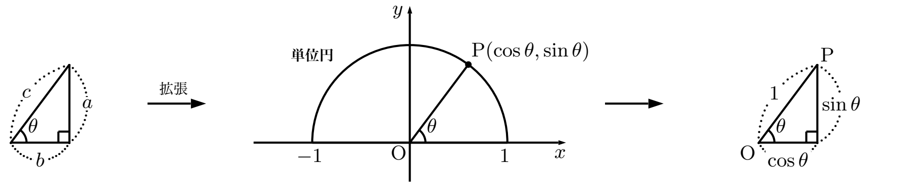
三角比・平面図形公式マインドマップ

三角比の定義，相互関係



$$\begin{cases}\sin\theta = \dfrac{a}{c}\\ \cos\theta = \dfrac{b}{c}\\ \tan\theta = \dfrac{a}{b}\end{cases}$$

$$\begin{cases}\boldsymbol{\sin\theta = (\text{P の } y \text{ 座標})}\\ \boldsymbol{\cos\theta = (\text{P の } x \text{ 座標})}\\ \boldsymbol{\tan\theta = \dfrac{\sin\theta}{\cos\theta} = (\text{OP の傾き})}\end{cases}$$

三平方の定理より

$$\boldsymbol{\cos^2\theta + \sin^2\theta = 1}$$

$\div \cos^2\theta$

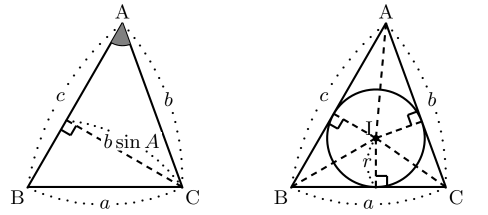
$$\boldsymbol{1 + \tan^2\theta = \frac{1}{\cos^2\theta}}$$

還元公式

$$\begin{cases}\sin(90^\circ - \theta) = \cos\theta\\ \cos(90^\circ - \theta) = \sin\theta\\ \tan(90^\circ - \theta) = \dfrac{1}{\tan\theta}\end{cases}$$

$$\begin{cases}\sin(180^\circ - \theta) = \sin\theta\\ \cos(180^\circ - \theta) = -\cos\theta\\ \tan(180^\circ - \theta) = -\tan\theta\end{cases}$$

三角形の面積 (r は内接円の半径)



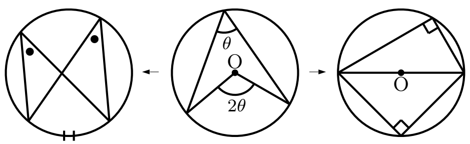
$$\boldsymbol{S = \frac{1}{2}bc\sin A}$$

$$\boldsymbol{S} = \frac{1}{2}ar + \frac{1}{2}br + \frac{1}{2}cr$$
$$\boldsymbol{= \frac{r}{2}(a+b+c)}$$

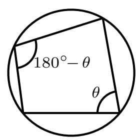
内心の定義→性質

各内角の二等分線の交点→内接円の中心

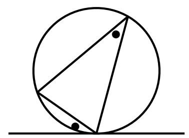
円周角の定理



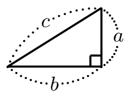
円に内接する四角形



接弦定理

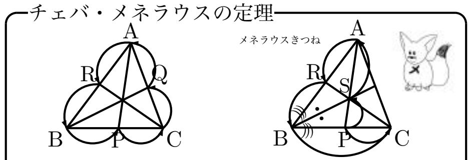


三平方の定理



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

チェバ・メネラウスの定理

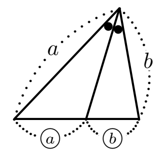


$$\frac{\mathrm{AR}}{\mathrm{RB}} \cdot \frac{\mathrm{BP}}{\mathrm{PC}} \cdot \frac{\mathrm{CQ}}{\mathrm{QA}} = 1 \qquad \frac{\mathrm{BC}}{\mathrm{CP}} \cdot \frac{\mathrm{PS}}{\mathrm{SA}} \cdot \frac{\mathrm{AR}}{\mathrm{RB}} = 1$$

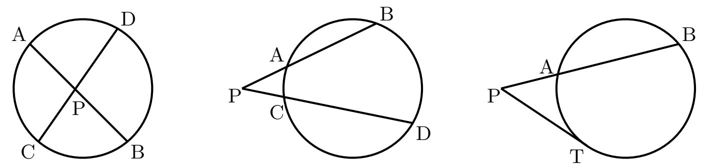
重心の定義→性質

各中線の交点→各中線を 2 : 1 に内分

角の二等分線と比

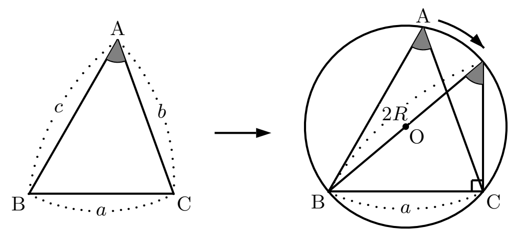


方べきの定理



△PAC∽△PDB	△PAC∽△PDB	△PTA∽△PBT
∴ PA : PD = PC : PB	∴ PA : PD = PC : PB	∴ PT : PB = PA : PT
∴ **PA · PB = PC · PD**	∴ **PA · PB = PC · PD**	∴ **PA · PB = PT²**

正弦定理 (R は外接円の半径)



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

同様に

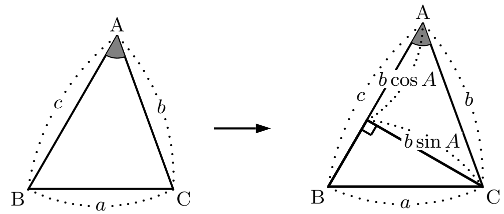
$$\boldsymbol{\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C} = 2R}$$

※上の証明は A が鋭角のとき

外心の定義→性質

各辺の垂直二等分線の交点→外接円の中心

余弦定理



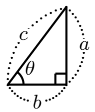
$$\begin{aligned}\boldsymbol{a^2} &= (b\sin A)^2 + (c - b\cos A)^2\\ &= b^2\sin^2 A + c^2 - 2bc\cos A + b^2\cos^2 A\\ &\boldsymbol{= b^2 + c^2 - 2bc\cos A}\end{aligned}$$

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

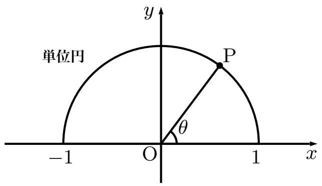
※上の証明は A が鋭角のとき

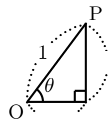
三角比・平面図形公式マインドマップ (問題 ✍：15分)

三角比の定義，相互関係



拡張





$$\begin{cases} \sin\theta = \\ \cos\theta = \\ \tan\theta = \end{cases}$$

$$\begin{cases} \boldsymbol{\sin\theta =} \\ \boldsymbol{\cos\theta =} \\ \boldsymbol{\tan\theta =} \end{cases}$$

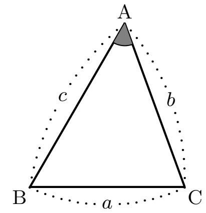
三平方の定理より

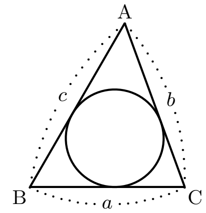
還元公式

$$\begin{cases} \sin(90° - \theta) = \\ \cos(90° - \theta) = \\ \tan(90° - \theta) = \end{cases}$$

$$\begin{cases} \sin(180° - \theta) = \\ \cos(180° - \theta) = \\ \tan(180° - \theta) = \end{cases}$$

三角形の面積 (r は内接円の半径)



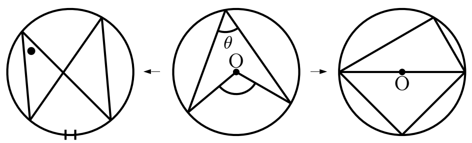


$\boldsymbol{S} =$

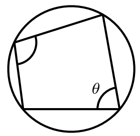
$\boldsymbol{S} =$

内心の定義→性質

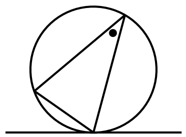
円周角の定理



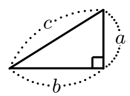
円に内接する四角形



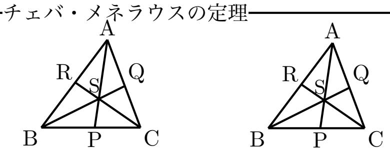
接弦定理



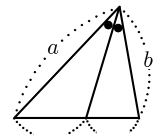
三平方の定理



チェバ・メネラウスの定理

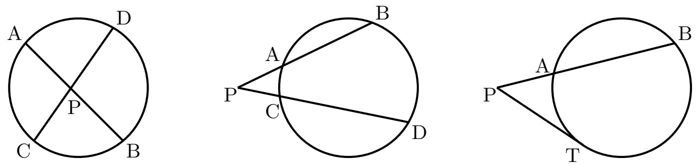


角の二等分線と比

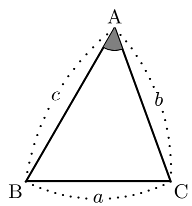


重心の定義→性質

方べきの定理



正弦定理 (R は外接円の半径)



外心の定義→性質

余弦定理