GEOMETRÍA

Capítulo 13

4th
SECONDARY

Áreas de regiones triangulares

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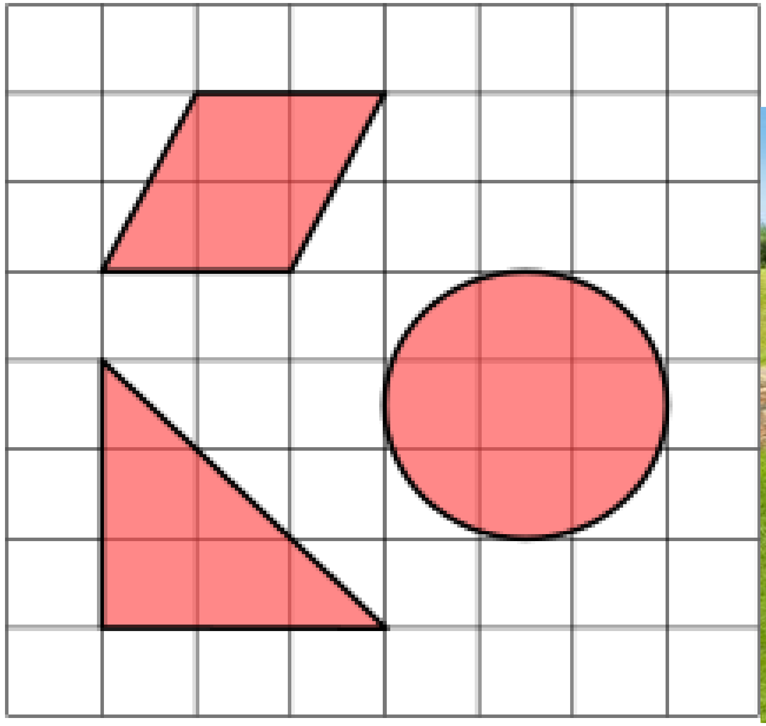
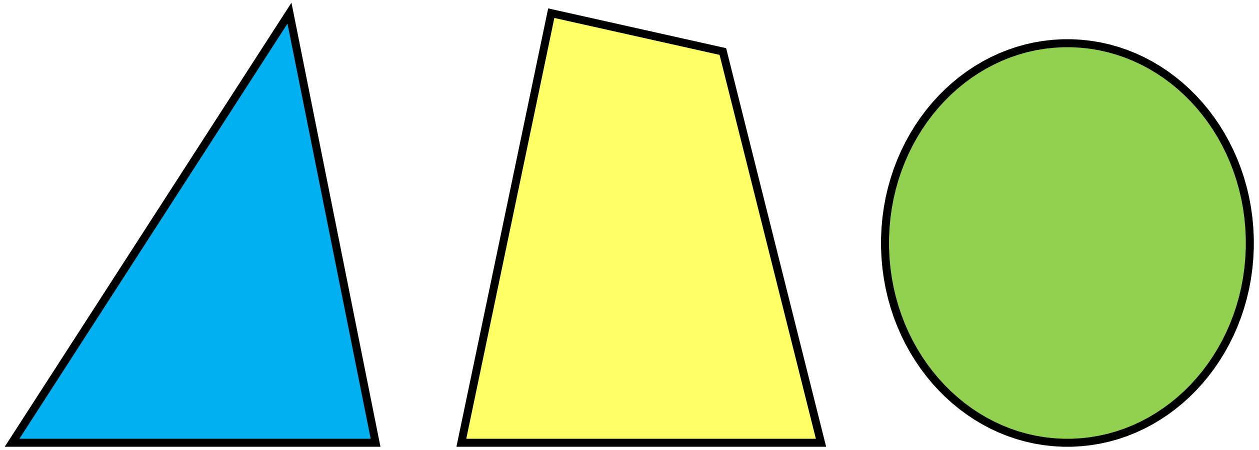
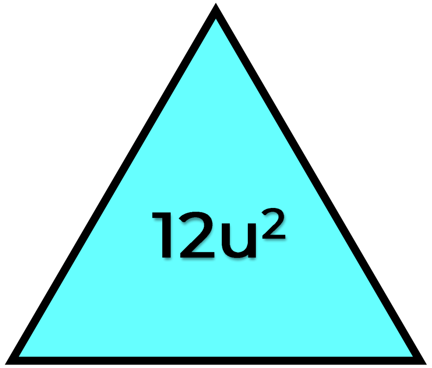


ÁREAS DE REGIONES TRIANGULARES

REGIÓN PLANA.- Es la unión de una línea plana cerrada y su interior.

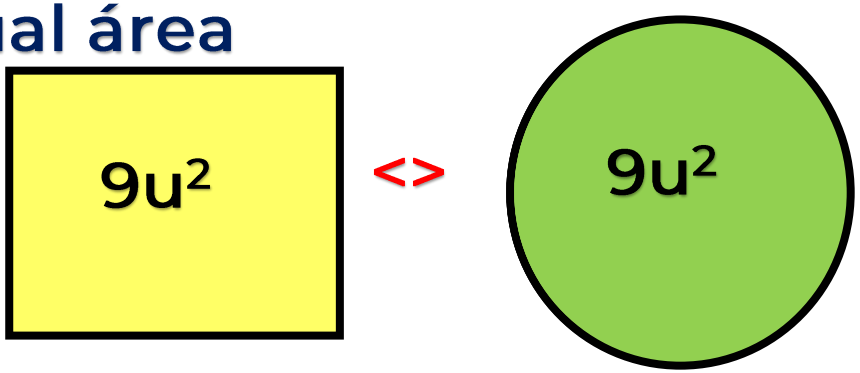


Región Triangular Región Cuadrangular Región Circular



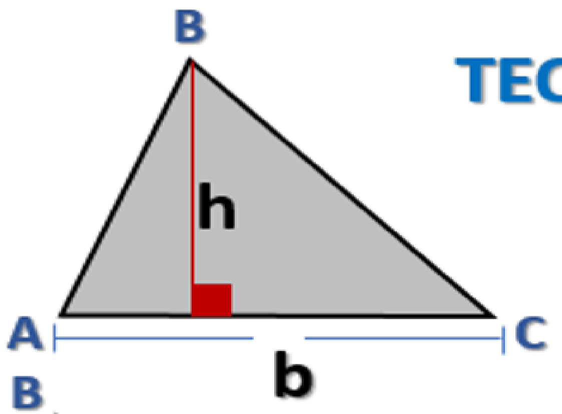
A△ = 12u²

REGIONES EQUIVALENTES.- Son Aquellas regiones que tienen igual área

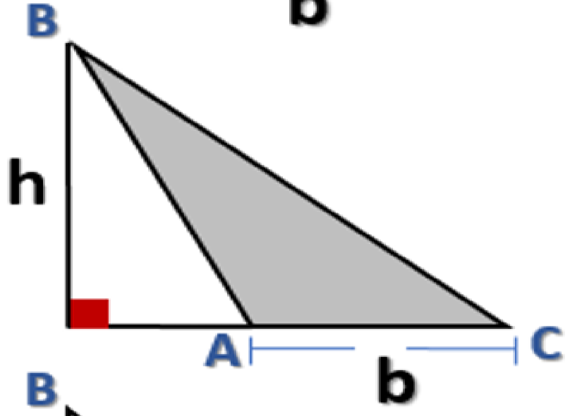


Áreas de regiones triangulares

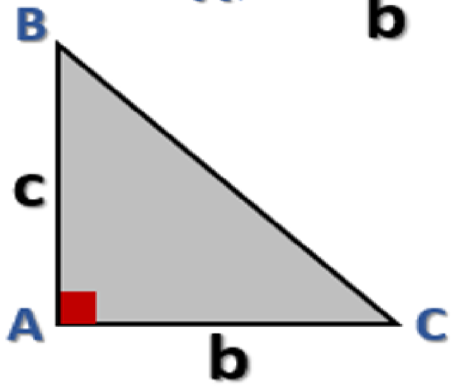
TEOREMAS BÁSICOS



$$S_{ABC} = \frac{bh}{2}$$

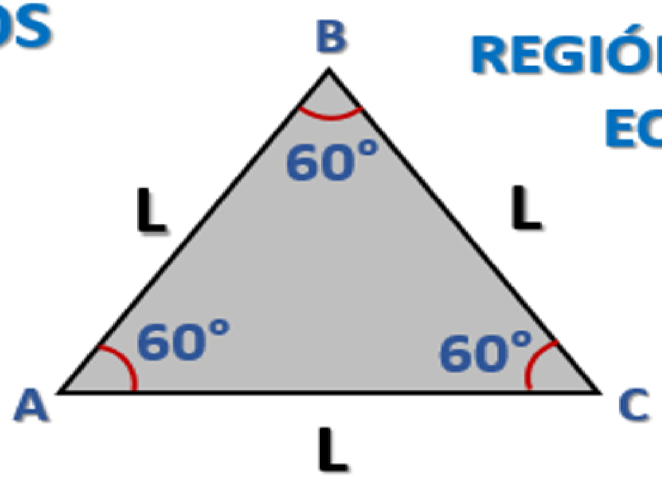


$$S_{ABC} = \frac{bh}{2}$$



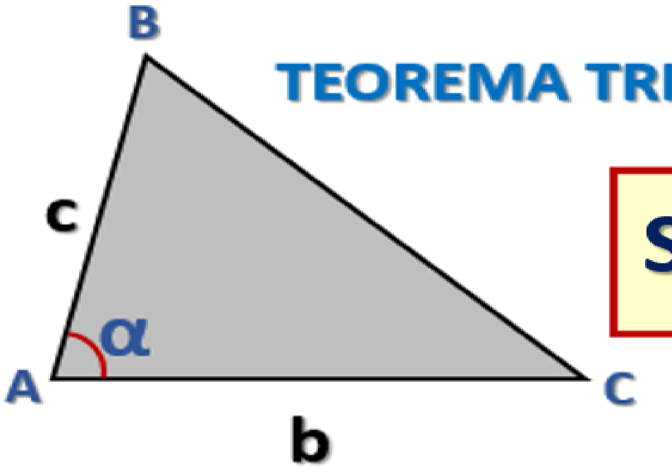
$$S_{ABC} = \frac{bc}{2}$$

REGIÓN TRIANGULAR EQUILÁTERA



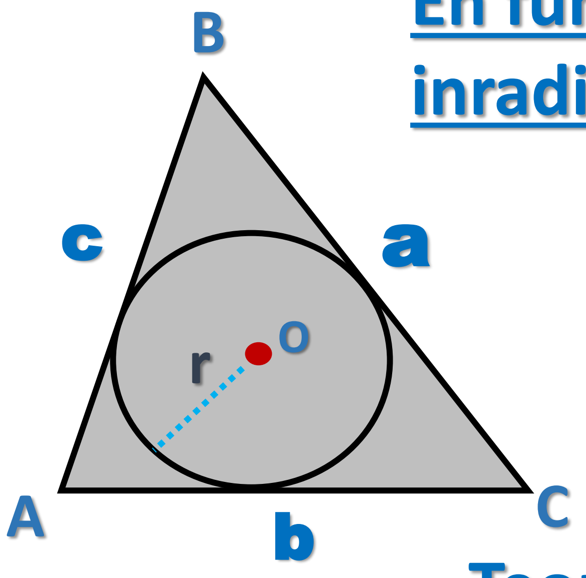
$$S_{ABC} = \frac{L^2\sqrt{3}}{4}$$

TEOREMA TRIGONOMÉTRICO



$$S_{ABC} = \frac{bc\,\mathrm{sen}\alpha}{2}$$

TEOREMAS

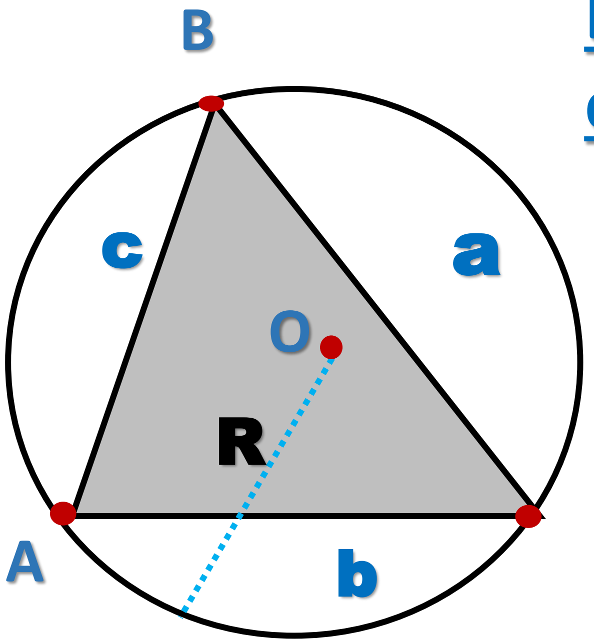


En función del inradio

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

r : longitud del inradio

$$\boxed{S_{ABC} = p.r}$$



En función del circunradio

O : centro

R : longitud del circunradio

$$\boxed{S_{ABC} = \frac{abc}{4R}}$$

C

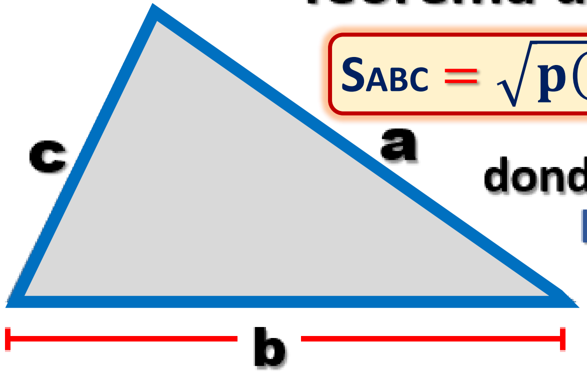
Teorema de Herón

- **Teorema de Herón**

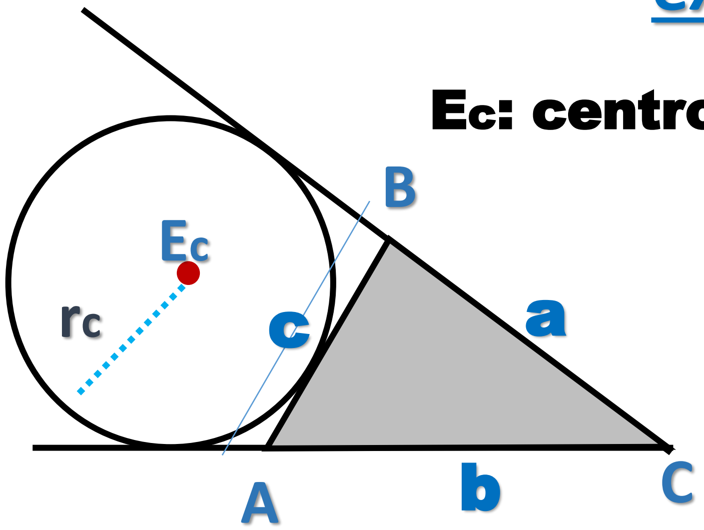
$$\boxed{S_{ABC} = \sqrt{p(p-a)(p-b)(p-c)}}$$

donde

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



En función al exradio



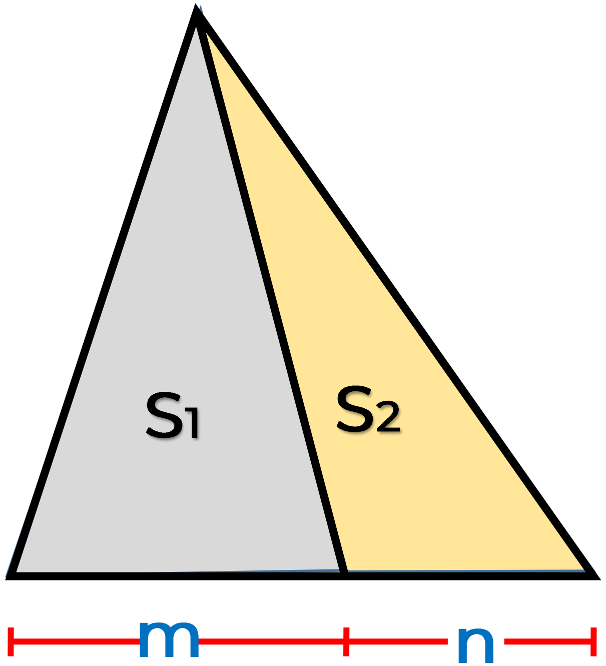
E_c: centro

r_c : longitud del exradio

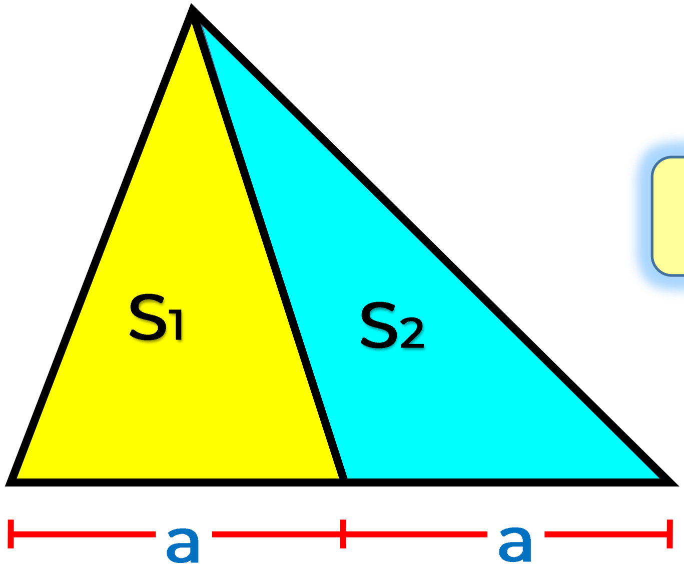
$$p = \frac{a + b + c}{2}$$

$$\boxed{S_{ABC} = (p-c)r_c}$$

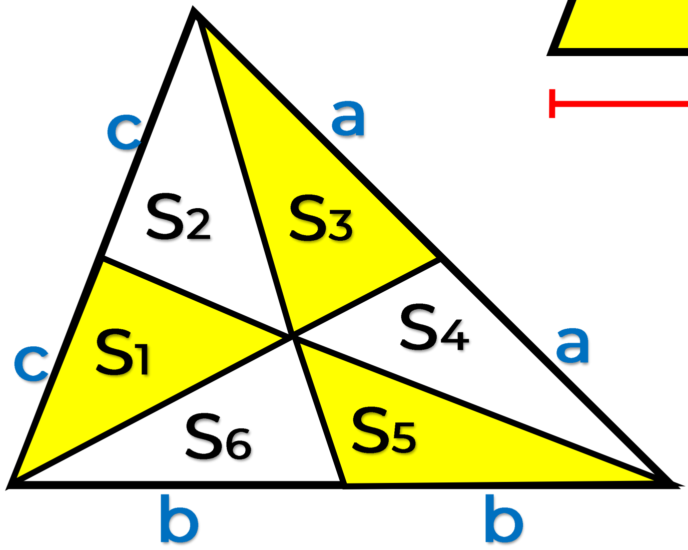
Relación de áreas



$$\frac{S_1}{S_2} = \frac{m}{n}$$



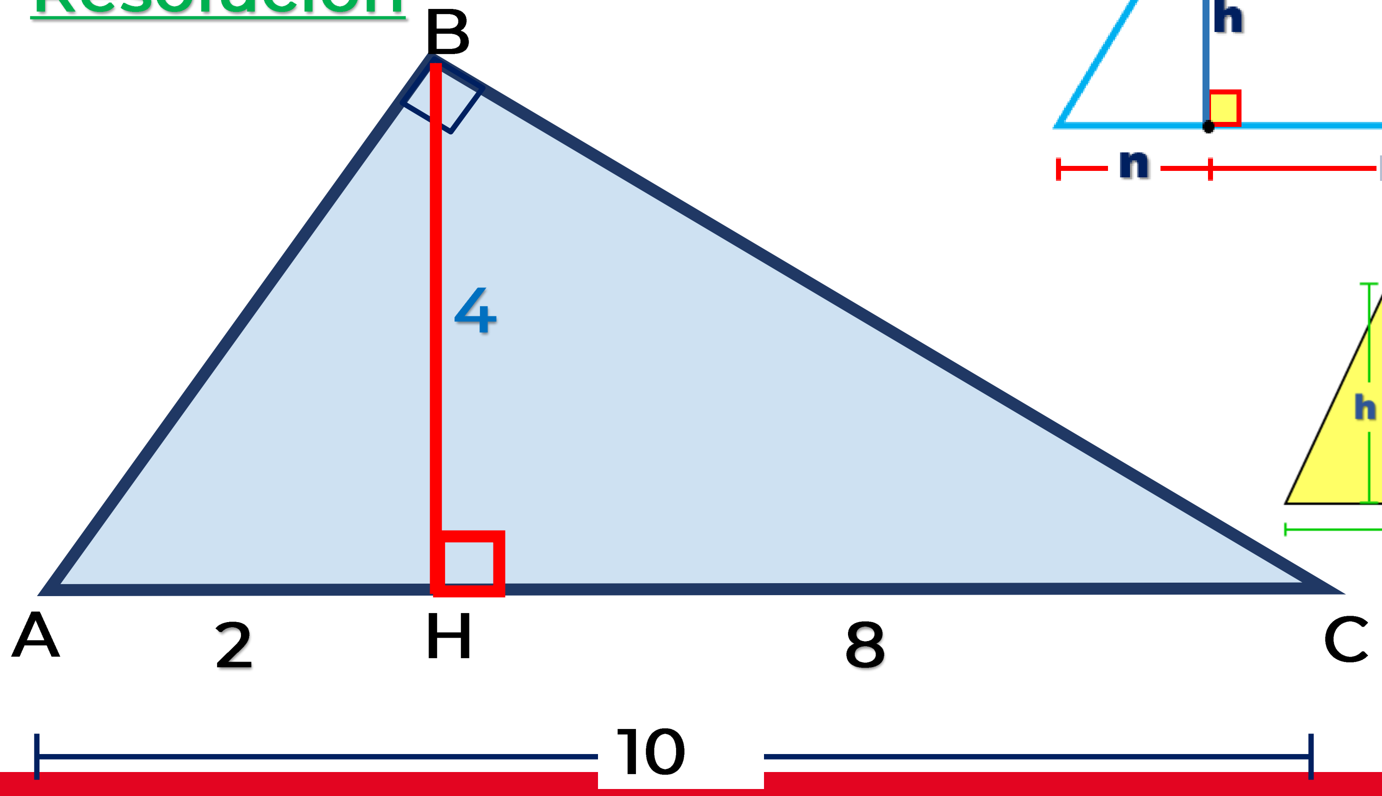
$$S_1 = S_2$$

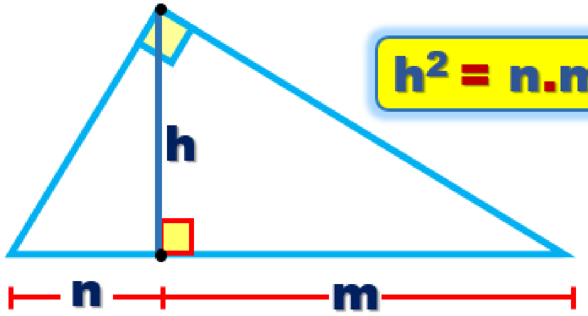


$$S_1 = S_2 = S_3 = S_4 = S_5 = S_6$$

1. En un triángulo rectángulo ABC, recto en B, se traza la altura $\overline{BH}$ tal que AH = 2 y HC = 8. Calcule el área de la región triangular ABC.

Resolución



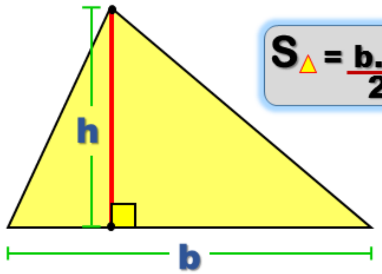


$h^2 = n.m$

$$(BH)^2 = (2)(8)$$

$$(BH)^2 = 16$$

$$BH = 4$$



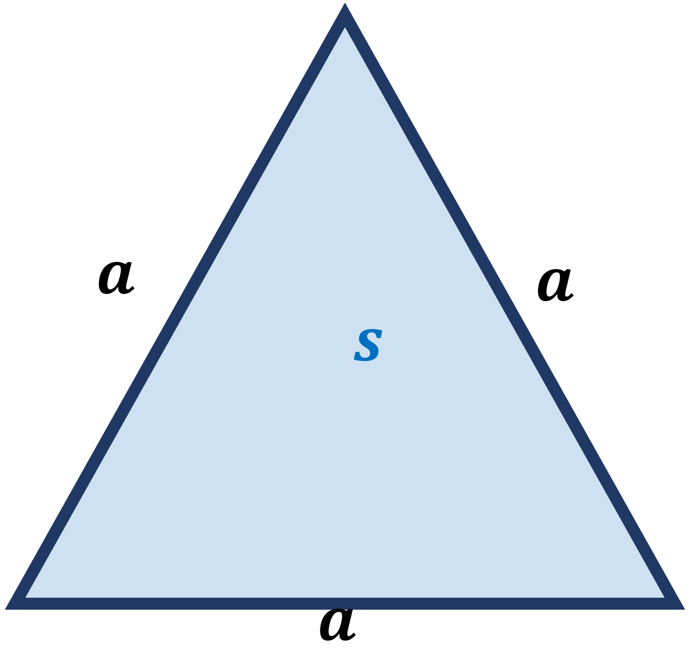
$S_{\triangle} = \frac{b.h}{2}$

$$S_{ABC} = \frac{(10)(4)}{2}$$

$$S_{ABC} = 20u^2$$

2. Calcule el área de la región triangular equilátera cuyo perímetro es igual a 24u.

Resolución

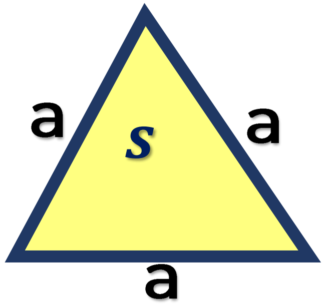


Por dato

$$2_p = 24$$

$$a + a + a = 24$$

$$3a = 24 \rightarrow a = 8$$

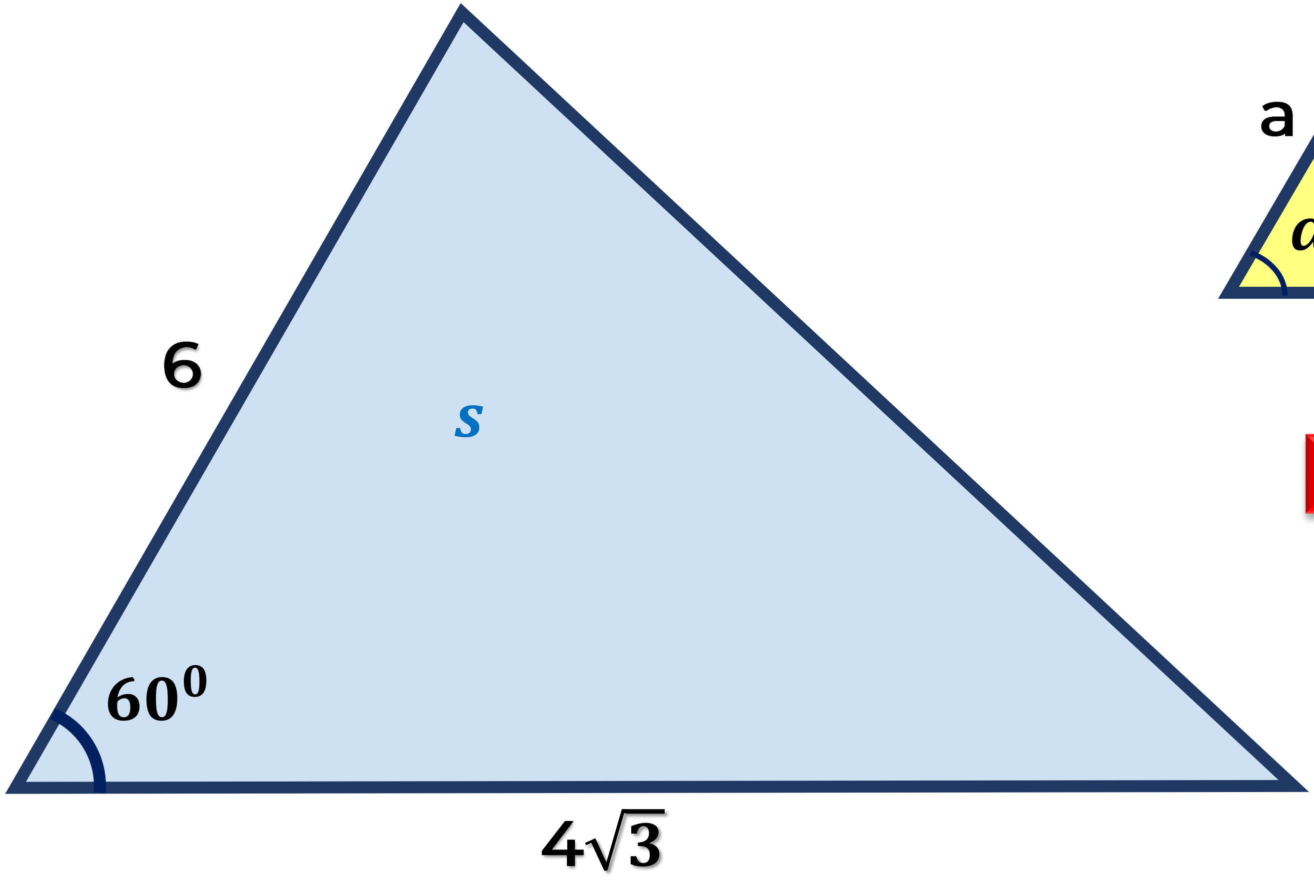


$$\boxed{S = \frac{(a)^2\sqrt{3}}{4}}$$

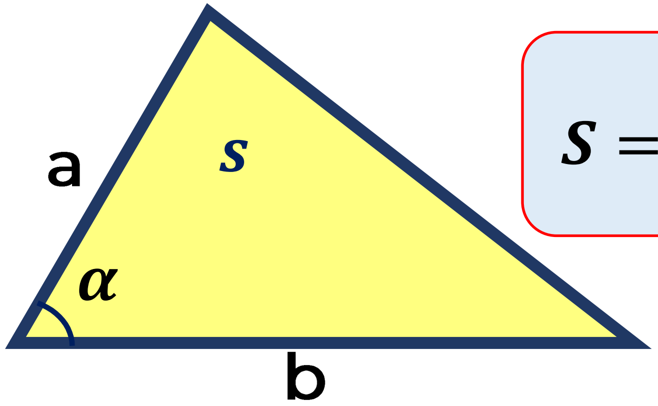
$$S = \frac{(8)^2\sqrt{3}}{4}$$

$$\boxed{S = 16\sqrt{3}u^2}$$

3. Calcule el área de la región triangular mostrada.



Resolución



$$S = \frac{(a)(b)}{2}.Sen\alpha$$

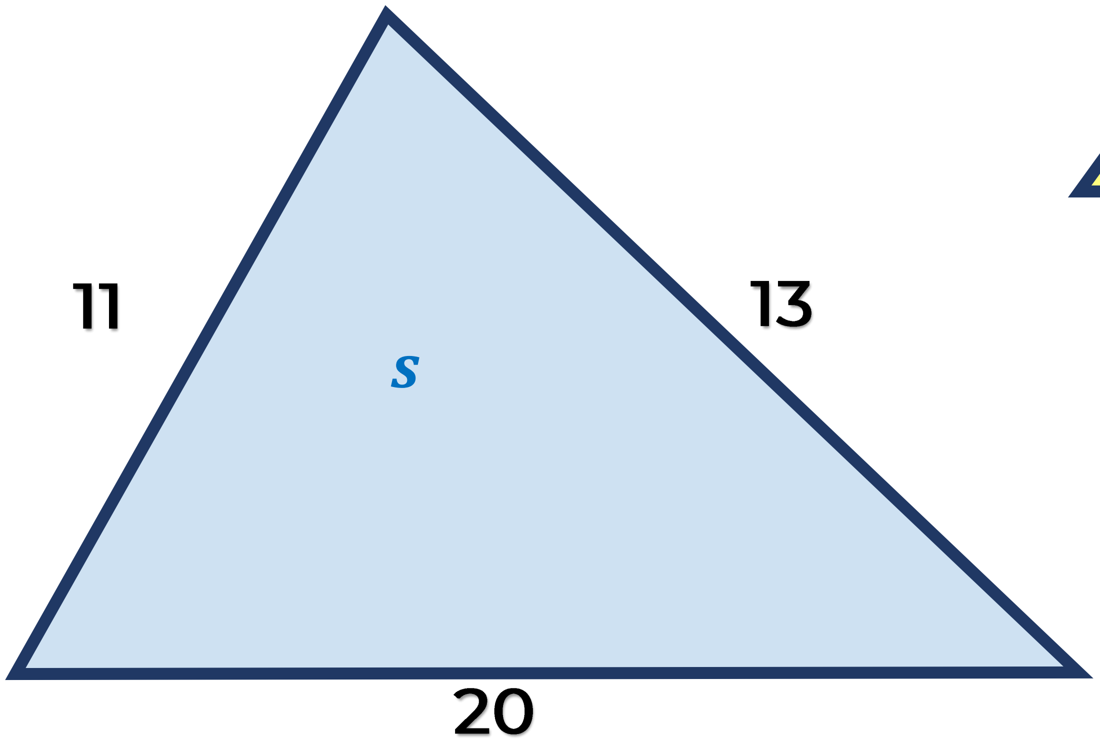
$$S = \frac{(6)(4\sqrt{3})}{2}.Sen60^0$$

$$S = \overbrace{\frac{(\cancel{6})(4\sqrt{3})}{\cancel{2}}.\frac{\sqrt{3}}{\cancel{2}}}^{3}$$

$$\boxed{S = 18u^2}$$

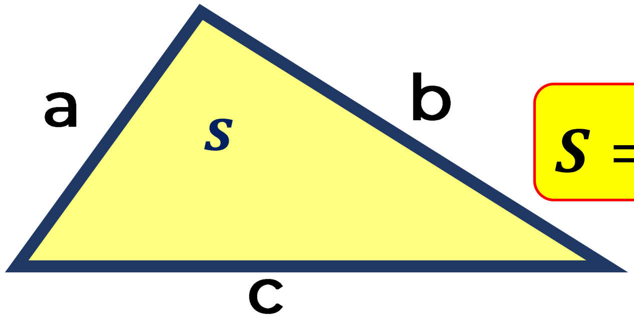
4. Calcule el área de una región triangular si sus lados miden 11, 13 y 20.

Resolución



Teorema de Herón:

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



$$S = \sqrt{p(p-a)(p-b)(p-c)}$$

$$p = \frac{11+13+20}{2} \rightarrow p = 22$$

$$S = \sqrt{22(22-11)(22-13)(22-20)}$$

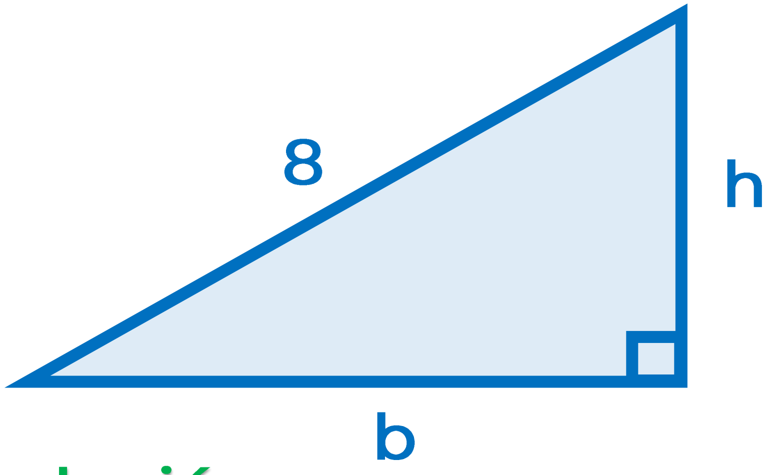
$$S = \sqrt{22(11)(9)(2)}$$

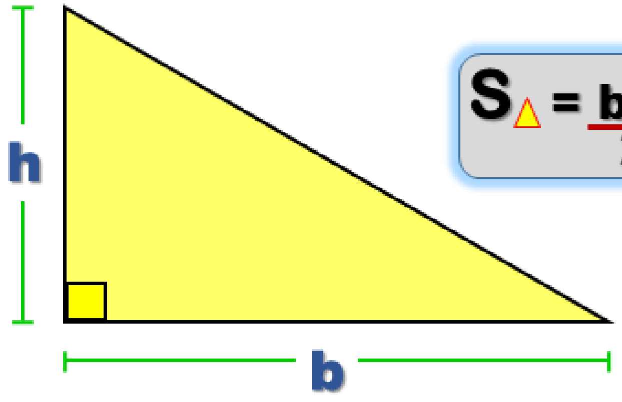
$$S = \sqrt{(22)(22)(9)}$$

S = 22.3

$$\boxed{S = 66u^2}$$

5. Calcule el área de la región triangular mostrada si $b + h = 10$.





$$S_{\triangle} = \frac{b.h}{2}$$

Resolución

T. Pitágoras

$$b^2 + h^2 = 8^2$$

$$b^2 + h^2 = 64$$

- Binomio al cuadrado

$$(b + h)^2 = b^2 + h^2 + 2b.h$$

$$(10)^2 = 64 + 2b.h$$

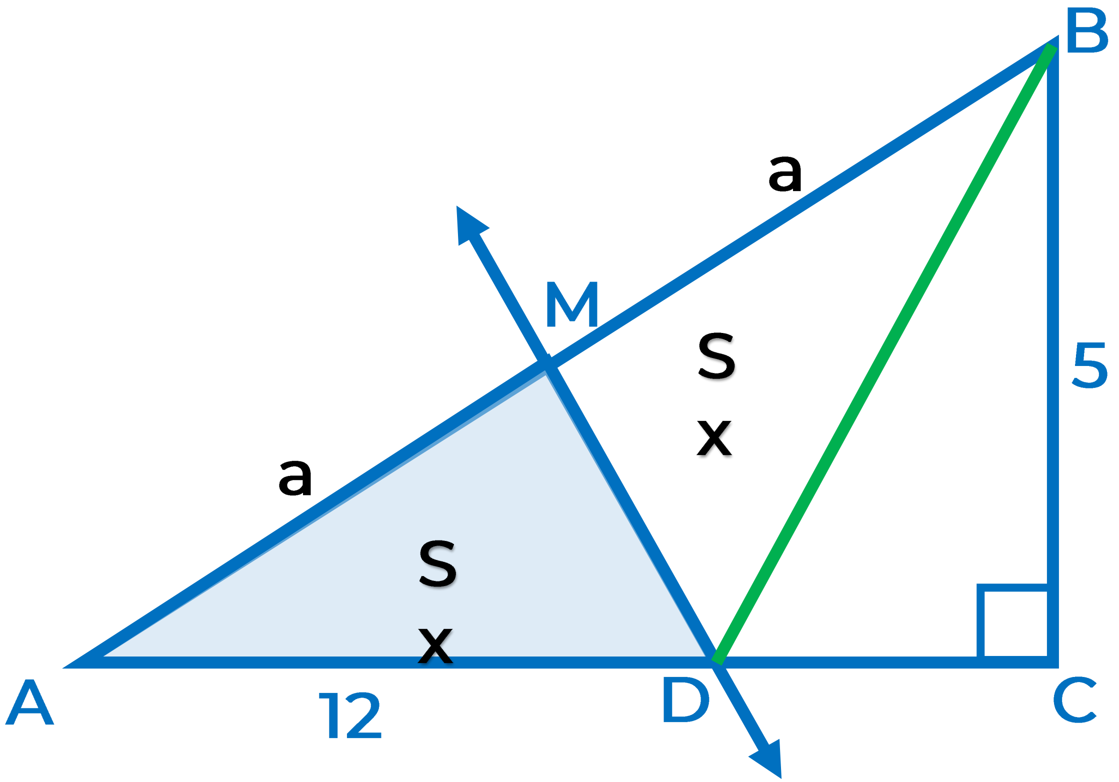
$$36 = 2b.h$$

$$18 = b.h$$

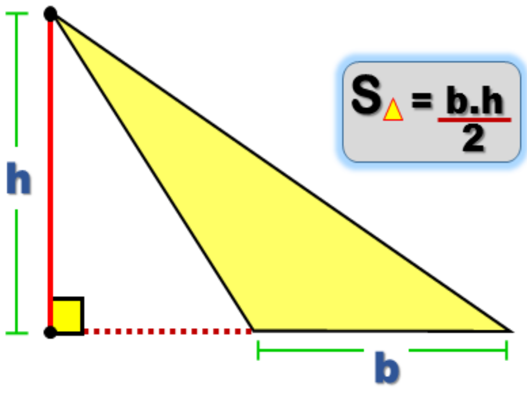
$$S_{\triangle} = \frac{18}{2}$$

$$\boxed{S_{\triangle} = 9u^2}$$

6. Calcule el área de la región triangular AMD si la $\overleftrightarrow{MD}$ es mediatriz del $\overline{AB}$.



Resolución



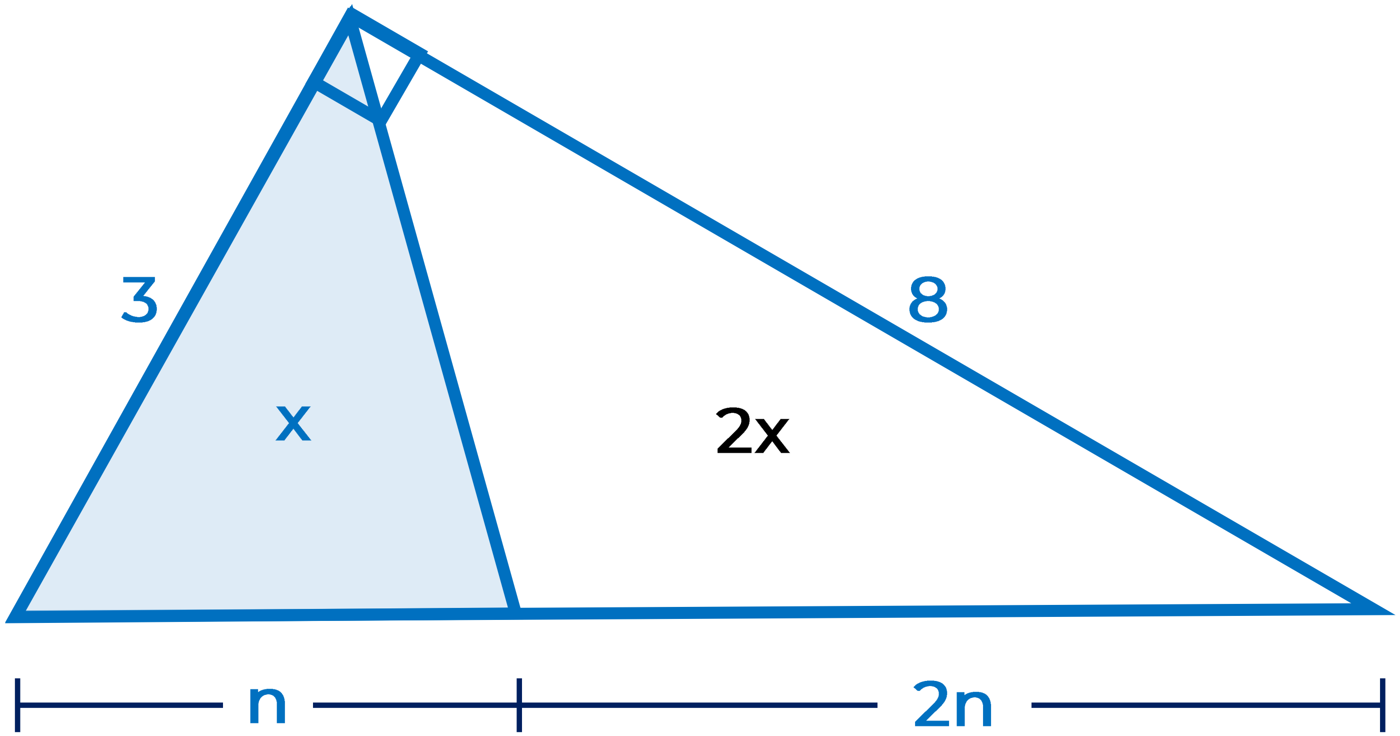
- Nos piden

$$2S_x = \frac{12.5}{2}$$

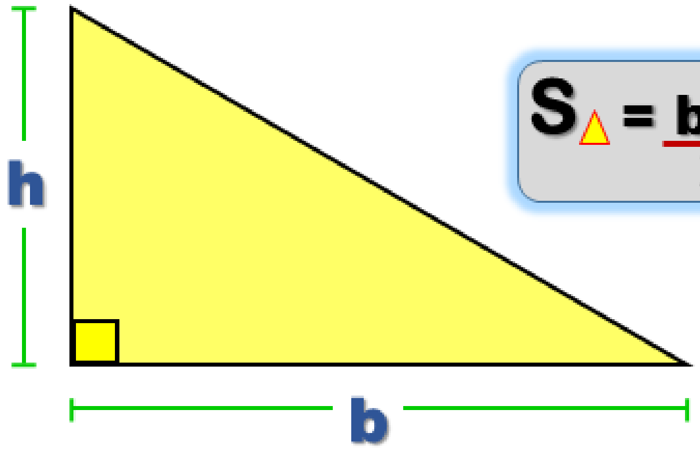
$$2S_x = 30$$

$$\boxed{S_x = 15u^2}$$

7. En la figura, calcule el área x.



Resolución



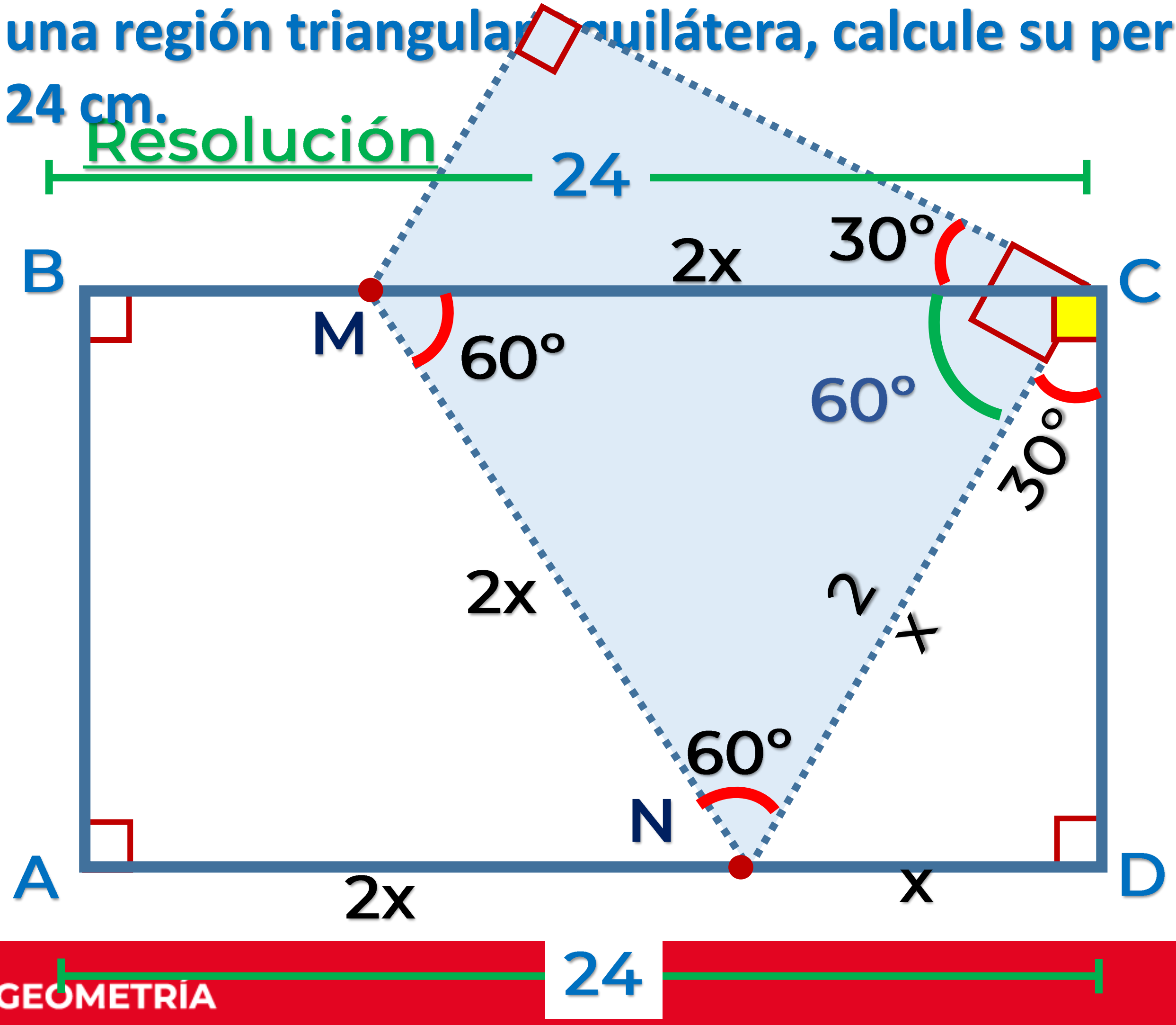
$$S_{\triangle} = \frac{b.h}{2}$$

$$\cancel{3}x = \frac{\cancel{3}.8}{2}$$

$$\boxed{Sx = 4u^2}$$

8. **Se tiene una hoja de forma rectangular la cual se dobla uniendo dos vértices opuestos. Si la parte común entre las dos partes en que quedó dividida la hoja por la línea del doblez, es una región triangular equilátera, calcule su perímetro si el largo de la hoja rectangular es de 24 cm.**

Resolución



- $\triangle$ CMN : Equilátero
- $\triangle$ CDN : Notable de 30° y 60°

$CN = AN = 2x$

$x + 2x = 24$

$3x = 24$

$x = 8$

- Nos piden

$2p_{\triangle}CMN = 16 + 16 + 16$

$\boxed{2p_{\triangle}CMN = 48u^2}$