



Cúrsaí airgid

“Cá fhad a thógfaidh sé ar an tsuim airgid dúbailt, infheistithe ag 20% ús iolraithe agus é iolraithe go bliantúil?”

**Teastaíonn uainn an t-ionchur (an chúis) a ríomh.
Is é an t-easpónant/cumhacht/séan an anaithnid.**

Comhthéacs Stairiúil

(16^ú agus go luath sa 17^ú haois)

- Fás as cuimse ar eolas eolaíochtúil, Tíreolaíocht, Fisic agus Réalteolaíocht.
- Eolaithe ag caitheamh an iomarca ama ag déanamh ríomhanna tuirsiúla uimhriúla.
- Bhí gá le haireageán a scaoilfeadh eolaithe saor ón tromualach seo.
- Thug an matamaiticeoir Albanach John Napier (1550 – 1617) aghaidh ar an dúshlán.



Réamheolas

Séana, cumhachtaí,
easpónaint

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

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

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

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

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



x	2^x
0	1
1	2
2	4
3	8
4	16
5	32
6	64
7	128
8	256
9	512
10	1024
11	2048
12	4096

Cén cineálacha sraithe a thaispeántar anseo?

Tá coibhneas simplí idir téarmaí an tSeichimh Iolraígh agus séana nó easpónaint chóimheas coiteann an tSeichimh Iolraígh a fhreagraíonn dóibh.

Is é an coibhneas seo an idé chroílárnach atá mar bhonloch ag aireagán Napier.

Ríomh mar a leanas:

(a) 32×128

(b) $4096 \div 512$

(c) 8^4

Bain úsáid as an tábla agus as d'eolas ar shéana.

x	2^x
0	1
1	2
2	4
3	8
4	16
5	32
6	64
7	128
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9	512
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2	4
3	8
4	16
5	32
6	64
7	128
8	256
9	512
10	1024
11	2048
12	4096

Ríomh:

(i) 32×128

Méadú athraithe go suimiú!

Déan seiceáil ar na samplaí.

x	2^x
0	1
1	2
2	4
3	8
4	16
5	32
6	64
7	128
8	256
9	512
10	1024
11	2048
12	4096

Ríomh:

$$(ii) 4096 \div 512$$

Roinnt athraithe go dealú!

Déan seiceáil ar shamplaí eile.

x	2^x
0	1
1	2
2	4
3	8
4	16
5	32
6	64
7	128
8	256
9	512
10	1024
11	2048
12	4096

$\times 4$ 3 8 $\wedge 4$

Ríomh:

(iii) 8^4

$$8^4 = (2^3)^4 = (2)^{3 \times 4} = (2)^{12}$$

Easpónantú athraithe go méadú!

Déan seiceáil ar shamplaí eile.

Bearnaí sa tábla



(uimhir sheasta)^{cumhacht} = uimhir dheimhneach

“Dá bhféadfaimis aon uimhir dheimhneach a scríobh mar chumhacht de uimhir sheasta éigin, (ar ar tugadh ‘an bonn’ ní ba dhéanaí), ansin d’athrófaí méadú agus roinnt uimhreacha go suimiú agus dealú a n-easpónant.”

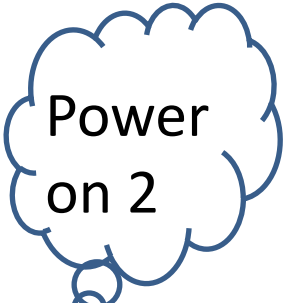
Chaith sé 20 bliain dá shaol ag tarraingt suas táblaí de chumhachtaí boinn do aon uimhir dheimhneach ar bith!

- Cén chumhacht a chuirim ar 2 le 256 a thabhairt ?

- Cén chumhacht a chuirim ar 2 le 1024 a thabhairt?

x	2^x
0	1
1	2
2	4
3	8
4	16
5	32
6	64
7	128
8	256
9	512
10	1024
11	2048
12	4096

$$2^x = y \Leftrightarrow \log_2(y) = x$$



\log_2 ←

$$\log_2(256) = 8$$

$$\log_2(1024) = 10$$

$$\log_2(1) = 0$$

$$\log_2(2) = 1$$

x	2^x
0	1
1	2
2	4
3	8
4	16
5	32
6	64
7	128
8	256
9	512
10	1024
11	2048
12	4096

Is iad na hionchuir do $y= 2^x$ ná “ \log_2 ”.

Laghdaíonn logartaim raon mór uimhreacha go raon níos soláimhsithe .

Ciallaíonn meadú de 1 ar an scála \log_2 sa bhunscála.



$$2^x = y \Leftrightarrow \log_2(y) = x$$

Cleachtadh sa leabhrán:
aistriú idir foirmeacha
easpónantúla agus
foirmeacha logartaim

Power
on 2

\log_2



$$\log_2(256) = 8$$

$$\log_2(1024) = 10$$

$$\log_2(1) = 0$$

$$\log_2(2) = 1$$

x	2^x
0	1
1	2
2	4
3	8
4	16
5	32
6	64
7	128
8	256
9	512
10	1024
11	2048
12	4096

Is iad na hionchuir
do $y = 2^x$ ná “ \log_2 ”.

Laghdaíonn
logartaim raon mór
uimhreacha go raon
níos soláimhsithe .

Ciallaíonn meadú de
1 ar an scála \log_2
..... sa
bhunscála.



x	2^x
0	1
1	2
2	4
3	8
4	16
5	32
6	64
7	128
8	256
9	512
10	1024
11	2048
12	4096

Céard iad na luachanna
ar x dá bhfuil
 $\log_2(x) < 0$?

Log₂ (uimhreacha idir 0 agus 1)



x	2^x
0	1
-1	1/2
-2	1/4
-3	1/8
-4	1/16
-5	1/32
-6	1/64
-7	1/128
-8	1/256
-9	1/512
-10	1/1024

x	$\log_2 x$
1	0
1/2	
1/4	
1/8	
1/16	
1/32	
1/64	
1/128	
1/256	
1/512	
1/1024	

Leathann
logartaim
miondifríocht

x	2^x
0	1
1	2
2	4
3	8
4	16
5	32
6	64
7	128
8	256
9	512
10	1,024

x	3^x
0	1
1	3
2	9
3	27
4	81
5	243
6	729
7	2,187
8	6,561
9	19,683
10	59,049

x	5^x
0	1
1	5
2	25
3	125
4	625
5	3,125
6	15,625
7	78,125
8	390,625
9	1,953,125
10	9,765,625

x	6^x
0	1
1	6
2	36
3	216
4	1,296
5	7,776
6	46,656
7	279,936
8	1,679,616
9	10,077,696
10	60,466,176

x	10^x
0	1
1	10
2	100
3	1,000
4	10,000
5	100,000
6	1,000,000
7	10,000,000
8	100,000,000
9	1,000,000,000
10	10,000,000,000

2^x	$\log_2(2^x)$
1	0
2	1
4	2
8	3
16	4
32	5
64	6
128	7
256	8
512	9
1,024	10

3^x	$\log_3(3^x)$
1	0
3	1
9	2
27	3
81	4
243	5
729	6
2,187	7
6,561	8
19,683	9
59,049	10

5^x	$\log_5(5^x)$
1	0
5	1
25	2
125	3
625	4
3,125	5
15,625	6
78,125	7
390,625	8
1,953,125	9
9,765,625	10

6^x	$\log_6(6^x)$
1	0
6	1
36	2
216	3
1,296	4
7,776	5
46,656	6
279,936	7
1,679,616	8
10,077,696	9
60,466,176	10


Logartaim choiteanna (Log)

10^x	$\log_{10}(10^x)$
1	0
10	1
100	2
1,000	3
10,000	4
100,000	5
1,000,000	6
10,000,000	7
100,000,000	8
1,000,000,000	9
10,000,000,000	10

Cuireann logartaim uimhreacha ar scála atá soláimhsithe ag an duine. Tá milliúin, billiúin agus trilliúin millteach mór ach smachtaítear iad trína scríobh mar chumhachtaí de 10. Níl iontu ach 6 agus 9 agus 12!

Dá mhéad é an bonn is ea is lú log na huimhreach ar an mbonn sin.

An bonn e agus logartaim nádúrtha (\ln)



x	e^x
0	1
1	e^1
2	e^2
3	e^3
4	e^4
5	e^5
6	e^6
7	e^7
8	e^8
9	e^9
10	e^{10}

e^x	$\log_e(x) = \ln(x)$
1	0
e^1	1
e^2	2
e^3	3
e^4	4
e^5	5
e^6	6
e^7	7
e^8	8
e^9	9
e^{10}	10

Is cumachtaí den bhonn e iad logartaim nádúrtha

Switching between Exponential and logarithmic forms of Equations

4.

Evaluate the expression below forming an equation	Write the equivalent exponential form of the equation formed from the first column
$\log_2 16 = 4$	$2^4 = 16$
$\log_2 \left(\frac{1}{64} \right)$	$2^x = \frac{1}{64}$
$\log_2(1)$	$2^x = 1$
$\log_2 \left(\frac{1}{8} \right)$	$2^x = \frac{1}{8}$
$\log_e e$	$2^e = e$
$\log_2(-4)$	$2^x = -4$

5.

Exponential form of an equation	Write the equivalent log form of the equation in the previous column
$5^2 = 25$	$\log_5 25 = 2$
$5^{-2} = \frac{1}{25}$	$\log_5 \left(\frac{1}{25} \right) = -2$
$10^1 = 10$	$\log_{10} 10 = 1$
$9^{\frac{1}{2}} = 3$	$\log_9 3 = \left(\frac{1}{2} \right)$
$27^{\frac{1}{3}} = 3$	$\log_{27} 3 = \left(\frac{1}{3} \right)$
$b^0 = 1$	$\log_b 1 = 0$

Switching between Exponential and logarithmic forms of Equations

4.

Evaluate the expression below forming an equation	Write the equivalent exponential form of the equation formed from the first column
$\log_2 16 = 4$	$2^4 = 16$
$\log_2 \left(\frac{1}{64} \right)$	$2^{-6} = \frac{1}{64}$
$\log_2 (1)$	$2^0 = 1$
$\log_2 \left(\frac{1}{8} \right)$	$2^{-3} = \frac{1}{8}$
$\log_e e$	$e^1 = e$
$\log_2 (-4)$	<i>dodhéanta</i>

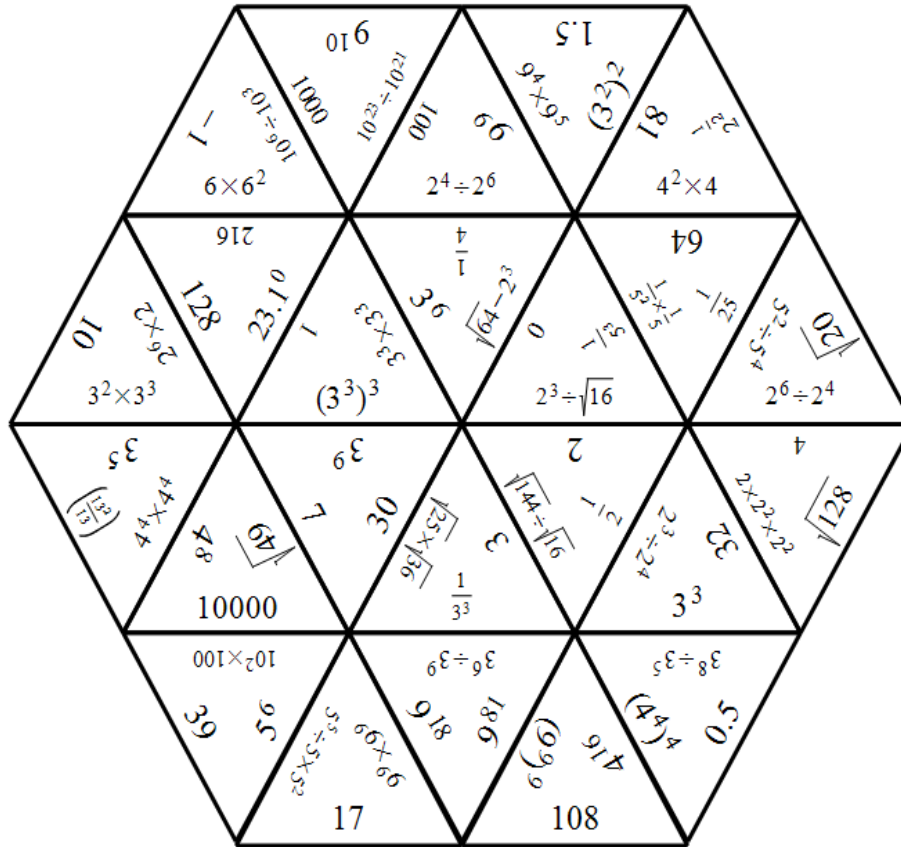
5.

Exponential form of an equation	Write the equivalent log form of the equation in the previous column
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$10^1 = 10$	$\log_{10} 10 = 1$
$9^{\frac{1}{2}} = 3$	$\log_9 3 = \left(\frac{1}{2} \right)$
$27^{\frac{1}{3}} = 3$	$\log_{27} 3 = \left(\frac{1}{3} \right)$
$b^0 = 1$	$\log_b 1 = 0$

Formulator Tarsia

Tarsia - [Indices puzzle]

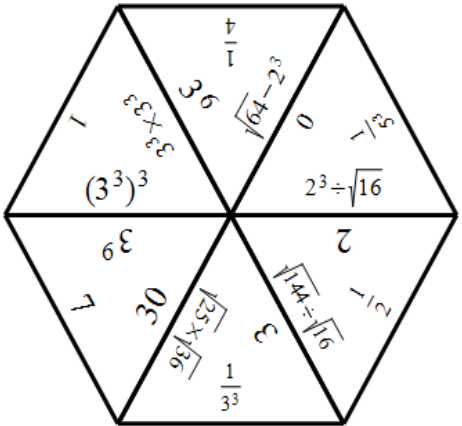
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Number



Algebra



Geometry



Statistics

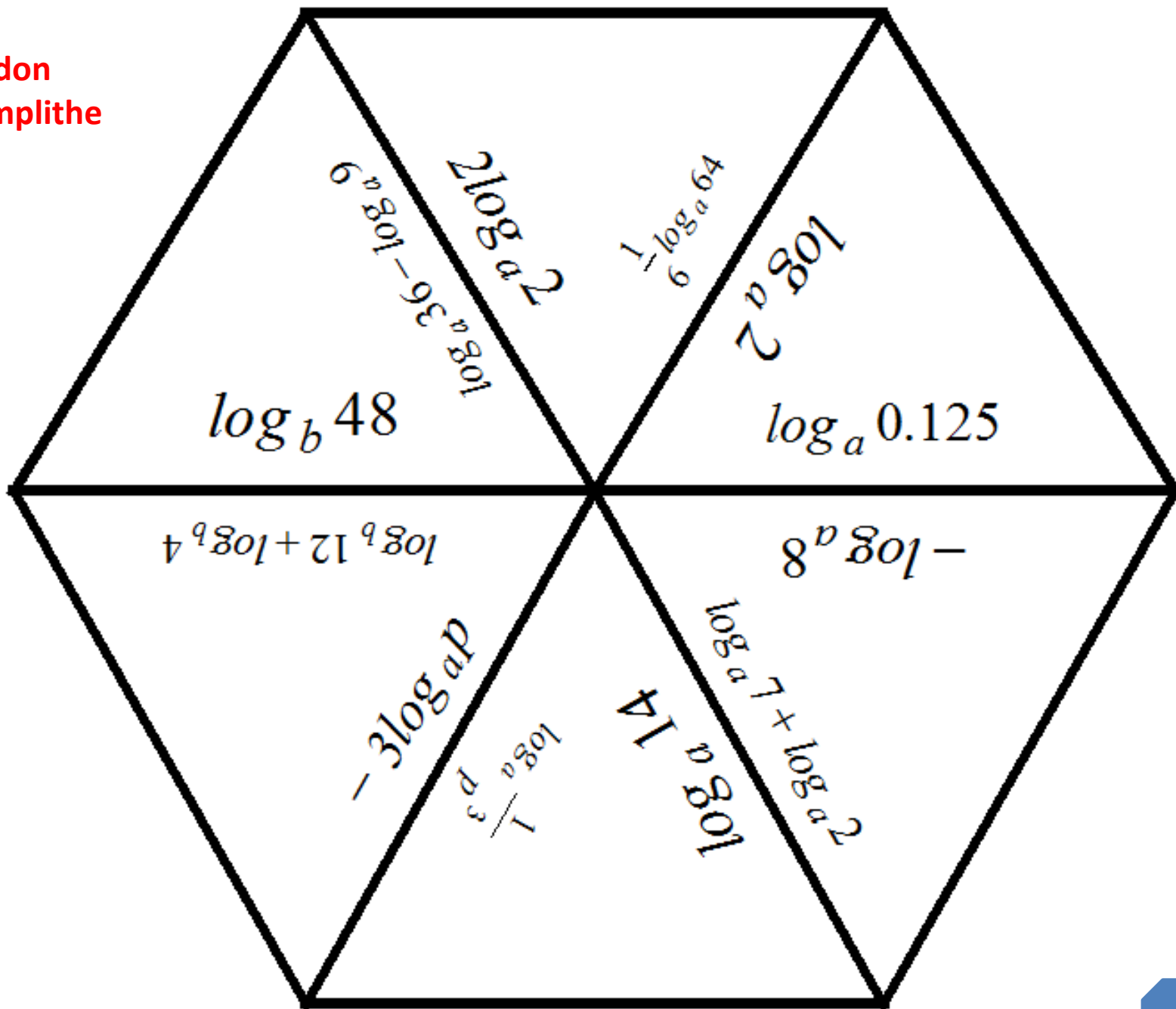
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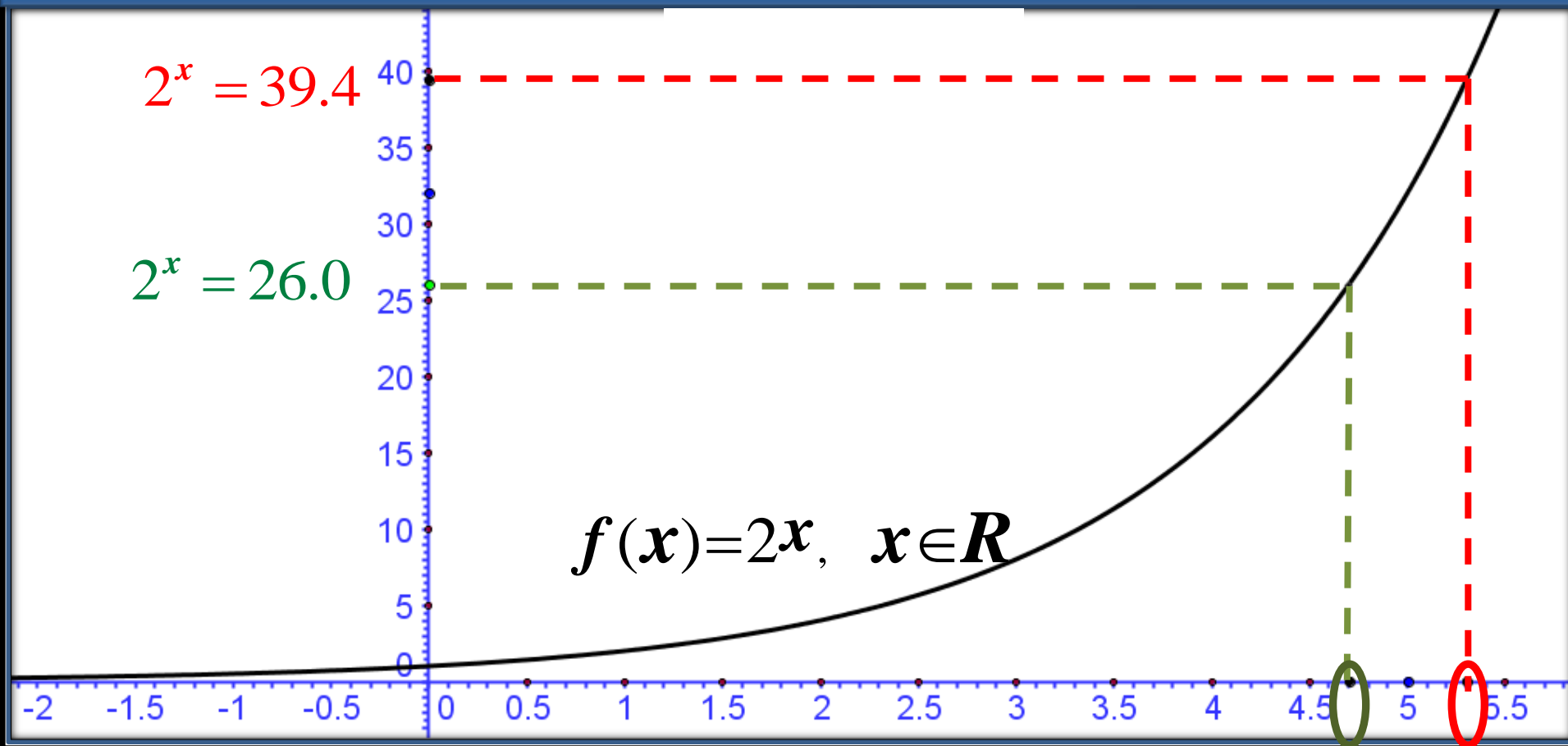
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Réiteach don
leagan simplithe



Bain úsáid as graf $y=2^x$ chun (i) $\log_2 26$ (ii) $\log_2 39.4$ a mheas?



$$2^{4.7} \approx 26 \quad \Rightarrow \log_2(26) \approx 4.7$$

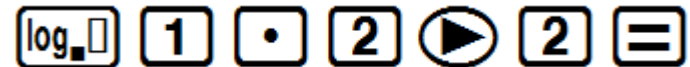
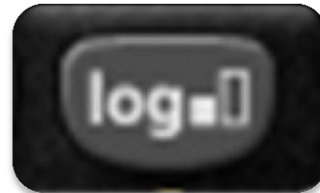
$$2^{5.3} \approx 39.4 \quad \Rightarrow \log_2(39.4) = 5.3$$



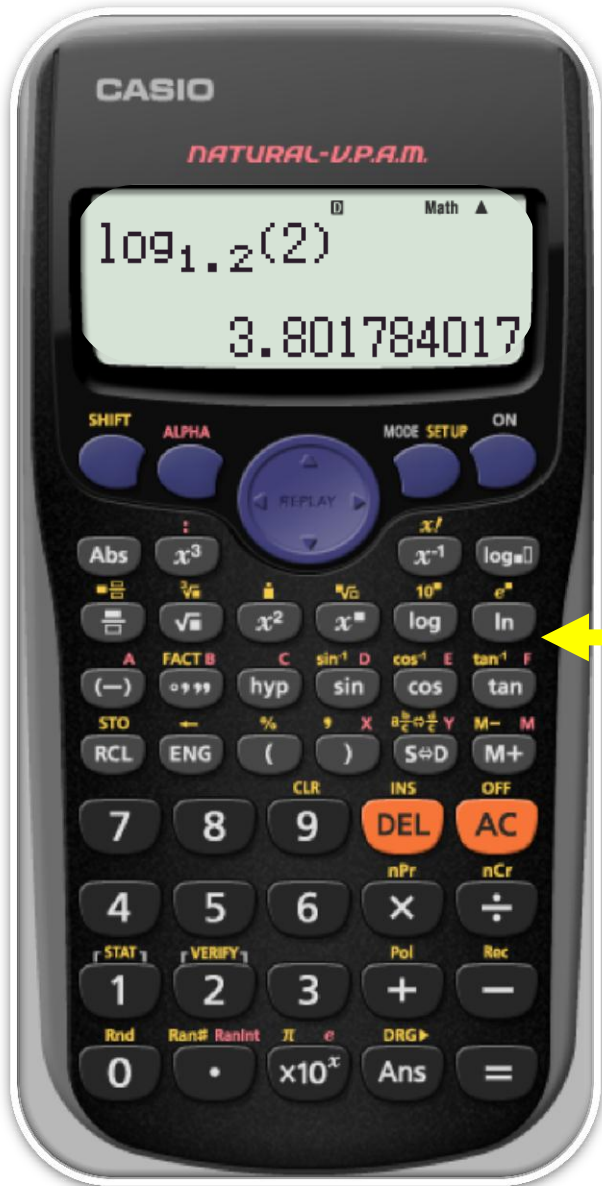
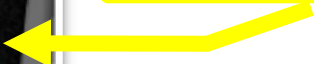
Tugann logartaim an t-inchur do aschur áirithe; an fáth atá le toradh áirithe

$$t = \log_{1.2} 2$$

Cén chumhacht a chuirim ar 1.2, chun 2 a fháil?

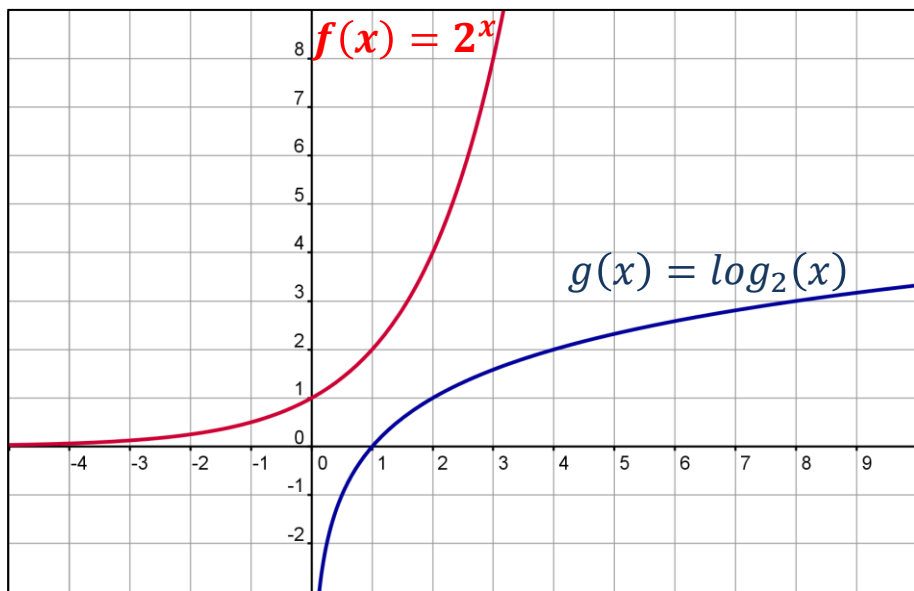


Logartaim



Freagra: 4 bliana

Líon isteach an tábla agus uaidh sin tarraing graf $g(x) = f^{-1}(x)$

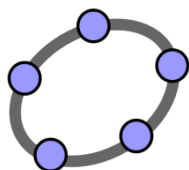


x	$f(x) = 2^x$	(x, y)
-2	$\frac{1}{4}$	$\left(-2, \frac{1}{4}\right)$
-1	$\frac{1}{2}$	$\left(-1, \frac{1}{2}\right)$
0	1	(0,1)
1	2	(1,2)
2	4	(2,4)
3	8	(3,8)

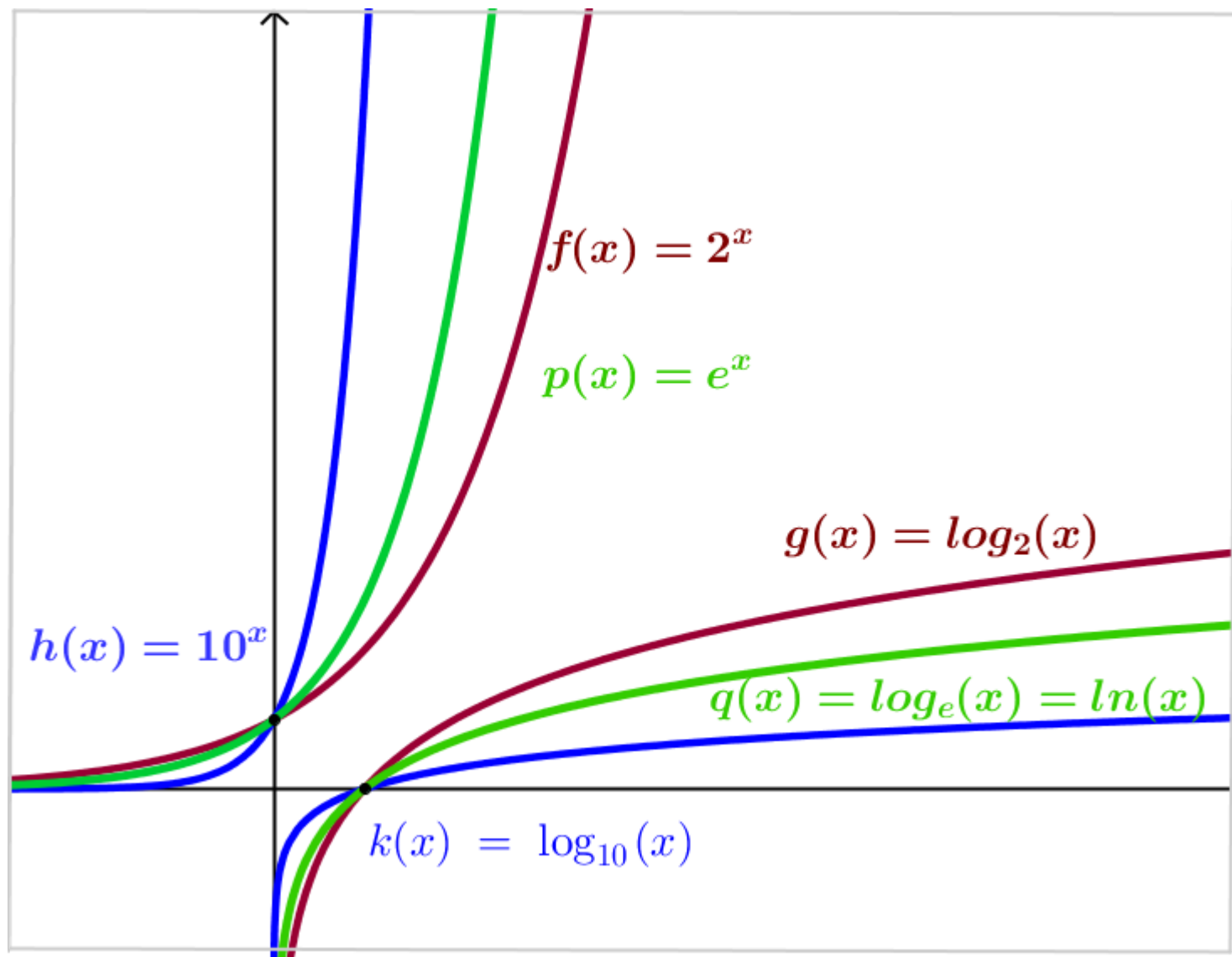
x	$g(x) = \log_2(x)$	(x, y)
$\frac{1}{4}$	-2	$\left(\frac{1}{4}, -2\right)$
$\frac{1}{2}$	-1	$\left(\frac{1}{2}, -1\right)$
1	0	(1,0)
2	1	(1,2)
4	2	(4,2)
8	3	(8,3)

(b) Cén gaol atá idir $f(x) = 2^x$ agus $g(x) = \log_2(x)$

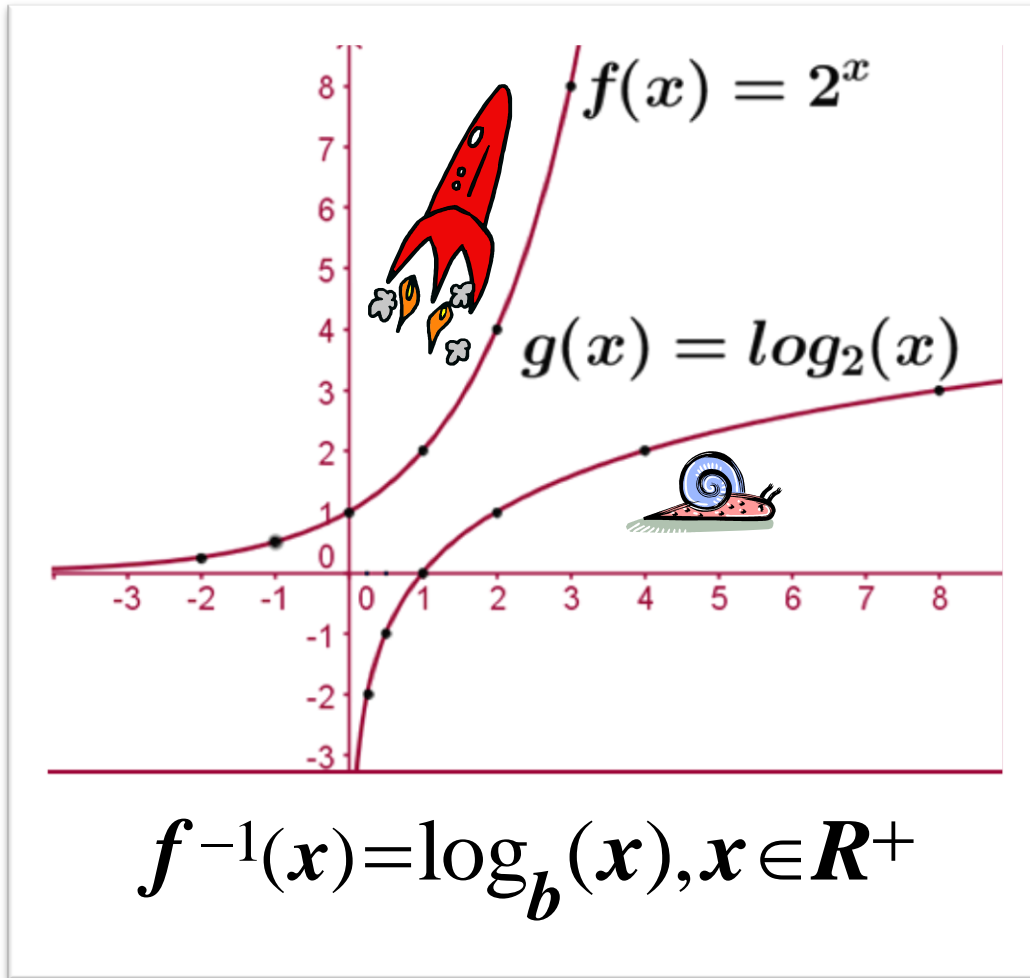
(c) Mínigh cén fáth gur feidhm é an coibhneas $g(x) = \log_2(x), x \in \mathbb{R}^+$

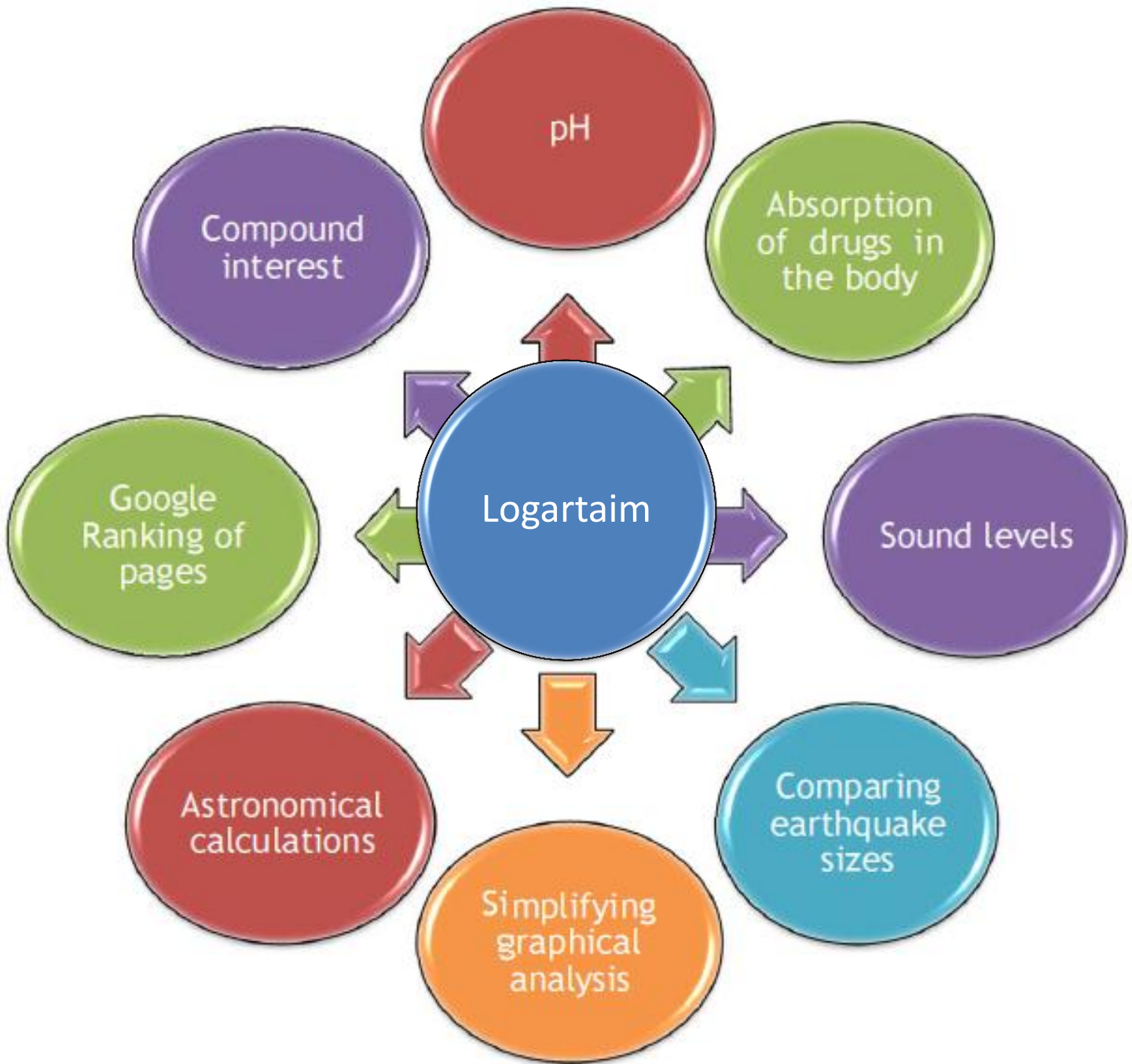


Sceitseáil.....



Grafanna $f(x) = 2^x$ agus $f^{-1}(x) = \log_2(x)$



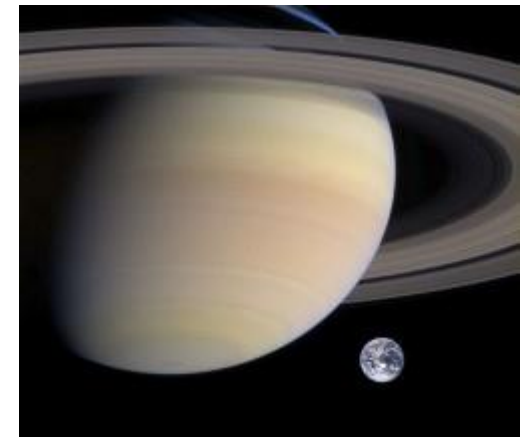


Faightear coincheap na logartam i ngach áit

In Defense of Six Figure Salaries

Tá Satarn dhá ord méadaíochta níos mó ná an domhan i dtaca le mais.

Ord méadaíochta



Tagraíonn bitheolaithe do thréimhse fáis na mbaictéar mar a “logthréimhse” toisc an ceangal atá idir a ndúbailtí leanúnacha agus logartaim dhénártha.



Minor earthquake felt in north Donegal

Updated: 19:18, Thursday, 26 January 2012

<http://www.rte.ie/news/2012/0126/donegal.html>



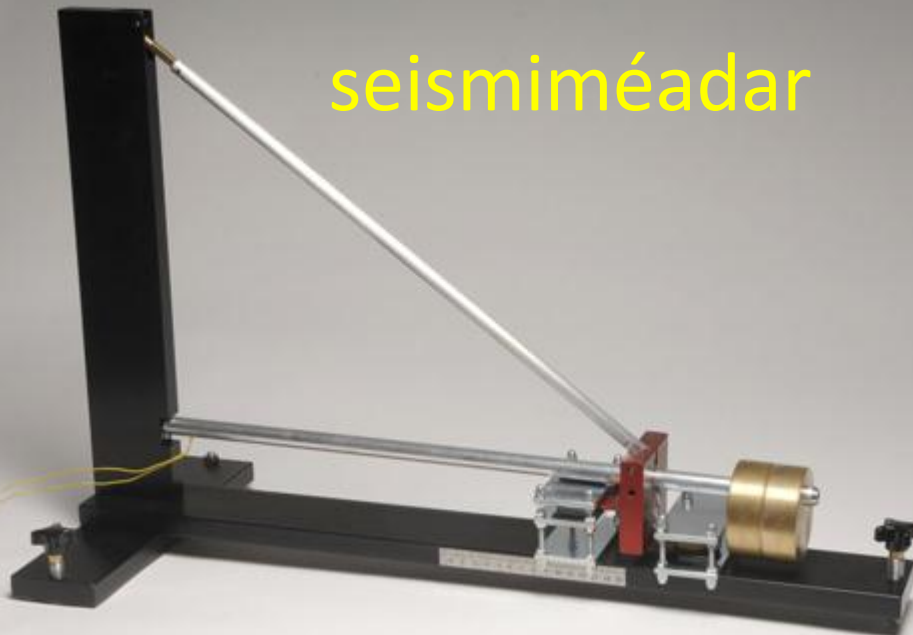
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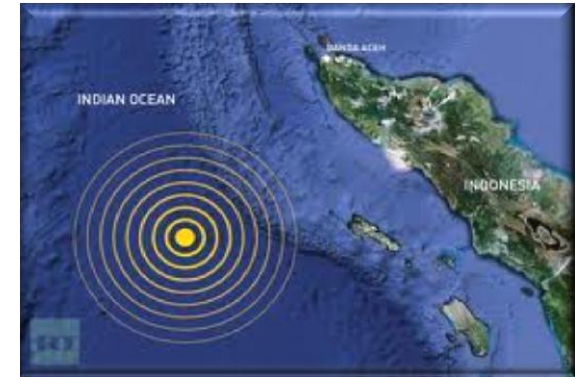
0:00:00 / 0:02:01



Mharaigh crith talún, a rátáladh a bheith de mhéid 6.3 ar an scála Richter, 40,000 duine san Iaráin ar an 26 Nollaig 2003.

Rátáladh an crith talún in Aceh a bheith de mhéid 9.2 ar an scála Richter.

Cá mhéad níos mó in aimplitiúid gluaisne talún a bhí an crith in Aceh i gcomparáid leis an gceann san Iaráin?



$$\begin{aligned}\text{Difríocht} &= 9.2 - 6.3 \\ &= 2.9\end{aligned}$$

$$\log_{10}x = 2.9$$

$$10^{2.9} = x$$

***Bhí an crith talún in Aceh
794 uair
níos mó in aimplitiúid***

SHROICH AN LEIBHÉAL DÉINE FUAIME AG BABHTA KATIE 113.7dB



Ba é an leibhéal déine fuaime ag babhta leathchraoibhe Oilimpeach Katie ná 113.7 dB.

Oibríodh casúr cumhachtaithe ag an bhfad céanna ón áit ar tomhaiseadh an fhuaim. Ba é 92dB a leibhéal déine fuaime siúd.



$$\begin{aligned} \text{Difríocht in dB} &= 113.7 - 92 \\ &= 21.7\text{dB} \end{aligned}$$

$$\log_{10}x = 2.17$$

$$10^{2.17} = x$$

$$\text{Difríocht in B} = 2.17 \text{ B}$$

**147 uair
níos mó déine**