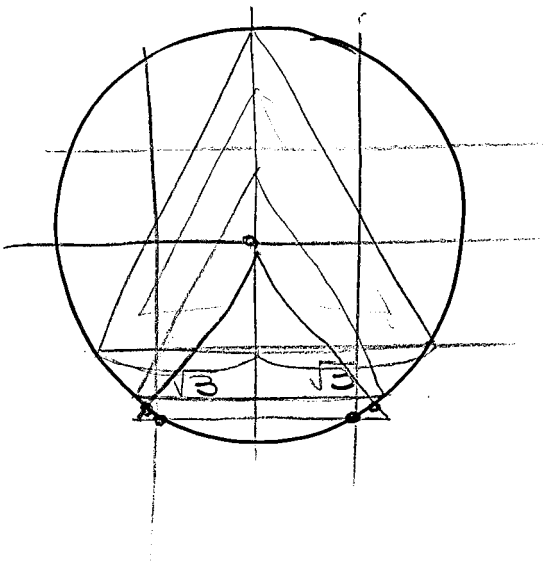


$$\left\{ \frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C} = 2.2 \right.$$

$$S = \frac{1}{2} ab \sin C$$

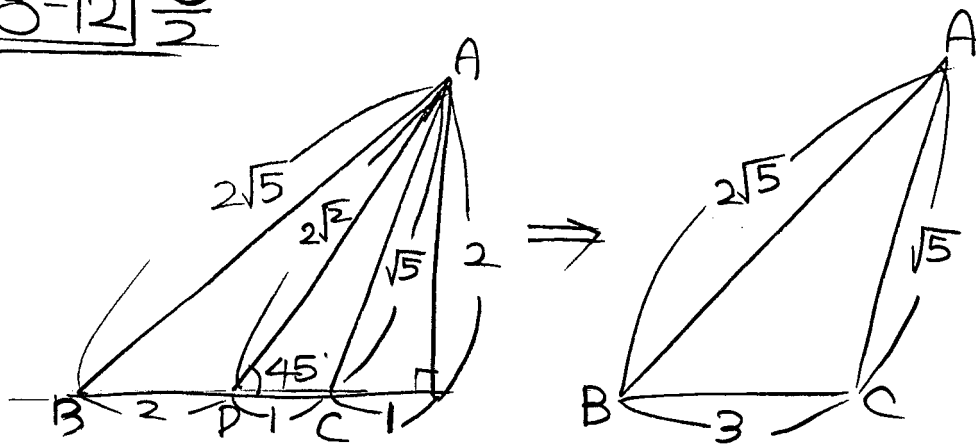
$$S = \frac{1}{2} ab \cdot \frac{c}{4} = 3 \quad abc = 24$$

8-11 ③



4개

8-12 5



$$9 = 20 + 5 - 2 \cdot 2\sqrt{5} \cdot \sqrt{5} \cdot \cos A$$

$$20 \cos A = 16$$

$$\cos A = \frac{4}{5}$$

$$\sin A = \frac{3}{5}$$

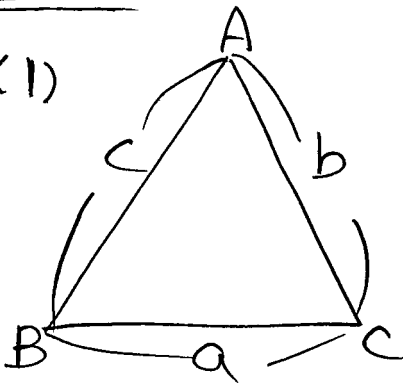
$$\frac{3}{\sin A} = 2R$$

$$3 = 2R \times \frac{3}{5}$$

$$\boxed{R = \frac{5}{2}}$$

8-13

(1)



$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C} = 2R$$

$$c^2 = a^2 + b^2 - 2ab \cos C$$

$$\cos C = \frac{a^2 + b^2 - c^2}{2ab}$$

$$\frac{a}{2R} = 2 \cdot \frac{b}{2R} \cdot \frac{a^2 + b^2 - c^2}{2ab}$$

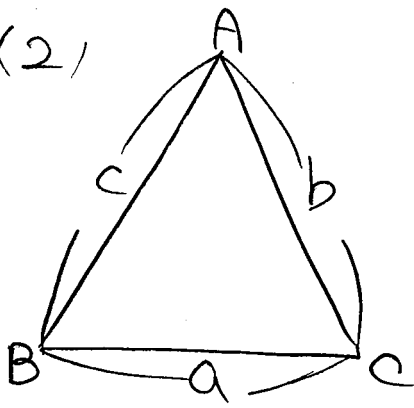
$$a^2 = a^2 + b^2 - c^2$$

$$b^2 - c^2 = 0$$

$$(b+c)(b-c) = 0$$

$$\therefore b = c \text{ 인 이등변 } \triangle$$

(2)



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

$$b^2 = c^2 + a^2 - 2ca \cos B$$

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

$$a \times \frac{b^2 + c^2 - a^2}{2bc} = b \times \frac{c^2 + a^2 - b^2}{2ca}$$

$$a^2(b^2 + c^2 - a^2) = b^2(c^2 + a^2 - b^2)$$

$$a^2b^2 + c^2a^2 - a^4 = b^2c^2 + a^2b^2 - b^4$$

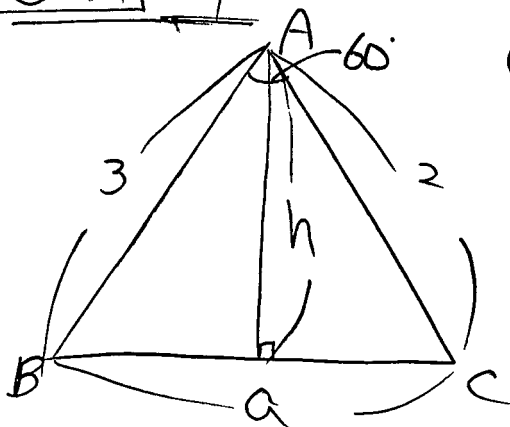
$$(a^4 - b^4) - (a^2 - b^2)c^2 = 0$$

$$\frac{(a^2 - b^2)(a^2 + b^2 - c^2)}{\text{㉠} \quad \text{㉡}} = 0$$

$$\text{㉠ } (a+b)(a-b)=0 \quad \therefore a=b \text{ 인 이등변 } \triangle$$

$$\text{㉡ } a^2 + b^2 = c^2 \quad \therefore c=90^\circ \text{ 인 직각 } \triangle$$

8-14 $\frac{3\sqrt{3}}{7}$



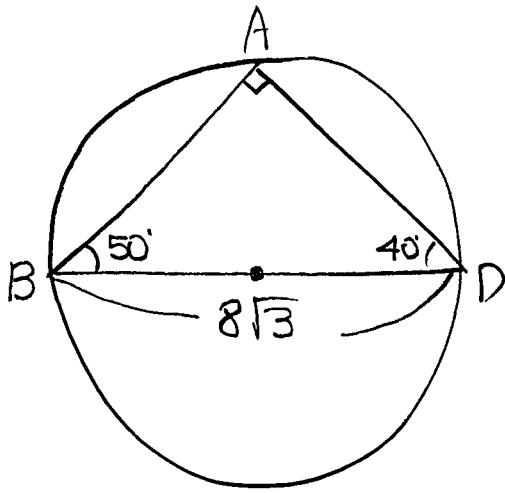
$$\text{㉠ } a^2 = 9 + 4 - 2 \cdot 3 \cdot 2 \cdot \frac{1}{2} = 7$$

$$a = \sqrt{7}$$

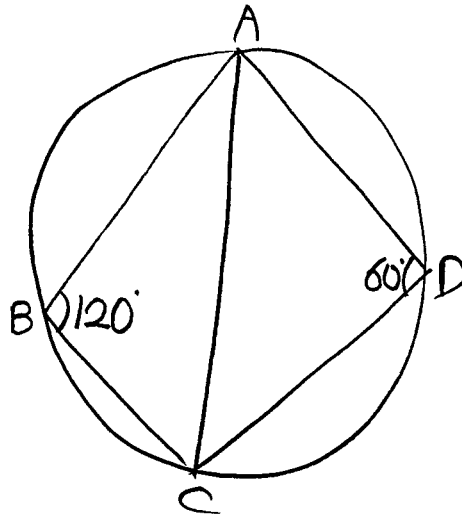
$$\text{㉡ } \frac{1}{2} \times 3 \times 2 \times \frac{\sqrt{3}}{2} = \frac{1}{2} \times \sqrt{7} \times h$$

$$h = \frac{3\sqrt{3}}{\sqrt{7}} = \frac{3\sqrt{21}}{7}$$

8-15 12

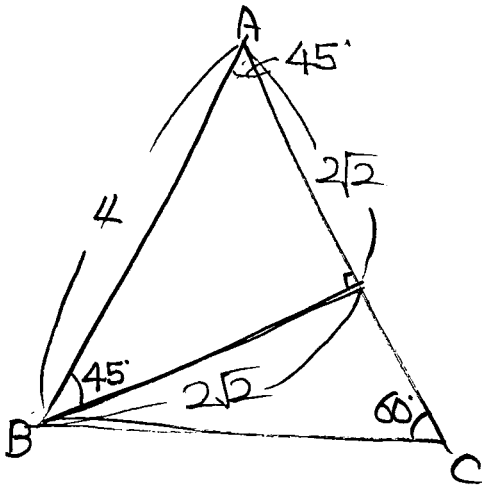


$$\frac{\overline{AC}}{\sin 60^\circ} = 8\sqrt{3}$$



$$\overline{AC} = 8\sqrt{3} \times \frac{\sqrt{3}}{2} = 12$$

8-16 $\frac{4\sqrt{6}}{3}$

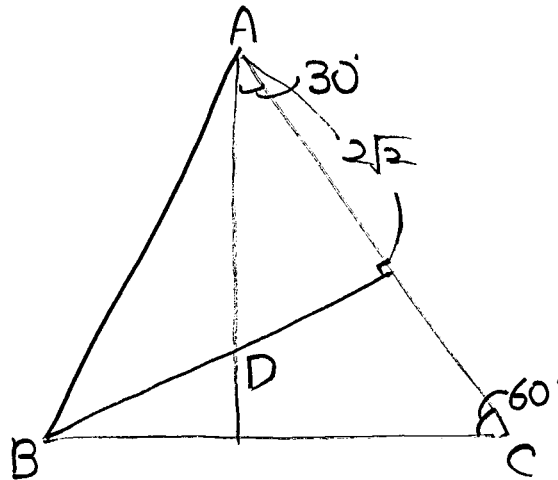


$$\frac{2\sqrt{2}}{\overline{AD}} = \cos 30^\circ$$

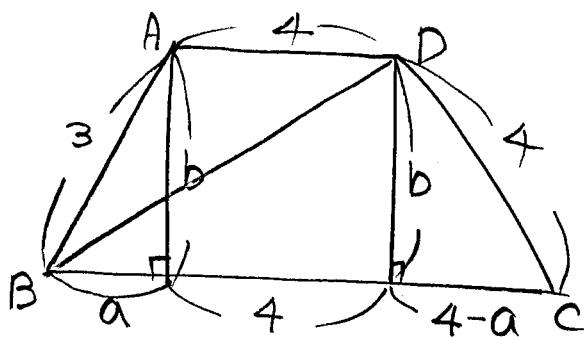
$$\cos 30^\circ \overline{AD} = 2\sqrt{2}$$

$$\frac{\sqrt{3}}{2} \times \overline{AD} = 2\sqrt{2}$$

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



8-17|√34



$$b^2 = 9 - a^2 = 16 - (4-a)^2$$

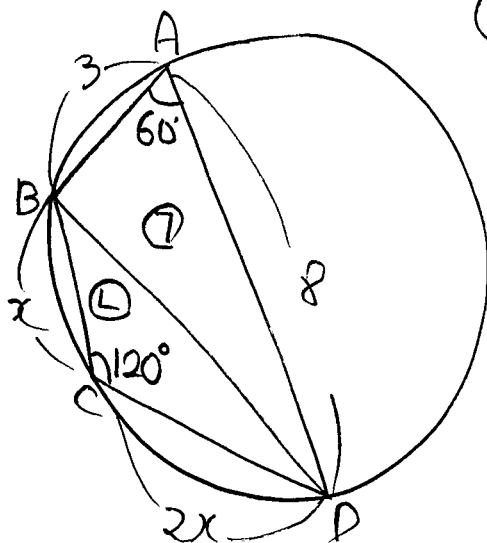
$$9 - a^2 = 8a - a^2$$

$$a = \frac{9}{8}$$

$$\overline{BD}^2 = (a+4)^2 + b^2 = a^2 + 8a + 16 + b^2 = 9 + 9 + 16 = 34$$

$$\overline{BD} = \sqrt{34}$$

8-18|√7



$$\textcircled{7} \overline{BD}^2 = 64 + 9 - 2 \cdot 8 \cdot 3 \cdot \frac{1}{2}$$

$$= 73 - 24 = 49$$

$$\overline{BD} = 7$$

$$\textcircled{12} 49 = 4x^2 + x^2 - 2 \cdot 2x \cdot x \cdot \cos 120^\circ$$

$$= 7x^2$$

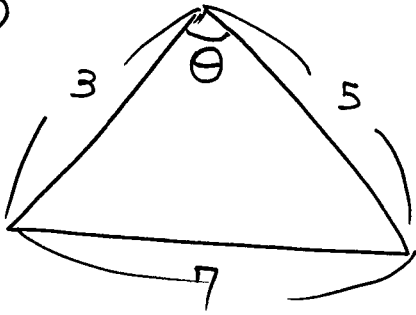
$$x^2 = 7$$

$$x = \sqrt{7}$$

$$\begin{aligned} \cos 120^\circ &= -\cos 60^\circ \\ &= -\frac{1}{2} \end{aligned}$$

8-19]

(1)



$$49 = 9 + 25 - 2 \cdot 3 \cdot 5 \cos \theta$$

$$30 \cos \theta = -15$$

$$\boxed{\cos \theta = -\frac{1}{2}}$$

$$(2) \quad c^2 = a^2 + b^2 - 2ab \cos C$$

$$\frac{a^2 + b^2}{3} = a^2 + b^2 - 2ab \cos C$$

$$2ab \cos C = \frac{2}{3}(a^2 + b^2)$$

$$\cos C = \frac{1}{3} \cdot \frac{a^2 + b^2}{ab} = \frac{1}{3} \left(\frac{a}{b} + \frac{b}{a} \right) \geq \frac{1}{3} \cdot 2\sqrt{\frac{a}{b} \cdot \frac{b}{a}} = \frac{2}{3}$$

$$\therefore \text{최소값} : \frac{2}{3}$$

8-20]

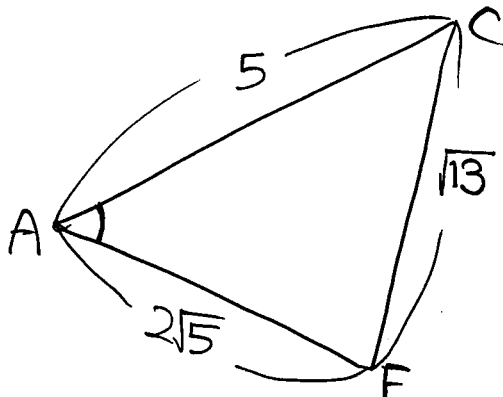
$$\textcircled{1} \quad A + B + C = \pi$$

$$\cos(A+B) = \cos(\pi - C) = -\cos C$$

$$\textcircled{2} \quad a : b : c = \sin A : \sin B : \sin C$$

$\textcircled{3}$

8-21] $\sqrt{61}$



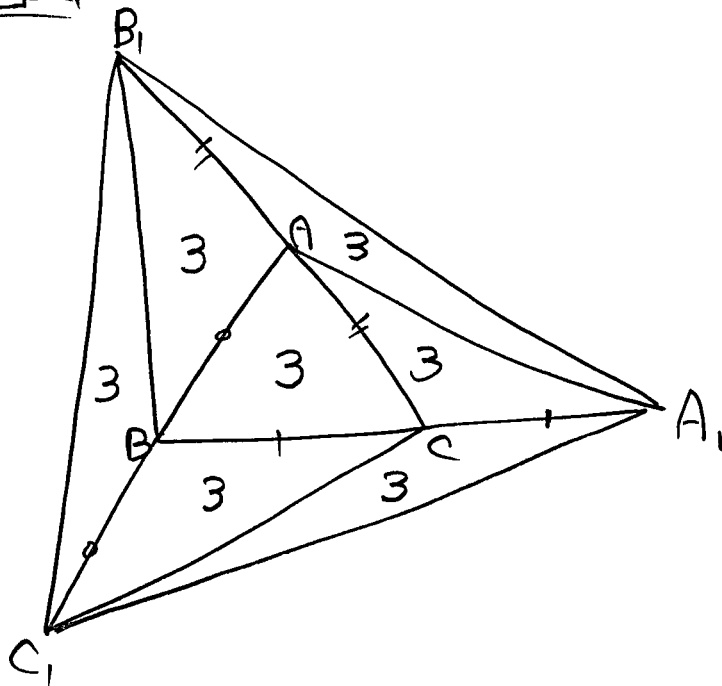
$$13 = 25 + 20 - 2 \cdot 5 \cdot 2\sqrt{5} \cos A$$

$$20\sqrt{5} \cos A = 32$$

$$\cos A = \frac{8}{5\sqrt{5}} \quad \sin A = \frac{\sqrt{61}}{5\sqrt{5}}$$

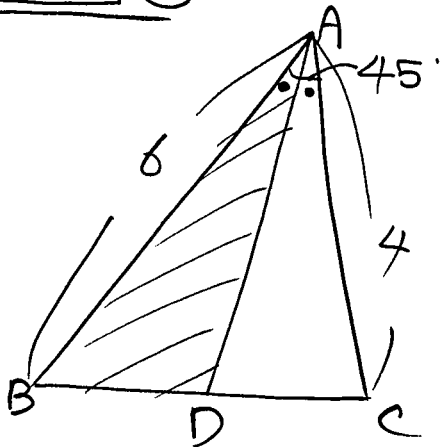
$$S = \frac{1}{2} \times 5 \times 2\sqrt{5} \times \sin A = \sqrt{61}$$

8-22|21



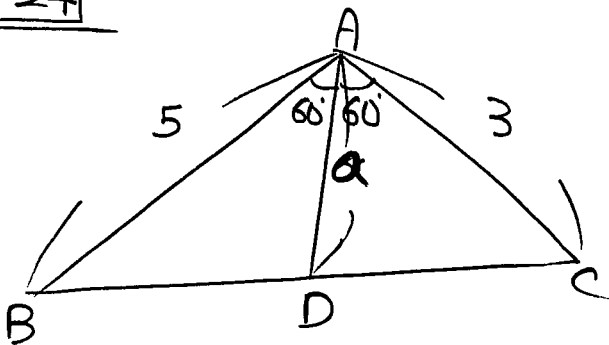
$$S=21$$

8-23|2



$$S = \frac{1}{2} \times 6 \times 4 \times \frac{\sqrt{2}}{2} \times \frac{3}{5} = \frac{18\sqrt{2}}{5}$$

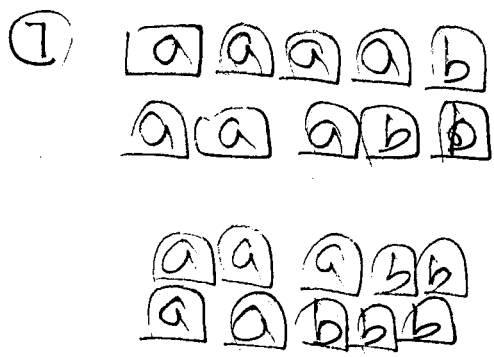
8-24|



$$\frac{1}{2} \times 5 \times 3 \times \sin 120^\circ = \frac{1}{2} \times 5 \times a \times \sin 60^\circ + \frac{1}{2} \times 3 \times a \times \sin 60^\circ$$

$$15 = 8a$$

$$a = \frac{15}{8}$$

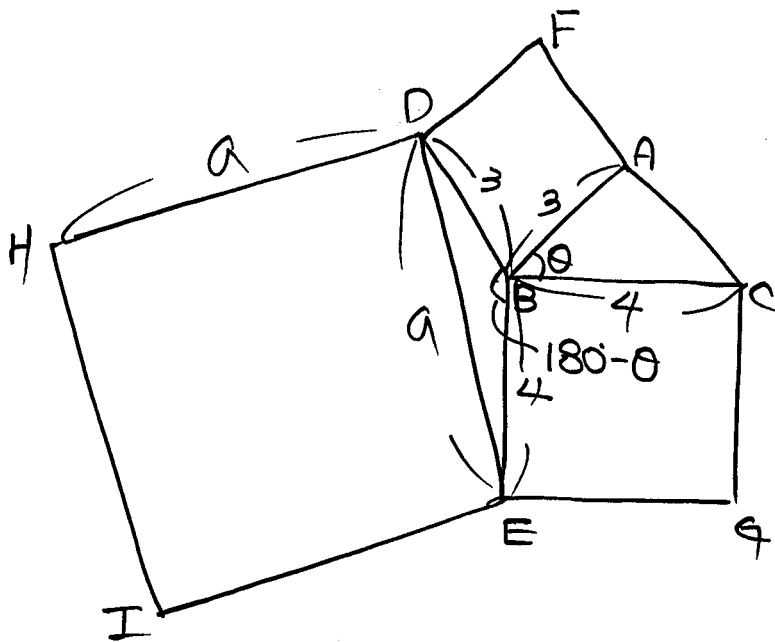


$$6 \times \left(\frac{5!}{4!} + \frac{5!}{3!2!} \right)$$

$$= 6 \times (5 + 10) = 90$$

$$7 \times \frac{5!}{3!2!} \times 2 = 140$$

$$\underline{\underline{8-25 \mid 25+8\sqrt{5}}}$$



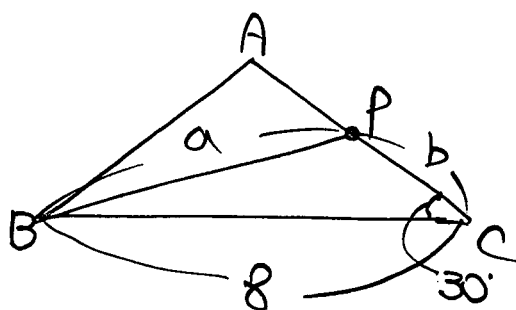
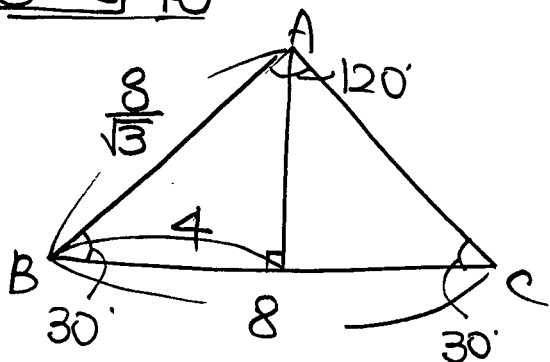
$(0^\circ < \theta < 90^\circ)$

$$\frac{1}{2} \cdot 3 \cdot 4 \cdot \sin \theta = 4 \quad \sin \theta = \frac{2}{3} \quad \cos \theta = \frac{\sqrt{5}}{3}$$

$$\cos(180^\circ - \theta) = -\cos\theta = -\frac{1}{5}$$

$$S = a^2 = 9 + 16 - 2 \cdot 3 \cdot 4 \cdot \cos(180^\circ - \theta) \\ = 25 + 8\sqrt{5}$$

8-26 40



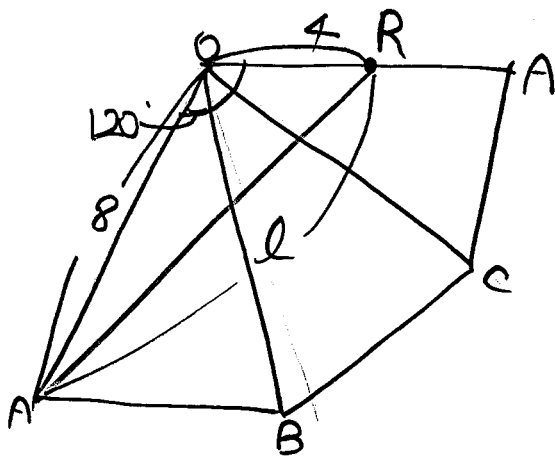
$$a^2 = b^2 + 64 - 2 \cdot 8 \cdot b \cdot \frac{\sqrt{3}}{2} = b^2 - 8\sqrt{3}b + 64$$

$$a^2 + b^2 = 2b^2 - 8\sqrt{3}b + 64$$

$$= 2(b^2 - 4\sqrt{3}b + 12) + 40$$

$$= 2(b - 2\sqrt{3})^2 + \underline{\underline{40}}$$

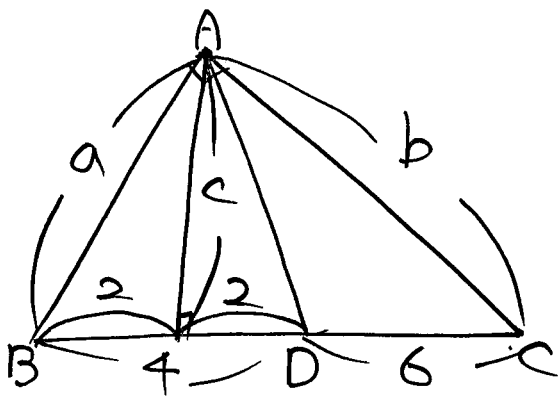
8-27 | $4\sqrt{7}$



$$l^2 = 64 + 16 - 2 \cdot 8 \cdot 4 \cdot \left(-\frac{1}{2}\right) \\ = 80 + 32 = 112$$

$$l = \sqrt{112} = 4\sqrt{7}$$

8-28 | $4\sqrt{5}$



$$\overline{AC} = b = 4\sqrt{5}$$

$$a^2 + b^2 = 100$$

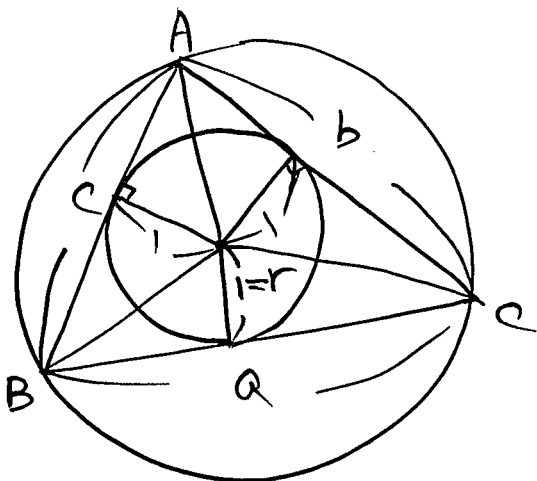
$$c^2 = a^2 - 4 = b^2 - 64$$

$$b^2 = a^2 + 60$$

$$2a^2 + 60 = 100$$

$$a^2 = 20, b^2 = 80$$

8-29 | 6



$$R = 3, r = 1$$

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C} = 2R = 6$$

$$S = \frac{1}{2} ab \sin C = \frac{1}{2} ab \cdot \frac{c}{2R}$$

$$S = \frac{1}{2} \cdot (ar + br + cr)$$

$$S = \frac{a+b+c}{2}$$

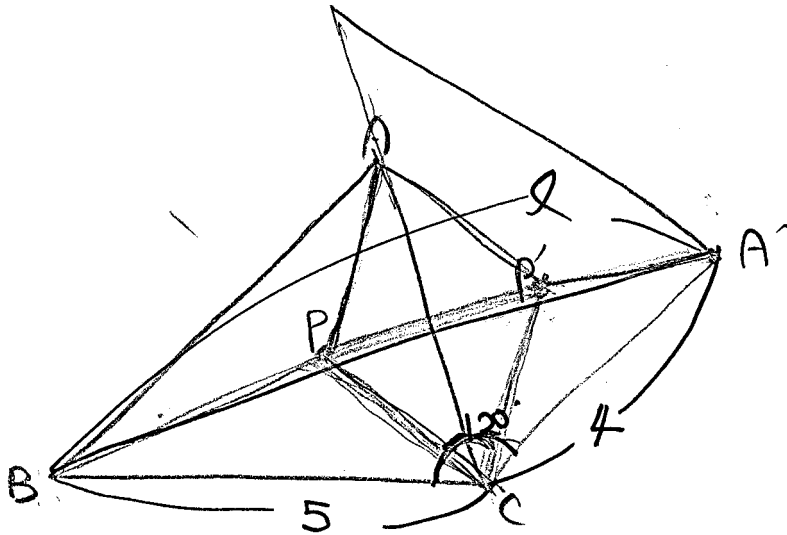
$$\frac{abc}{4R} = \frac{a+b+c}{2}$$

$$\frac{a+b+c}{abc} = \frac{1}{6}$$

$$\left(\frac{a+b+c}{abc}\right) = \frac{\frac{a+b+c}{6}}{\frac{abc}{6 \cdot 6 \cdot 6}}$$

$$= \frac{(a+b+c) \times 36}{abc} = 6$$

$$\underline{8-30 \mid \sqrt{61}}$$



$$\therefore Q^2 = 25 + 16 - 2 \cdot 5 \cdot 4 \cdot \left(-\frac{1}{2}\right)$$

$$= 41 + 20$$

$$Q = \sqrt{61}$$

$$\sin A = \frac{a}{6}$$

$$\sin B = \frac{b}{6}$$

$$\sin C = \frac{c}{6}$$