2010

FÓRMULAS Y DATOS

Savid Jara Garrido

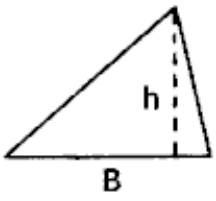
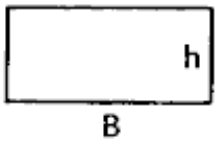
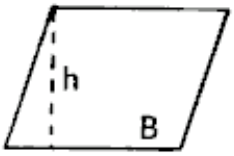
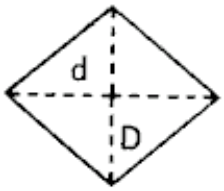
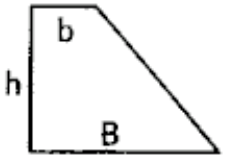
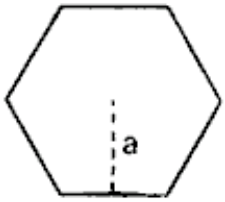
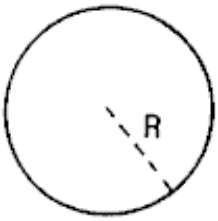
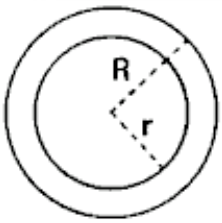
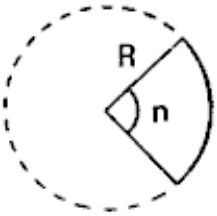
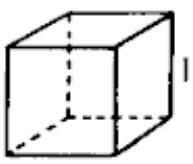
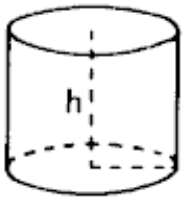
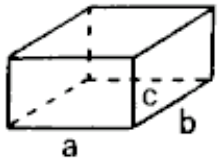
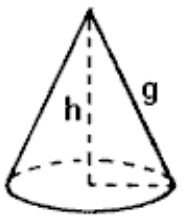
Fabricación y Montaje Industrial

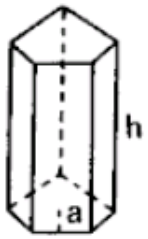
Santiago, Chile

www.savidjara.jimdo.com

www.savidjara.blogspot.com

AREAS Y VOLUMEN

	**Cuadrado** $A = l^2$	**Triángulo** $A = \frac{1}{2} \cdot B \cdot h$	
	**Rectángulo** $A = B \cdot h$	**Romboide** $A = B \cdot h$	
	**Rombo** $A = \frac{1}{2} D \cdot d$	**Trapecio** $A = \frac{B + b}{2} \cdot h$	
	**Polígono regular** $A = \frac{P \cdot a}{2}$	**Círculo** $A = \pi R^2$ $L = 2\pi R$	
	**Corona circular** $A = \pi (R^2 - r^2)$	**Sector circular** $A = \frac{\pi R^2}{360} n$	
	**Cubo** $A = 6\,l^2$ $V = l^3$	**Cilindro** $A = 2\pi R(h + R)$ $V = \pi R^2 \cdot h$	
	**Ortoedro** $A = 2(ab + ac + bc)$ $V = abc$	**Cono** $A = \pi R \cdot (g + R)$ $V = \frac{1}{3} \pi R^2 \cdot h$	



Prisma recto

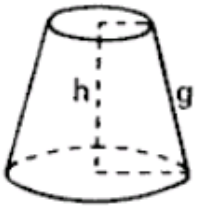
$$A = P(h + a)$$

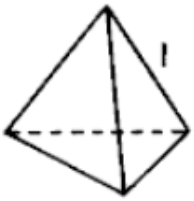
$$V = A_b \cdot h$$

Tronco de cono

$$A = \pi[g(R + r) + R^2 + r^2]$$

$$V = \frac{1}{3}\pi h(R^2 + r^2 + Rr)$$





Tetraedro regular

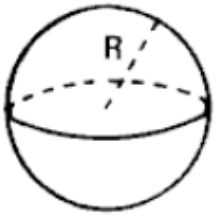
$$A = l^2\sqrt{3}$$

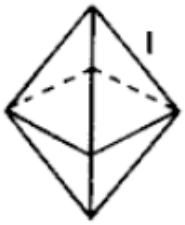
$$V = \frac{l^3 \cdot \sqrt{2}}{12}$$

Esfera

$$A = 4\pi R^2$$

$$V = \frac{4}{3}\pi R^3$$





Octaedro regular

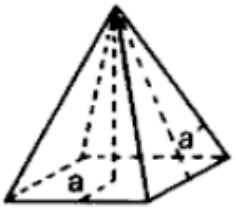
$$A = 2l^2\sqrt{3}$$

$$V = \frac{l^3 \cdot \sqrt{2}}{3}$$

Huso - Cuña esférica

$$A = \frac{4\pi R^2}{360} \cdot n$$

$$V = \frac{4}{3} \cdot \frac{\pi R^3}{360} \cdot n$$



Pirámide recta

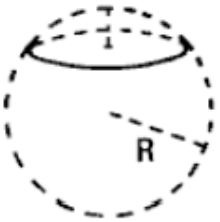
$$A = \frac{1}{2}P \cdot (a + a')$$

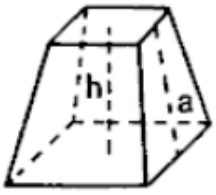
$$V = \frac{1}{3}A_b \cdot h$$

Casquete esférico

$$A = 2\pi R \cdot h$$

$$V = \frac{1}{3}\pi h^2 \cdot (3R - h)$$





Tronco de pirámide

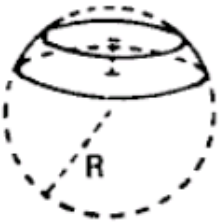
$$A = \frac{1}{2}(P + P') \cdot a + A_b + A_b'$$

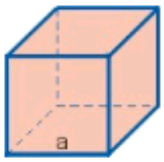
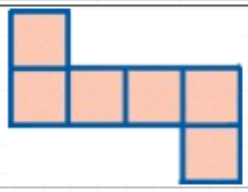
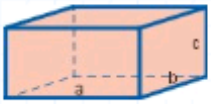
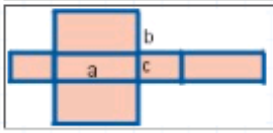
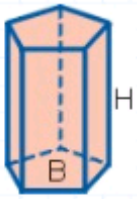
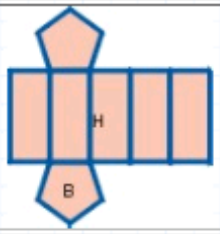
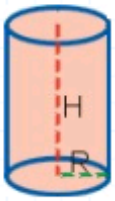
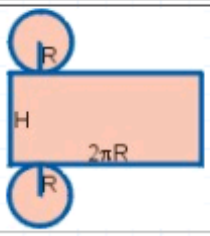
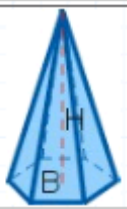
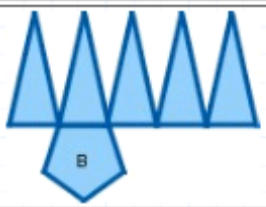
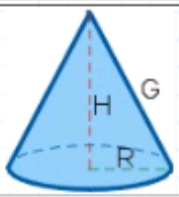
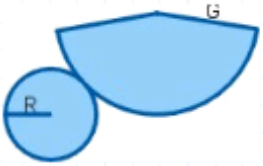
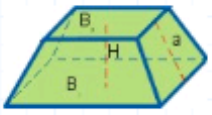
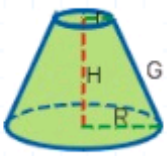
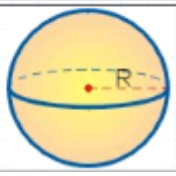
$$V = \frac{1}{3}h(A_b + A_b' + \sqrt{A_b A_b'})$$

Zona esférica

$$A = 2\pi R \cdot h$$

$$V = \frac{\pi h}{6}(h^2 + 3r^2 + 3r'^2)$$



Nombre	Dibujo	Desarrollo	Área	Volumen
Cubo o Hexaedro			$A = 6a^2$	$V = 6a^3$
Paralelepípedo u ortoedro			$A = 2(ab+ac+bc)$	$V = abc$
Prisma			$A_T = 2A_B + A_L$	$V = A_B H$
Cilindro			$A_T = 2A_B + A_L$ $A_B = \pi R^2$ $A_L = 2\pi RH$	
Pirámide			$A_T = A_B + A_L$	$V = \frac{1}{3} A_B H$
Cono			$A_T = A_B + A_L$ $A_B = \pi R^2$ $A_L = \pi RG$	
Tronco de pirámide			$A_T = A_{B1} + A_{B2} + A_L$	$V = \frac{1}{3}(A_{B1} + A_{B2} + \sqrt{A_{B1} \cdot A_{B2}} \cdot H)$
Tronco de cono			$A_T = A_{B1} + A_{B2} + A_L$ $A_{B1} = \pi R^2$ $A_{B2} = \pi r^2$ $A_L = \pi(R + r)G$	
esfera			$A = 4\pi R^2$	$V = \frac{4}{3}\pi R^3$

Circunferencia

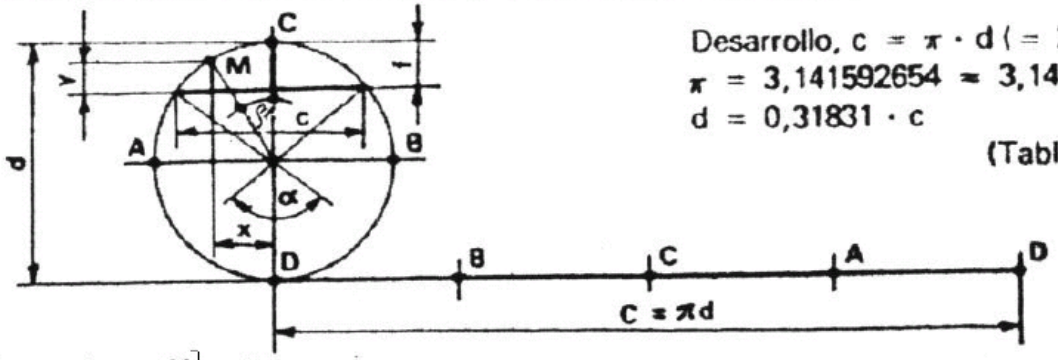
$$f = r + y - \sqrt{r^2 - x^2}\ ;$$

$$f = r\left(1 - \cos\frac{\alpha}{2}\right).$$

$$x = \sqrt{r^2 - (r + y - f)^2}\ ;$$

$$x = r \operatorname{sen} \beta$$

$$y = \sqrt{r^2 - x^2} + f - r\ ;\ y = \left[f - r(\cos \beta)\right] \times -1$$



Desarrollo, $c = \pi \cdot d\ (= 2 \cdot \pi \cdot r)$

$\pi = 3{,}141592654 \approx 3{,}1416$

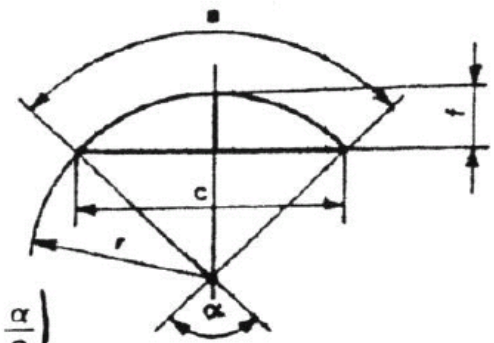
$d = 0{,}31831 \cdot c$

(Tablas 7 · 1)

$$r = \frac{c^2}{8f} + \frac{f}{2}\ ;\ r = \frac{c}{2} : \operatorname{sen}\frac{\alpha}{2}$$

$$c = \sqrt{8f\left(r - \frac{f}{2}\right)}\ ;\ c = 2r \operatorname{sen}\frac{\alpha}{2}$$

$$f = r - \sqrt{r^2 - \left(\frac{c}{2}\right)^2}\ ;\ f = r\left(1 - \cos\frac{\alpha}{2}\right)$$



$$\operatorname{sen}\frac{\alpha}{2} = \frac{c}{2r} \qquad \alpha = 2 \times \left[\text{SEN}^{-1}\left(\frac{c}{2r}\right)\right]$$

$$a = \frac{\pi \cdot r \cdot \alpha^\circ}{180} = 0{,}017453 \cdot r \cdot \alpha^\circ$$

(Tablas $8_1 \cdot 1$ y $8_2 \cdot 1$)

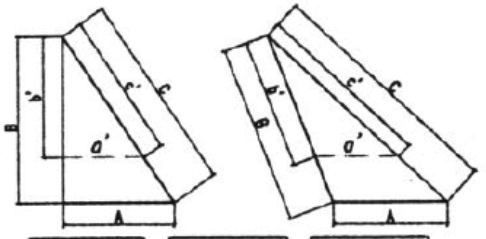
Arco de circunferencia

Savid Jara G.

- r = RADIO
- a = PERÍMETRO DEL ARCO
- f = FLECHA
- α = ÁNGULO DEL CENTRO
- c = CUERDA
- d = DIÁMETRO
- x = DESPLAZAMIENTO HORIZONTAL DE UN PUNTO CONTENIDO EN EL ARCO
- Y = DESPLAZAMIENTO VERTICAL DE UN PUNTO CONTENIDO EN EL ARCO
- β = ÁNGULO SUSTENTADO POR UN PUNTO CUALQUIERA, CONTENIDO EN EL ARCO

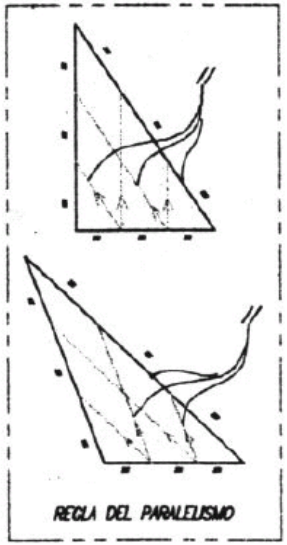
FÓRMULAS PARA CÁLCULO DE ESTRUCTURAS

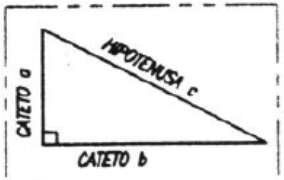
RELACIÓN DE LOS LADOS DE UN TRIÁNGULO



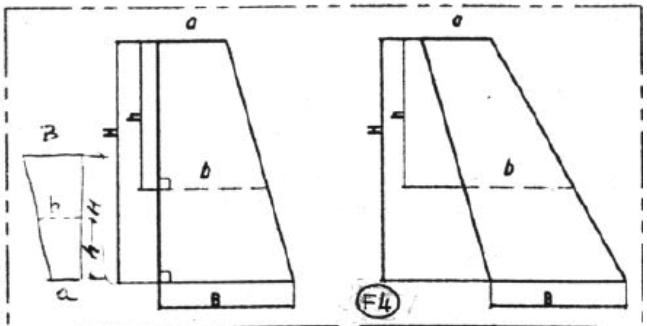
$$\frac{A}{B} = \frac{a'}{b'} \qquad \frac{A}{C} = \frac{a'}{c'} \qquad \frac{B}{C} = \frac{b'}{c'}$$

(F1) $$a' = \frac{A}{B} \times b'$$



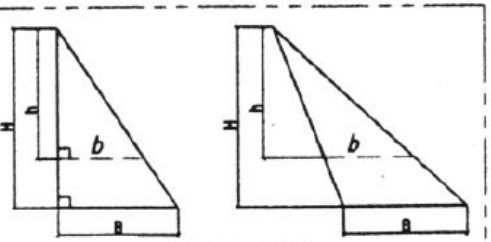


$$c = \sqrt{a^2 + b^2} \qquad a = \sqrt{c^2 - b^2} \qquad b = \sqrt{c^2 - a^2}$$

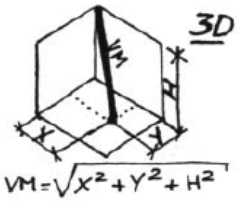


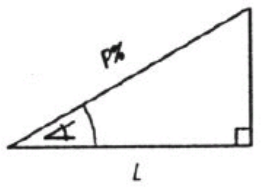
(F3) $$b = \left[\frac{(B - a)}{H} \times h\right] + a$$

(F4) $$h = \frac{(b - a)}{(B - a)} \times H$$



(F2) $$b = \frac{B}{H} \times h$$





(F5) $$P\% = TG\ \alpha \times 100$$

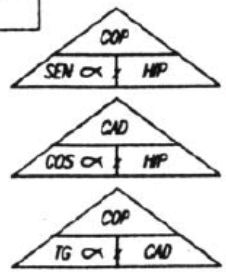
(F6) $$\alpha = TG^{-1}\left(\frac{P\%}{100}\right)$$

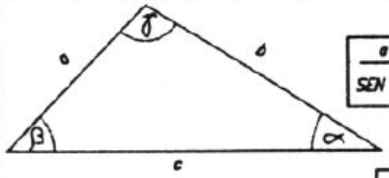
(F7) $$P\% = \frac{H}{L} \times 100$$

(F8) $$H = \frac{P\%}{100} \times L$$

(F9) $$L = \frac{H}{P\%} \times 100$$

$$SEN\ \alpha = \frac{COP}{HIP} \qquad COS\ \alpha = \frac{CAD}{HIP} \qquad TG\ \alpha = \frac{COP}{CAD}$$





$$\frac{a}{SEN\ \alpha} = \frac{b}{SEN\ \beta} = \frac{c}{SEN\ \gamma}$$

TEOREMA DEL SENO

(F10) $$a = \frac{b}{SEN\ \beta} \times SEN\ \alpha$$

(F11) $$a^2 = b^2 + c^2 - 2\,b\,c \times COS\ \alpha$$

TEOREMA DEL COSENO

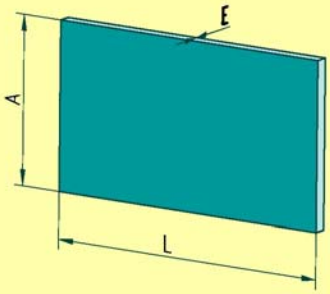
(F12) $$\alpha = COS^{-1}\left[\frac{b^2 + c^2 - a^2}{2\,b\,c}\right]$$

CUBICACION DE PIEZAS DE ACERO

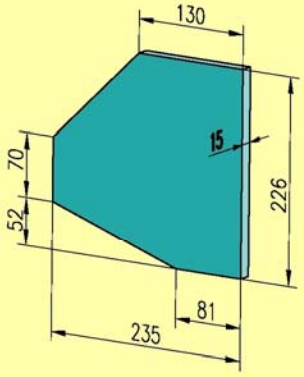
SAVID JARA G. 2009
www.savidjara.jimdo.com
89689765

$$\text{PESO PLANCHA (Kg)} = \frac{\text{ÁREA (mm2)} \times \text{E (mm)} \times 7{,}85\ \text{Kg/dm3}}{1000000}$$

PESO ESPECIFICO DEL ACERO = 7,85 Kg/dm^3



$$\text{PESO PLANCHA (Kg)} = \frac{A \times L \times E \times 7{,}85\ \text{Kg/dm3}}{1000000}$$



PESO NETO= PESO REAL DE LA PIEZA DESCONTANDO LOS CORTES
(SE USA PARA CONTRATAR EL SERVICIO DE CONFORMADO)

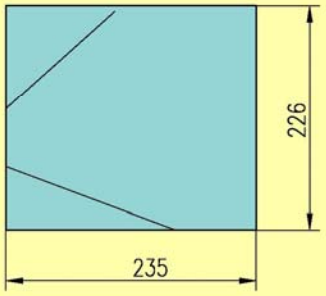
PESO BRUTO= PESO DEL RECTANGULO QUE CONTIENE A LA FIGURA REAL
(SE USA EN PLANOS DE FABRICACIÓN Y MONTAJE)

DETERMINE :

(1) PESO BRUTO DE LA PIEZA MOSTRADA

$$\text{PESO} = \frac{235 \times 226 \times 15 \times 7{,}85}{1000000}$$

PESO = 6,25 Kg



(1) PESO NETO DE LA PIEZA MOSTRADA

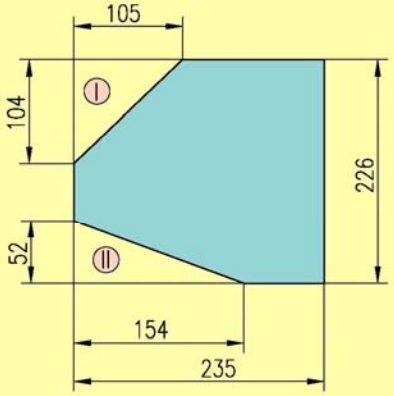
$$A\square - A\triangle\,\text{(I)} - A\triangle\,\text{(II)}$$

$$\text{AREA TOTAL} = (226 \times 235) - \frac{(105 \times 104)}{2} - \frac{(154 \times 52)}{2}$$

AREA TOTAL= 43646 mm^2

$$\text{PESO} = \frac{43646 \times 15 \times 7{,}85}{1000000}$$

PESO = 5,14 Kg



PESO ESPECIFICO DE MATERIALES DE CONSTRUCCIÓN		
Material	Peso específico aparente	
	Kg/dm3	
A. Rocas		
Arenisca	2,6	
Arenisca porosa y caliza porosa	2,4	
Basalto, diorita	3	
Calizas compactas y mármoles	2,8	
Granito, sienita, diabosa, pórfido	3,8	
Gneis	3	
Pizarra de tejados	2,8	
B. Piedras artificiales		
Adobe	1,6	
Amiantocemento	2	
Baldosa cerámica	1,8	
Baldosa de gres	1,9	
Baldosa hidráulica	2,1	
Hormigón ordinario	2,2	
Ladrillo cerámico macizo (0 a 10% de huecos)	1,8	
Ladrillo cerámico perforado (20 a 30% de huecos)	1,4	
Ladrillo cerámico hueca (40 a 50% de huecos)	1	
Ladrillo de escorias	1,4	
Ladrillo silicocalcáreo	1,9	
C. Maderas		
Maderas resinosas:	0	
Pino, pinabete, abeto	0,6	
Pino tea, pino melis	0,8	
Maderas frondosas:		
Castaño, roble, nogal	0,8	
D. Metales		
Acero	7,85	
Aluminio	2,7	
Bronce	8,5	
Cobre	8,9	
Estaño	7,4	
Latón	8,5	
Plomo	11,4	
Zinc	7,2	
E. Materiales diversos		
Alquitran	1,2	
Asfalto	1,3	
Caucho en plancha	1,7	
Linoleo en plancha	1,2	
Papel	1,1	
Plástico en plancha	2,1	
Vidrio plano	2,6	

TABLAS DE EQUIVALENCIAS VARIAS:

EQUIVALENCIAS DE ÁREA O SUPERFICIE						
UNIDADES	(m^2)	Área (a)	Hectárea (ha)	Acre (ac)	1/4 Acre (rood)	Yarda cuadrada (Yd^2)
m^2	1	0,01	0,0001	0,000247	-	1,19599
Área	100	1	0,01	0,0247	0,09884	119,599
Hectárea	10000	100	1	2,471	9,88422	11959,9
Acre	4046,86	40,47	0,4047	1	4	4840
1/4 acre	1011,71	10,12	0,1012	-0,25	1	1210
$Yarda^2$	0,836127	83,61	-	-	-	1

EQUIVALENCIAS DE LONGITUD						
UNIDADES	milímetro (mm)	centímetro (cm)	metros (mts)	Pulgada (in ó ")	Pie (ft ó ')	Yarda (yd)
Milímetro	1	0,1	0,001	0,0394	0,0033	0,0011
Centímetro	10	1	0,01	0,3937	0,0328	0,0109
Metro	1000	100	1	39,3701	3,2809	1,0936
Pulgada	25,4	2,54	0,0254	1	0,0833	0,0278
Pie	304,8	30,48	0,3048	12	1	0,3333
Yarda	914,4	91,44	0,9144	36	3	1