Coimisiún na Scrúduithe Stáit
State Examinations Commission

foirmlí agus táblaí

faofa lena n-úsáid sna scrúduithe stáit

formulae and tables

approved for use in the state examinations

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faofa lena n-úsáid sna scrúduithe stáit

Tá an leabhrán seo ar fáil ó dhíoltóirí leabhar nó díreach ón

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Clár / Contents

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Clár / Contents

Tabhair faoi deara nach gceadaítear do chóip féin den leabhrán seo a úsáid sna scrúduithe stáit.

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Clár / Contents

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Clár — Contents

Clár / Contents

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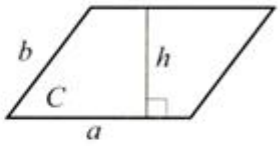
Clár / Contents

Clár / Contents

Seasann A iontu seo a leanas d'achar na fíorach atá i gceist.

In the following, A represents the area of the shape in question.

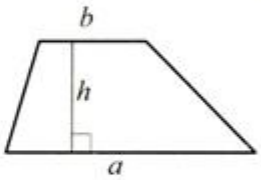
Comhthreomharán



$A = ah$
$= ab\sin C$

Parallelogram

Traipéisiam

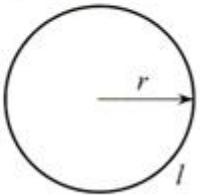


$A = \left(\frac{a+b}{2}\right)h$

Trapezium

Ciorcal / Dioscа

fad l
(imlíne l)



$l = 2\pi r$
$A = \pi r^2$

Circle / Disc

length l
(circumference l)

Clár / Contents

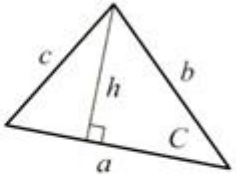
Stua / Teascóg

Arc / Sector

nuair is ina raidiain atá θ	$l = r\theta$	$A = \frac{1}{2}r^2\theta$	*when* θ *is in radians*
nuair is ina chéimeanna atá θ	$l = 2\pi r\left(\frac{\theta}{360°}\right)$	$A = \pi r^2\left(\frac{\theta}{360°}\right)$	*when* θ *is in degrees*

Triantán

áit a bhfuil $s = \frac{a+b+c}{2}$



$$A = \frac{1}{2}ah$$
$$= \frac{1}{2}ab\sin C$$
$$= \sqrt{s(s-a)(s-b)(s-c)}$$

Triangle

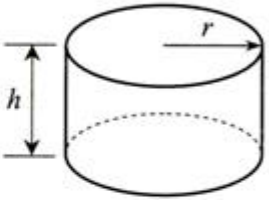
taking $s = \frac{a+b+c}{2}$

Achar dromchla agus toirt — Surface area and volume

Seasann A iontu seo d'achar **cuar** an dromchla agus seasann V do thoirt an tsolaid atá i gceist.

In the following, A represents the **curved** surface area and V represents the volume of the solid in question.

Sorcóir

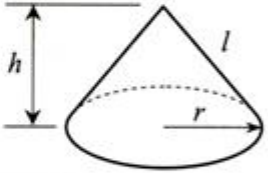


$A = 2\pi rh$

$V = \pi r^2 h$

Cylinder

Cón



$A = \pi rl$

$V = \frac{1}{3}\pi r^2 h$

Cone

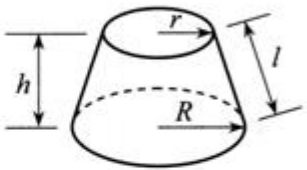
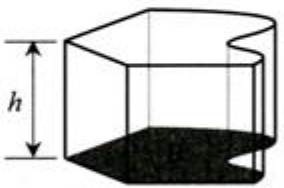
Sféar

$A = 4\pi r^2$

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

Sphere

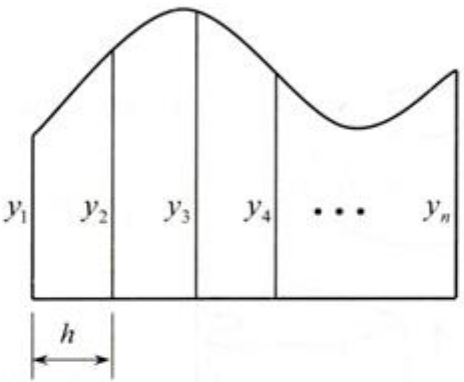
Clár / Contents

Frustam cóin		$A = \pi(r + R)l$ $V = \frac{1}{3}\pi h\left(R^2 + Rr + r^2\right)$	**Frustum of cone**
Solad de thrasghearradh aonfhoirmeach (priosma) áit arb é B achar an bhoinn		$V = Bh$	**Solid of uniform cross-section (prism)** taking B as the area of the base
Pirimid ar bhonn ar bith áit arb é B achar an bhoinn		$V = \frac{1}{3}Bh$	**Pyramid on any base** taking B as the area of the base

Clár / Contents

Meastacháin ar achar — Area approximations

Seasann A d'achar na fíorach. — A represents the area of the shape.



Riail thraipéasóideach

$$A \approx \frac{h}{2}\left[y_1 + y_n + 2(y_2 + y_3 + y_4 + \cdots + y_{n-1})\right]$$

Trapezoidal rule

Riail Simpson
áit ar corruimhir n

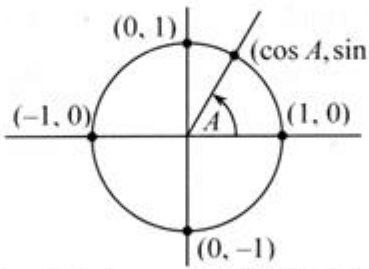
$$A \approx \frac{h}{3}\left[y_1 + y_n + 2(y_3 + y_5 + \cdots + y_{n-2}) + 4(y_2 + y_4 + \cdots + y_{n-1})\right]$$

Simpson's rule
for odd n

Clár / Contents

$$\tan A = \frac{\sin A}{\cos A} \qquad \cot A = \frac{\cos A}{\sin A}$$

$$\sec A = \frac{1}{\cos A} \qquad \operatorname{cosec} A = \frac{1}{\sin A}$$



$$\cos^2 A + \sin^2 A = 1$$
$$\sec^2 A = 1 + \tan^2 A$$

$$\cos(-A) = \cos A$$
$$\sin(-A) = -\sin A$$
$$\tan(-A) = -\tan A$$

Nóta: Bíonn $\tan A$ agus $\sec A$ gan sainiú nuair $\cos A = 0$.
Bíonn $\cot A$ agus $\operatorname{cosec} A$ gan sainiú nuair $\sin A = 0$.

Note: $\tan A$ and $\sec A$ are not defined when $\cos A = 0$.
$\cot A$ and $\operatorname{cosec} A$ are not defined when $\sin A = 0$.

A (céimeanna)	0°	90°	180°	270°	30°	45°	60°	A (degrees)
A (raidiain)	0	$\frac{\pi}{2}$	π	$\frac{3\pi}{2}$	$\frac{\pi}{6}$	$\frac{\pi}{4}$	$\frac{\pi}{3}$	A (radians)
$\cos A$	1	0	−1	0	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	$\cos A$
$\sin A$	0	1	0	−1	$\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{\sqrt{3}}{2}$	$\sin A$
$\tan A$	0	-	0	-	$\frac{1}{\sqrt{3}}$	1	$\sqrt{3}$	$\tan A$

1 rad. ≈ 57.296° 1° ≈ 0.01745 rad.

Clár / Contents

Foirmlí uillinneacha comhshuite **Compound angle formulae**

$$\cos(A+B) = \cos A\cos B - \sin A\sin B \qquad \cos(A-B) = \cos A\cos B + \sin A\sin B$$

$$\sin(A+B) = \sin A\cos B + \cos A\sin B \qquad \sin(A-B) = \sin A\cos B - \cos A\sin B$$

$$\tan(A+B) = \frac{\tan A + \tan B}{1 - \tan A\tan B} \qquad \tan(A-B) = \frac{\tan A - \tan B}{1 + \tan A\tan B}$$

Foirmlí uillinneacha dúbailte **Double angle formulae**

$$\cos 2A = \cos^2 A - \sin^2 A \qquad \tan 2A = \frac{2\tan A}{1 - \tan^2 A}$$

$$\sin 2A = 2\sin A\cos A \qquad \cos 2A = \frac{1 - \tan^2 A}{1 + \tan^2 A}$$

$$\cos^2 A = \tfrac{1}{2}(1 + \cos 2A) \qquad \sin 2A = \frac{2\tan A}{1 + \tan^2 A}$$

$$\sin^2 A = \tfrac{1}{2}(1 - \cos 2A)$$

Iolraigh a thiontú ina suimeanna agus ina ndifríochtaí **Products to sums and differences**

$$2\cos A\cos B = \cos(A+B)+\cos(A-B)$$

$$2\sin A\cos B = \sin(A+B)+\sin(A-B)$$

$$2\sin A\sin B = \cos(A-B)-\cos(A+B)$$

$$2\cos A\sin B = \sin(A+B)-\sin(A-B)$$

Suimeanna agus difríochtaí a thiontú ina n-iolraigh **Sums and differences to products**

$$\cos A+\cos B = 2\cos\frac{A+B}{2}\cos\frac{A-B}{2}$$

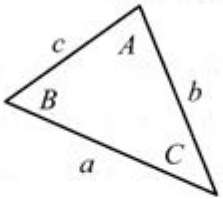
$$\cos A-\cos B = -2\sin\frac{A+B}{2}\sin\frac{A-B}{2}$$

$$\sin A+\sin B = 2\sin\frac{A+B}{2}\cos\frac{A-B}{2}$$

$$\sin A-\sin B = 2\cos\frac{A+B}{2}\sin\frac{A-B}{2}$$

Triantánacht an triantáin

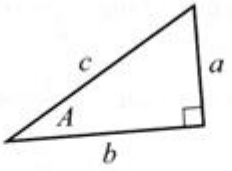
Trigonometry of the triangle



achar	$\frac{1}{2}ab\sin C$	area
riail an tsínis	$\frac{a}{\sin A}=\frac{b}{\sin B}=\frac{c}{\sin C}$	sine rule
riail an chomhshínis	$a^2=b^2+c^2-2bc\cos A$	cosine rule

Triantán dronuilleach

Right-angled triangle



$$\sin A=\frac{a}{c} \qquad \cos A=\frac{b}{c} \qquad \tan A=\frac{a}{b}$$

teoirim Phíotagaráis	$c^2=a^2+b^2$	Pythagoras' theorem

Clár / Contents

Nodaireacht		Notation
líne trí A agus B	AB	line through A and B
mírline ó A go B	$[AB]$	line segment from A to B
fad ó A go B	$\lvert AB\rvert$	distance from A to B
veicteoir ó A go B	$\overrightarrow{AB}$	vector from A to B
veicteoir ón mbunphointe O go A	$\overrightarrow{OA} = \vec{a}$	vector from origin O to A

Oibríochtaí le veicteoirí

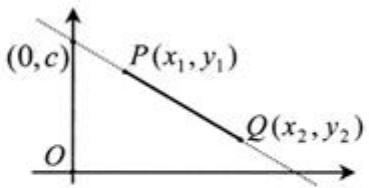
nuair a thugtar na haonadveicteoirí ceartingearacha $\vec{i}$ agus $\vec{j}$ agus $\vec{v}_1 = x_1\vec{i} + y_1\vec{j}$ agus $\vec{v}_2 = x_2\vec{i} + y_2\vec{j}$

Vector operations

given perpendicular unit vectors $\vec{i}$ and $\vec{j}$ and $\vec{v}_1 = x_1\vec{i} + y_1\vec{j}$ and $\vec{v}_2 = x_2\vec{i} + y_2\vec{j}$

norm	$\lvert\vec{v}_1\rvert = \sqrt{x_1^{\,2} + y_1^{\,2}}$	norm
iolrach scálach	$\vec{v}_1 \cdot \vec{v}_2 = x_1x_2 + y_1y_2$ $= \lvert\vec{v}_1\rvert\,\lvert\vec{v}_2\rvert\cos\theta$	scalar product

Clár / Contents

Líne		Line
		
fána PQ	$m = \frac{y_2 - y_1}{x_2 - x_1}$	slope of PQ
fad $[PQ]$	$\lvert PQ\rvert = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$	length of $[PQ]$
lárphointe $[PQ]$	$\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$	midpoint of $[PQ]$
cothromóid PQ	$y - y_1 = m(x - x_1)$ $y = mx + c$	equation of PQ
achar an triantáin OPQ	$\frac{1}{2}\lvert x_1 y_2 - x_2 y_1\rvert$	area of triangle OPQ
pointe a roinneann $[PQ]$ sa chóimheas $a : b$	$\left(\frac{bx_1 + ax_2}{b + a}, \frac{by_1 + ay_2}{b + a}\right)$	point dividing $[PQ]$ in the ratio $a : b$

Clár / Contents

an fad ó (x_1, y_1) go dtí an líne $ax + by + c = 0$	$\dfrac{\lvert ax_1 + by_1 + c\rvert}{\sqrt{a^2 + b^2}}$	distance from (x_1, y_1) to the line $ax + by + c = 0$
uillinneacha idir dhá líne dar fánaí m_1 agus m_2	$\tan\theta = \pm\dfrac{m_1 - m_2}{1 + m_1 m_2}$	angles between two lines of slopes m_1 and m_2

Ciorcal		**Circle**
nuair a thugtar an lárphointe (h,k) agus an ga r		given centre (h,k) and radius r
cothromóid	$(x-h)^2 + (y-k)^2 = r^2$	equation
tadhlaí ag (x_1, y_1)	$(x-h)(x_1-h) + (y-k)(y_1-k) = r^2$	tangent at (x_1, y_1)
nuair a thugtar an chothromóid $x^2 + y^2 + 2gx + 2fy + c = 0$		given equation $x^2 + y^2 + 2gx + 2fy + c = 0$
lárphointe	$(-g,-f)$	centre
ga	$\sqrt{g^2 + f^2 - c}$	radius
tadhlaí ag (x_1, y_1)	$xx_1 + yy_1 + g(x + x_1) + f(y + y_1) + c = 0$	tangent at (x_1, y_1)

Clár / Contents

fréamhacha na cothromóide cearnaí $ax^2+bx+c=0$

$$x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$$

roots of the quadratic equation $ax^2+bx+c=0$

---

inbhéarta na maitríse $A=\begin{pmatrix} a & b \\ c & d \end{pmatrix}$ leis an deitéarmanant $\det(A)=ad-bc\neq 0$

$$\frac{1}{\det(A)}\begin{pmatrix} d & -b \\ -c & a \end{pmatrix}$$

inverse of the matrix $A=\begin{pmatrix} a & b \\ c & d \end{pmatrix}$ with determinant $\det(A)=ad-bc\neq 0$

Teoirim de Moivre

De Moivre's theorem

$$\left[r(\cos\theta+i\sin\theta)\right]^n=r^n(\cos n\theta+i\sin n\theta)=r^n e^{in\theta}$$

An Teoirim dhéthéarmach

Binomial theorem

$$(x+y)^n=\sum_{r=0}^{n}\binom{n}{r}x^{n-r}y^r=\binom{n}{0}x^n+\binom{n}{1}x^{n-1}y+\binom{n}{2}x^{n-2}y^2+\cdots+\binom{n}{r}x^{n-r}y^r+\cdots+\binom{n}{n}y^n$$

comhéifeachtaí déthéarmacha

$$\binom{n}{r}={}^nC_r=C(n,r)=\frac{n!}{r!(n-r)!}$$

binomial coefficients

Clár / Contents

$a^p a^q = a^{p+q}$

$\frac{a^p}{a^q} = a^{p-q}$

$(a^p)^q = a^{pq}$

$a^0 = 1$

$a^{-p} = \frac{1}{a^p}$

$a^{\frac{1}{q}} = \sqrt[q]{a}$

$a^{\frac{p}{q}} = \sqrt[q]{a^p} = (\sqrt[q]{a})^p$

$(ab)^p = a^p b^p$

$\left(\frac{a}{b}\right)^p = \frac{a^p}{b^p}$

$\log_a(xy) = \log_a x + \log_a y$

$\log_a\left(\frac{x}{y}\right) = \log_a x - \log_a y$

$\log_a(x^q) = q \log_a x$

$\log_a 1 = 0$

$\log_a\left(\frac{1}{x}\right) = -\log_a x$

$a^x = y \Leftrightarrow \log_a y = x$

$\log_a(a^x) = x$

$a^{\log_a x} = x$

$\log_b x = \frac{\log_a x}{\log_a b}$

Is é T_n an nú téarma iontu seo, agus is é S_n suim na chéad n téarma.

In the following, T_n is the n^{th} term, and S_n is the sum of the first n terms.

Seicheamh comhbhreise nó sraith chomhbhreise

Arithmetic sequence or series

nuair:
is é a an chéad téarma, agus
is é d an chomhbhreis

$$T_n = a + (n-1)d$$

$$S_n = \frac{n}{2}[2a + (n-1)d]$$

where:
a is the first term
d is the common difference

Seicheamh iolraíoch nó sraith iolraíoch

Geometric sequence or series

$$T_n = ar^{n-1}$$

nuair:
is é a an chéad téarma, agus
is é r an comhiolraitheoir

$$S_n = \frac{a(1-r^n)}{1-r}$$

where:
a is the first term
r is the common ratio

nuair a thugtar $|r| < 1$

$$S_\infty = \frac{a}{1-r}$$

given $|r| < 1$

Clár / Contents

Siombailí na dtacar		Set symbols
idirmhír	$\cap$	intersection
aontas	$\cup$	union
difríocht (lúide)	$\setminus$	difference (less)
difríocht shiméadrach	Δ	symmetric difference
fothacar de	$\subset$	is a subset of
ball de	$\in$	is an element of
tacar nialasach	$\varnothing$	null set

Tacair uimhreacha		Number sets
uimhreacha aiceanta	$\mathbb{N} = \{1, 2, 3, 4, 5, 6, \cdots\}$	natural numbers
slánuimhreacha	$\mathbb{Z} = \{\cdots -3, -2, -1, 0, 1, 2, 3, \cdots\}$	integers
uimhreacha cóimheasta	$\mathbb{Q} = \left\{ \frac{p}{q} \middle\| p \in \mathbb{Z}, \quad q \in \mathbb{Z}, \quad q \neq 0 \right\}$	rational numbers
réaduimhreacha	$\mathbb{R}$	real numbers
uimhreacha coimpléascacha	$\mathbb{C} = \left\{ a + bi \middle\| a \in \mathbb{R}, \quad b \in \mathbb{R}, \quad i^2 = -1 \right\}$	complex numbers

Clár / Contents

Siombailí loighce		Logic symbols
AND	$\wedge$	AND
OR	$\vee$	OR
NOT	$\neg$	NOT
NAND	$\uparrow$	NAND
NOR	$\downarrow$	NOR
tugann le fios	$\Rightarrow$	implies
coibhéiseach le	$\Leftrightarrow$	is equivalent to
do gach	$\forall$	for all
tá…ann	$\exists$	there exists
a thugann	$\vdash$	yields, (infer)
dá réir sin	$\therefore$	therefore

Dlíthe de Morgan	$\neg(A \wedge B) \Leftrightarrow (\neg A) \vee (\neg B)$ $\neg(A \vee B) \Leftrightarrow (\neg A) \wedge (\neg B)$	**De Morgan's laws**
Séanadh agus cainníochtóirí	$\neg((\forall x)A(x)) \Leftrightarrow (\exists x)(\neg A(x))$ $\neg((\exists x)A(x)) \Leftrightarrow (\forall x)(\neg A(x))$	**Negation and quantifiers**

Clár / Contents

Díorthaigh

Derivatives

$f(x)$	$f'(x)$
x^n	nx^{n-1}
$\ln x$	$\frac{1}{x}$
e^x	e^x
e^{ax}	ae^{ax}
a^x	$a^x \ln a$
$\cos x$	$-\sin x$
$\sin x$	$\cos x$
$\tan x$	$\sec^2 x$
$\cos^{-1}\frac{x}{a}$	$-\frac{1}{\sqrt{a^2-x^2}}$
$\sin^{-1}\frac{x}{a}$	$\frac{1}{\sqrt{a^2-x^2}}$
$\tan^{-1}\frac{x}{a}$	$\frac{a}{a^2+x^2}$

Riail an toraidh — **Product rule**

$$y = uv$$

$$\Rightarrow \frac{dy}{dx} = u\frac{dv}{dx} + v\frac{du}{dx}$$

Riail an lín — **Quotient rule**

$$y = \frac{u}{v}$$

$$\Rightarrow \frac{dy}{dx} = \frac{v\frac{du}{dx} - u\frac{dv}{dx}}{v^2}$$

Cuingriail — **Chain rule**

$$f(x) = u(v(x))$$

$$\Rightarrow f'(x) = \frac{du}{dv}\frac{dv}{dx}$$

Suimeálaithe

Tá tairisigh na suimeála fágtha ar lár.

$f(x)$	$\int f(x)dx$
$x^n \quad (n \neq -1)$	$\frac{x^{n+1}}{n+1}$
$\frac{1}{x}$	$\ln\lvert x\rvert$
e^x	e^x
e^{ax}	$\frac{1}{a}e^{ax}$
a^x	$\frac{a^x}{\ln a}$
$\cos x$	$\sin x$
$\sin x$	$-\cos x$
$\tan x$	$\ln\lvert\sec x\rvert$

Integrals

Constants of integration omitted.

$f(x)$	$\int f(x)dx$
$\cos^2 x$	$\frac{1}{2}\left[x+\frac{1}{2}\sin 2x\right]$
$\sin^2 x$	$\frac{1}{2}\left[x-\frac{1}{2}\sin 2x\right]$
$\frac{1}{\sqrt{a^2-x^2}}$	$\sin^{-1}\frac{x}{a}$
$\frac{1}{x^2+a^2}$	$\frac{1}{a}\tan^{-1}\frac{x}{a}$

$f(x)$	$\int f(x)dx$
$\frac{1}{x\sqrt{x^2-a^2}}$	$\frac{1}{a}\sec^{-1}\frac{x}{a}$
$\frac{1}{\sqrt{x^2+a^2}}$	$\ln\left\lvert\frac{x+\sqrt{x^2+a^2}}{a}\right\rvert$
$\frac{1}{a^2-x^2}$	$\frac{1}{2a}\ln\left\lvert\frac{a+x}{a-x}\right\rvert$
$\frac{1}{\sqrt{x^2-a^2}}$	$\ln\left\lvert\frac{x+\sqrt{x^2-a^2}}{a}\right\rvert$

Suimeáil na míreanna

$$\int udv = uv - \int vdu$$

Integration by parts

Atriall Newton-Raphson	**Newton-Raphson iteration**

$$x_{n+1} = x_n - \frac{f(x_n)}{f'(x_n)}$$

Sraith Taylor agus *a* mar lárphointe — **Taylor series with centre *a***

$$f(a+x) = f(a) + f'(a)x + \frac{f''(a)}{2!}x^2 + \cdots + \frac{f^{(r)}(a)}{r!}x^r + \cdots$$

Sraith Maclaurin — **Maclaurin series**

$$f(x) = f(0) + f'(0)x + \frac{f''(0)}{2!}x^2 + \cdots + \frac{f^{(r)}(0)}{r!}x^r + \cdots$$

Toirt solaid imrothlaithe timpeall ar an *x*-ais — **Volume of solid of revolution about *x*-axis**

$$V = \int_{x=a}^{x=b} \pi y^2 dx$$

Leaisteachas

Iontu seo a leanas,
P = praghas, Q = cainníocht, Y = ioncam,
tagraíonn foscript 1 agus 2 don am
roimh an athrú agus ina dhiaidh,
agus seasann A agus B do na hearraí A agus B.

Elasticity

In the following,
P = price, Q = quantity, Y = income,
subscripts 1 and 2 refer to
before and after change,
A and B refer to goods A and B.

praghasleaisteachas an éilimh	$\frac{\Delta Q}{\Delta P} \times \frac{P_1 + P_2}{Q_1 + Q_2}$	price elasticity of demand
ioncamleaisteachas an éilimh	$\frac{\Delta Q}{\Delta Y} \times \frac{Y_1 + Y_2}{Q_1 + Q_2}$	income elasticity of demand
trasleaisteachas an éilimh	$\frac{\Delta Q_A}{\Delta P_B} \times \frac{P_{1,B} + P_{2,B}}{Q_{1,A} + Q_{2,A}}$	cross price elasticity of demand
praghasleaisteachas an tsoláthair	$\frac{\Delta Q}{\Delta P} \times \frac{P_1 + P_2}{Q_1 + Q_2}$	price elasticity of supply

Cothromóid OTI		**GDP equation**
Y = olltáirgeacht intíre	$Y = C + I + G + (X - M)$	Y = gross domestic product
C = caiteachas ar thomhaltas		C = consumption expenditure
I = caiteachas ar infheistíocht		I = investment expenditure
G = ceannacháin rialtais		G = government purchases
$(X - M)$ = glanluach easpórtálacha		$(X - M)$ = net exports

Iolraitheoirí		**Multipliers**
Iontu seo a leanas,		In the following,
MPC = claonadh imeallach chun tomhaltais		MPC = marginal propensity to consume
MPS = claonadh imeallach chun coigilte		MPS = marginal propensity to save
MPM = claonadh imeallach chun iompórtála		MPM = marginal propensity to import
MPT = claonadh imeallach chun cáin a íoc		MPT = marginal propensity to pay tax
Nóta: $MPS = 1 - MPC$		Note: $MPS = 1 - MPC$
geilleagar iata gan earnáil rialtais	$\frac{1}{MPS}$	closed economy with no government sector
geilleagar oscailte gan earnáil rialtais	$\frac{1}{MPS + MPM}$	open economy with no government sector
geilleagar oscailte le hearnáil rialtais	$\frac{1}{MPS + MPM + MPT}$	open economy with government sector

Iontu seo a leanas, is é t an fad ama ina bhlianta agus is é i an ráta bliantúil úis, dímheasa nó fáis, agus é sloinnte mar dheachúil nó mar chodán (ionas go seasann $i = 0.08$ do ráta 8%, mar shampla)*.

In all of the following, t is the time in years and i is annual rate of interest, depreciation or growth, expressed as a decimal or fraction (so that, for example, $i = 0.08$ represents a rate of 8%)*.

Ús iolraithe
F = luach deiridh, P = príomhshuim

$$F = P(1+i)^t$$

Compound interest
F = final value, P = principal

Luach láithreach
P = luach láithreach, F = luach deiridh

$$P = \frac{F}{(1+i)^t}$$

Present value
P = present value, F = final value

Dímheas
– modh an chomhardaithe laghdaithigh
F = luach déanach, P = luach tosaigh

$$F = P(1-i)^t$$

Depreciation
– reducing balance method
F = later value, P = initial value

Dímheas
– an modh dronlíneach
A = méid an dímheasa bhliantúil
P = luach tosaigh, S = dramhluach
t = saolré eacnamaíoch fhónta

$$A = \frac{P-S}{t}$$

Depreciation
– straight line method
A = annual depreciation amount
P = initial value, S = scrap value
t = useful economic life

*Bíonn feidhm ag na foirmlí sin freisin nuair a bhítear ag athiolrú i gceann eatraimh chothroma seachas blianta. Sa chás sin, déantar t a thomhas sa tréimhse chuí ama, agus is é i an ráta don tréimhse.

*The formulae also apply when compounding at equal intervals other than years. In such cases, t is measured in the relevant periods of time, and i is the period rate.

Clár / Contents

Amúchadh – morgáistí agus iasachtaí
(aisíocaíochtaí cothroma i gceann eatraimh chothroma)
A = méid na haisíocaíochta bliantúla
P = príomhshuim

$$A = P\frac{i(1+i)^t}{(1+i)^t - 1}$$

Amortisation – mortgages and loans
(equal repayments at equal intervals)

A = annual repayment amount
P = principal

Ráta céatadánach bliantúil (RCB) – foirmle reachtúil

Is ionann an RCB agus luach i (agus é sloinnte ina chéatadán) nuair is ionann suim luachanna reatha na n-airleacan uile agus suim luachanna reatha na n-aisíocaíochtaí uile. Is é sin, luach i áit a bhfuil:

Annual percentage rate (APR) – statutory formula

The APR is the value of i (expressed as a percentage) for which the sum of the present values of all advances is equal to the sum of the present values of all repayments. That is, the value of i for which:

$$\sum_{k=1}^{N} \frac{A_k}{(1+i)^{T_k}} = \sum_{j=1}^{n} \frac{R_j}{(1+i)^{t_j}}$$

nuair:
is é N líon na n-airleacan
is é n líon na n-aisíocaíochtaí
is é A_k méid an airleacain k
is é R_j méid na haisíocaíochta j
is é T_k an fad ama ina bhlianta go dtí airleacan k
is é t_j an fad ama ina bhlianta go dtí aisíocaíocht j

where:
N is the number of advances
n is the number of repayments
A_k is the amount of advance k
R_j is the amount of repayment j
T_k is the time in years to advance k
t_j is the time in years to repayment j

Tréimhse eile iolraithe a thiontú ina ráta bliantúil

Converting to annual rate from other compounding period

$$i = \left(1 + \frac{r}{m}\right)^m - 1$$

nuair
is é i an ráta bliantúil iarbhír (mar dheachúil)
is é r an ráta bliantúil ainmniúil (mar dheachúil)
is é m líon na dtréimhsí athiolraithe in aon bhliain amháin

where
i is the actual annual rate (as a decimal)
r is the nominal annual rate (as a decimal)
m is the number of compounding periods in one year

Athiolrú leanúnach

Continuous compounding

$$F = Pe^{rt}$$
$$i = e^r - 1$$
$$r = \log_e(1 + i)$$

nuair
is é F an luach deiridh
is é P an phríomhshuim
is é r an ráta bliantúil ainmniúil
is é i an ráta bliantúil iarbhír

where
F is the final value
P is the principal
r is the nominal annual rate
i is the actual annual rate

Staitisticí agus dóchúlacht

Statistics and probability

Clár / Contents

An Meán		**Mean**
ó liosta de n uimhir	$\mu = \frac{\Sigma x}{n}$	from list of n numbers
ó thábla minicíochta	$\mu = \frac{\Sigma fx}{\Sigma f}$	from frequency table
An Diall caighdeánach		**Standard deviation**
ó liosta de n uimhir	$\sigma = \sqrt{\frac{\Sigma(x-\mu)^2}{n}}$	from list of n numbers
ó thábla minicíochta	$\sigma = \sqrt{\frac{\Sigma f(x-\mu)^2}{\Sigma f}}$	from frequency table
Dáiltí dóchúlachta		**Probability distributions**
an dáileadh déthéarmach	$P(X=r) = \binom{n}{r} p^r q^{n-r}$ $r = 0 \ldots n$	binomial distribution
an meán	$\mu = np$	mean
an diall caighdeánach	$\sigma = \sqrt{npq}$	standard deviation

Clár Staitisticí / Statistics Contents

Clár / Contents

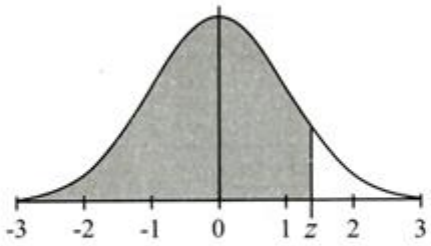
dáileadh Poisson	$P(X=r)=e^{-\lambda}\frac{\lambda^r}{r!}$ $r=0,1,2,\ldots$	Poisson distribution
an meán	$\mu=\lambda$	mean
an diall caighdeánach	$\sigma=\sqrt{\lambda}$	standard deviation
an dáileadh normalach (dáileadh Gauss)	$f(X)=\frac{1}{\sigma\sqrt{2\pi}}e^{-\frac{(X-\mu)^2}{2\sigma^2}}$	normal (Gaussian) distribution
an dáileadh normalach caighdeánach	$f(Z)=\frac{1}{\sqrt{2\pi}}e^{-\frac{1}{2}Z^2}$	standard normal distribution
foirmle an chaighdeánaithe	$z=\frac{x-\mu}{\sigma}$	standardising formula
Sampláil		**Sampling**
measachán ar dhiall caighdeánach an daonra ó sampla	$s=\sqrt{\frac{\Sigma(x-\bar{x})^2}{n-1}}$	estimate of population standard deviation from sample
earráid chaighdeánach an mheáin	$\sigma_{\bar{X}}=\frac{\sigma}{\sqrt{n}}$	standard error of the mean
earráid chaighdeánach na comhréire	$\sigma_{\hat{p}}=\sqrt{\frac{p(1-p)}{n}}$	standard error of the proportion

Tástáil hipitéisí		**Hypothesis testing**
z-thástáil aon sampla	$z = \dfrac{\bar{x} - \mu}{\left(\dfrac{\sigma}{\sqrt{n}}\right)}$	one-sample *z*-test
t-thástáil aon sampla	$t = \dfrac{\bar{x} - \mu}{\left(\dfrac{s}{\sqrt{n}}\right)}$; $\nu = n - 1$	one-sample *t*-test
z-thástáil dhá shampla	$z = \dfrac{\bar{x}_1 - \bar{x}_2}{\sqrt{\dfrac{\sigma_1^2}{n_1} + \dfrac{\sigma_2^2}{n_2}}}$	two-sample *z*-test
t-thástáil dhá shampla (comhthiomsaithe)	$t = \dfrac{\bar{x}_1 - \bar{x}_2}{s\sqrt{\dfrac{1}{n_1} + \dfrac{1}{n_2}}}$; $s^2 = \dfrac{(n_1 - 1)s_1^2 + (n_2 - 1)s_2^2}{n_1 + n_2 - 2}$; $\nu = n_1 + n_2 - 2$	two-sample *t*-test (pooled)
tástáil χ^2 ar fheabhas na hoiriúnachta *k* catagóir, *m* paraiméadar mheasta	$\chi^2 = \sum_{i=1}^{k} \dfrac{(o_i - e_i)^2}{e_i}$; $\nu = k - 1 - m$	χ^2 goodness-of-fit test *k* categories, *m* estimated parameters
suntasacht chomhéifeacht an chomhchoibhnis (Pearson)	$t = \dfrac{r\sqrt{n-2}}{\sqrt{1 - r^2}}$; $\nu = n - 2$	significance of correlation coefficient (Pearson)

Dóchúlachtaí don dáileadh normalach caighdeánach

I gcás z a thugtar, faightear ón tábla

$$P(Z \le z) = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^{z} e^{-\frac{1}{2}t^2}\, dt$$



Probabilities for the standard normal distribution

For a given z, the table gives

$$P(Z \le z) = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^{z} e^{-\frac{1}{2}t^2}\, dt$$

z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.5000	.5040	.5080	.5120	.5160	.5199	.5239	.5279	.5319	.5359
0.1	0.5398	.5438	.5478	.5517	.5557	.5596	.5636	.5675	.5714	.5753
0.2	0.5793	.5832	.5871	.5910	.5948	.5987	.6026	.6064	.6103	.6141
0.3	0.6179	.6217	.6255	.6293	.6331	.6368	.6406	.6443	.6480	.6517
0.4	0.6554	.6591	.6628	.6664	.6700	.6736	.6772	.6808	.6844	.6879
0.5	0.6915	.6950	.6985	.7019	.7054	.7088	.7123	.7157	.7190	.7224
0.6	0.7257	.7291	.7324	.7357	.7389	.7422	.7454	.7486	.7517	.7549
0.7	0.7580	.7611	.7642	.7673	.7704	.7734	.7764	.7794	.7823	.7852
0.8	0.7881	.7910	.7939	.7967	.7995	.8023	.8051	.8078	.8106	.8133
0.9	0.8159	.8186	.8212	.8238	.8264	.8289	.8315	.8340	.8365	.8389
1.0	0.8413	.8438	.8461	.8485	.8508	.8531	.8554	.8577	.8599	.8621

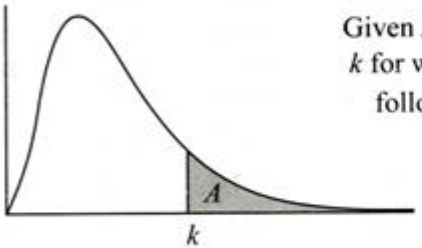
Clár / Contents

an dáileadh normalach (ar lean) — normal distribution (continued)

z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
1.1	0.8643	.8665	.8686	.8708	.8729	.8749	.8770	.8790	.8810	.8830
1.2	0.8849	.8869	.8888	.8907	.8925	.8944	.8962	.8980	.8997	.9015
1.3	0.9032	.9049	.9066	.9082	.9099	.9115	.9131	.9147	.9162	.9177
1.4	0.9192	.9207	.9222	.9236	.9251	.9265	.9279	.9292	.9306	.9319
1.5	0.9332	.9345	.9357	.9370	.9382	.9394	.9406	.9418	.9429	.9441
1.6	0.9452	.9463	.9474	.9484	.9495	.9505	.9515	.9525	.9535	.9545
1.7	0.9554	.9564	.9573	.9582	.9591	.9599	.9608	.9616	.9625	.9633
1.8	0.9641	.9649	.9656	.9664	.9671	.9678	.9686	.9693	.9699	.9706
1.9	0.9713	.9719	.9726	.9732	.9738	.9744	.9750	.9756	.9761	.9767
2.0	0.9772	.9778	.9783	.9788	.9793	.9798	.9803	.9808	.9812	.9817
2.1	0.9821	.9826	.9830	.9834	.9838	.9842	.9846	.9850	.9854	.9857
2.2	0.9861	.9864	.9868	.9871	.9875	.9878	.9881	.9884	.9887	.9890
2.3	0.9893	.9896	.9898	.9901	.9904	.9906	.9909	.9911	.9913	.9916
2.4	0.9918	.9920	.9922	.9925	.9927	.9929	.9931	.9932	.9934	.9936
2.5	0.9938	.9940	.9941	.9943	.9945	.9946	.9948	.9949	.9951	.9952
2.6	0.9953	.9955	.9956	.9957	.9959	.9960	.9961	.9962	.9963	.9964
2.7	0.9965	.9966	.9967	.9968	.9969	.9970	.9971	.9972	.9973	.9974
2.8	0.9974	.9975	.9976	.9977	.9977	.9978	.9979	.9979	.9980	.9981
2.9	0.9981	.9982	.9982	.9983	.9984	.9984	.9985	.9985	.9986	.9986
3.0	0.9987	.9987	.9987	.9988	.9988	.9989	.9989	.9989	.9990	.9990

Dáileadh chí-chearnaithe
luachanna criticiúla tástála aonfhoircní

Nuair a thugtar A, faightear ón tábla an luach ar k mar a bhfuil $P(X > k) = A$, áit a leanann X dáileadh chí-chearnaithe a bhfuil v céim saoirse aige.



Chi-squared distribution
one-tailed critical values

Given A, the table gives the value of k for which $P(X > k) = A$, where X follows a chi-squared distribution with v degrees of freedom.

v \ A	0.995	0.99	0.975	0.95	0.05	0.025	0.01	0.005
1	0.0000	0.0002	0.0010	0.0039	3.8415	5.0239	6.6349	7.8794
2	0.0100	0.0201	0.0506	0.1026	5.9915	7.3778	9.2103	10.597
3	0.0717	0.1148	0.2158	0.3518	7.8147	9.3484	11.345	12.838
4	0.2070	0.2971	0.4844	0.7107	9.4877	11.143	13.277	14.860
5	0.4117	0.5543	0.8312	1.1455	11.070	12.833	15.086	16.750
6	0.6757	0.8721	1.2373	1.6354	12.592	14.449	16.812	18.548
7	0.9893	1.2390	1.6899	2.1673	14.067	16.013	18.475	20.278
8	1.3444	1.6465	2.1797	2.7326	15.507	17.535	20.090	21.955
9	1.7349	2.0879	2.7004	3.3251	16.919	19.023	21.666	23.589
10	2.1559	2.5582	3.2470	3.9403	18.307	20.483	23.209	25.188
11	2.6032	3.0535	3.8157	4.5748	19.675	21.920	24.725	26.757
12	3.0738	3.5706	4.4038	5.2260	21.026	23.337	26.217	28.300
13	3.5650	4.1069	5.0088	5.8919	22.362	24.736	27.688	29.819
14	4.0747	4.6604	5.6287	6.5706	23.685	26.119	29.141	31.319

Clár / Contents

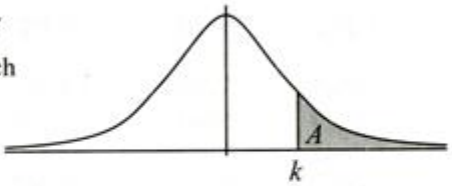
dáileadh chí-chearnaithe (ar lean) — chi-squared distribution (continued)

v \ A	0.995	0.99	0.975	0.95	0.05	0.025	0.01	0.005
15	4.6009	5.2293	6.2621	7.2609	24.996	27.488	30.578	32.801
16	5.1422	5.8122	6.9077	7.9616	26.296	28.845	32.000	34.267
17	5.6972	6.4078	7.5642	8.6718	27.587	30.191	33.409	35.718
18	6.2648	7.0149	8.2307	9.3905	28.869	31.526	34.805	37.156
19	6.8440	7.6327	8.9065	10.117	30.144	32.852	36.191	38.582
20	7.4338	8.2604	9.5908	10.851	31.410	34.170	37.566	39.997
21	8.0337	8.8972	10.283	11.591	32.671	35.479	38.932	41.401
22	8.6427	9.5425	10.982	12.338	33.924	36.781	40.289	42.796
23	9.2604	10.196	11.689	13.091	35.172	38.076	41.638	44.181
24	9.8862	10.856	12.401	13.848	36.415	39.364	42.980	45.559
25	10.520	11.524	13.120	14.611	37.652	40.646	44.314	46.928
26	11.160	12.198	13.844	15.379	38.885	41.923	45.642	48.290
27	11.808	12.879	14.573	16.151	40.113	43.195	46.963	49.645
28	12.461	13.565	15.308	16.928	41.337	44.461	48.278	50.993
29	13.121	14.256	16.047	17.708	42.557	45.722	49.588	52.336
30	13.787	14.953	16.791	18.493	43.773	46.979	50.892	53.672
40	20.707	22.164	24.433	26.509	55.758	59.342	63.691	66.766
50	27.991	29.707	32.357	34.764	67.505	71.420	76.154	79.490
60	35.534	37.485	40.482	43.188	79.082	83.298	88.379	91.952
70	43.275	45.442	48.758	51.739	90.531	95.023	100.43	104.21
80	51.172	53.540	57.153	60.391	101.88	106.63	112.33	116.32
90	59.196	61.754	65.647	69.126	113.15	118.14	124.12	128.30
100	67.328	70.065	74.222	77.929	124.34	129.56	135.81	140.17

t-dháileadh Student

luachanna criticiúla tástála aonfhoircní

Nuair a thugtar A, faightear ón tábla an luach ar k mar a bhfuil $P(T > k) = A$, áit a leanann T, t-dháileadh a bhfuil ν céim saoirse aige.



Student's *t*-distribution

one-tailed critical values

Given A, the table gives the value of k for which $P(T > k) = A$, where T follows a t-distribution with ν degrees of freedom.

ν \ A	0.1	0.05	0.025	0.01	0.005	0.001	0.0005	0.0001	0.00005
1	3.078	6.314	12.71	31.82	63.66	318.3	636.6	3183	6366
2	1.886	2.920	4.303	6.965	9.925	22.33	31.60	70.70	99.99
3	1.638	2.353	3.182	4.541	5.841	10.21	12.92	22.20	28.00
4	1.533	2.132	2.776	3.747	4.604	7.173	8.610	13.03	15.54
5	1.476	2.015	2.571	3.365	4.032	5.893	6.869	9.678	11.18
6	1.440	1.943	2.447	3.143	3.707	5.208	5.959	8.025	9.082
7	1.415	1.895	2.365	2.998	3.499	4.785	5.408	7.063	7.885
8	1.397	1.860	2.306	2.896	3.355	4.501	5.041	6.442	7.120
9	1.383	1.833	2.262	2.821	3.250	4.297	4.781	6.010	6.594
10	1.372	1.812	2.228	2.764	3.169	4.144	4.587	5.694	6.211
11	1.363	1.796	2.201	2.718	3.106	4.025	4.437	5.453	5.921
12	1.356	1.782	2.179	2.681	3.055	3.930	4.318	5.263	5.694
13	1.350	1.771	2.160	2.650	3.012	3.852	4.221	5.111	5.513
14	1.345	1.761	2.145	2.624	2.977	3.787	4.140	4.985	5.363

t-dháileadh Student (ar lean) Student's *t*-distribution (continued)

v \ A	0.1	0.05	0.025	0.01	0.005	0.001	0.0005	0.0001	0.00005
15	1.341	1.753	2.131	2.602	2.947	3.733	4.073	4.880	5.239
16	1.337	1.746	2.120	2.583	2.921	3.686	4.015	4.790	5.134
17	1.333	1.740	2.110	2.567	2.898	3.646	3.965	4.715	5.043
18	1.330	1.734	2.101	2.552	2.878	3.610	3.922	4.648	4.966
19	1.328	1.729	2.093	2.539	2.861	3.579	3.883	4.590	4.899
20	1.325	1.725	2.086	2.528	2.845	3.552	3.850	4.539	4.838
21	1.323	1.721	2.080	2.518	2.831	3.527	3.819	4.492	4.785
22	1.321	1.717	2.074	2.508	2.819	3.505	3.792	4.452	4.736
23	1.319	1.714	2.069	2.500	2.807	3.485	3.768	4.416	4.694
24	1.318	1.711	2.064	2.492	2.797	3.467	3.745	4.382	4.654
25	1.316	1.708	2.060	2.485	2.787	3.450	3.725	4.352	4.619
26	1.315	1.706	2.056	2.479	2.779	3.435	3.707	4.324	4.587
27	1.314	1.703	2.052	2.473	2.771	3.421	3.689	4.299	4.556
28	1.313	1.701	2.048	2.467	2.763	3.408	3.674	4.276	4.531
29	1.311	1.699	2.045	2.462	2.756	3.396	3.660	4.254	4.505
30	1.310	1.697	2.042	2.457	2.750	3.385	3.646	4.234	4.482
40	1.303	1.684	2.021	2.423	2.704	3.307	3.551	4.094	4.321
50	1.299	1.676	2.009	2.403	2.678	3.261	3.496	4.014	4.228
60	1.296	1.671	2.000	2.390	2.660	3.232	3.460	3.962	4.169
80	1.292	1.664	1.990	2.374	2.639	3.195	3.416	3.899	4.095
100	1.290	1.660	1.984	2.364	2.626	3.174	3.390	3.861	4.054
∞	1.282	1.645	1.960	2.326	2.576	3.090	3.290	3.719	3.891

Mearthástáil Tukey (foirm achomair) **Tukey quick test (compact form)**

Leibhéal suntasachta	5%	1%	0.1%	Significance level
Luach criticiúil áireamh na bhfoirceann	7	10	13	Critical value of tail-count

Comhéifeacht Spearman do chomhchoibhneas na rang-ord
luachanna criticiúla tástála aonfhoircní

Spearman's rank-order correlation coefficient
one-tailed critical values

n	5%	2.5%
5	0.900	1.000
6	0.829	0.886
7	0.714	0.786
8	0.643	0.738
9	0.600	0.700
10	0.564	0.648
11	0.536	0.618
12	0.503	0.587
13	0.484	0.560
14	0.464	0.538
15	0.446	0.521
16	0.429	0.503

n	5%	2.5%
17	0.414	0.488
18	0.401	0.472
19	0.391	0.460
20	0.380	0.447
21	0.370	0.436
22	0.361	0.425
23	0.353	0.416
24	0.344	0.407
25	0.337	0.398
26	0.331	0.390
27	0.324	0.383
28	0.318	0.375

n	5%	2.5%
29	0.312	0.368
30	0.306	0.362
31	0.301	0.356
32	0.296	0.350
33	0.291	0.345
34	0.287	0.340
35	0.283	0.335
36	0.279	0.330
37	0.275	0.325
38	0.271	0.321
39	0.267	0.317
40	0.264	0.313

U-thástáil Mann-Whitney
luachanna criticiúla tástála défhoircní ar 5%
Má fhaightear luach ar U atá níos lú ná an luach sa tábla nó cothrom leis, tá difríocht shuntasach i gceist.

Mann-Whitney U-test
two-tailed 5% critical values
A value of U less than or equal to the value in the table indicates a significant difference.

n_1																			
2	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	n_2
-	-	-	-	-	-	0	0	0	0	1	1	1	1	1	2	2	2	2	**2**
	-	-	0	1	1	2	2	3	3	4	4	5	5	6	6	7	7	8	**3**
		0	1	2	3	4	4	5	6	7	8	9	10	11	11	12	13	14	**4**
			2	3	5	6	7	8	9	11	12	13	14	15	17	18	19	20	**5**
				5	6	8	10	11	13	14	16	17	19	21	22	24	25	27	**6**
					8	10	12	14	16	18	20	22	24	26	28	30	32	34	**7**
						13	15	17	19	22	24	26	29	31	34	36	38	41	**8**
							17	20	23	26	28	31	34	37	39	42	45	48	**9**
								23	26	29	33	36	39	42	45	48	52	55	**10**
									30	33	37	40	44	47	51	55	58	62	**11**
										37	41	45	49	53	57	61	65	69	**12**
											45	50	54	59	63	67	72	76	**13**
												55	59	64	67	74	78	83	**14**
													64	70	75	80	85	90	**15**
														75	81	86	92	98	**16**
															87	93	99	105	**17**
																99	106	112	**18**
																	113	119	**19**
																		127	**20**

$U = \min\{U_1, U_2\}$ *áit a bhfuil* where

$$U_1 = R_1 - \frac{n_1(n_1+1)}{2}, \qquad U_2 = R_2 - \frac{n_2(n_2+1)}{2}$$

Na bunaonaid

Tá Córas Idirnáisiúnta na nAonad (*Système International d'Unités*) bunaithe ar sheacht mbunchainníocht a nglactar leis iad a bheith neamhspleách ar a chéile.
Is iad seo a leanas na bunaonaid:

Base units

The International System of Units (*Système International d'Unités*) is founded on seven base quantities, which are assumed to be mutually independent. These base units are:

Bunchainníocht	Bunaonad SI	*Siombail an aonaid* Symbol for unit	SI base unit	Base quantity
fad (*l*)	méadar	m	metre	length (*l*)
mais (*m*)	cileagram	kg	kilogram	mass (*m*)
am (*t*)	soicind	s	second	time (*t*)
sruth leictreach (*I*)	aimpéar	A	ampere	electric current (*I*)
teocht (*T*)	ceilvin	K	kelvin	temperature (*T*)
méid substainte (*n*)	mól	mol	mole	amount of substance (*n*)
déine lonrachais (I_v)	caindéala	cd	candela	luminous intensity (I_v)

Aonaid dhíortha

Is é is aonad díortha ann aonad is féidir a shloinneadh i dtéarmaí na mbunaonad agus a dtugtar ainm uathúil air, e.g. niútan (N) = kg m s^{-2}.

Derived units

A derived unit is a unit which can be expressed in terms of base units and is given a unique name, e.g. newton (N) = kg m s^{-2}.

Clár / Contents

Réimíreanna

Baintear leas as réimíreanna chun iolraithe agus fo-iolraithe deachúlacha d'aonaid SI a dhéanamh. Is iad seo na réimíreanna coitianta:

Réimír	*Fachtóir* Factor	*Siombail* Symbol	Prefix
yota-, yotai-	10^{24}	Y	yotta
zeitea-, zeiti-	10^{21}	Z	zetta
eicsea-, eicsi-	10^{18}	E	exa
peitea-, peiti-	10^{15}	P	peta
teirea-, teiri-	10^{12}	T	tera
gigea-, gigi-	10^{9}	G	giga
meigea-, meigi-	10^{6}	M	mega
cilea-, cili-	10^{3}	k	kilo
heictea-, heicti-	10^{2}	h	hecto
deaca-, deacai-	10^{1}	da	deka

Cónasctar siombail réimíre le siombail bunaonaid chun siombail nua aonaid a dhéanamh, e.g. ciliméadar (km), micreashoicind (μs).

Prefixes

Prefixes are used to form decimal multiples and submultiples of SI units. The common prefixes are:

Réimír	*Fachtóir* Factor	*Siombail* Symbol	Prefix
yochta-, yochtai-	10^{-24}	y	yocto
zeiptea-, zeipti-	10^{-21}	z	zepto
ata-, atai	10^{-18}	a	atto
feimtea-, feimti-	10^{-15}	f	femto
picea-, pici-	10^{-12}	p	pico
nana-, nanai-	10^{-9}	n	nano
micrea-, micri-	10^{-6}	μ	micro
millea-, milli-	10^{-3}	m	milli
ceintea-, ceinti-	10^{-2}	c	centi
deicea-, deici-	10^{-1}	d	deci

The symbol for a prefix is combined with the symbol for the base unit to form a new unit symbol, e.g. kilometre (km), microsecond (μs).

Tairisigh bhunúsacha fhisiceacha — Fundamental physical constants

Tairiseach	*Siombail* Symbol	*Luach* Value	Constant
mais alfa-cháithnín	m_α	$6.644\,6565 \times 10^{-27}$ kg	alpha particle mass
tairiseach Avogadro	N_A	$6.022\,1415 \times 10^{23}$ mol^{-1}	Avogadro constant
tairiseach Boltzmann	k	$1.380\,6505 \times 10^{-23}$ J K^{-1}	Boltzmann constant
mais leictreoin	m_e	$9.109\,3826 \times 10^{-31}$ kg	electron mass
leictreonvolta	eV	$1.602\,176\,53 \times 10^{-19}$ J	electron volt
lucht leictreonach	e	$1.602\,176\,53 \times 10^{-19}$ C	electronic charge
tairiseach Faraday	F	96 485.3383 C mol^{-1}	Faraday constant
tairiseach na himtharraingthe	G	6.6742×10^{-11} m^3 kg^{-1} s^{-2}	gravitational constant
mais neodróin	m_n	$1.674\,927\,28 \times 10^{-27}$ kg	neutron mass

Clár / Contents

Tairiseach	***Siombail*** **Symbol**	***Luach*** **Value**	**Constant**
tréscaoilteacht an tsaorspáis	μ_0	$4\pi \times 10^{-7}$ H m^{-1}	permeability of free space
ceadaíocht an tsaorspáis	ε_0	$8.854\ 187\ 817 \times 10^{-12}$ F m^{-1}	permittivity of free space
tairiseach Planck	h	$6.626\ 0693 \times 10^{-34}$ J s	Planck constant
mais phrótóin	m_p	$1.672\ 621\ 71 \times 10^{-27}$ kg	proton mass
cóimheas maise prótóin is leictreoin	$\frac{m_p}{m_e}$	1836.182 672 16	proton-electron mass ratio
luas an tsolais *in vacuo*	c_0	$2.997\ 924\ 58 \times 10^{8}$ m s^{-1}	speed of light *in vacuo*
aonad maise adamhaí aontaithe	u	$1.660\ 5402 \times 10^{-27}$ kg	unified atomic mass unit
tairiseach uilíoch gáis	R	8.314 472 J K^{-1} mol^{-1}	universal gas constant

Aicme ainm	*Siombail* Symbol	*Mais* / Mass (*i gcoibhneas le mais leictreoin*) (relative to mass of electron)	*Leath-ré* Half-life	Class name
Leaptóin				**Leptons**
leictreon	e	1	*cobhsaí* / stable	electron
neoidríonó	ν	4.305×10^{-6}	*cobhsaí* / stable	neutrino
muón	μ^+ μ^-	206.9	1.52×10^{-6} s	muon
tó	τ^+ τ^-	3478	2.05×10^{-13} s	tau
muón-neoidríonó	ν_μ	0.3327	*cobhsaí* / stable	muon neutrino
tó-neoidríonó	ν_τ	30.33	*cobhsaí* / stable	tau neutrino
Méasóin				**Mesons**
pí-mhéasón	π^+ π^-	273	1.80×10^{-8} s	pi meson
	π^o	264	5.82×10^{-17} s	
K-mhéasón	K^+ K^-	967	8.58×10^{-9} s	K meson
	K^o	975	—	
Baróin				**Baryons**
prótón	p	1836	*cobhsaí* / stable	proton
neodrón	n	1839	6.14×10^{2} s	neutron
lambda	Λ^o	2183	1.82×10^{-10} s	lambda
sigme	Σ^+	2328	5.56×10^{-11} s	sigma
	Σ^-	2343	1.02×10^{-10} s	
	Σ^o	2334	5.13×10^{-20} s	
xí	Ξ^-	2586	1.14×10^{-10} s	xi
	Ξ^o	2573	2.01×10^{-10} s	
óimige	Ω^-	3272	$\sim 10^{-10}$ s	omega

Clár / Contents

cuarc	***siombail*** **symbol**	***lucht*** **charge**	**quark**
uaschuarc	u	$\frac{2}{3}$	up
cuarc aduain	s	$-\frac{1}{3}$	strange
barrchuarc	t	$\frac{2}{3}$	top
íoschuarc	d	$-\frac{1}{3}$	down
briochtchuarc	c	$\frac{2}{3}$	charmed
bunchuarc	b	$-\frac{1}{3}$	bottom

Clár / Contents

Meicnic

Mechanics

Clár / Contents

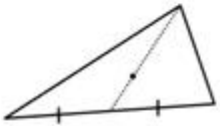
Tugtar liosta aibítreach de na siombailí a úsáidtear sna foirmlí seo a leanas agus an bhrí atá leo sa comhthéacs cuí ar leathanach 65.

An alphabetical list of the symbols used in the following formulae and their meaning in the relevant context is given on page 65.

Meicnic		Mechanics
fórsa agus luasghéarú	$F = ma$	force and acceleration
Gluaisne líneach faoi luasghéarú tairiseach	$v = u + at$	**Linear motion with constant acceleration**
	$s = ut + \frac{1}{2}at^2$	
	$v^2 = u^2 + 2as$	
	$s = \left(\frac{u + v}{2}\right)t$	
Gluaisne choibhneasta		**Relative motion**
díláithriú coibhneasta	$\vec{s}_{BC} = \vec{s}_B - \vec{s}_C$	relative displacement
treoluas coibhneasta	$\vec{v}_{BC} = \vec{v}_B - \vec{v}_C$	relative velocity
luasghéarú coibhneasta	$\vec{a}_{BC} = \vec{a}_B - \vec{a}_C$	relative acceleration

Imbhuailtí		**Collisions**
móiminteam cáithnín	mv	momentum of a particle
dlí turgnamhach Newton	$v_1 - v_2 = -e(u_1 - u_2)$	Newton's experimental law
imchoimeád an mhóimintim	$m_1u_1 + m_2u_2 = m_1v_1 + m_2v_2$	conservation of momentum
ríog	$I = \int F\,dt = mv - mu$	impulse

Gluaisne i gciorcal		**Motion in a circle**
uillinn ina raidiain	$\theta = \frac{s}{r}$	angle in radians
treoluas uilleach	$\omega = \frac{\theta}{t}$	angular velocity
treoluas líneach agus uilleach	$v = r\omega$	linear and angular velocity
luasghéarú láraimsitheach	$a = r\omega^2 = \frac{v^2}{r}$	centripetal acceleration
fórsa láraimsitheach	$F = mr\omega^2 = \frac{mv^2}{r}$	centripetal force

Meáchanláir		**Centres of gravity**
leathsféar soladach, ga r, fad slí ó lárphointe an leathsféir go dtí an meáchanlár	$\frac{3}{8}r$	solid hemisphere, radius r distance from centre of hemisphere to centre of gravity
sliogán leathsféarach, ga r, fad slí ó lárphointe an leathsféir go dtí an meáchanlár	$\frac{1}{2}r$	hemispherical shell, radius r distance from centre of hemisphere to centre of gravity
dronchón ciorclach soladach, airde h, fad slí ó bhonn an chóin go dtí an meáchanlár	$\frac{1}{4}h$	solid right circular cone, height h distance from base of cone to centre of gravity
lann thriantánach		triangular lamina
$\frac{1}{3}$ ón mbonn feadh na meánlíne		$\frac{1}{3}$ from base along median
foirm chomhordanáideach	$\left(\frac{x_1+x_2+x_3}{3}, \frac{y_1+y_2+y_3}{3}\right)$	co-ordinate form
stua, ga r, stua-uillinn 2θ fad slí ó lárphointe an chiorcail go dtí meáchanlár an stua	$\frac{r\sin\theta}{\theta}$	arc, radius r, arc-angle 2θ distance from centre of circle to centre of gravity of arc
teascóg diosca, ga r, stua-uillinn 2θ fad slí ó lárphointe an chiorcail go dtí meáchanlár na teascóige	$\frac{2r\sin\theta}{3\theta}$	sector of disc, radius r, arc-angle 2θ distance from centre of circle to centre of gravity of sector

Móimintí táimhe		**Moments of inertia**
slat aonfhoirmeach, fad $2l$ timpeall aise trí lárphointe ingearach leis an tslat	$\frac{1}{3}ml^2$	uniform rod, length $2l$ about axis through centre perpendicular to rod
timpeall aise ag foirceann amháin ingearach leis an tslat	$\frac{4}{3}ml^2$	about axis at one end perpendicular to rod
diosca aonfhoirmeach, ga r timpeall aise trí lárphointe ingearach leis an diosca	$\frac{1}{2}mr^2$	uniform disc, radius r about axis through centre perpendicular to disc
timpeall trastomhais	$\frac{1}{4}mr^2$	about diameter
fonsa aonfhoirmeach, ga r timpeall aise trí lárphointe ingearach leis an bhfoinse	mr^2	uniform hoop, radius r about axis through centre perpendicular to hoop
timpeall trastomhais	$\frac{1}{2}mr^2$	about diameter
sféar soladach aonfhoirmeach, ga r timpeall trastomhais	$\frac{2}{5}mr^2$	uniform solid sphere, radius r about diameter
teoirim na n-aiseanna comhthreomhara	$I_b = I_c + md^2$	parallel axis theorem
teoirim na n-aiseanna ingearacha	$I_z = I_x + I_y$	perpendicular axis theorem

Coirp rothlacha		**Rotating bodies**
móiminteam uilleach	$L = I\omega = rmv$	angular momentum
móimint fórsa	$M = Fd$	moment of a force
torc cúpla	$T = Fd$	torque of a couple
dara dlí Newton don rothlú	$T = \frac{dL}{dt}$	Newton's 2nd law for rotation
fuinneamh cinéiteach rothlach	$E = \frac{1}{2} I\omega^2$	rotational kinetic energy
Gluaisne armónach shimplí		**Simple harmonic motion**
	$a = -\omega^2 s$	
	$T = \frac{1}{f} = \frac{2\pi}{\omega}$	
	$s = A \sin(\omega t + \alpha)$	
	$v^2 = \omega^2 (A^2 - s^2)$	
luascadán simplí	$T = 2\pi\sqrt{\frac{l}{g}}$	simple pendulum
comhluascadán	$T = 2\pi\sqrt{\frac{I}{mgh}}$	compound pendulum

Fuinneamh agus obair		**Energy and work**
obair	$W = Fs = \int F ds$	work
cumhacht	$P = \frac{W}{t} = Fv$	power
céatadán éifeachtachta	$\frac{P_o \times 100}{P_i}$	percentage efficiency
fuinneamh poitéinsiúil (imtharraingthe)	$E_p = mgh$	potential energy (gravitational)
fuinneamh cinéiteach	$E_k = \frac{1}{2} mv^2$	kinetic energy
prionsabal imchoimeád an fhuinnimh (faoi fhórsaí meicniúla imchoimeádacha)	$\Delta E_p + \Delta E_k = 0$	principle of conservation of energy (under conservative mechanical forces)
coibhéis mhaise is fuinnimh	$E = mc^2$	mass-energy equivalence

Imtharraingt		**Gravitation**
dlí imtharraingthe Newton	$F = \frac{Gm_1m_2}{d^2}$	Newton's law of gravitation
meáchan	$W = mg = V\rho g$	weight
luasghéarú de bharr na domhantarraingthe	$g = \frac{GM}{d^2}$	acceleration due to gravity
neart réimse imtharraingthe	$g = \frac{F}{m}$	gravitational field strength
peiriad satailíte	$T^2 = \frac{4\pi^2R^3}{GM}$	period of a satellite

Fórsaí agus ábhair		**Forces and materials**
dlí Hooke	$F = -ks$	Hooke's law
strus	$\sigma = \frac{F}{A}$	stress
straidhn	$\varepsilon = \frac{\Delta l}{l}$	strain
modal Young	$E = \frac{\sigma}{\varepsilon}$	Young's modulus
dlús	$\rho = \frac{m}{V}$	density
comhéifeacht na frithchuimilte	$\mu = \frac{F}{R}$	coefficient of friction
brú	$p = \frac{F}{A}$	pressure
brú i leacht	$p = \rho gh$	pressure in a fluid
sá ar dhromchla plánach tumtha	$T = Ap_c$	thrust on an immersed plane surface
dlí Boyle	$p \propto \frac{1}{V}$	Boyle's law

Teas agus teocht		Heat and temperature
teocht Celsius	$\theta/^{\circ}\mathrm{C} = T/\mathrm{K} - 273.15$	Celsius temperature
an fuinneamh a theastaíonn chun teocht a athrú	$\Delta E = mc\Delta\theta \qquad \Delta E = C\Delta\theta$	energy needed to change temperature
an fuinneamh a theastaíonn chun staid a athrú	$\Delta E = ml \qquad \Delta E = L$	energy needed to change state
seoltacht theirmeach	$\frac{\Delta E}{\Delta t} = kA\frac{\Delta\theta}{\Delta l}$	thermal conductivity
friotachas teirmeach	$r = \frac{1}{k}$	thermal resistivity
R-luach (friotaíocht theirmeach)	$R = \frac{l}{k} = lr$	R-value (thermal resistance)
U-luach (tarchuras teirmeach)	$\frac{\Delta E}{\Delta t} = AU\Delta\theta$	U-value (thermal transmittance)
U-luach de bhacainn ilchodach	$U = \frac{1}{\Sigma R} \qquad \frac{1}{U} = \frac{1}{U_1} + \frac{1}{U_2} + \ldots$	U-value of a composite barrier

Clár / Contents

Solas agus fuaim		Light and sound
treoluas fuaime	$c = f\lambda$	velocity of a wave
iarmhairt Doppler	$f' = \frac{fc}{c \pm u}$	Doppler effect
minicíocht bhunúsach sreinge rite	$f = \frac{1}{2l}\sqrt{\frac{T}{\mu}}$	fundamental frequency of a stretched string
comhéifeacht athraonta	$n = \frac{c_1}{c_2}$	refractive index
gríl díraonta	$n\lambda = d\sin\theta$	diffraction grating
fuinneamh fótóin	$E = hf$	energy of a photon
dlí fótailéictreach Einstein	$hf = \Phi + \frac{1}{2}mv_{max}^2 \; ; \; \Phi = hf_0$	Einstein's photoelectric law

Clár / Contents

Optaic gheoiméadrach		Geometric optics
foirmle lionsa agus scannáin	$\frac{1}{f}=\frac{1}{u}+\frac{1}{v}$	mirror and lens formula
formhéadú	$m=\frac{v}{u}$	magnification
cumhacht lionsa	$P=\frac{1}{f}$	power of a lens
dhá lionsa thanaí i dteagmháil le chéile	$P=P_1+P_2$	two thin lenses in contact
comhéifeacht athraonta	$n=\frac{\sin i}{\sin r}=\frac{1}{\sin C}$	refractive index

Clár / Contents

Leictreachas		Electricity
dlí Coulomb	$F = \frac{1}{4\pi\varepsilon}\frac{q_1 q_2}{d^2}$	Coulomb's law
neart réimse leictrigh	$E = \frac{F}{q}$	electric field strength
difríocht poitéinsil	$V = \frac{W}{q}$	potential difference
friotaíocht	$R = \frac{V}{I}$	resistance
friotachas	$\rho = \frac{RA}{l}$	resistivity
friotóirí i sraithcheangal	$R = R_1 + R_2$	resistors in series
friotóirí i dtreocheangal	$\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2}$	resistors in parallel
droichead Wheatstone	$\frac{R_1}{R_2} = \frac{R_3}{R_4}$	Wheatstone bridge
dlí Joule	$P \propto I^2$	Joule's law

Clár / Contents

cumhacht (mheandrach)	$P = VI$	power (instantaneous)
fórsa ar sheoltóir sruthiompartha	$F = IlB; \quad l \perp B$	force on a current-carrying conductor
fórsa ar cháithnín luchtaithe	$F = qvB; \quad v \perp B$	force on a charged particle
flg ionduchtaithe	$E = -\frac{d\Phi}{dt}$	induced emf
voltas agus sruth ailtéarnach	$V_{rms} = \frac{V_0}{\sqrt{2}} \qquad I_{rms} = \frac{I_0}{\sqrt{2}}$	alternating voltage and current
toilleas	$C = \frac{q}{V}$	capacitance
toilleoir plátaí comhthreomhara	$C = \frac{\varepsilon_0 A}{d}$	parallel-plate capacitor
an fuinneamh atá stóráilte i dtoilleoir	$W = \frac{1}{2}CV^2$	energy stored in capacitor
flosc maighnéadach	$\Phi = BA$	magnetic flux
claochladán	$\frac{V_i}{V_o} = \frac{N_p}{N_s}$	transformer

Clár / Contents

Radaighníomhaíocht		Radioactivity
gníomhaíocht	$A = -\frac{dN}{dt}$	activity
dlí an mheatha radaighníomhaigh	$A = \lambda N$	law of radioactive decay
leath-ré	$T_{1/2} = \frac{\ln 2}{\lambda}$	half-life
coibhéis mhaise is fuinnimh	$E = mc^2$	mass-energy equivalence

Clár / Contents

Ceimic		Chemistry
teocht chaighdeánach	273.15 K	standard temperature
tríphointe an uisce	273.16 K	triple point of water
brú caighdeánach	1.01325×10^{5} Pa	standard pressure
toirt mhólarach (ina lítir) ag brú agus teocht chaighdeánach	22.4	molar volume (in litres) at standard temperature and pressure
pH	$pH = -\log_{10}[H^{+}] = -\log_{10}[H_3O^{+}]$	pH
toradh ianach an uisce	$K_w = [H^{+}]\,[OH^{-}] = [H_3O^{+}]\,[OH^{-}]$	ionic product of water
cothromóid uilíoch an gháis	$pV = nRT = NkT$	universal gas equation
aonad maise (adamhaí)	$1\ u = 1.660\ 5402 \times 10^{-27}$ kg	(atomic) mass unit

Clár / Contents

Siombailí do chainníochtaí fisiceacha coitianta agus na haonaid ina dtomhaistear iad

Symbols and units of measurement of common physical quantities

Braitheann brí siombailí áirithe ar an gcomhthéacs ina n-úsáidtear iad. In ord aibítre na siombailí atá an tábla. Tá na litreacha Gréigise chun deiridh.

The meaning of some symbols depends on the context in which they are used. The table is alphabetically ordered by symbol. Greek letters are at the end.

Cainníocht	***Siombail*** **Symbol**	***Aonad SI*** **SI unit**	**Quantity**
luasghéarú	a	$m\ s^{-2}$	acceleration
gníomhaíocht	A	Bq	activity
aimplitiúid	A	m	amplitude
achar	A	m^2	area
maisuimhir	A	kg	mass number
mais adamhach choibhneasta	A_r		relative atomic mass
floscdhlús maighnéadach	B	T	magnetic flux density
tiúchan	c	$mol\ m^{-3}$	concentration
saintoilleadh teasa	c	$J\ kg^{-1}\ K^{-1}$	specific heat capacity
luas an tsolais	c	$m\ s^{-1}$	speed of light
luas an tsolais *in vacuo*	c_0	$m\ s^{-1}$	speed of light *in vacuo*

Clár / Contents

Cainníocht	*Siombail* Symbol	*Aonad SI* SI unit	Quantity
toilleas	C	F	capacitance
uillinn chriticiúil	C		critical angle
toilleadh teasa	C	$J\ K^{-1}$	heat capacity
fad slí	d	m	distance
dáileog ionsúite	D	Gy	absorbed dose
lucht leictreonach	e	C	electronic charge
comhéifeacht an chúitimh	e		coefficient of restitution
fuinneamh gníomhachtúcháin	E	$J\ mol^{-1}$	activation energy
neart réimse leictrigh	E	$V\ m^{-1}$	electric field strength
flg (fórsa leictreaghluaisneach)	E	V	emf (electromotive force)
fuinneamh	E	J	energy
modal Young	E	$N\ m^{-2}$	Young's modulus
fuinneamh (cinéiteach)	E_k	J	energy (kinetic)
fuinneamh (poitéinsiúil)	E_p	J	energy (potential)
fad fócasach	f	m	focal length
minicíocht	f	Hz	frequency
minicíocht tairsí	f_0	Hz	threshold frequency

Cainníocht	*Siombail* Symbol	*Aonad SI* SI unit	Quantity
tairiseach Faraday	F	$C\ mol^{-1}$	Faraday constant
fórsa	F	N	force
luasghéarú de bharr na domhantarraingthe	g	$m\ s^{-2}$	acceleration due to gravity
tairiseach na himtharraingthe	G	$m^3\ kg^{-1}\ s^{-2}$	gravitational constant
tairiseach Planck	h	$J\ s$	Planck constant
coibhéis dháileogach	H	Sv	dose equivalent
eantalpacht	H	$J\ mol^{-1}$	enthalpy
neart réimse mhaighnéadaigh	H	$A\ m^{-1}$	magnetic field strength
sruth leictreach	I	A	electric current
ríog	I	$N\ s$	impulse
móimint na táimhe	I	$kg\ m^2$	moment of inertia
fuaimdhéine	I	$W\ m^{-2}$	sound intensity
leibhéal fuaimdhéine	$I.L.$		sound intensity level
déine lonrúil	I_v	cd	luminous intensity
tairiseach (cineálach)	k		constant (generic)
tairiseach Boltzmann	k	$J\ K^{-1}$	Boltzmann constant
seoltacht theirmeach	k	$W\ m^{-1}\ K^{-1}$	thermal conductivity

Cainníocht	*Siombail* Symbol	*Aonad SI* SI unit	Quantity
toradh ianach an uisce	K_w	$mol^2\ m^{-6}$	ionic product of water
fad	l	m	length
móiminteam uilleach	L	J s	angular momentum
teas folaigh	L	J	latent heat
uathionduchtas	L	H	self inductance
formhéadú	m		magnification
mais	m	kg	mass
mólaracht	M	$mol\ m^{-3}$	molarity
móimint fórsa	M	N m	moment of a force
comhionduchtas	M	H	mutual inductance
mais mhóilíneach choibhneasta	M_r		relative molecular mass
méid substainte	n	mol	amount of substance
comhéifeacht athraonta	n		refractive index
líon cáithníní	N		number of particles
líon cor	N		number of turns
tairiseach Avogadro	N_A	mol^{-1}	Avogadro constant
neart poil mhaighnéadaigh	p	Wb	magnetic pole strength

Cainníocht	*Siombail* Symbol	*Aonad SI* SI unit	Quantity
móiminteam	p	kg m s^{-1}	momentum
brú	p, P	Pa	pressure
cumhacht	P	W	power
lucht	q	C	charge
fuinneamh (teas)	Q	J	energy (heat)
friotachas teirmeach	r	K m W^{-1}	thermal resistivity
frithghníomhú normalach	R	N	normal reaction
friotachas	R	Ω	resistance
ga	r, R	m	radius
R-luach (friotaíocht theirmeach)	R	K m^2 W^{-1}	R-value (thermal resistance)
tairiseach uilíoch gáis	R	J K^{-1} mol^{-1}	universal gas constant
díláithriú, fad	s	m	displacement, distance
am	t	s	time
teocht Celsius	t, θ	°C	Celsius temperature
am tréimhsiúil	T	s	periodic time
teocht	T	K	temperature
teannas	T	N	tension

Cainníocht	*Siombail* Symbol	*Aonad SI* SI unit	Quantity
torc	T	N m	torque
leathré	$T_{1/2}$	s	half-life
U-luach (tarchuras teirmeach)	U	W m^{-2} K^{-1}	U-value (thermal transmittance)
luas, treoluas	u	m s^{-1}	speed, velocity
luas, treoluas	v	m s^{-1}	speed, velocity
difríocht poitéinsil (voltas)	V	V	potential difference (voltage)
toirt	V	m^3	volume
fuinneamh (leictreach)	W	J	energy (electrical)
meáchan	W	N	weight
obair	W	J	work
uimhir adamhach	Z		atomic number
athrú teochta	$\Delta\theta$	K	change in temperature
ceadaíocht	ε	F m^{-1}	permittivity
ceadaíocht an tsaorspáis	ε_0	F m^{-1}	permittivity of free space
straidhn	ε		strain
uillinn	θ	rad	angle

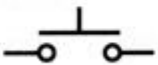
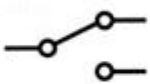
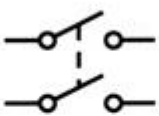
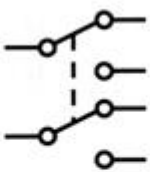
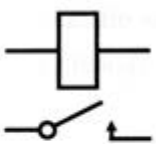
Cainníocht	*Siombail* Symbol	*Aonad SI* SI unit	Quantity
teocht Celsius	θ	°C	Celsius temperature
tonnfhad	λ	m	wavelength
comhéifeacht na frithchuimilte	μ		coefficient of friction
tréscaoilteacht	μ	$H\ m^{-1}$	permeability
tréscaoilteacht an tsaorspáis	μ_0	$H\ m^{-1}$	permeability of free space
dlús	ρ	$kg\ m^{-3}$	density
friotachas	ρ	$\Omega\ m$	resistivity
strus	σ	Pa	stress
flosc maighnéadach	Φ	Wb	magnetic flux
feidhm oibre	Φ	J	work function
treoluas uilleach	ω	$rad\ s^{-1}$	angular velocity
uillinn sholadach	Ω	sr	solid angle

Siombailí ciorcaid leictrigh

Electrical circuit symbols

Clár / Contents

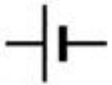
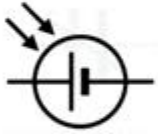
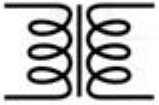
Lasca — **Switches**

sá-lasc chun ceangail  push-to-make switch	sá-lasc chun gearrtha  push-to-break switch	lasc gnáthoscailte (lasc aon phoil aon bhealaigh) (SPST)  normally open switch (single-pole single-throw switch) (SPST)	lasc gnáthdhúnta (SPST)  normally closed switch (SPST)
lasc dhá bhealach (lasc aon phoil dhébhealaigh) (SPDT)  two-way switch (single-pole double-throw switch) (SPDT)	lasc phoil dhúbailte aon bhealaigh (DPST)  double-pole single-throw switch (DPST)	lasc phoil dhúbailte dhébhealaigh (DPDT)  double-pole double-throw switch (DPDT)	athsheachadán  relay

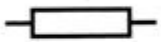
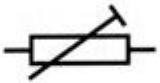
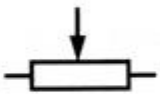
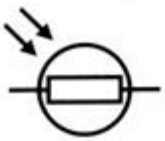
Seoltóirí **Conductors**

cumar seoltóirí  junction of conductors	seoltóirí ag trasnú a chéile gan cheangal  conductors crossing with no connection

Soláthar cumhachta **Power supply**

cill  cell	ceallra  battery	soláthar s.d.  d.c. supply	soláthar s.a.  a.c. supply
cill fhótavoltach  photovoltaic cell	claochladán  transformer	fiús  fuse	talmhú  earth

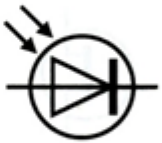
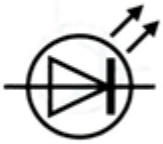
Friotóirí **Resistors**

friotóir fosaithe  fixed resistor	friotóir inathraithe (réastat)  variable resistor (rheostat)	friotóir inathraithe réamhshocraithe  preset variable resistor	roinnteoir poitéinsil  potential divider
teirmeastar  thermistor	friotóir solas-spleách  light-dependent resistor		

Toilleoirí **Capacitors**

toilleoir  capacitor	toilleoir leictrealaíoch (toilleoir polaraithe)  electrolytic capacitor (polarised capacitor)	toilleoir inathraithe  variable capacitor	toilleoir inathraithe réamhshocraithe  preset variable capacitor

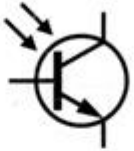
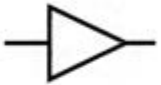
Dé-óidí **Diodes**

dé-óid  diode	dé-óid Zener  Zener diode	fótaidhé-óid  photodiode	dé-óid astaithe solais (LED)  light-emitting diode (LED)

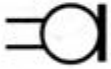
Méadair **Meters**

voltmhéadar  voltmeter	galbhánaiméadar  galvanometer	aimpmhéadar  ammeter	óm-mhéadar  ohmmeter
ascalascóp  oscilloscope			

Trasraitheoirí agus aimpliú **Transistors and amplification**

trasraitheoir cumair npn  npn-junction transistor	trasraitheoir tionchar réimse n-chainéil (JFET)  n-channel field-effect transistor (JFET)	fótathrasraitheoir  phototransistor	aimplitheoir  amplifier

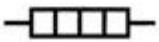
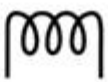
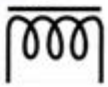
Fuaim **Audio**

micreafón  microphone	cluasán  earphone	callaire  loudspeaker	cloigín  bell
dordánaí  buzzer	trasduchtóir písileictreach  piezoelectric transducer	aeróg  aerial (antenna)	

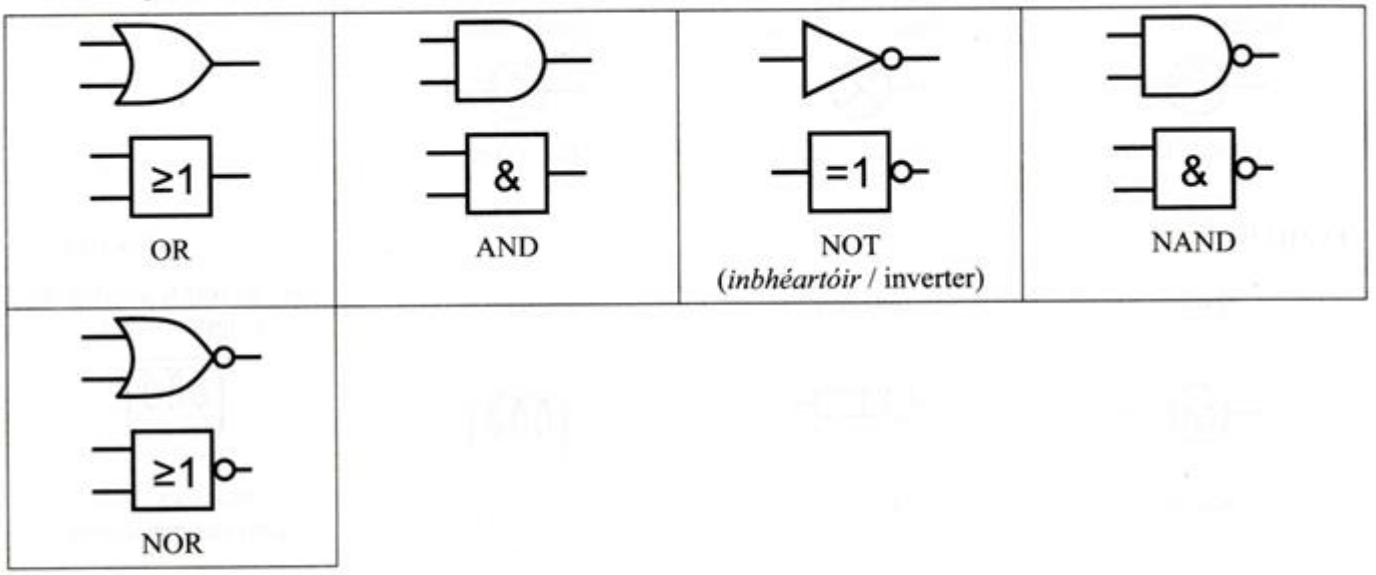
Lampaí **Lamps**

lampa filiméid	lampa comhartha	lampa neoin
		
filament lamp	signal lamp	neon lamp

Feistí eile **Other devices**

mótar	téitheoir	ionduchtóir	ionduchtóir le croíleacán fearómaighnéadach
			
motor	heater	inductor	inductor with ferromagnetic core

Geataí loighce **Logic gates**



Na dúile

The elements

Clár / Contents

Tábla peiriadach na ndúl

Periodic table of the elements

1												13	14	15	16	17	18
1 H 1.008	2																2 He 4.003
3 Li 6.941	4 Be 9.012											5 B 10.81	6 C 12.01	7 N 14.01	8 O 16.00	9 F 19.00	10 Ne 20.18
11 Na 22.99	12 Mg 24.31	3	4	5	6	7	8	9	10	11	12	13 Al 26.98	14 Si 28.09	15 P 30.97	16 S 32.07	17 Cl 35.45	18 Ar 39.95
19 K 39.10	20 Ca 40.08	21 Sc 44.96	22 Ti 47.87	23 V 50.94	24 Cr 52.00	25 Mn 54.94	26 Fe 55.85	27 Co 58.93	28 Ni 58.69	29 Cu 63.55	30 Zn 65.41	31 Ga 69.72	32 Ge 72.64	33 As 74.92	34 Se 78.96	35 Br 79.90	36 Kr 83.80
37 Rb 85.47	38 Sr 87.62	39 Y 88.91	40 Zr 91.22	41 Nb 92.91	42 Mo 95.94	43 Tc (97.91)	44 Ru 101.1	45 Rh 102.9	46 Pd 106.4	47 Ag 107.9	48 Cd 112.4	49 In 114.8	50 Sn 118.7	51 Sb 121.8	52 Te 127.6	53 I 126.9	54 Xe 131.3
55 Cs 132.9	56 Ba 137.3	57 La 138.9	72 Hf 178.5	73 Ta 180.9	74 W 183.8	75 Re 186.2	76 Os 190.2	77 Ir 192.2	78 Pt 195.1	79 Au 197.0	80 Hg 200.6	81 Tl 204.4	82 Pb 207.2	83 Bi 209.0	84 Po (209.0)	85 At (210.0)	86 Rn (222.0)
87 Fr (223.0)	88 Ra (226.0)	89 Ac (227.0)	104 Rf (261.1)	105 Db (262.1)	106 Sg (266.1)	107 Bh (264.1)	108 Hs (277.0)	109 Mt (268.1)	110 Ds (271.0)	111 Rg (272.2)	112 Uub (285.0)	113 Uut (284)	114 Uuq (289.0)	115 Uup (288)	116 Uuh (289.0)	117 Uus*	118 Uuo (293.0)

* Níor braitheadh an dúil seo go fóill (2009).
Ar lch 82 atá an tSraith Lantanóideach agus an tSraith Achtanóideach.
Cuireann na lúibíní in iúl nach bhfuil iseatóp cobhsaí ag an dúil.

* This element has not yet been detected (2009).
See page 82 for the Lanthanoid and the Actinoid Series.
Brackets indicate that the element has no stable isotope.

Clár na dúile / The elements contents

Clár / Contents

Fuinneamh céadianúcháin na ndúl
(ina kJ mol^{-1})

First ionisation energies of the elements
(in kJ mol^{-1})

1												13	14	15	16	17	18
1 H 1312	2																2 He 2372
3 Li 520	4 Be 900											5 B 801	6 C 1086	7 N 1402	8 O 1314	9 F 1681	10 Ne 2081
11 Na 496	12 Mg 738	3	4	5	6	7	8	9	10	11	12	13 Al 578	14 Si 789	15 P 1012	16 S 1000	17 Cl 1251	18 Ar 1521
19 K 419	20 Ca 590	21 Sc 631	22 Ti 658	23 V 650	24 Cr 653	25 Mn 717	26 Fe 759	27 Co 758	28 Ni 737	29 Cu 746	30 Zn 906	31 Ga 579	32 Ge 762	33 As 947	34 Se 941	35 Br 1140	36 Kr 1351
37 Rb 403	38 Sr 550	39 Y 616	40 Zr 660	41 Nb 665	42 Mo 685	43 Tc 702	44 Ru 711	45 Rh 720	46 Pd 805	47 Ag 731	48 Cd 868	49 In 558	50 Sn 709	51 Sb 834	52 Te 869	53 I 1008	54 Xe 1170
55 Cs 376	56 Ba 503	57 La 538	72 Hf 680	73 Ta 761	74 W 770	75 Re 760	76 Os 840	77 Ir 880	78 Pt 870	79 Au 890	80 Hg 1007	81 Tl 589	82 Pb 716	83 Bi 703	84 Po 812	85 At 890±40	86 Rn 1037
87 Fr 380	88 Ra 509	89 Ac 499	104 Rf 580	105 Db --	106 Sg --	107 Bh --	108 Hs --	109 Mt --	110 Ds --	111 Rg --	112 Uub --	113 Uut --	114 Uuq --	115 Uup --	116 Uuh --	117 Uus*	118 Uuo --

Ar lch 82 atá an tSraith Lantanóideach agus an tSraith Achtanóideach.

See page 82 for the Lanthanoid and the Actinoid Series.

Clár na dúile / The elements contents

Clár / Contents

Luachanna leictridhiúltachta na ndúl

(Ag baint úsáid as scála Pauling)

Electronegativity values of the elements

(Using the Pauling scale)

1																	18
1 H 2.20	2											13	14	15	16	17	2 He --
3 Li 0.98	4 Be 1.57											5 B 2.04	6 C 2.55	7 N 3.04	8 O 3.44	9 F 3.98	10 Ne --
11 Na 0.93	12 Mg 1.31	3	4	5	6	7	8	9	10	11	12	13 Al 1.61	14 Si 1.90	15 P 2.19	16 S 2.58	17 Cl 3.16	18 Ar --
19 K 0.82	20 Ca 1.00	21 Sc 1.36	22 Ti 1.54	23 V 1.63	24 Cr 1.66	25 Mn 1.55	26 Fe 1.83	27 Co 1.88	28 Ni 1.91	29 Cu 1.90	30 Zn 1.65	31 Ga 1.81	32 Ge 2.01	33 As 2.18	34 Se 2.55	35 Br 2.96	36 Kr --
37 Rb 0.82	38 Sr 0.95	39 Y 1.22	40 Zr 1.33	41 Nb 1.60	42 Mo 2.16	43 Tc 2.10	44 Ru 2.20	45 Rh 2.28	46 Pd 2.20	47 Ag 1.93	48 Cd 1.69	49 In 1.78	50 Sn 1.96	51 Sb 2.05	52 Te 2.10	53 I 2.66	54 Xe 2.60
55 Cs 0.79	56 Ba 0.89	57 La 1.10	72 Hf 1.30	73 Ta 1.50	74 W 1.70	75 Re 1.90	76 Os 2.20	77 Ir 2.20	78 Pt 2.20	79 Au 2.40	80 Hg 1.90	81 Tl 1.80	82 Pb 1.80	83 Bi 1.90	84 Po 2.00	85 At 2.20	86 Rn --
87 Fr 0.70	88 Ra 0.90	89 Ac 1.10	104 Rf --	105 Db --	106 Sg --	107 Bh --	108 Hs --	109 Mt --	110 Ds --	111 Rg --	112 Uub --	113 Uut --	114 Uuq --	115 Uup --	116 Uuh --	117 Uus*	118 Uuo --

Ar lch 82 atá an tSraith Lantanóideach agus an tSraith Achtanóideach.

See page 82 for the Lanthanoid and the Actinoid Series.

Tábla peiriadach na ndúl

Periodic table of the elements

An tSraith Lantanóideach Lanthanoid Series	58 **Ce** 140.1	59 **Pr** 140.9	60 **Nd** 144.2	61 **Pm** (144.9)	62 **Sm** 150.4	63 **Eu** 152.0	64 **Gd** 157.3	65 **Tb** 158.9	66 **Dy** 162.5	67 **Ho** 164.9	68 **Er** 167.3	69 **Tm** 168.9	70 **Yb** 173.0	71 **Lu** 175.0
An tSraith Achtanóideach Actinoid Series	90 **Th** 232.0	91 **Pa** 231.0	92 **U** 238.0	93 **Np** (237.0)	94 **Pu** (244.1)	95 **Am** (243.1)	96 **Cm** (247.1)	97 **Bk** (247.1)	98 **Cf** (251.1)	99 **Es** (252.1)	100 **Fm** (257.1)	101 **Md** (258.1)	102 **No** (259.1)	103 **Lr** (262.1)

Cuireann na lúibíní in iúl nach bhfuil iseatóp cobhsaí ag an dúil.

Brackets indicate that the element has no stable isotope.

Fuinneamh céadianúcháin na ndúl

(ina kJ mol^{-1})

First ionisation energies of the elements

(in kJ mol^{-1})

An tSraith Lantanóideach Lanthanoid Series	58 **Ce** 534	59 **Pr** 527	60 **Nd** 533	61 **Pm** 540	62 **Sm** 545	63 **Eu** 547	64 **Gd** 593	65 **Tb** 566	66 **Dy** 573	67 **Ho** 581	68 **Er** 589	69 **Tm** 597	70 **Yb** 603	71 **Lu** 524
An tSraith Achtanóideach Actinoid Series	90 **Th** 587	91 **Pa** 568	92 **U** 598	93 **Np** 605	94 **Pu** 581	95 **Am** 576	96 **Cm** 581	97 **Bk** 601	98 **Cf** 608	99 **Es** 619	100 **Fm** 627	101 **Md** 635	102 **No** 642	103 **Lr** 470

Luachanna leictridhiúltachta na ndúl

(Ag baint úsáid as scála Pauling)

Electronegativity values of the elements

(Using the Pauling scale)

An tSraith Lantanóideach Lanthanoid Series	58 **Ce** 1.12	59 **Pr** 1.13	60 **Nd** 1.14	61 **Pm** – –	62 **Sm** 1.17	63 **Eu** – –	64 **Gd** 1.20	65 **Tb** – –	66 **Dy** 1.22	67 **Ho** 1.23	68 **Er** 1.24	69 **Tm** 1.25	70 **Yb** – –	71 **Lu** 1.00
An tSraith Achtanóideach Actinoid Series	90 **Th** 1.30	91 **Pa** 1.50	92 **U** 1.70	93 **Np** 1.30	94 **Pu** 1.30	95 **Am** 1.30	96 **Cm** 1.30	97 **Bk** 1.30	98 **Cf** 1.30	99 **Es** 1.30	100 **Fm** 1.30	101 **Md** 1.30	102 **No** 1.30	103 **Lr** 1.30

Liosta atá sa tábla de mhaiseanna na núiclídí cobhsaí agus de mhaiseanna na n-iseatóp is fadsaolaí de na núiclídí éagobhsaí. Tugtar céatadán líonmhaireachta nádúrtha na núiclídí cobhsaí agus leathré na n-iseatóp is fadsaolaí de na núiclídí éagobhsaí. Tugtar sonraí breise i gcomhair an úráiniam.

The table lists the mass of the stable nuclides and that of the longest-lived isotope of the unstable nuclides. The percentage natural abundance is given for the stable nuclides and the half-life is given for the longest-lived isotope of the unstable nuclides. Additional information is given for uranium.

Z	*siombail* symbol	*mais adaimh* mass of atom (u)	*líonmhaireacht* abundance (%)	*leathré* half-life
1	^{1}H	1.007 825	99.9885	
	^{2}H	2.014 102	0.0115	
	^{3}H	3.016 049	–	12.33 y
2	^{3}He	3.016 029	0.000134	
	^{4}He	4.002 603	99.999866	
3	^{6}Li	6.015 123	7.59	
	^{7}Li	7.016 005	92.41	
4	^{9}Be	9.012 182	100	
5	^{10}B	10.012 937	19.9	
	^{11}B	11.009 305	80.1	
6	^{12}C	12.000 000	98.93	
	^{13}C	13.003 355	1.07	
	^{14}C	14.003 242	–	5730 y
7	^{14}N	14.003 074	99.636	
	^{15}N	15.000 109	0.364	
8	^{16}O	15.994 915	99.757	
	^{17}O	16.999 132	0.038	
	^{18}O	17.999 161	0.205	
9	^{19}F	18.998 403	100	
10	^{20}Ne	19.992 440	90.48	
	^{21}Ne	20.993 847	0.27	
	^{22}Ne	21.991 385	9.25	
11	^{23}Na	22.989 769	100	
12	^{24}Mg	23.985 042	78.99	
	^{25}Mg	24.985 837	10.00	
	^{26}Mg	25.982 593	11.01	
13	^{27}Al	26.981 538	100	
14	^{28}Si	27.976 927	92.223	

Clár / Contents

Z	*siombail* symbol	*mais adaimh* mass of atom (u)	*lionmhaireacht* abundance (%)	*leathré* half-life
	^{29}Si	28.976 495	4.685	
	^{30}Si	29.973 770	3.092	
15	^{31}P	30.973 762	100	
16	^{32}S	31.972 071	94.99	
	^{33}S	32.971 458	0.75	
	^{34}S	33.967 867	4.25	
	^{36}S	35.967 081	0.01	
17	^{35}Cl	34.968 853	75.76	
	^{37}Cl	36.965 903	24.24	
18	^{36}Ar	35.967 545	0.3365	
	^{38}Ar	37.962 732	0.0632	
	^{40}Ar	39.962 383	99.6003	
19	^{39}K	38.963 707	93.2581	
	^{40}K	39.963 999	0.0117	
	^{41}K	40.961 826	6.7302	
20	^{40}Ca	39.962 591	96.941	
	^{42}Ca	41.958 618	0.647	
	^{43}Ca	42.958 767	0.135	
	^{44}Ca	43.955 482	2.086	
	^{46}Ca	45.953 693	0.004	
	^{48}Ca	47.952 534	0.187	

Z	*siombail* symbol	*mais adaimh* mass of atom (u)	*lionmhaireacht* abundance (%)	*leathré* half-life
21	^{45}Sc	44.955 912	100	
22	^{46}Ti	45.952 632	8.25	
	^{47}Ti	46.951 763	7.44	
	^{48}Ti	47.947 946	73.72	
	^{49}Ti	48.947 870	5.41	
	^{50}Ti	49.944 791	5.18	
23	^{50}V	49.947 159	0.250	
	^{51}V	50.943 960	99.750	
24	^{50}Cr	49.946 044	4.345	
	^{52}Cr	51.940 508	83.789	
	^{53}Cr	52.940 649	9.501	
	^{54}Cr	53.938 880	2.365	
25	^{55}Mn	54.938 045	100	
26	^{54}Fe	53.939 611	5.845	
	^{56}Fe	55.934 938	91.754	
	^{57}Fe	56.935 394	2.119	
	^{58}Fe	57.933 276	0.282	
27	^{59}Co	58.933 195	100	
28	^{58}Ni	57.935 343	68.0769	
	^{60}Ni	59.930 786	26.2231	
	^{61}Ni	60.931 056	1.1399	

Z	*siombail* symbol	*mais adaimh* mass of atom (u)	*lionmhaireacht* abundance (%)	*leathré* half-life
	^{62}Ni	61.928 345	3.6345	
	^{64}Ni	63.927 966	0.9256	
29	^{63}Cu	62.929 598	69.15	
	^{65}Cu	64.927 790	30.85	
30	^{64}Zn	63.929 142	48.268	
	^{66}Zn	65.926 033	27.975	
	^{67}Zn	66.927 127	4.102	
	^{68}Zn	67.924 844	19.024	
	^{70}Zn	69.925 319	0.631	
31	^{69}Ga	68.925 574	60.108	
	^{71}Ga	70.924 701	39.892	
32	^{70}Ge	69.924 247	20.38	
	^{72}Ge	71.922 076	27.31	
	^{73}Ge	72.923 459	7.76	
	^{74}Ge	73.921 178	36.72	
	^{76}Ge	75.921 403	7.83	
33	^{75}As	74.921 597	100	
34	^{74}Se	73.922 476	0.89	
	^{76}Se	75.919 214	9.37	
	^{77}Se	76.919 914	7.63	
	^{78}Se	77.917 309	23.77	

Z	*siombail* symbol	*mais adaimh* mass of atom (u)	*lionmhaireacht* abundance (%)	*leathré* half-life
	^{80}Se	79.916 521	49.61	
	^{82}Se	81.916 700	8.73	
35	^{79}Br	78.918 337	50.69	
	^{81}Br	80.916 291	49.31	
36	^{78}Kr	77.920 365	0.355	
	^{80}Kr	79.916 379	2.286	
	^{82}Kr	81.913 484	11.593	
	^{83}Kr	82.914 136	11.500	
	^{84}Kr	83.911 507	56.987	
	^{86}Kr	85.910 611	17.279	
37	^{85}Rb	84.911 790	72.17	
	^{87}Rb	86.909 181	27.83	
38	^{84}Sr	83.913 425	0.56	
	^{86}Sr	85.909 260	9.86	
	^{87}Sr	86.908 877	7.00	
	^{88}Sr	87.905 612	82.58	
39	^{89}Y	88.905 848	100	
40	^{90}Zr	89.904 704	51.45	
	^{91}Zr	90.905 645	11.22	
	^{92}Zr	91.905 041	17.15	
	^{94}Zr	93.906 315	17.38	

Clár / Contents

Z	*siombail* symbol	*mais adaimh* mass of atom (u)	*lionmhaireacht* abundance (%)	*leathré* half-life
	^{96}Zr	95.908 273	2.80	
41	^{93}Nb	92.906 378	100	
42	^{92}Mo	91.906 811	14.77	
	^{94}Mo	93.905 088	9.23	
	^{95}Mo	94.905 842	15.90	
	^{96}Mo	95.904 680	16.68	
	^{97}Mo	96.906 020	9.56	
	^{98}Mo	97.905 408	24.19	
	^{100}Mo	99.907 477	9.67	
43	^{98}Tc	97.907 216	–	4.2×10^6 y
44	^{96}Ru	95.907 598	5.54	
	^{98}Ru	97.905 287	1.87	
	^{99}Ru	98.905 939	12.76	
	^{100}Ru	99.904 220	12.60	
	^{101}Ru	100.905 582	17.06	
	^{102}Ru	101.904 350	31.55	
	^{104}Ru	103.905 433	18.62	
45	^{103}Rh	102.905 504	100	
46	^{102}Pd	101.905 609	1.02	
	^{104}Pd	103.904 036	11.14	
	^{105}Pd	104.905 085	22.33	
	^{106}Pd	105.903 486	27.33	
	^{108}Pd	107.903 892	26.46	
	^{110}Pd	109.905 153	11.72	
47	^{107}Ag	106.905 097	51.839	
	^{109}Ag	108.904 752	48.161	
48	^{106}Cd	105.906 459	1.25	
	^{108}Cd	107.904 184	0.89	
	^{110}Cd	109.903 002	12.49	
	^{111}Cd	110.904 178	12.80	
	^{112}Cd	111.902 758	24.13	
	^{113}Cd	112.904 402	12.22	
	^{114}Cd	113.903 359	28.73	
	^{116}Cd	115.904 756	7.49	
49	^{113}In	112.904 058	4.29	
	^{115}In	114.903 878	95.71	
50	^{112}Sn	111.904 819	0.97	
	^{114}Sn	113.902 780	0.66	
	^{115}Sn	114.903 342	0.34	
	^{116}Sn	115.901 741	14.54	
	^{117}Sn	116.902 952	7.68	
	^{118}Sn	117.901 603	24.22	

Z	*siombail* symbol	*mais adaimh* mass of atom (u)	*lionmhaireacht* abundance (%)	*leathré* half-life
	^{119}Sn	118.903 308	8.59	
	^{120}Sn	119.902 195	32.58	
	^{122}Sn	121.903 440	4.63	
	^{124}Sn	123.905 274	5.79	
51	^{121}Sb	120.903 816	57.21	
	^{123}Sb	122.904 214	42.79	
52	^{120}Te	119.904 020	0.09	
	^{122}Te	121.903 044	2.55	
	^{123}Te	122.904 270	0.89	
	^{124}Te	123.902 818	4.74	
	^{125}Te	124.904 431	7.07	
	^{126}Te	125.903 312	18.84	
	^{128}Te	127.904 463	31.74	
	^{130}Te	129.906 224	34.08	
53	^{127}I	126.904 473	100	
54	^{124}Xe	123.905 893	0.0952	
	^{126}Xe	125.904 274	0.0890	
	^{128}Xe	127.903 531	1.9102	
	^{129}Xe	128.904 779	26.4006	
	^{130}Xe	129.903 508	4.0710	
	^{131}Xe	130.905 082	21.2324	

Z	*siombail* symbol	*mais adaimh* mass of atom (u)	*lionmhaireacht* abundance (%)	*leathré* half-life
	^{132}Xe	131.904 154	26.9086	
	^{134}Xe	133.905 395	10.4357	
	^{136}Xe	135.907 220	8.8573	
55	^{133}Cs	132.905 452	100	
56	^{130}Ba	129.906 321	0.106	
	^{132}Ba	131.905 061	0.101	
	^{134}Ba	133.904 508	2.417	
	^{135}Ba	134.905 687	6.592	
	^{136}Ba	135.904 576	7.854	
	^{137}Ba	136.905 827	11.232	
	^{138}Ba	137.905 247	71.698	
57	^{138}La	137.907 112	0.090	
	^{139}La	138.906 353	99.910	
58	^{136}Ce	135.907 172	0.185	
	^{138}Ce	137.905 991	0.251	
	^{140}Ce	139.905 439	88.450	
	^{142}Ce	141.909 244	11.114	
59	^{141}Pr	140.907 643	100	
60	^{142}Nd	141.907 723	27.2	
	^{143}Nd	142.909 814	12.2	
	^{144}Nd	143.910 088	23.8	

Clár / Contents

Z	*siombail* symbol	*mais adaimh* mass of atom (u)	*lionmhaireacht* abundance (%)	*leathré* half-life
	^{145}Nd	144.912 574	8.3	
	^{146}Nd	145.913 117	17.2	
	^{148}Nd	147.916 893	5.7	
	^{150}Nd	149.920 891	5.6	
61	^{145}Pm	144.912 744	–	17.7 y
62	^{144}Sm	143.911 999	3.07	
	^{147}Sm	146.914 898	14.99	
	^{148}Sm	147.914 823	11.24	
	^{149}Sm	148.917 185	13.82	
	^{150}Sm	149.917 276	7.38	
	^{152}Sm	151.919 732	26.75	
	^{154}Sm	153.922 209	22.75	
63	^{151}Eu	150.919 850	47.81	
	^{153}Eu	152.921 230	52.19	
64	^{152}Gd	151.919 791	0.20	
	^{154}Gd	153.920 866	2.18	
	^{155}Gd	154.922 622	14.80	
	^{156}Gd	155.922 123	20.47	
	^{157}Gd	156.923 960	15.65	
	^{158}Gd	157.924 104	24.84	
	^{160}Gd	159.927 054	21.86	

Z	*siombail* symbol	*mais adaimh* mass of atom (u)	*lionmhaireacht* abundance (%)	*leathré* half-life
65	^{159}Tb	158.925 347	100	
66	^{156}Dy	155.924 283	0.056	
	^{158}Dy	157.924 409	0.095	
	^{160}Dy	159.925 198	2.29	
	^{161}Dy	160.926 933	18.889	
	^{162}Dy	161.926 798	25.475	
	^{163}Dy	162.928 731	24.896	
	^{164}Dy	163.929 175	28.260	
67	^{165}Ho	164.930 322	100	
68	^{162}Er	161.928 778	0.139	
	^{164}Er	163.929 200	1.601	
	^{166}Er	165.930 293	33.503	
	^{167}Er	166.932 048	22.869	
	^{168}Er	167.932 370	26.978	
	^{170}Er	169.935 464	14.910	
69	^{169}Tm	168.934 213	100	
70	^{168}Yb	167.933 897	0.13	
	^{170}Yb	169.934 762	3.04	
	^{171}Yb	170.936 326	14.28	
	^{172}Yb	171.936 382	21.83	
	^{173}Yb	172.938 211	16.13	

Z	*siombail* symbol	*mais adaimh* mass of atom (u)	*lionmhaireacht* abundance (%)	*leathré* half-life
	^{174}Yb	173.938 862	31.83	
	^{176}Yb	175.942 572	12.76	
71	^{175}Lu	174.940 772	97.41	
	^{176}Lu	175.942 686	2.59	
72	^{174}Hf	173.940 046	0.16	
	^{176}Hf	175.941 409	5.26	
	^{177}Hf	176.943 221	18.60	
	^{178}Hf	177.943 699	27.28	
	^{179}Hf	178.945 816	13.62	
	^{180}Hf	179.946 550	35.08	
73	^{180}Ta	179.947 465	0.012	
	^{181}Ta	180.947 996	99.988	
74	^{180}W	179.946 704	0.12	
	^{182}W	181.948 204	26.50	
	^{183}W	182.950 223	14.31	
	^{184}W	183.950 931	30.64	
	^{186}W	185.954 364	28.43	
75	^{185}Re	184.952 955	37.40	
	^{187}Re	186.955 753	62.60	
76	^{184}Os	183.952 489	0.02	
	^{186}Os	185.953 838	1.59	

Z	*siombail* symbol	*mais adaimh* mass of atom (u)	*lionmhaireacht* abundance (%)	*leathré* half-life
	^{187}Os	186.955 751	1.96	
	^{188}Os	187.955 838	13.24	
	^{189}Os	188.958 148	16.15	
	^{190}Os	189.958 447	26.26	
	^{192}Os	191.961 481	40.78	
77	^{191}Ir	190.960 594	37.3	
	^{193}Ir	192.962 926	62.7	
78	^{190}Pt	189.959 932	0.014	
	^{192}Pt	191.961 038	0.782	
	^{194}Pt	193.962 680	32.967	
	^{195}Pt	194.964 791	33.832	
	^{196}Pt	195.964 952	25.242	
	^{198}Pt	197.967 893	7.163	
79	^{197}Au	196.966 569	100	
80	^{196}Hg	195.965 833	0.15	
	^{198}Hg	197.966 769	9.97	
	^{199}Hg	198.968 280	16.87	
	^{200}Hg	199.968 326	23.10	
	^{201}Hg	200.970 302	13.18	
	^{202}Hg	201.970 643	29.86	
	^{204}Hg	203.973 494	6.87	

Z	*siombail* symbol	*mais adaimh* mass of atom (u)	*lionmhaireacht* abundance (%)	*leathré* half-life
81	^{203}Tl	202.972 344	29.52	
	^{205}Tl	204.974 428	70.48	
82	^{204}Pb	203.973 044	1.4	
	^{206}Pb	205.974 465	24.1	
	^{207}Pb	206.975 897	22.1	
	^{208}Pb	207.976 652	52.4	
83	^{209}Bi	208.980 379	100	
84	^{209}Po	208.982 430	–	103 y
85	^{210}At	209.987 150	–	8.1 h
86	^{222}Rn	222.017 578	–	3.824 d
87	^{223}Fr	223.019 736	–	22.0 min
88	^{226}Ra	226.025 410	–	1602 y
89	^{227}Ac	227.027 752	–	21.77 y
90	^{232}Th	232.038 055	–	1.4×10^{10} y
91	^{231}Pa	231.035 884	–	3.28×10^{4} y
92	^{234}U	234.040 952	0.0054	2.46×10^{6} y
	^{235}U	235.043 930	0.7204	7.04×10^{8} y
	^{238}U	238.050 788	99.2742	4.47×10^{9} y
93	^{237}Np	237.048 167	–	2.14×10^{6} y
94	^{244}Pu	244.067 900	–	8.08×10^{7} y
95	^{243}Am	243.061 381	–	7.37×10^{3} y

Z	*siombail* symbol	*mais adaimh* mass of atom (u)	*lionmhaireacht* abundance (%)	*leathré* half-life
96	^{247}Cm	247.070 354	–	1.56×10^{7} y
97	^{247}Bk	247.070 310	–	1.38×10^{3} y
98	^{251}Cf	251.079 587	–	898 y
99	^{252}Es	252.082 980	–	1.29 y
100	^{257}Fm	257.095 110	–	100.5 d
101	^{258}Md	258.098 431	–	51.5 d
102	^{259}No	259.101 024	–	57 min
103	^{262}Lr	262.1096	–	3.6 h
104	^{263}Rf	263.1126	–	10.0 min
105	^{262}Db	262.1141	–	0.5 min
106	^{266}Sg	266.1221	–	~ 21 s
107	^{264}Bh	264.1246	–	1.0 s
108	^{269}Hs	269.1341	–	~ 14 s
109	^{268}Mt	268.1387	–	~ 42 ms
110	^{273}Ds	272.1489	–	118 ms
111	^{272}Rg	272.1536	–	~ 2 ms
112	^{285}Uub	285.174	–	~34 s
113	^{284}Uut	284.178	–	~ 0.49 s
114	^{289}Uuq	289.187	–	~ 2.7 s
115	^{288}Uup	288.192	–	~ 87.5 ms
116	^{293}Uuh	(293)	–	~ 0.05 s
118	^{294}Uuo	(294)	–	~ 2.0 ms

Clár / Contents

Dúile, sórtáilte de réir na siombailí — Elements, sorted by symbol

Dúil	*Siombail* Symbol	Z	Element
achtainiam	Ac	89	actinium
airgead	Ag	47	silver
alúmanam	Al	13	aluminium
aimeiriciam	Am	95	americium
argón	Ar	18	argon
arsanaic	As	33	arsenic
astaitín	At	85	astatine
ór	Au	79	gold
bórón	B	5	boron
bairiam	Ba	56	barium
beirilliam	Be	4	beryllium
bóiriam	Bh	107	bohrium
biosmat	Bi	83	bismuth
beircéiliam	Bk	97	berkelium
bróimín	Br	35	bromine
carbón	C	6	carbon
cailciam	Ca	20	calcium
caidmiam	Cd	48	cadmium
ceiriam	Ce	58	cerium
calafoirniam	Cf	98	californium
clóirín	Cl	17	chlorine

Dúil	*Siombail* Symbol	Z	Element
ciúiriam	Cm	96	curium
cóbalt	Co	27	cobalt
cróimiam	Cr	24	chromium
caeisiam	Cs	55	caesium
copar	Cu	29	copper
deoitéiriam	D	1	deuterium
dúibniam	Db	105	dubnium
darmstaidiam	Ds	110	darmstadtium
diospróisiam	Dy	66	dysprosium
eirbiam	Er	68	erbium
éinstéiniam	Es	99	einsteinium
eoraipiam	Eu	63	europium
fluairín	F	9	fluorine
iarann	Fe	26	iron
feirmiam	Fm	100	fermium
frainciam	Fr	87	francium
gailliam	Ga	31	gallium
gadailiniam	Gd	64	gadolinium
gearmáiniam	Ge	32	germanium
hidrigin	H	1	hydrogen
héiliam	He	2	helium

Clár / Contents

Dúil	*Siombail* Symbol	Z	Element
haifniam	Hf	72	hafnium
mearcair	Hg	80	mercury
hoilmiam	Ho	67	holmium
haisiam	Hs	108	hassium
iaidín	I	53	iodine
indiam	In	49	indium
iridiam	Ir	77	iridium
potaisiam	K	19	potassium
crioptón	Kr	36	krypton
lantanam	La	57	lanthanum
litiam	Li	3	lithium
láirinciam	Lr	103	lawrencium
lúitéitiam	Lu	71	lutetium
meindiléiviam	Md	101	mendelevium
maignéisiam	Mg	12	magnesium
mangainéis	Mn	25	manganese
molaibdéineam	Mo	42	molybdenum
meitniriam	Mt	109	meitnerium
nítrigin	N	7	nitrogen
sóidiam	Na	11	sodium
niaibiam	Nb	41	niobium
neoidimiam	Nd	60	neodymium
neon	Ne	10	neon

Dúil	*Siombail* Symbol	Z	Element
nicil	Ni	28	nickel
nóbailiam	No	102	nobelium
neiptiúiniam	Np	93	neptunium
ocsaigin	O	8	oxygen
oismiam	Os	76	osmium
fosfair	P	15	phosphorus
prótachtainiam	Pa	91	protactinium
luaidhe	Pb	82	lead
pallaidiam	Pd	46	palladium
próiméitiam	Pm	61	promethium
polóiniam	Po	84	polonium
praiséidimiam	Pr	59	praseodymium
platanam	Pt	78	platinum
plútóiniam	Pu	94	plutonium
raidiam	Ra	88	radium
rubaidiam	Rb	37	rubidium
réiniam	Re	75	rhenium
rutarfoirdiam	Rf	104	rutherfordium
rointginiam	Rg	111	roentgenium
róidiam	Rh	45	rhodium
radón	Rn	86	radon
ruitéiniam	Ru	44	ruthenium
sulfar	S	16	sulfur

Dúil	*Siombail* Symbol	Z	Element
antamón	Sb	51	antimony
scaindiam	Sc	21	scandium
seiléiniam	Se	34	selenium
seaboirgiam	Sg	106	seaborgium
sileacan	Si	14	silicon
samairiam	Sm	62	samarium
stán	Sn	50	tin
strointiam	Sr	38	strontium
tritiam	T	1	tritium
tantalam	Ta	73	tantalum
teirbiam	Tb	65	terbium
teicnéitiam	Tc	43	technetium
teallúiriam	Te	52	tellurium
tóiriam	Th	90	thorium
tíotáiniam	Ti	22	titanium
tailliam	Tl	81	thallium
túiliam	Tm	69	thulium
úráiniam	U	92	uranium
únúinbiam	Uub	112	ununbium
únúinheicsiam	Uuh	116	ununhexium
únúnoichtiam	Uuo	118	ununoctium
únúinpeintiam	Uup	115	ununpentium
únúncuaidiam	Uuq	114	ununquadium

Dúil	*Siombail* Symbol	Z	Element
únúinseiptiam	Uus	117	ununseptium
únúintriam	Uut	113	ununtrium
vanaidiam	V	23	vanadium
tungstan	W	74	tungsten
xeanón	Xe	54	xenon
itriam	Y	39	yttrium
itéirbiam	Yb	70	ytterbium
sinc	Zn	30	zinc
siorcóiniam	Zr	40	zirconium

Clár / Contents

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Clár / Contents

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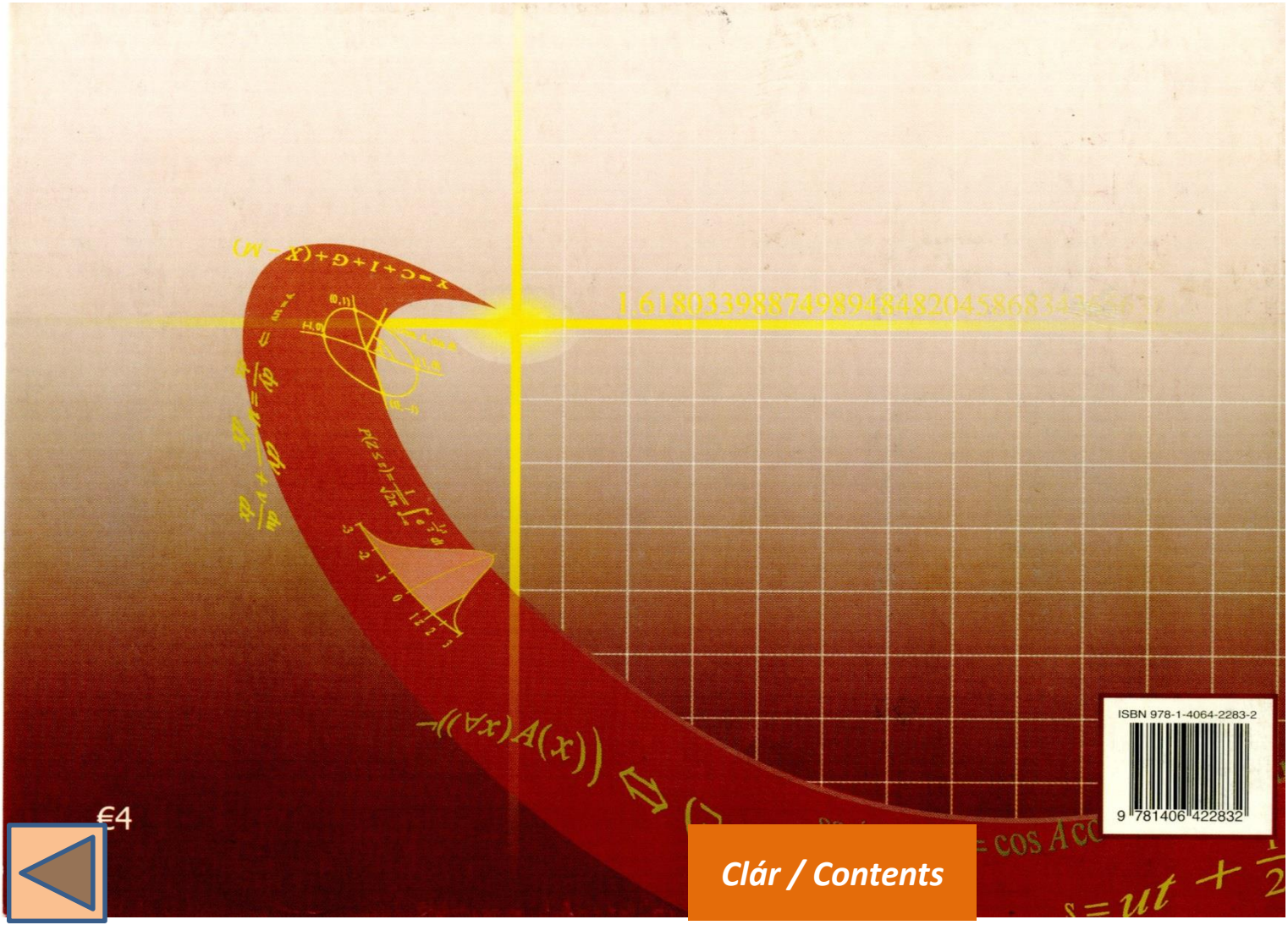

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Clár / Contents