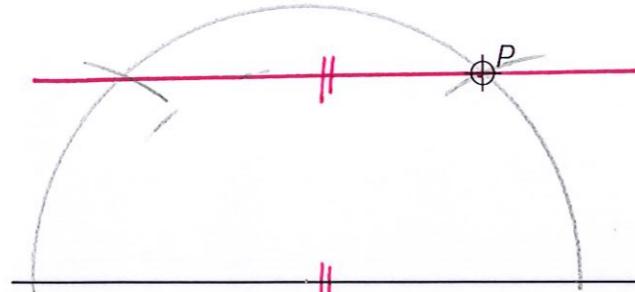
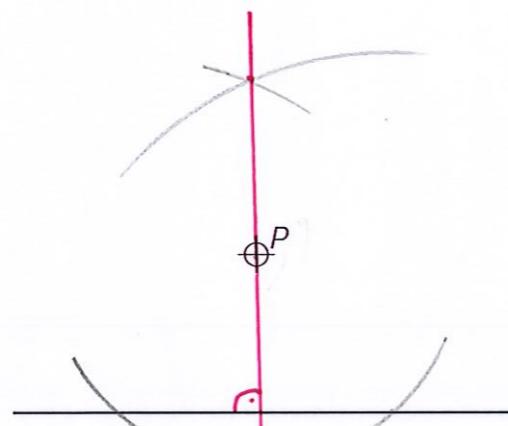
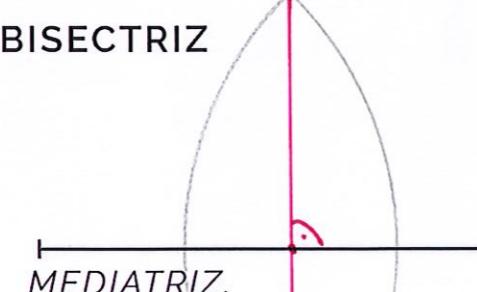
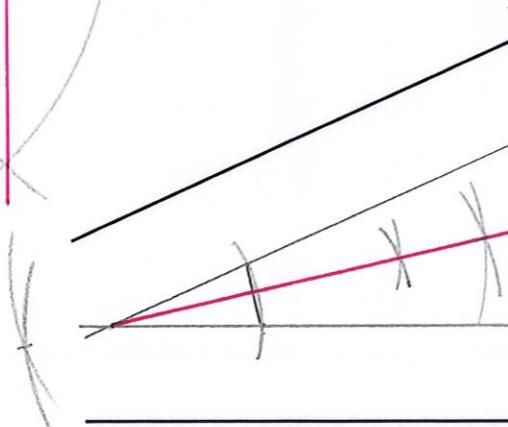
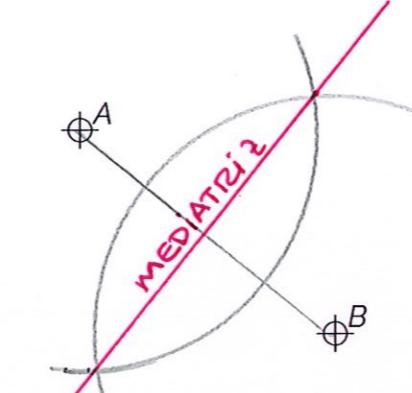
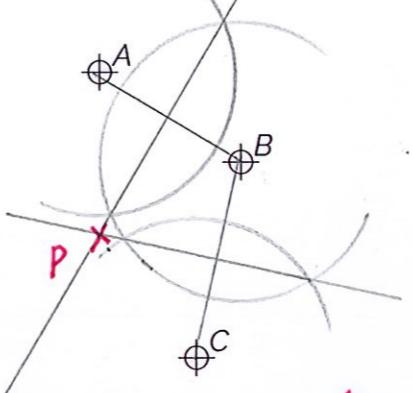
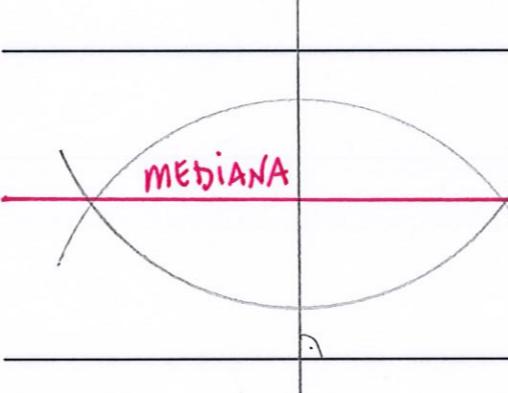
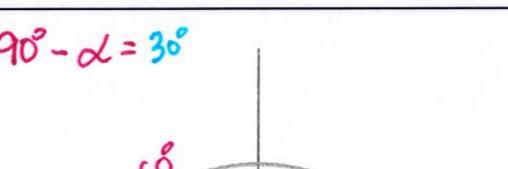
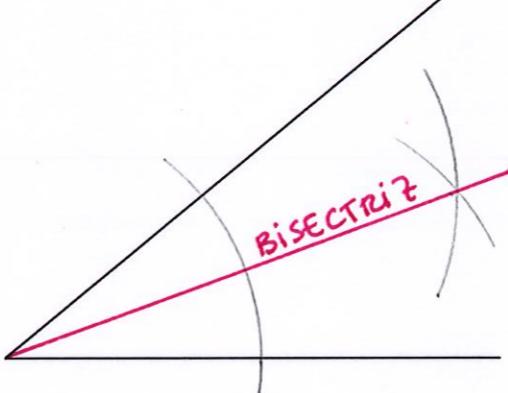
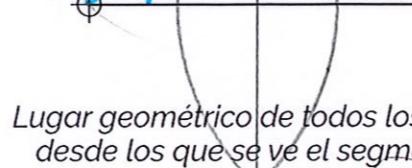
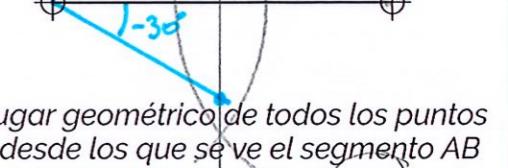
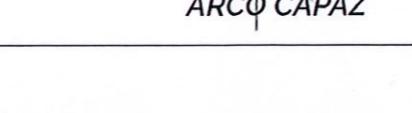
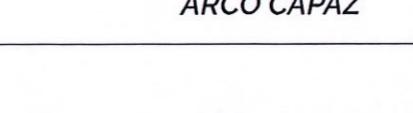
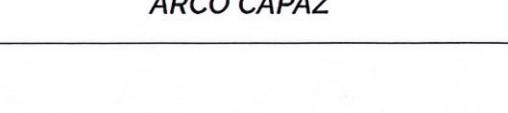
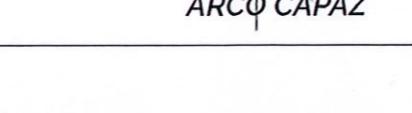
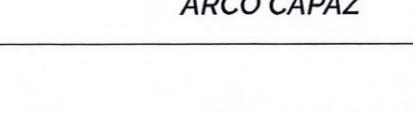
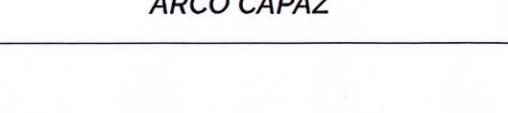
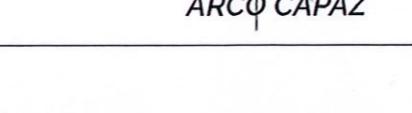
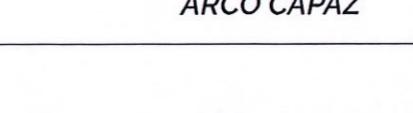
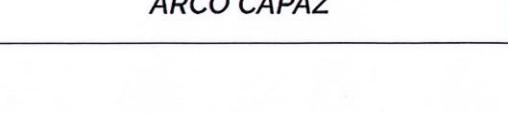
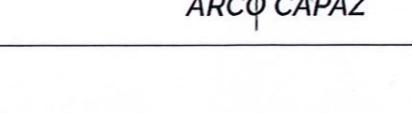
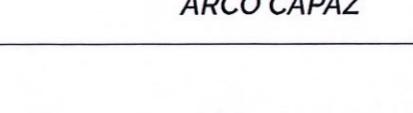
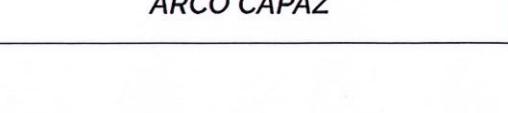
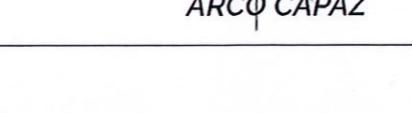
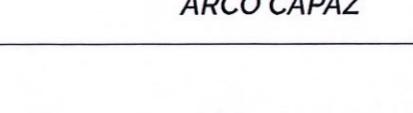
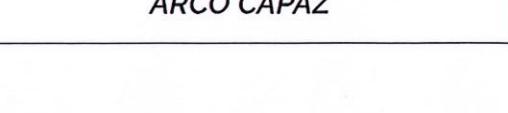
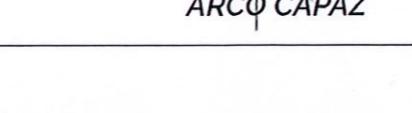
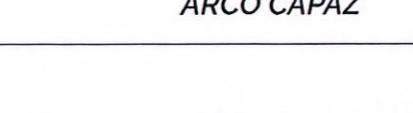
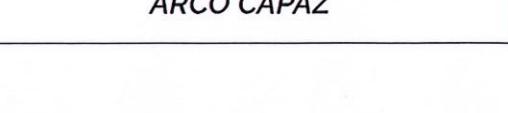
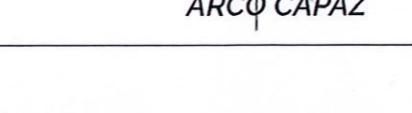
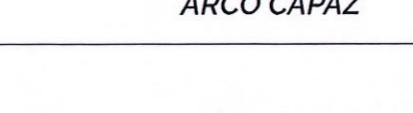
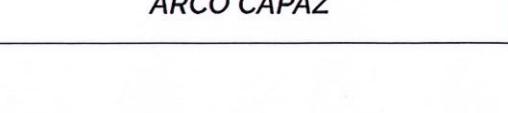
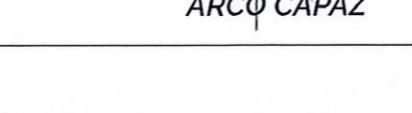
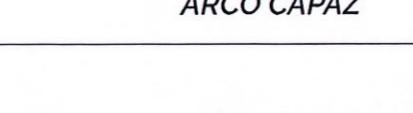
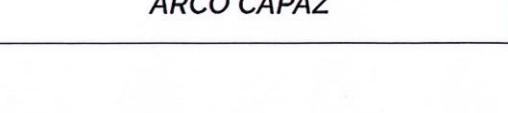
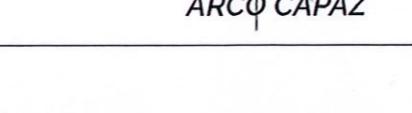
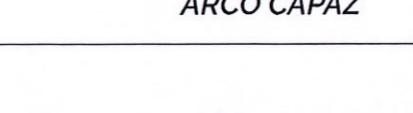
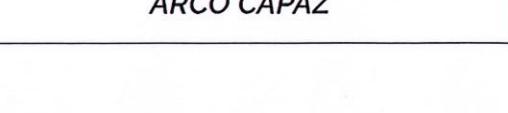
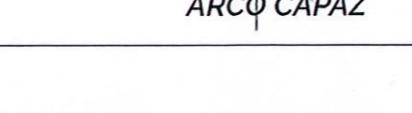
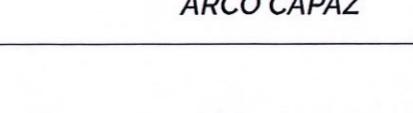
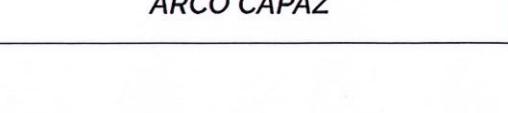
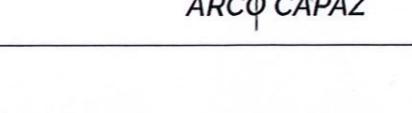
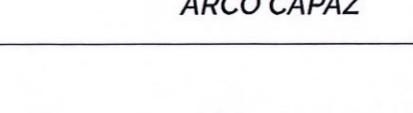
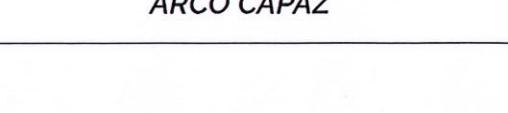
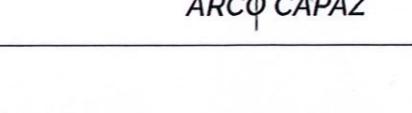
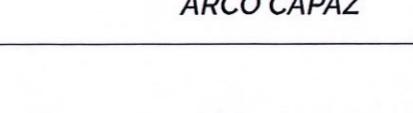
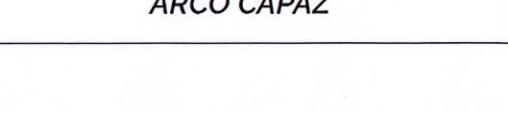
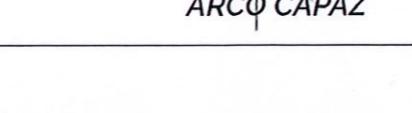
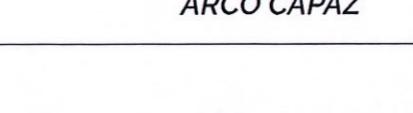
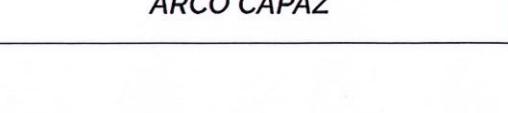
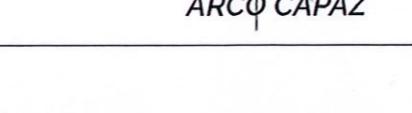
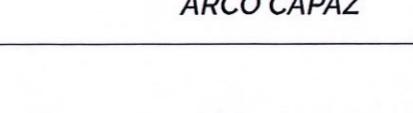
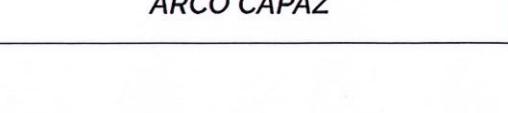
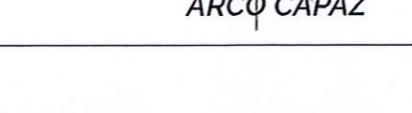
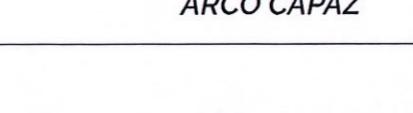
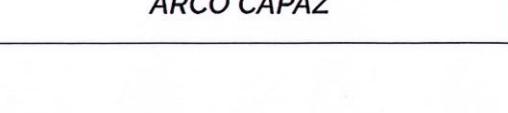
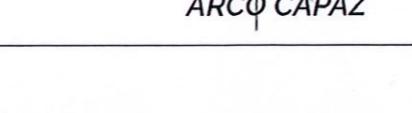
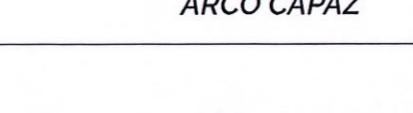
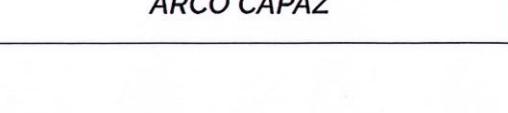
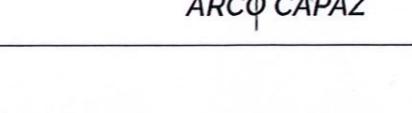
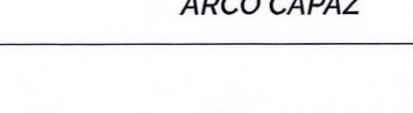
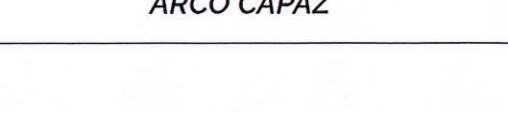
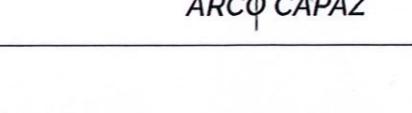
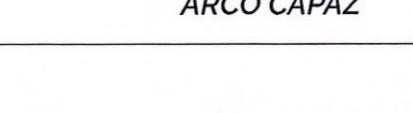
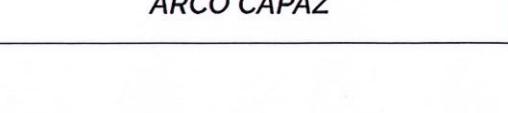


## #B1.1 LUGARES GEOMÉTRICOS

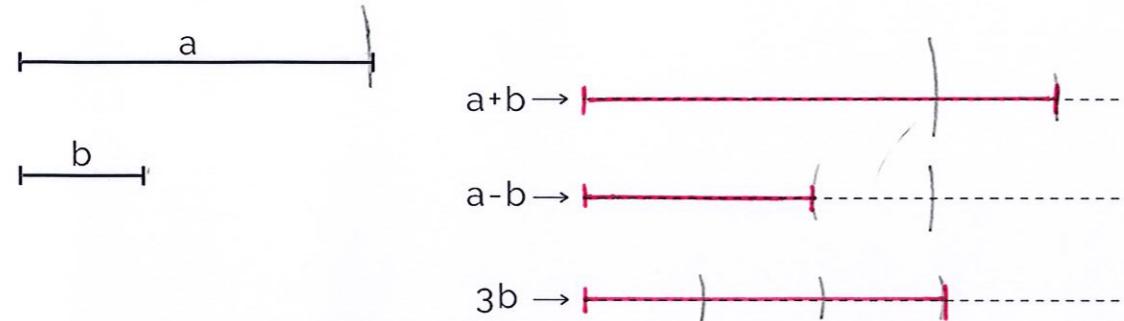
TRAZADOS FUNDAMENTALES	
→ PARALELISMO	
→ PERPENDICULARIDAD	 <p>Perpendicular por un punto de la recta.</p>  <p>Perpendicular por un punto exterior a la recta.</p>
→ MEDIATRIZ Y BISECTRIZ	 <p>MEDIATRIZ.</p>  <p>BISECTRIZ.</p>

LUGARES GEOMÉTRICOS	
	Lugar geométrico de todos los puntos que equidistan de los puntos A y B <b>MEDIATRIZ</b>
	(P) → Circuncentro de $\triangle ABC$ Punto equidista de los puntos A, B y C
	Recta concurrente a otras dos y que pase por el punto A
	<b>MEDIANA</b>
	<b>BISECTRIZ</b>
	Lugar geométrico de todos los puntos que equidistan de la recta y el arco
	$90^\circ - \alpha = 30^\circ$
	$A.C. 60^\circ$
	$90^\circ - \alpha = 0^\circ$
	$90^\circ - \alpha = -30^\circ$
	$A.C. 60^\circ$
	$90^\circ - \alpha = 90^\circ$
	$A.C. 90^\circ$
	$90^\circ - \alpha = 150^\circ$
	$90^\circ - \alpha = 120^\circ$
	$A.C. 120^\circ$
	$90^\circ - \alpha = 150^\circ$
	$90^\circ - \alpha = 180^\circ$
	$A.C. 150^\circ$
	$90^\circ - \alpha = 210^\circ$
	$90^\circ - \alpha = 240^\circ$
	$A.C. 180^\circ$
	$90^\circ - \alpha = 270^\circ$
	$90^\circ - \alpha = 300^\circ$
	$A.C. 210^\circ$
	$90^\circ - \alpha = 330^\circ$
	$90^\circ - \alpha = 360^\circ$
	$A.C. 240^\circ$
	$90^\circ - \alpha = 390^\circ$
	$90^\circ - \alpha = 420^\circ$
	$A.C. 270^\circ$
	$90^\circ - \alpha = 450^\circ$
	$90^\circ - \alpha = 480^\circ$
	$A.C. 300^\circ$
	$90^\circ - \alpha = 510^\circ$
	$90^\circ - \alpha = 540^\circ$
	$A.C. 330^\circ$
	$90^\circ - \alpha = 570^\circ$
	$90^\circ - \alpha = 600^\circ$
	$A.C. 360^\circ$
	$90^\circ - \alpha = 630^\circ$
	$90^\circ - \alpha = 660^\circ$
	$A.C. 420^\circ$
	$90^\circ - \alpha = 720^\circ$
	$90^\circ - \alpha = 780^\circ$
	$A.C. 480^\circ$
	$90^\circ - \alpha = 840^\circ$
	$90^\circ - \alpha = 900^\circ$
	$A.C. 540^\circ$
	$90^\circ - \alpha = 960^\circ$
	$90^\circ - \alpha = 1020^\circ$
	$A.C. 600^\circ$
	$90^\circ - \alpha = 1080^\circ$
	$90^\circ - \alpha = 1140^\circ$
	$A.C. 660^\circ$
	$90^\circ - \alpha = 1200^\circ$
	$90^\circ - \alpha = 1260^\circ$
	$A.C. 720^\circ$
	$90^\circ - \alpha = 1320^\circ$
	$90^\circ - \alpha = 1380^\circ$
	$A.C. 780^\circ$
	$90^\circ - \alpha = 1440^\circ$
	$90^\circ - \alpha = 1500^\circ$
	$A.C. 840^\circ$
	$90^\circ - \alpha = 1560^\circ$
	$90^\circ - \alpha = 1620^\circ$
	$A.C. 900^\circ$

## #B1.2 OPERACIONES CON SEGMENTOS

## OPERACIONES CON SEGMENTOS

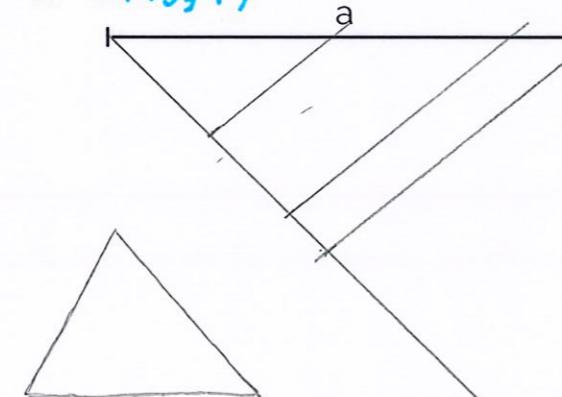
## SUMA Y RESTA DE SEGMENTOS



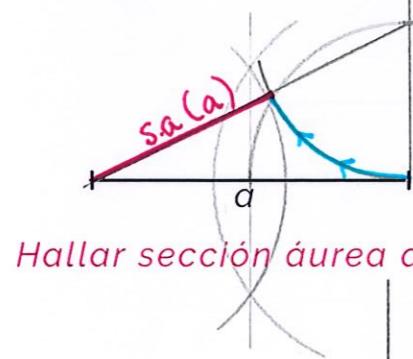
## DIVISIÓN DE UN SEGMENTO. TEOREMA DE TALES

- División en partes iguales

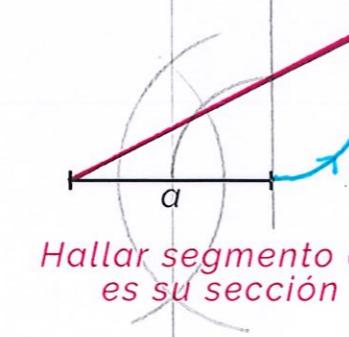
$$\frac{a}{5}$$

- División en partes proporcionales  
(a 18, 15 y 7)

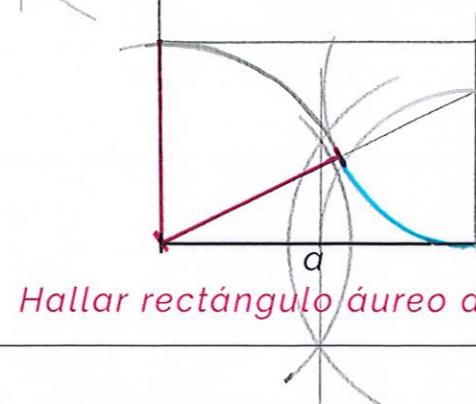
## SECCIÓN ÁUREA



Hallar sección áurea de a.



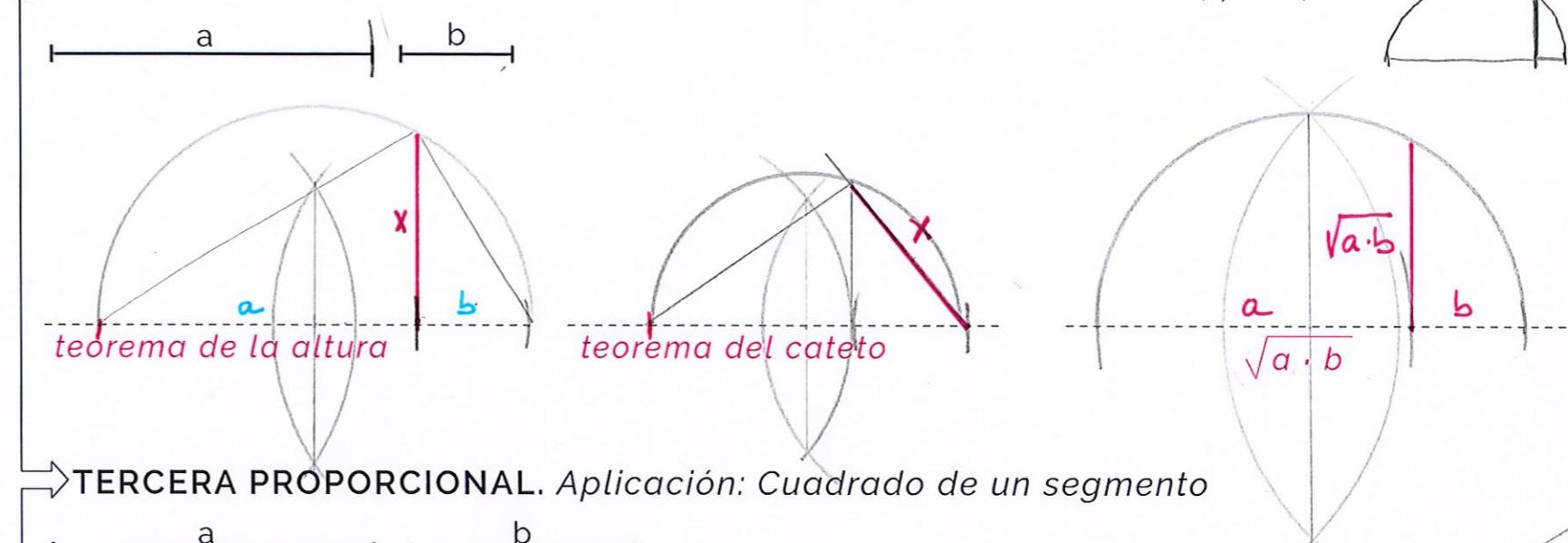
Hallar segmento del que a es su sección áurea.



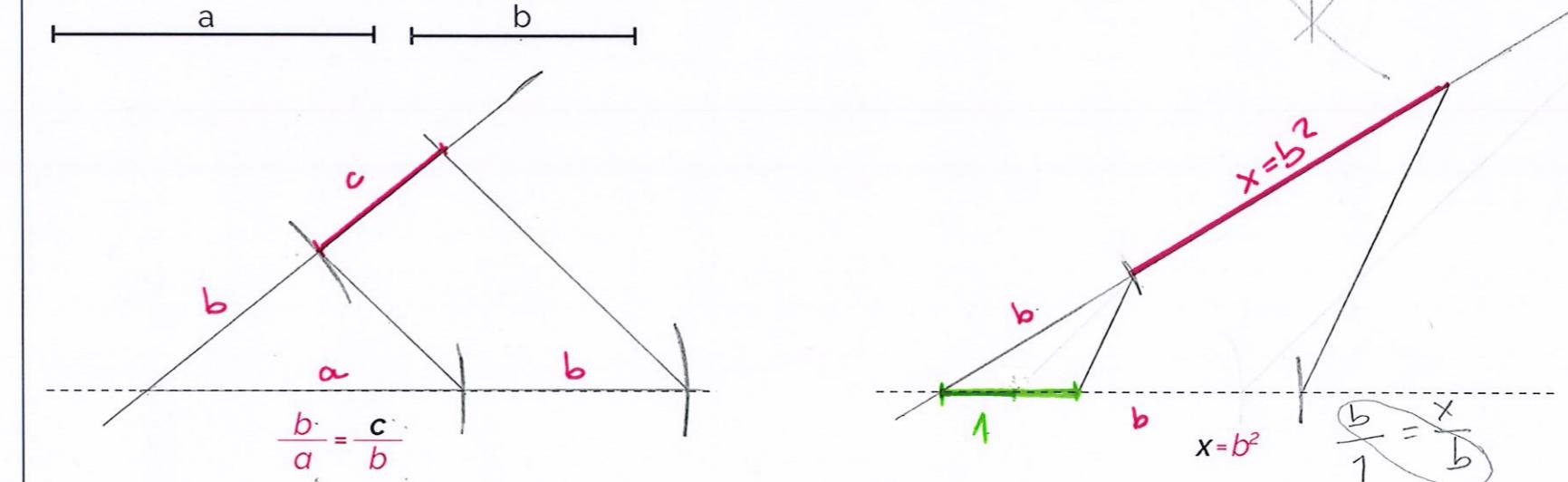
Hallar rectángulo áureo de base a.

## PROPORCIONALIDAD ENTRE SEGMENTOS

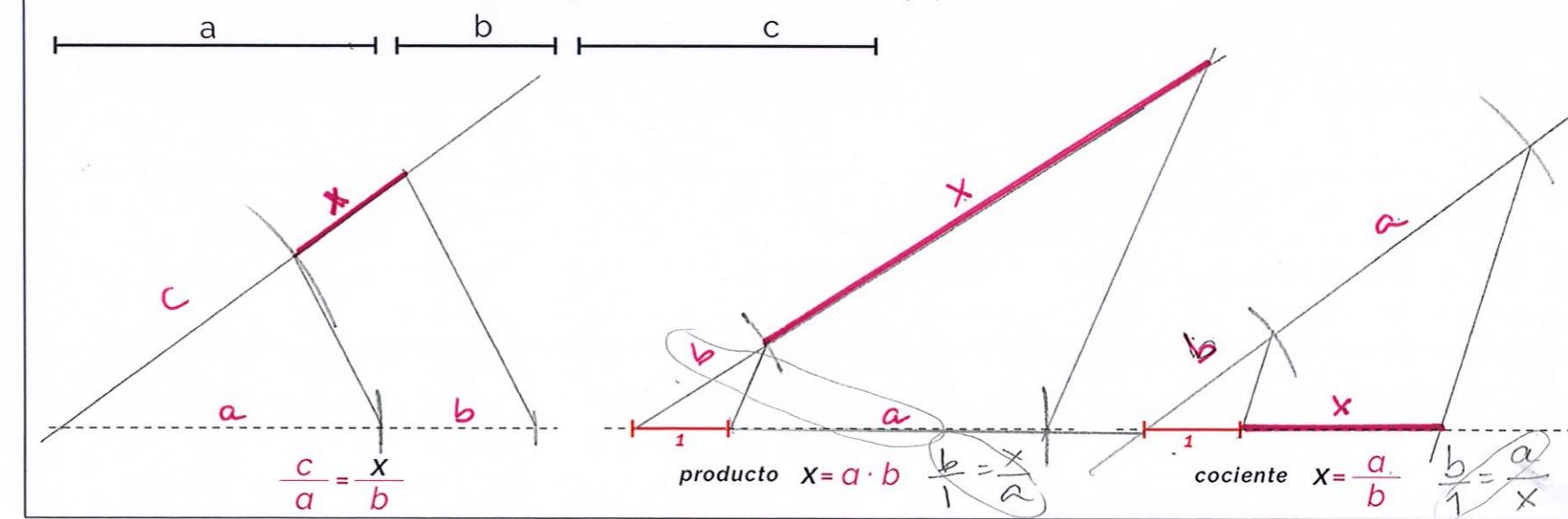
## MEDIA PROPORCIONAL. Aplicación: Raíz cuadrada



## TERCERA PROPORCIONAL. Aplicación: Cuadrado de un segmento



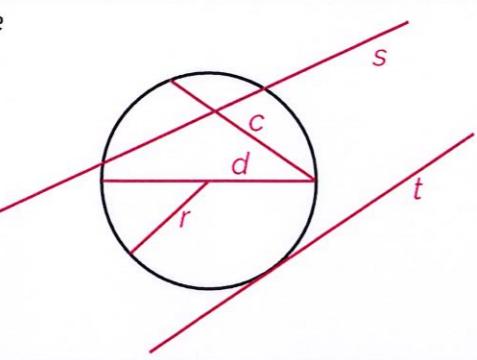
## CUARTA PROPORCIONAL. Aplicación: Cociente y producto



## #B1.3 ÁNGULOS.

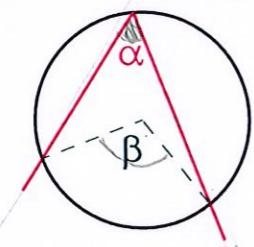
### CIRCUNFERENCIA

t: recta tangente  
s: recta secante  
c: cuerda  
d: diámetro  
r: radio

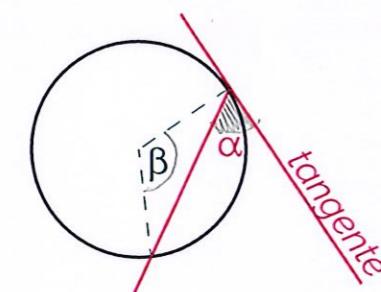


### ÁNGULOS EN CIRCUNFERENCIAS

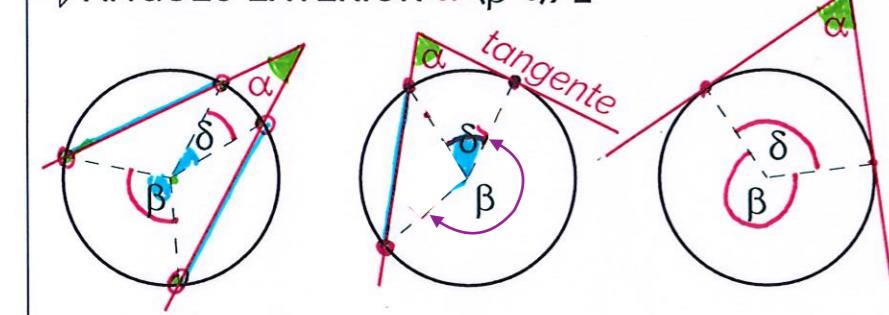
→ ÁNGULO INSCRITO  $\alpha = \beta/2$



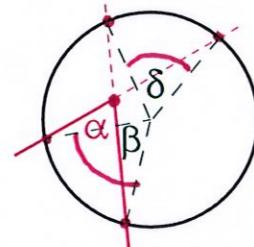
→ ÁNGULO SEMIINSCRITO  $\alpha = \beta/2$



→ ÁNGULO EXTERIOR  $\alpha = (\beta - \delta)/2$



→ ÁNGULO INTERIOR  $\alpha = (\beta + \delta)/2$



### ÁNGULOS

→ Tipos de ángulos

- ángulo llano  $= 180^\circ$
- ángulo recto  $= 90^\circ$
- ángulo obtuso  $> 90^\circ$
- ángulo agudo  $< 90^\circ$
- ángulo cóncavo  $> 180^\circ$
- ángulo completo  $= 360^\circ$

→ Relación entre ángulos

- Por la suma de sus ángulos:

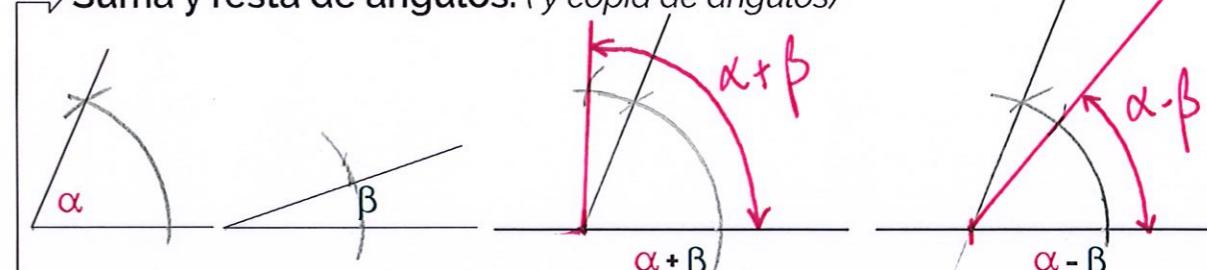
  - Complementarios**: Ángulos que suman  $90^\circ$ .
  - Suplementarios**: Ángulos que suman  $180^\circ$ .

→ Construcción de ángulos

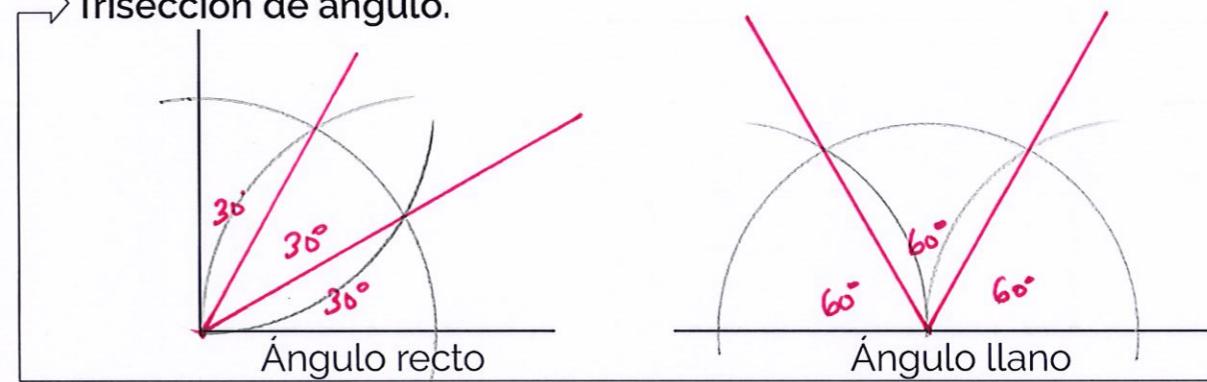
- 165°
- 15°
- 150°
- 30°
- 45°
- 60°
- 120°
- 105°
- 75°
- 135°
- 60°
- 90°
- 30°
- 45°
- 75°
- 120°
- 150°
- 15°

### OPERACIONES CON ÁNGULOS

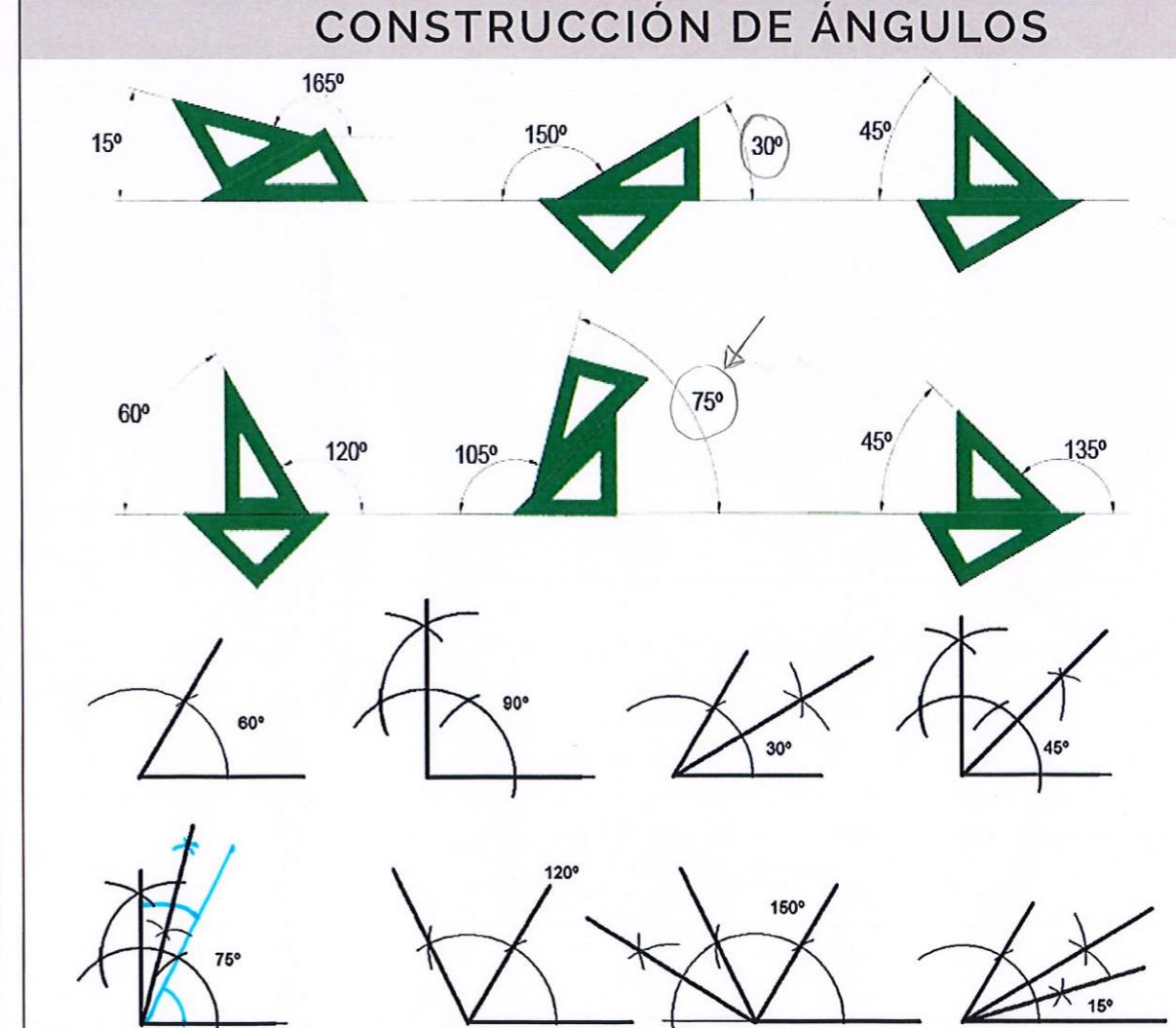
→ Suma y resta de ángulos. (y copia de ángulos)



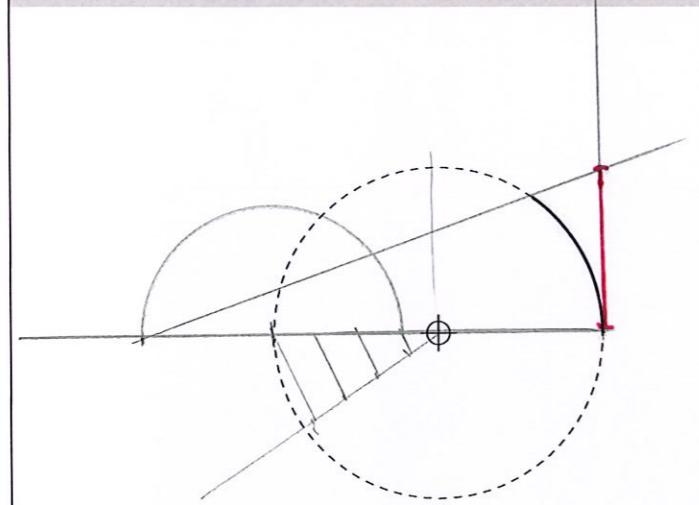
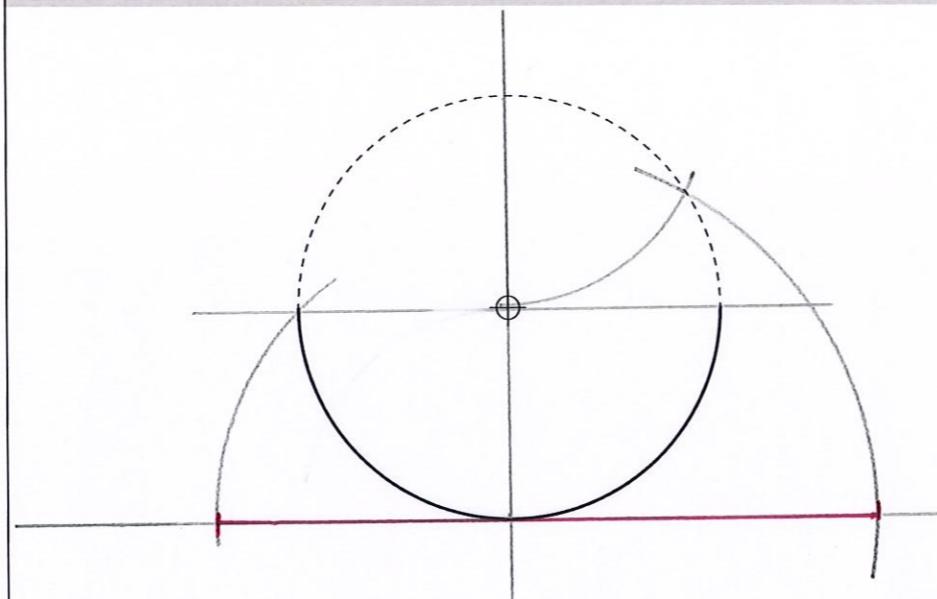
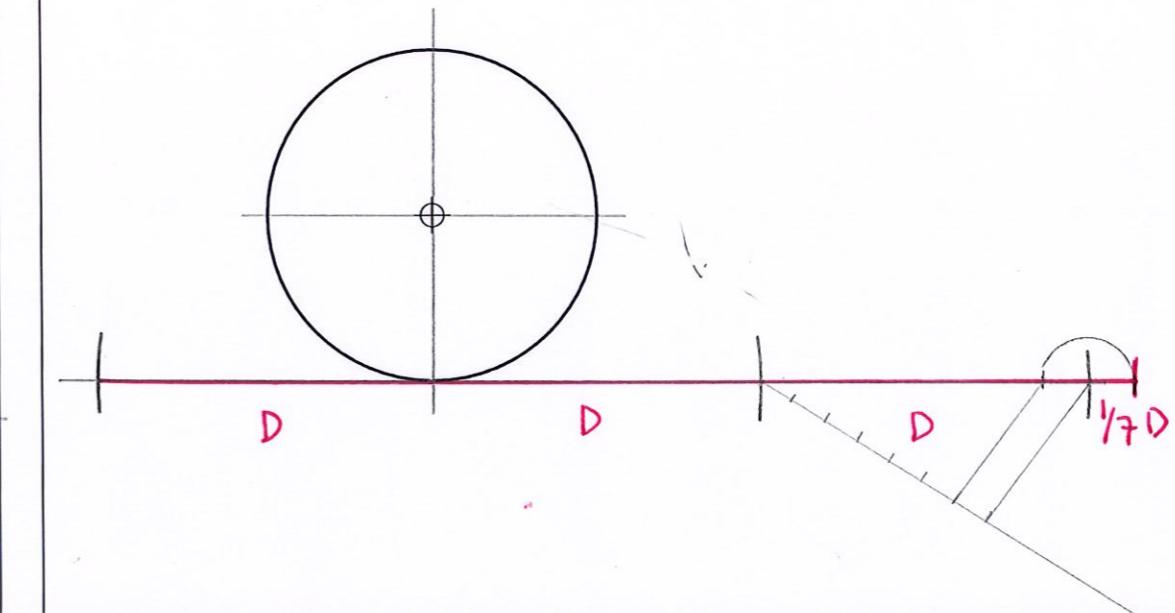
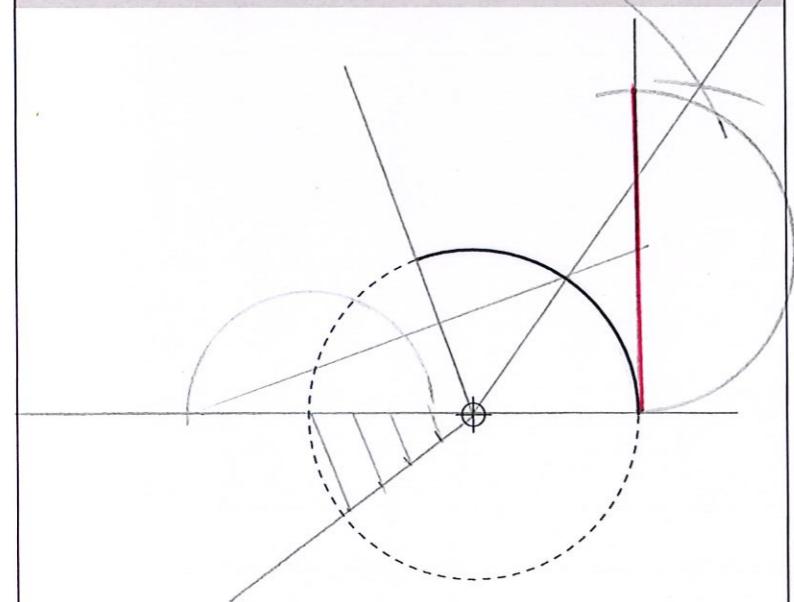
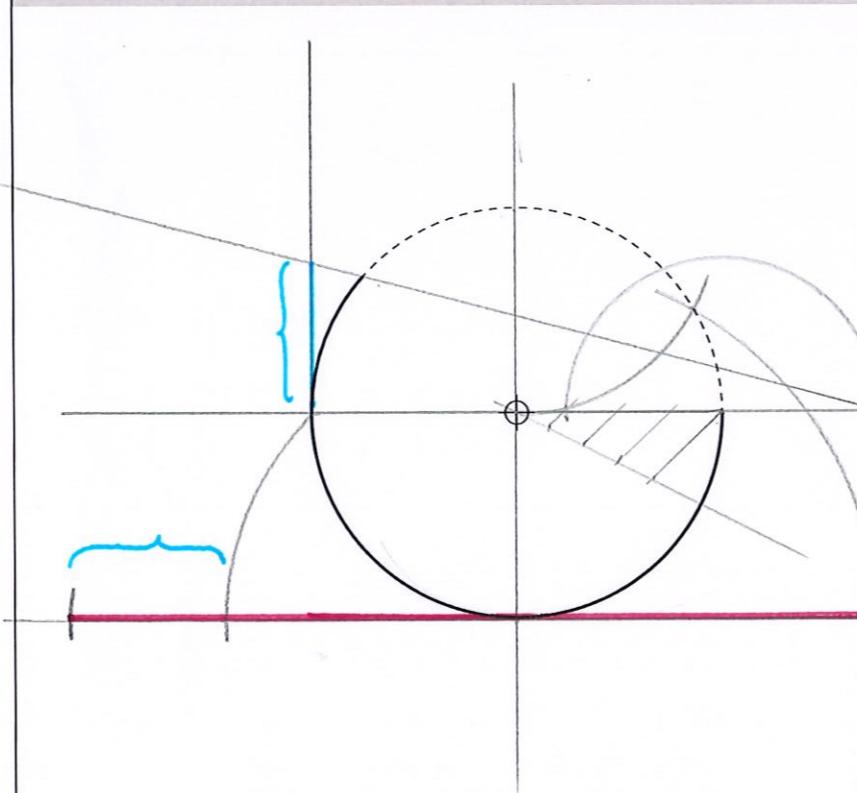
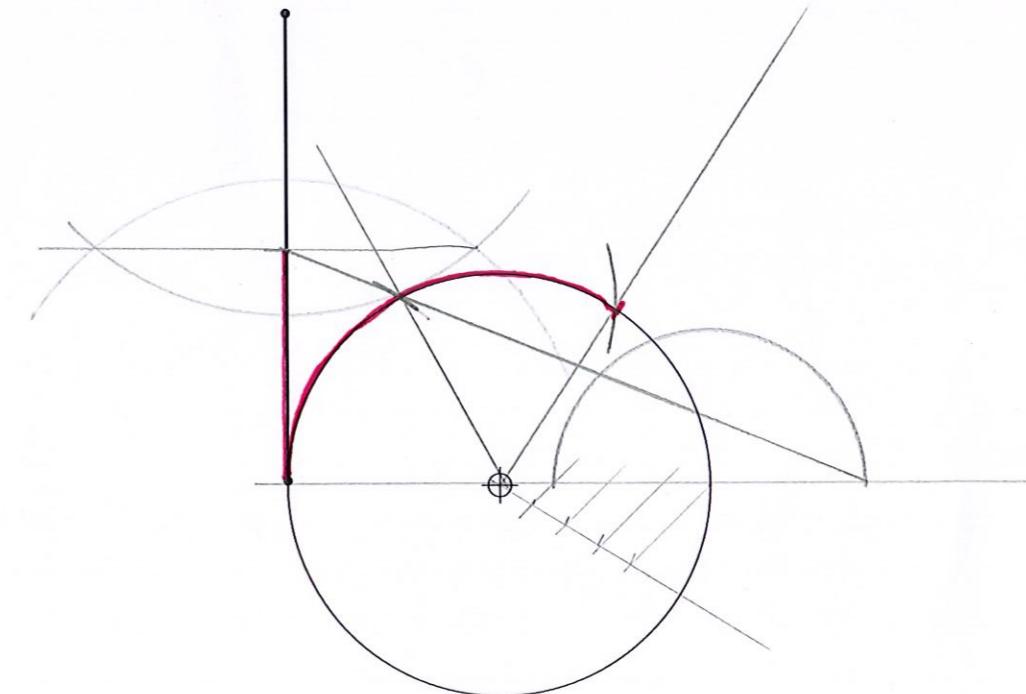
→ Trisección de ángulo.



### CONSTRUCCIÓN DE ÁNGULOS



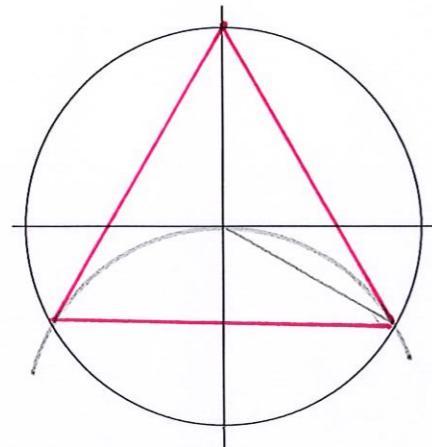
## #B1.4 RECTIFICACIÓN DE ARCOS.

RECTIFICACIÓN DE  
ÁNGULOS  $<90^\circ$ RECTIFICACIÓN DE  
SEMICIRCUNFERENCIASRECTIFICACIÓN DE  
CIRCUNFERENCIAS COMPLETARECTIFICACIÓN DE  
ÁNGULOS  $>90^\circ < 180^\circ$ RECTIFICACIÓN DE  
ÁNGULOS  $>180^\circ$ RECTIFICACIÓN INVERSA DE  
SEGMENTO SOBRE UNA CIRCUNF.

## #B1.5 POLÍGONOS REGULARES INSCRITOS.

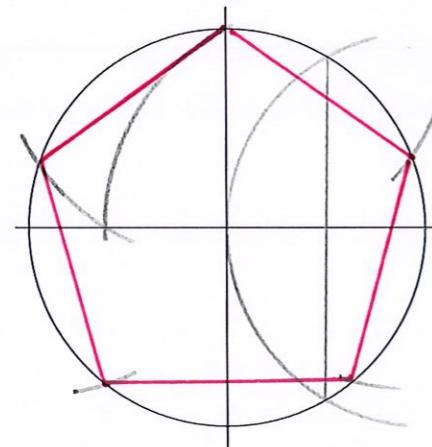
## POLÍGONOS REGULARES INSCRITOS

## → TRIÁNGULO INSCRITO



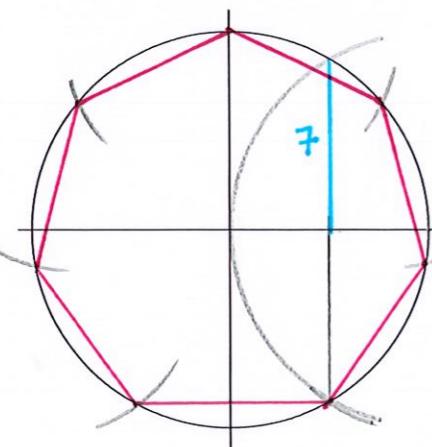
\*Hexágono y dodecágono

## → PENTÁGONO INSCRITO

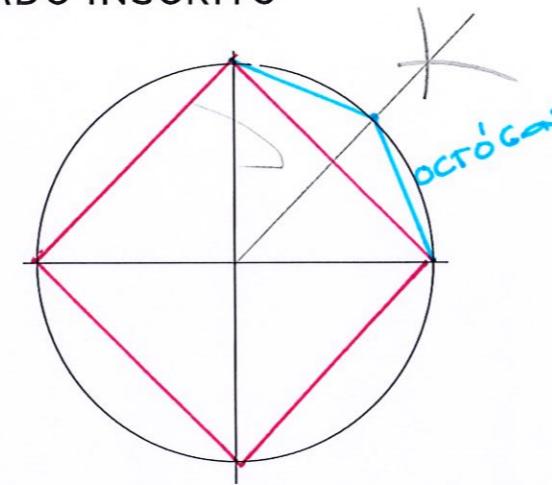


\*Decágono

## → HEPTÁGONO INSCRITO

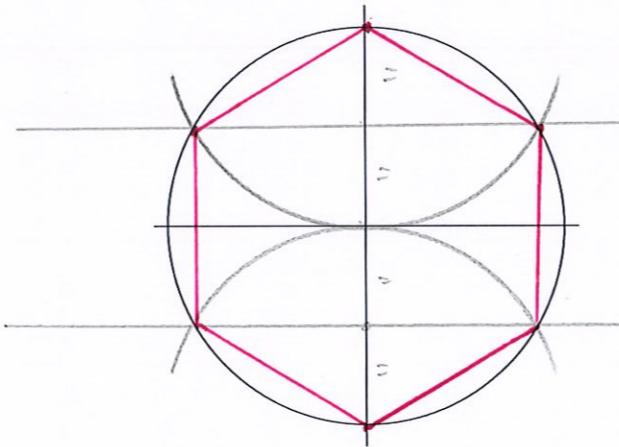


## → CUADRADO INSCRITO



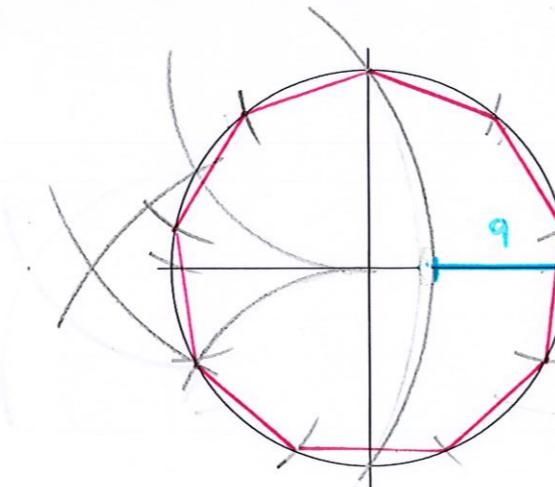
\*Octogono

## → HEXÁGONO INSCRITO



\*Dodecágono

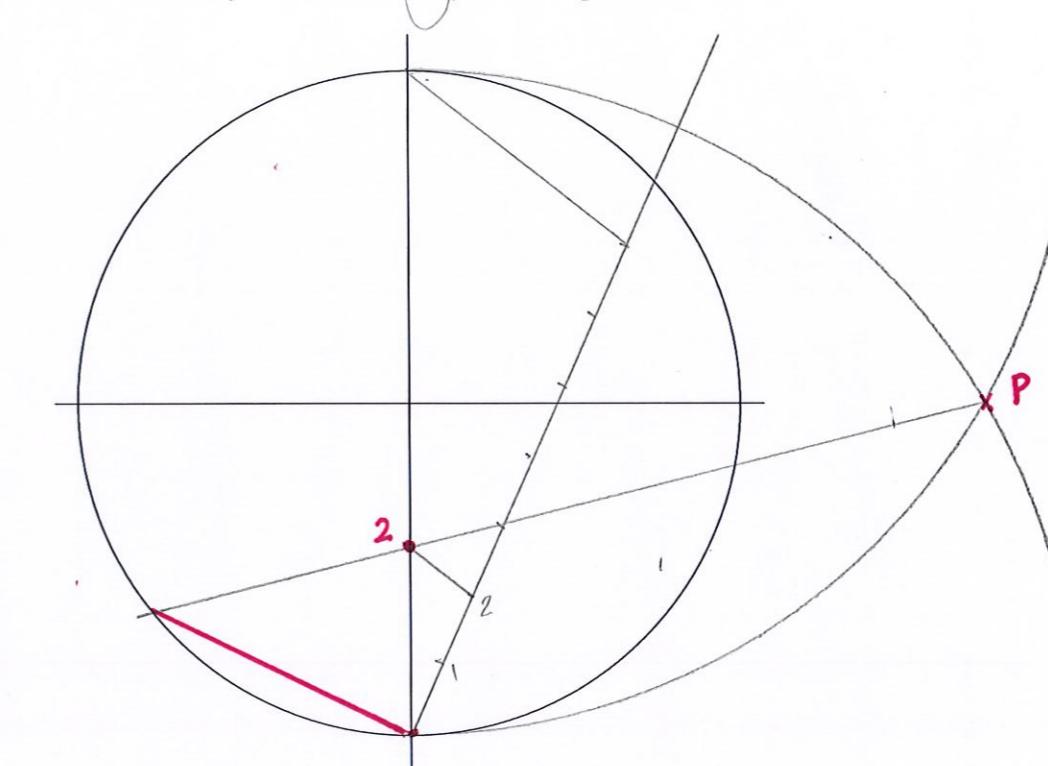
## → ENEÁGONO INSCRITO



## MÉTODO GENERAL

## → DIVIDIR UNA CIRCUNFERENCIA EN PARTES IGUALES.

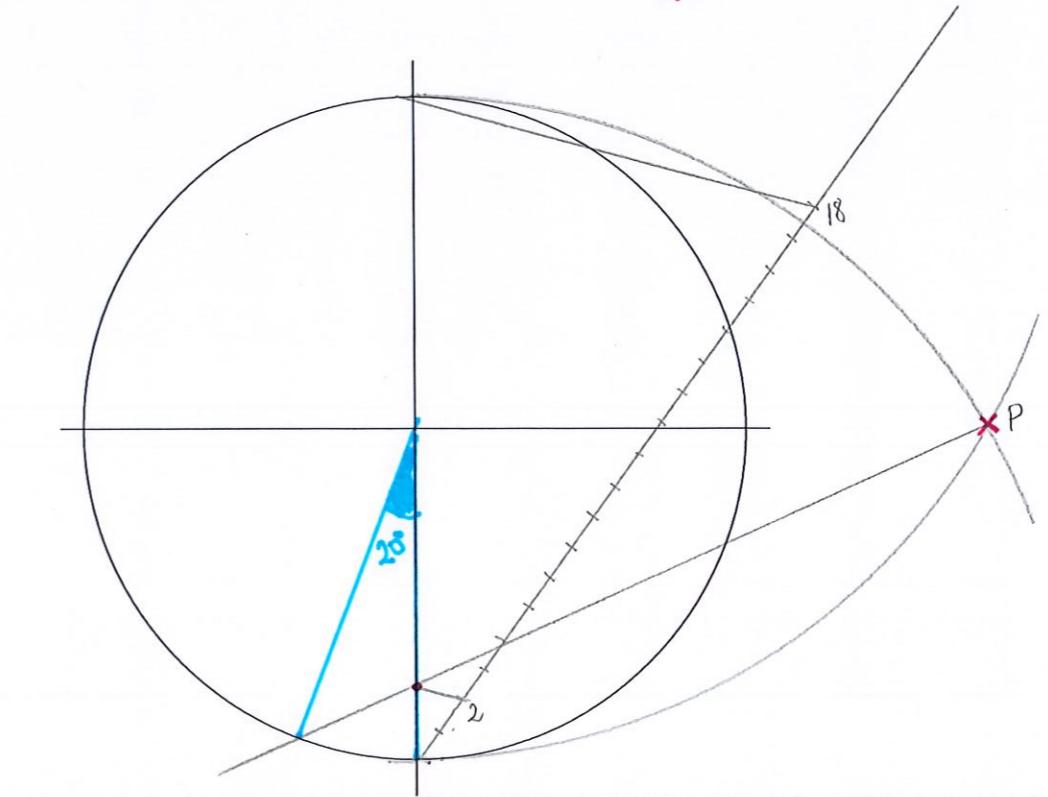
Dividir la circunferencia en 7 partes iguales



Aplicación: Trazado de ángulos

Trazar un ángulo de  $20^\circ$ 

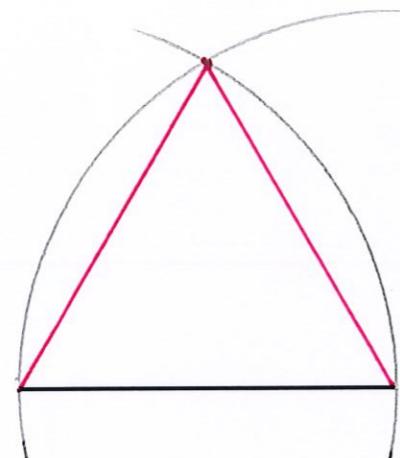
$$\frac{360^\circ}{18} = 20^\circ$$



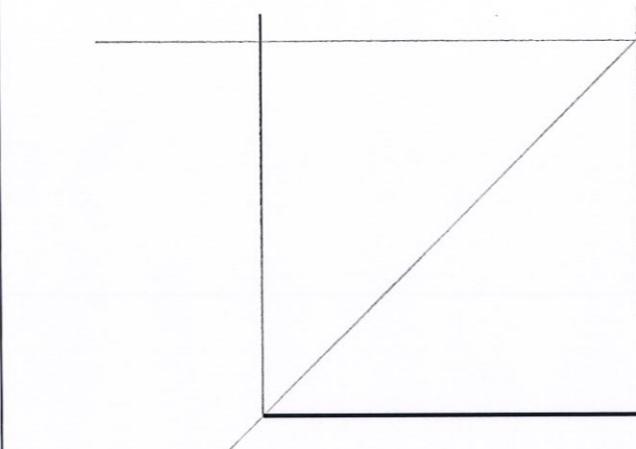
## #B1.6 POLÍGONOS REGULARES DADO EL LADO.

## POLÍGONOS REGULARES DADO EL LADO

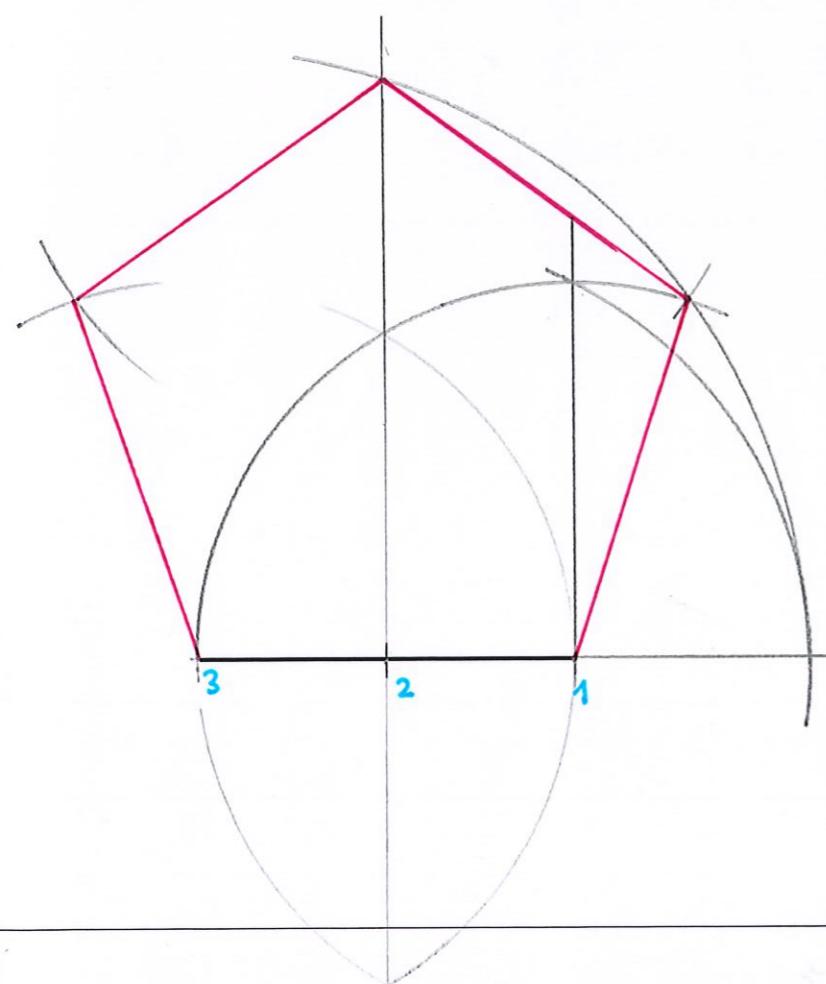
→ TRIÁNGULO DADO EL LADO



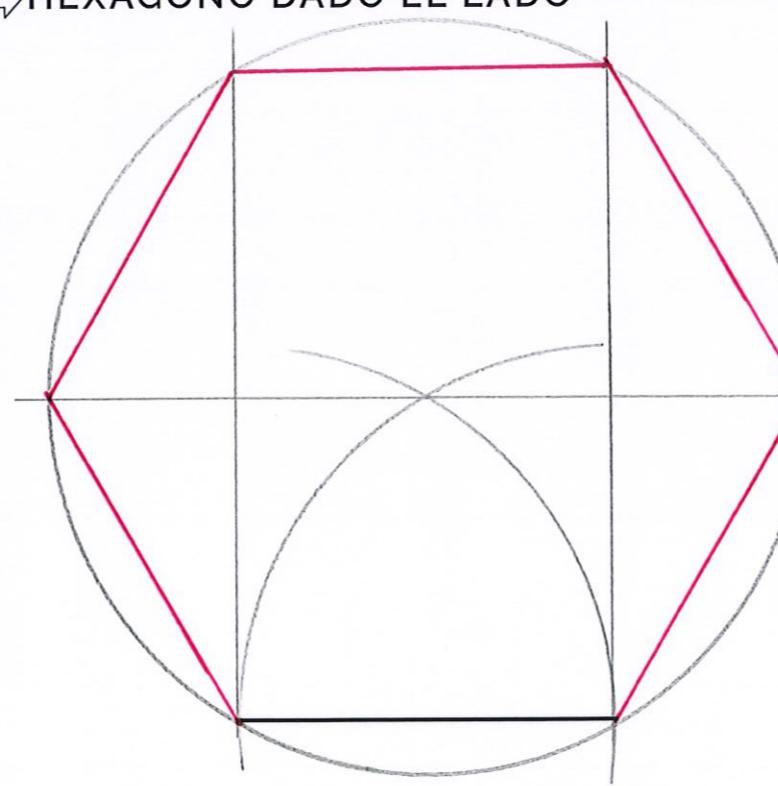
→ CUADRADO DADO EL LADO



→ PENTÁGONO DADO EL LADO

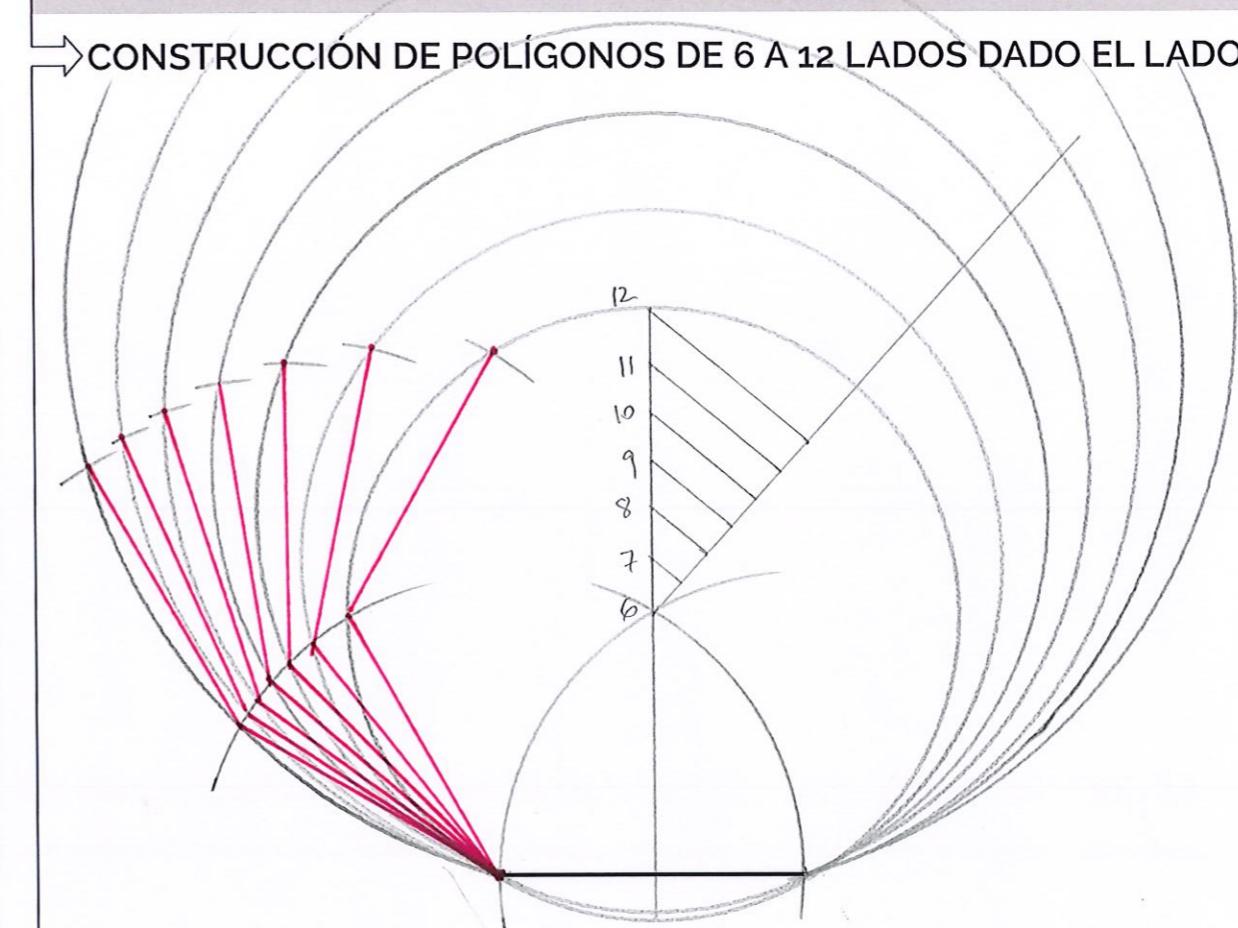


→ HEXÁGONO DADO EL LADO



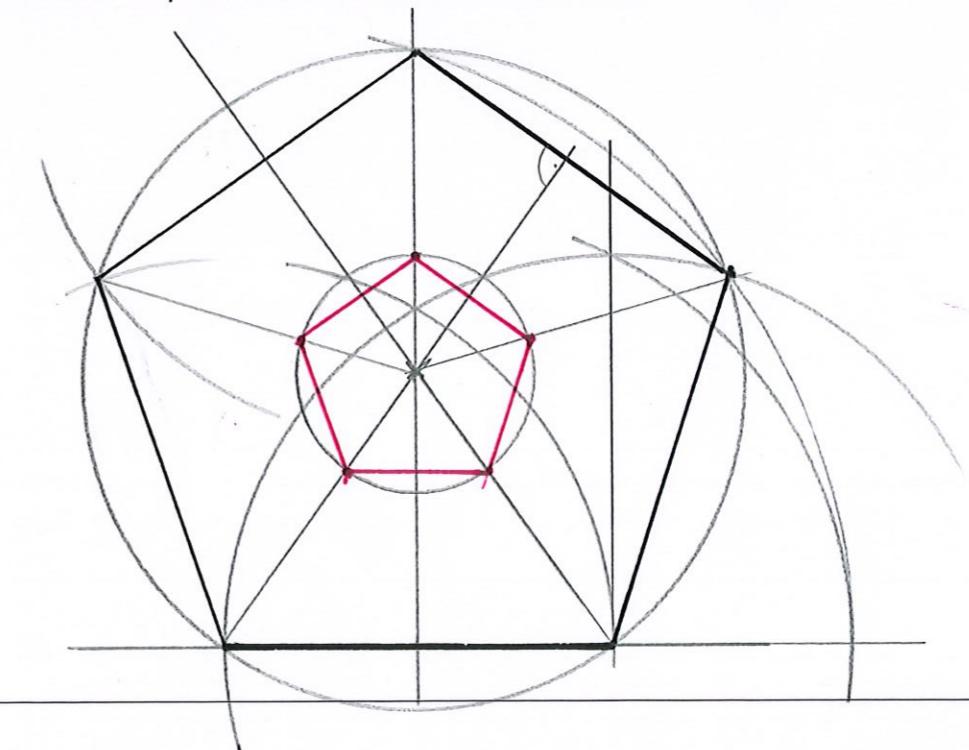
## MÉTODO GENERAL

→ CONSTRUCCIÓN DE POLÍGONOS DE 6 A 12 LADOS DADO EL LADO.



→ CONSTRUCCIÓN DE POLÍGONOS POR HOMOTECIA.

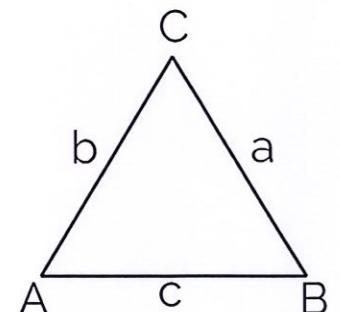
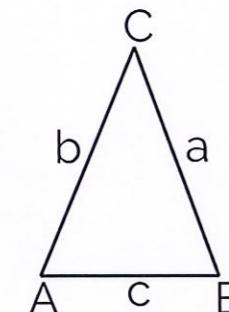
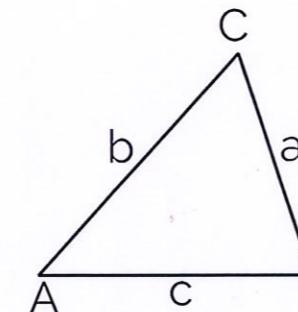
Ejemplo: Cuando te piden trazar un pentágono inscrito pero solo recuerdas el procedimiento dado el lado.

 $r=15'$ 

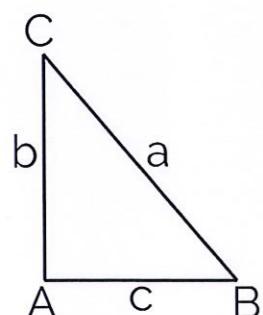
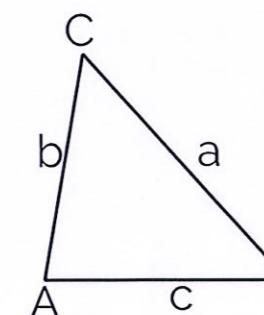
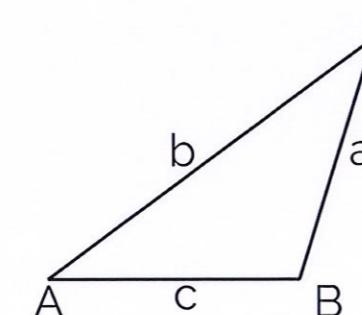
## #B1.7 TRIÁNGULOS

## CLASIFICACIÓN TRIÁNGULOS

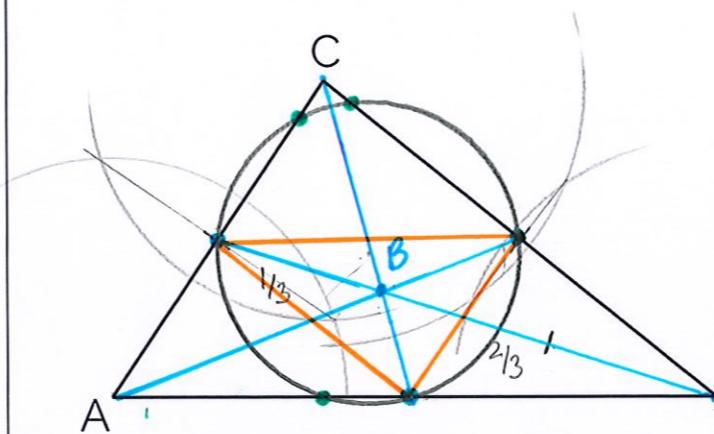
EN FUNCIÓN DE SUS LADOS

Equilátero  
 $a=b=c$ Isósceles  
 $a=b \neq c$ Escaleno  
 $a \neq b \neq c$ 

EN FUNCIÓN DE SUS ÁNGULOS

Rectángulo  
Un ángulo rectoAcutángulo  
3 ángulos agudosObtusángulo  
1 ángulo obtuso

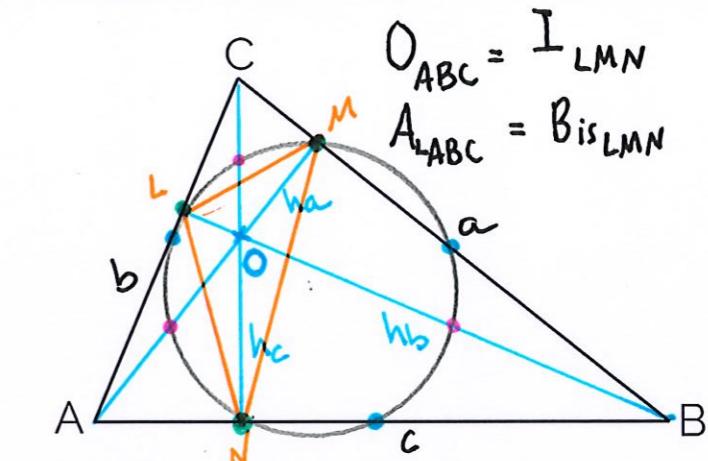
## RECTAS Y PUNTOS NOTABLES



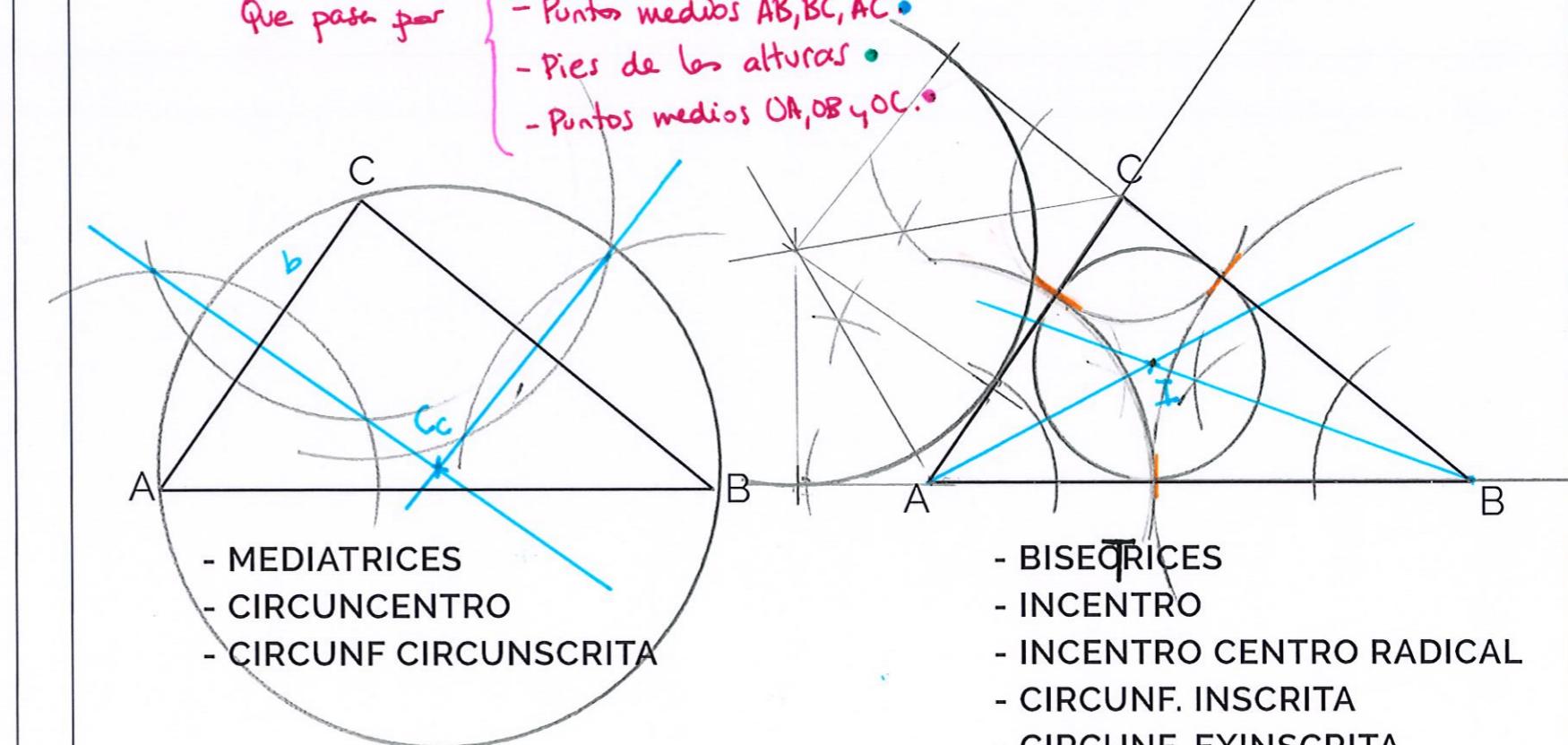
- MEDIANA
- BARICENTRO O c.d.g
- TRIÁNGULO COMPLEMENTARIO
- CIRCUNFERENCIA DE EULER (9 puntos)

Que pasa por

- Puntos medios AB, BC, AC	•
- Pies de las alturas	•
- Puntos medios OA, OB y OC	•



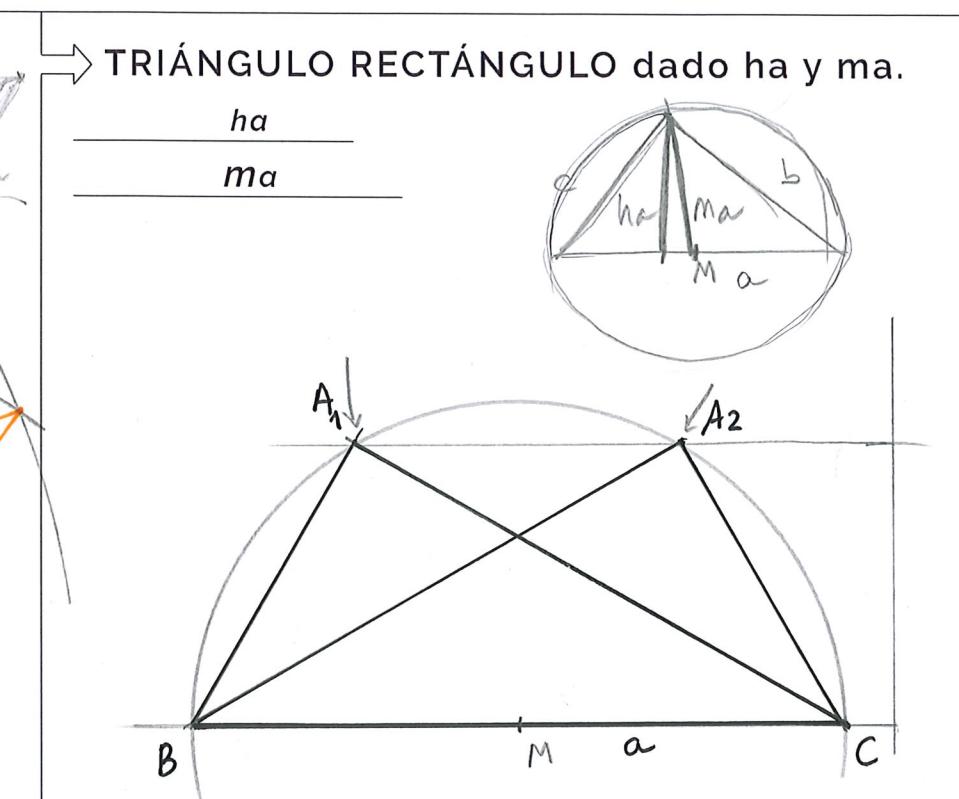
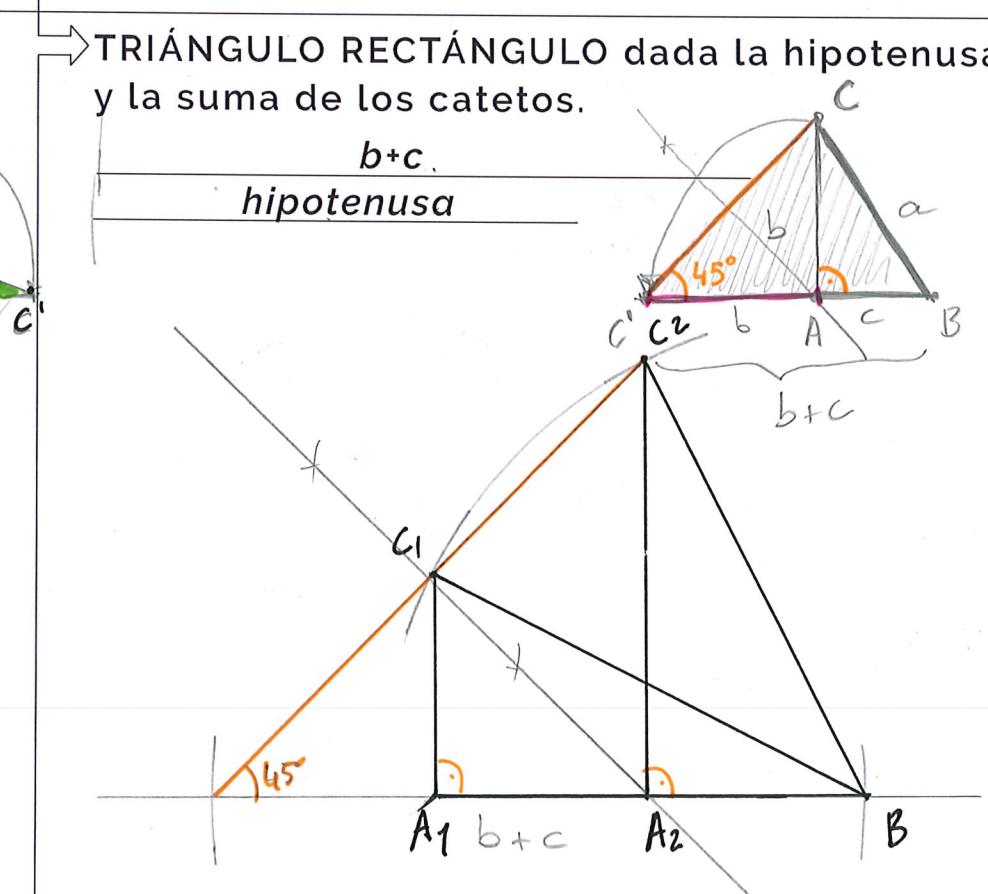
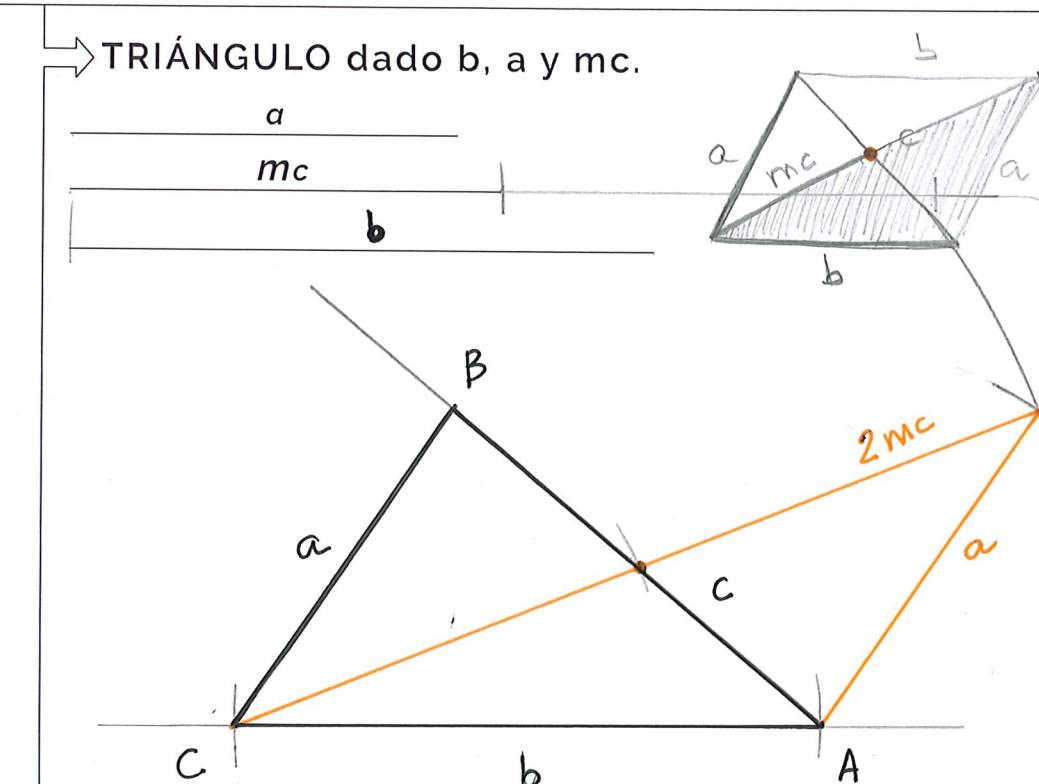
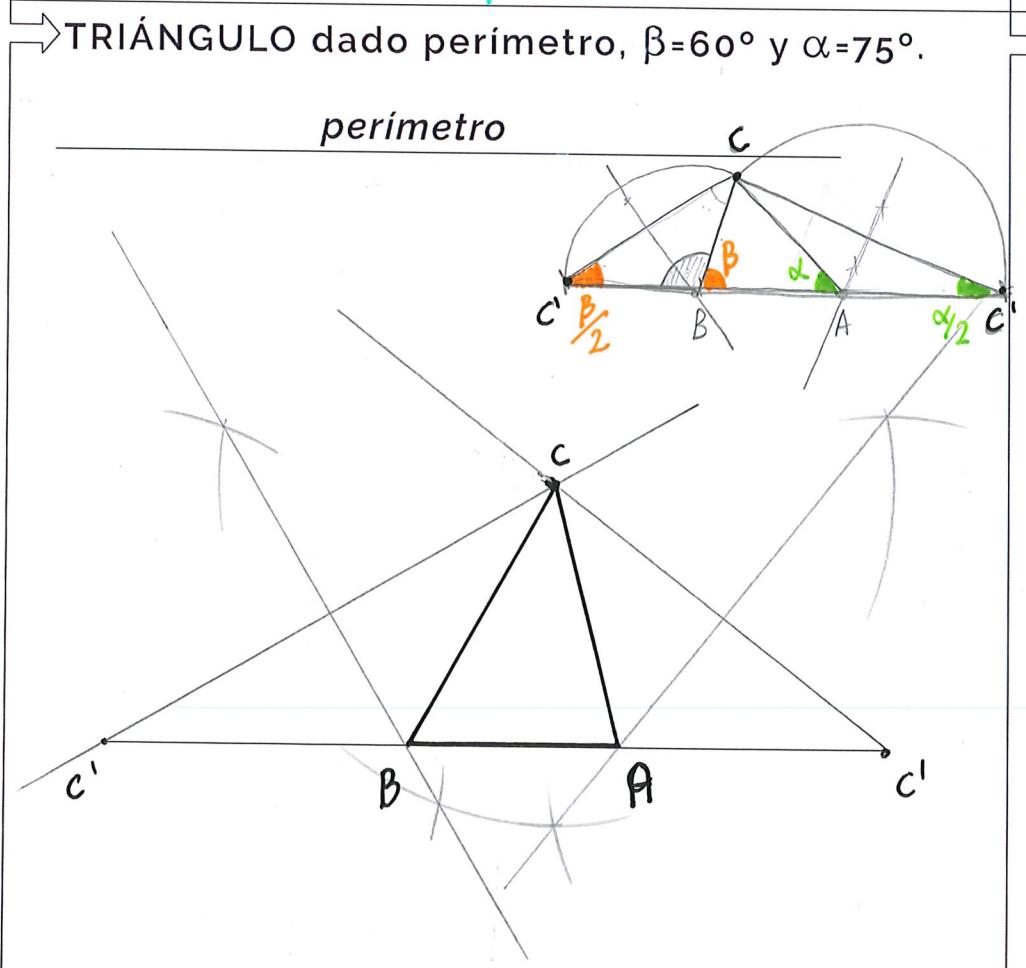
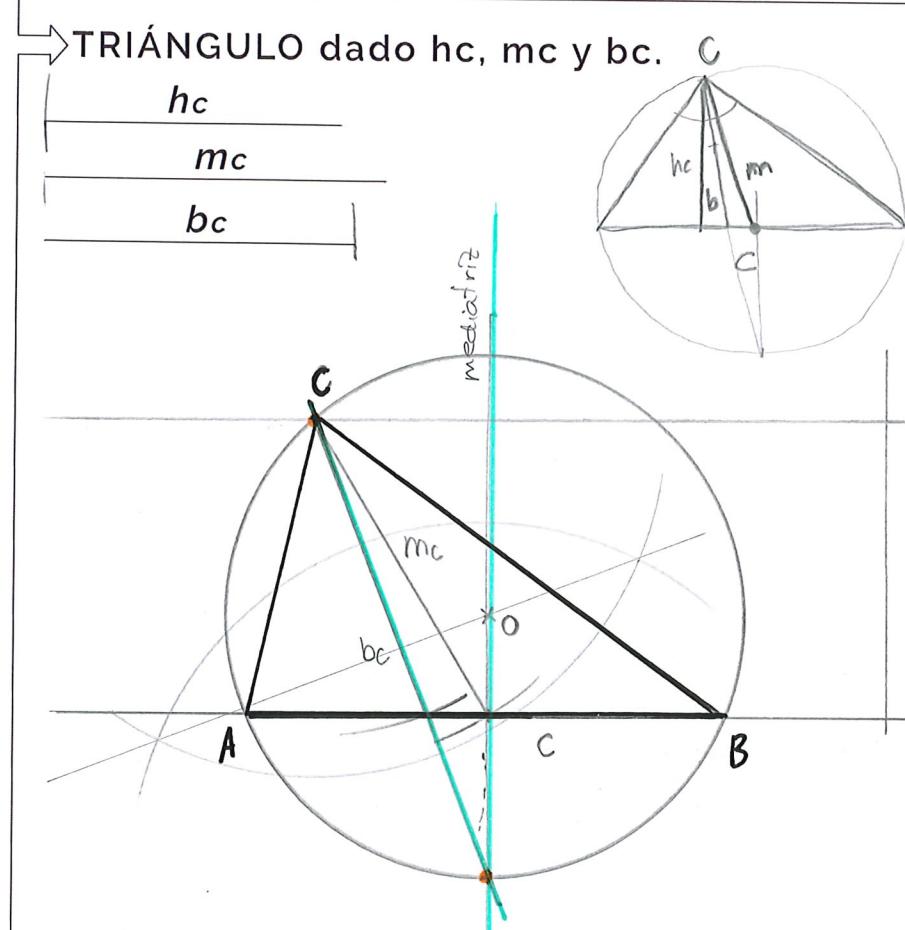
- ALTURAS
- ORTOCENTRO
- TRIÁNGULO ÓRTICO
- CIRCUNFERENCIA DE EULER



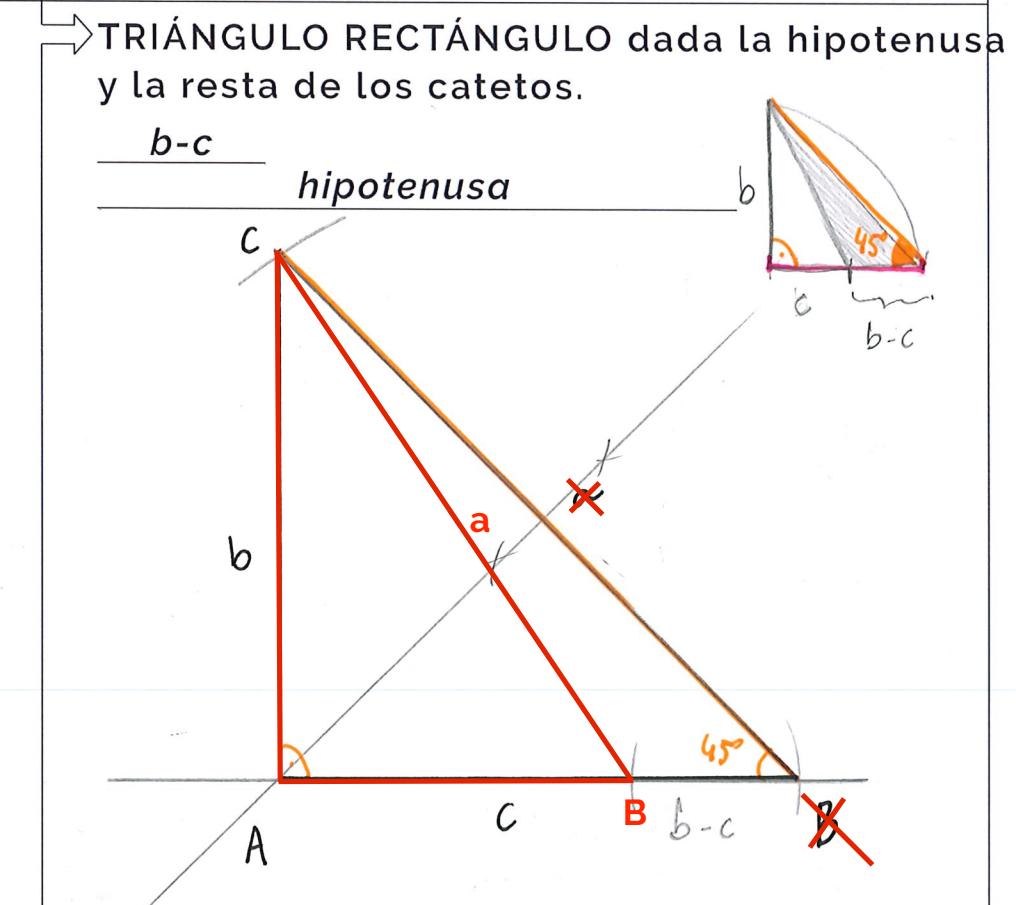
MAMB  
BOCI

# #B1 TRAZADOS FUNDAMENTALES. POLÍGONOS.

## #B1.8 CONSIDERACIONES GEOMÉTRICAS EN TRIÁNGULOS. EJERCICIOS



La mediana sobre la hipotenusa es igual al radio de la circunf. circunscrita



# #B1. TRAZADOS FUNDAMENTALES. POLÍGONOS.

## #B1.9 CUADRILÁTEROS

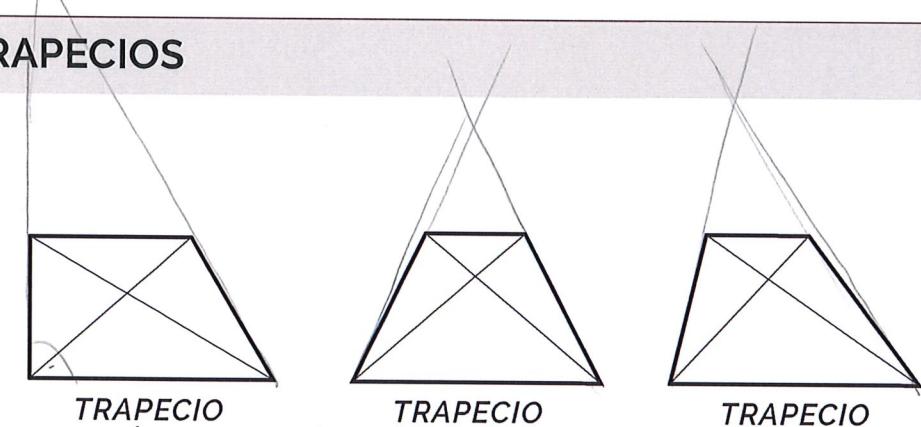
### CUADRILÁTEROS



convexo  
cónvaco

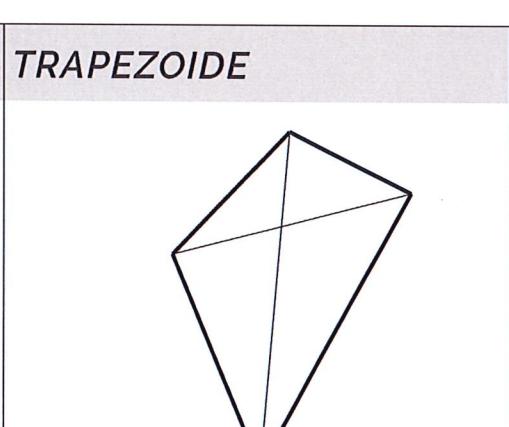
### CLASIFICACIÓN DE CUADRILÁTEROS

#### TRAPECIOS

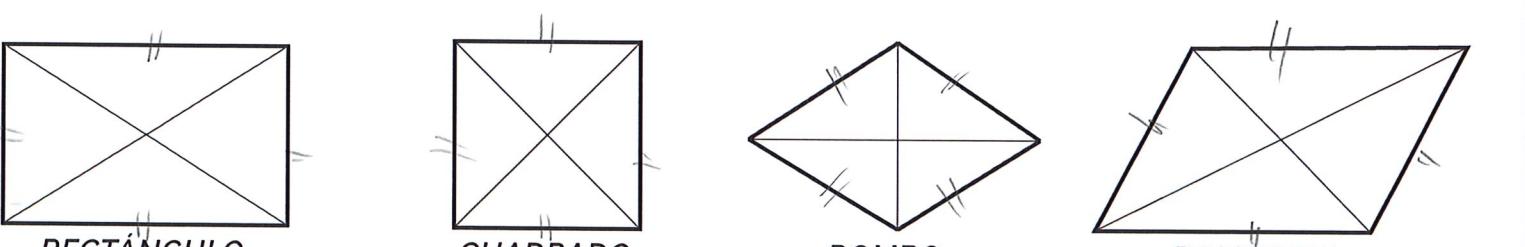


TRAPEZIO RECTÁNGULO  
TRAPEZIO ISÓSCLES (inscriptible)  
TRAPEZIO ESCALENO

#### TRAPEZOIDE

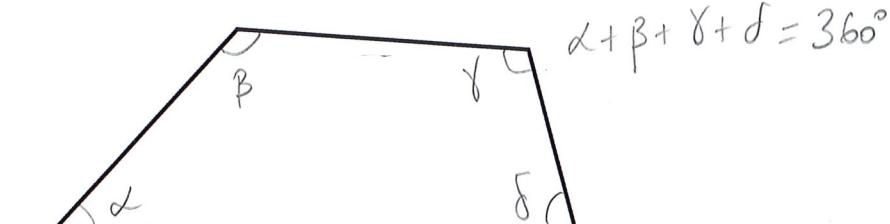


### CUADRILÁTEROS



RECTÁNGULO  
CUADRADO  
ROMBO  
ROMBOIDE

### CONSIDERACIONES GEOMÉTRICAS



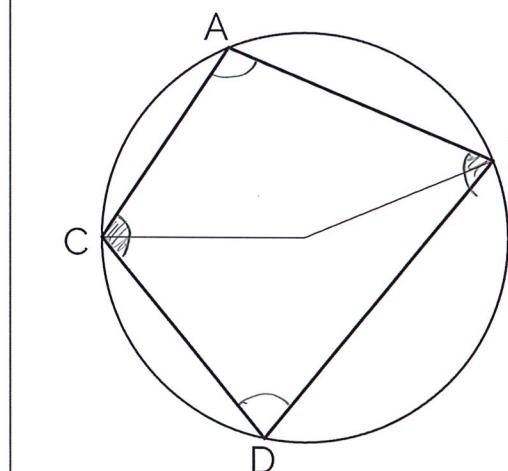
$$\alpha + \beta + \gamma + \delta = 360^\circ$$

La suma de sus ángulos es de  $360^\circ$

#### CUADRILÁTERO INSCRITO

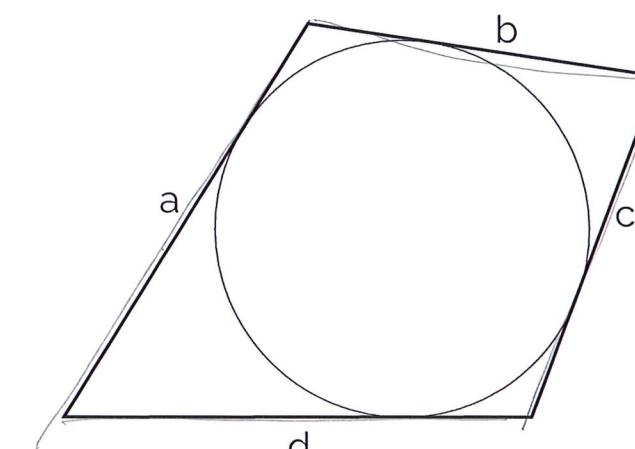
La suma de sus ángulos opuestos es de  $180^\circ$

$$A^\circ + D^\circ = 180^\circ$$

$$B^\circ + C^\circ = 180^\circ$$


#### CUADRILÁTERO CIRCUNSCRITO

Igualdad en la suma de lados opuestos

$$a + c = b + d$$


Enunciado :  $\begin{cases} 2 \text{ bases} \\ 2 \text{ lados} \end{cases}$

(B-B)

lado

B-B

Enunciado :  $\begin{cases} 2 \text{ bases} \\ 2 \text{ diagonales.} \end{cases}$

(B+B)

diagonal

B

B+B

## ESCALAS

### ESCALAS

Cuando necesitamos reducir o ampliar las dimensiones de un objeto para poder dibujarlo en un espacio determinado, utilizamos o bien escalas de reducción o ampliación.

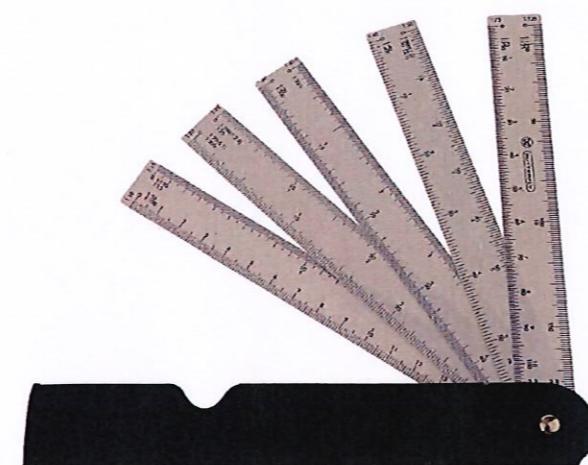
**La escala es la relación entre la magnitud del dibujo y la magnitud real.**

$$\text{escala} = \frac{\text{dibujo}}{\text{realidad}} \quad e = \frac{d}{r}$$

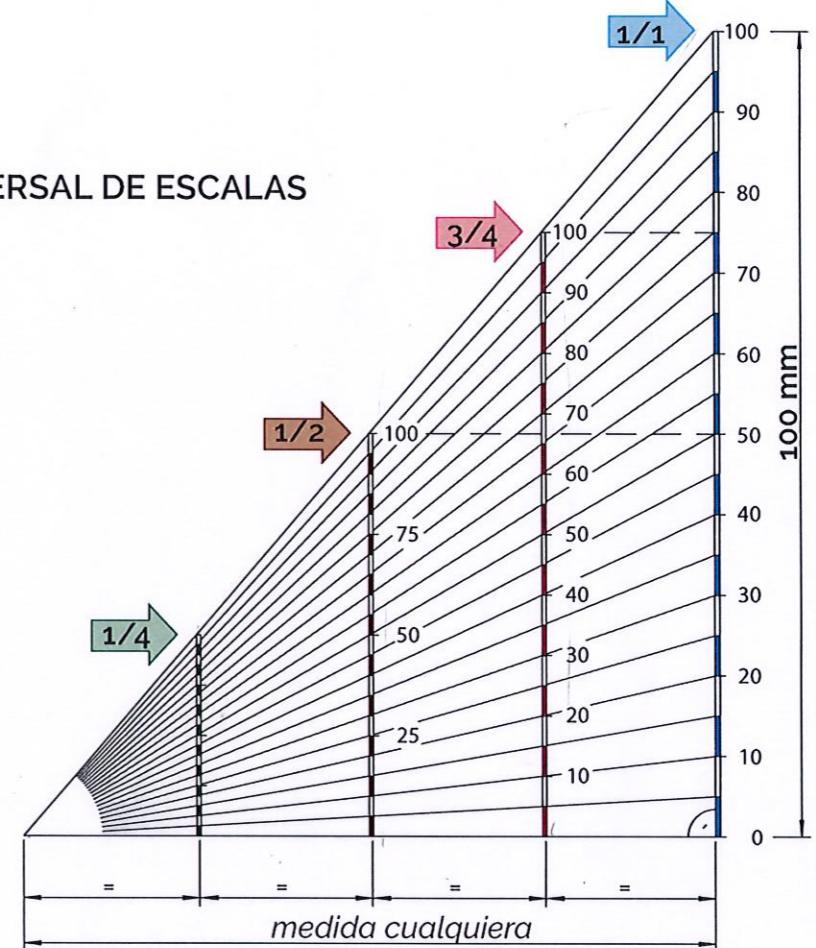
Puede venir expresada en forma de fracción, decimal o porcentaje.

### ESCALAS GRÁFICAS

#### ESCALAS VOLANTES



#### TRIÁNGULO UNIVERSAL DE ESCALAS



### TIPOS DE ESCALAS

- Escala de ampliación  $e=2/1$   $e=5/2$
- Escala natural  $e=1/1$
- Escala de reducción  $e=1/2$   $e=2/5$

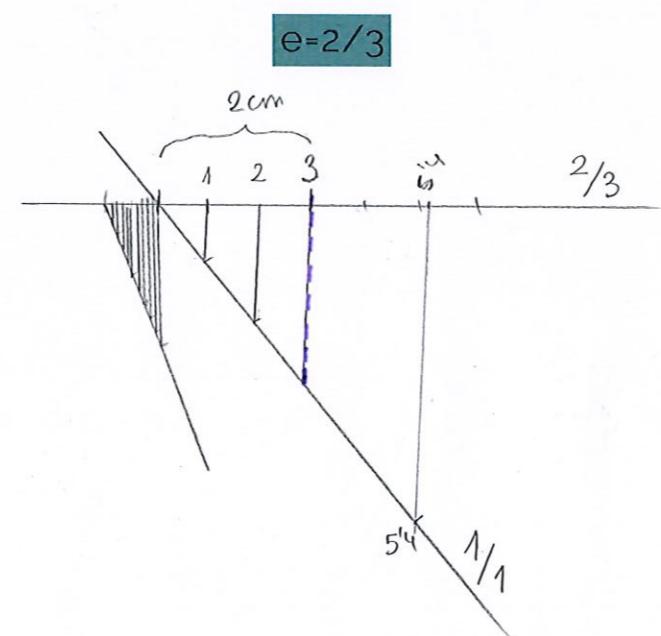
### ESCALA INTERMEDIA

Cuando tenemos un dibujo a una escala determinada (escala dibujo) y tenemos que reproducirlo a otra escala diferente (escala final), tendremos que obtener la escala resultante (escala intermedia).

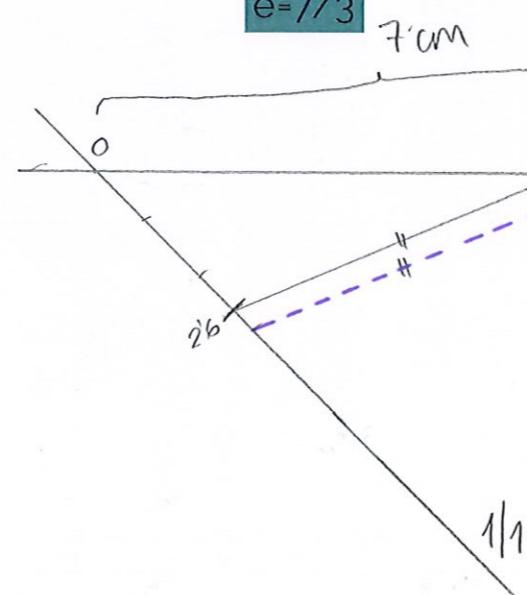
$$\text{escala intermedia} = \frac{\text{escala final}}{\text{escala dibujo}}$$

Este apartado lo practicaremos en la unidad de Sistema axonométrico y en la de Normalización.

#### ESCALA GRÁFICA



$$e=7/3$$



$$e=1/50$$

