Round 1 Babtha 1

Ceist 1

Réitigh na cothromóidí comhuaineacha a leanas:

$$x + \frac{y}{3} + \frac{z}{3} = 0$$

$$x - y + z = 2$$

$$\frac{x}{3} - \frac{y}{2} - \frac{z}{6} = \frac{3}{2}$$

Ceist 2

Lig $f(x) = \frac{x}{x-1}$, áit ina bhfuil $x \neq 1, x \in \mathbb{R}$.

Ríomh $f'(x)$ agus slonn do fhreagra san fhoirm $\frac{a}{(x+b)^c}$ áit ina bhfuil $a, b, c \in \mathbb{R}$.

Uaidh sin, nó ar shlí eile, aimsigh cé mhéad tadhlaithe atá ag $f(x)$ atá comthreomhar leis an x-ais.

Ní mór duit **an dá** $f'(x)$ a scríobh san fhoirm ceart agus an méid tadhlaithe i do fhreagra.

Round 2 Babtha 2

Ceist 1

Aimsigh luach $k \in \mathbb{Q}$ áit ina bhfuil:

$$k \log_a x + 2k \log_a x^2 + 3k \log_a x^3 + 4k \log_a x^4 = \log_a x$$

Ceist 2

Glac leis go bhfuil:

$\int_a^b f(x)\,dx = 3p$, $\int_b^c f(x)\,dx = 4p + 1$ and $\int_c^d f(x)\,dx = 7p + 9$

Aimsigh, i dtéarma p, luach:

$$\int_a^d f(x)\,dx$$

Round 3 Babtha 3

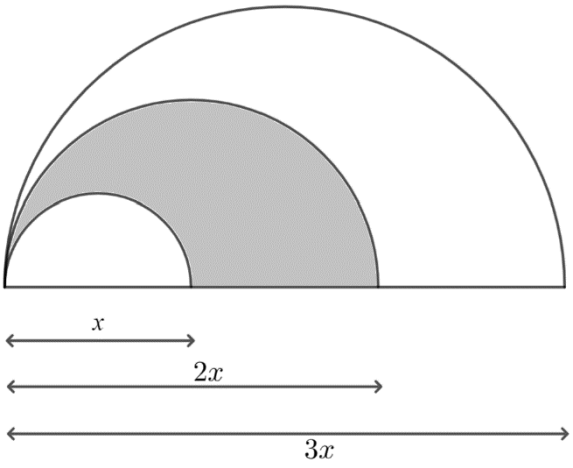
Ceist 1

Aimsigh an luach cruinn de

$$\frac{5^{702} - 5^{700} + 24}{5^{700} + 1}$$

Ceist 2

Taispeánann an léaráid trí leathchiorcail neadaithe. Tá trastomhas $3x$ ag an leathchiorcail is mó, trastomhas $2x$ ag an meánmhéide agus tá trastomhas x ag an leathchiorcail is lú, mar a thaispeántar.
Cén codán den an leathchiorcal **is mó** atá scáthaithe?



Round 4 Babtha 4

Ceist 1

Is ciorcail í k le lárphointe ag $(0,0)$ agus le $(-1,5)$ mar ball de k. Aimsigh gach pointe féideartha den fhoirm $(p,p), p \in \mathbb{Z}$, toisc go bhfuil (p,p) taobh istigh den ciorcail.

Ceist 2

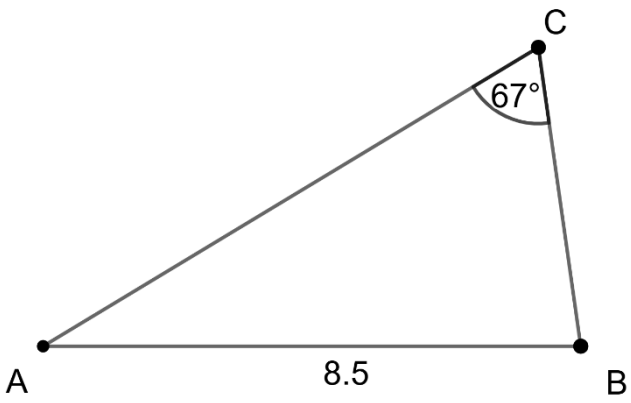
Réitigh do $x \in \mathbb{R}, x \neq 0, -1$ cé go bhfuil:

$$\left(\frac{2\sqrt{x}}{1+x}\right)\left(\sqrt{x}+\frac{1}{\sqrt{x}}\right) = x - 3$$

Round 5 Babtha 5

Ceist 1

Is triantán géaruilleach neamh-dronuilleach í ABC, áit ina bhfuil, $|AB| = 8.5$ agus $|\angle ACB| = 67^{\circ}$. Aimsigh ga an timpeallchiorcal den triantán ABC. Slonn do fhreagra ceart go dtí dhá ionad dheachúla.



Ceist 2

Lig $i = \sqrt{-1}$.

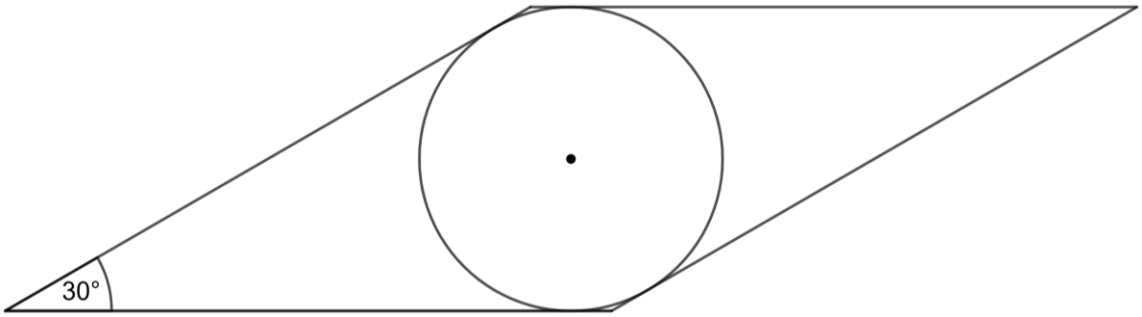
Aimsigh luach(anna) de $\sqrt{i}$.

Slonn do fhreagra i bhfoirm dhronuilleogach, $a + bi$, áit ina bhfuil $a, b \in \mathbb{R}$.

Round 6 Babtha 6

Ceist 1

Tá ciorcal le ga 1.25 inscríofa go foirfe laistigh de rombas mar a thaispeántar thíos, le huillinn inmheánach de mhéid 30^o mar a léirithe. i.e. tá an ciorcal tadhlaíoch do na ceithre thaobh ar fad ag an bpointe teagmhála. Aimsigh achar an rombas.



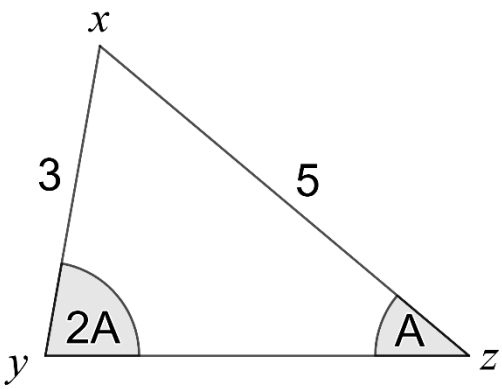
Ceist 2

Glac leis go raibh an 31ú Deireadh Fómhar ar an Máirt, cén lá den tseachtain a bhfuil is coitianta i 2025?

Round 7 Babtha 7

Ceist 1

I dtriantán xyz, $|\angle xyz| = 2\text{A}$, $|\angle xzy| = \text{A}$, $|xy| = 3$ agus $|xz| = 5$. Aimsigh $\tan \text{A}$ san fhoirm is simplí, $\frac{\sqrt{c}}{d}$ áit ina bhfuil $c, d \in \mathbb{N}$.



Ceist 2

Aimsigh an luach cruin de:

$$\left(1-\frac{1}{2}\right)\left(1-\frac{1}{3}\right)\left(1-\frac{1}{4}\right)\left(1-\frac{1}{5}\right)\ldots\left(1-\frac{1}{2025}\right)$$

Slonn do fhreagra san fhoirm $\frac{a}{b}$; $a, b \in \mathbb{Z}, b \neq 0$.

Ceist 3

Lig $y = \ln\sqrt{\frac{x-1}{x+1}}$. Aimsigh $a, b, c \in Z$ cé go bhfuil $\frac{dy}{dx} = \frac{a}{x^b+c}$.

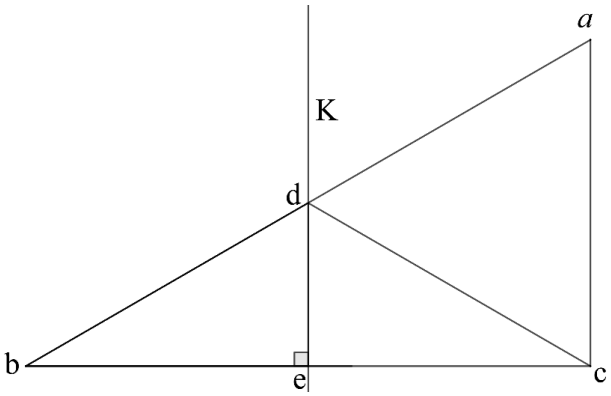
Ceist 4

Sa triantán abc, $ac \perp bc$ agus $|\angle abc| = 30°$.

Is í K an déroinnteoir ingearach de [bc] agus trasnaíonn [ab] ag d.

Aimsigh an cóimheas de $\frac{achar\ \Delta bed}{achar\ \Delta bca}$.

Slonn do fhreagra san fhoirm is simplí.



Round 8 Babtha 8

Ceist 1

Aimsigh luachanna $a, b \in \mathbb{N}, b < 10$, cé go bhfuil:

$$\left(\sqrt{5}\right)\left(\sqrt[3]{4}\right) = \sqrt[b]{a}$$

Ceist 2

Is triantán comhshleasach í ABC, le reanna $A(0,0)$, $B(10,0)$ agus $C(5, 5\sqrt{3})$. Aimiagh na comordanáidí cruinn de ionlár an traintán (i.e. i bhfoirm surda más gá).

Ceist 3

Tá bailiúchán stocaí measctha go randamach i dtarraiceán, iad uile comhionann seachas an dath. Tá 10 stocaí gorm, 17 buí, 20 bán agus 53 stocaí dubha ann. Roghnófar roinnt stocaí go randamach agus bainte le chéile. Cé mhéad stocaí a chaithfear a bhaint chun a **cinntiú** go bhfuil péire de na stocaí den dath céanna orthu?

Ceist 4

Luacháil:

$$\left[\binom{25}{0}+\binom{25}{1}+\binom{25}{2}+\binom{25}{3}+\cdots\binom{25}{24}+\binom{25}{25}\right] - \left[\binom{20}{0}+\binom{20}{1}+\binom{20}{2}+\binom{20}{3}+\cdots\binom{20}{19}+\binom{20}{20}\right]$$

Bíodh do fhreagra san fhoirm is simplí san fhoirm $a^1(b)^k$, áit ina bhfuil $a, b, k \in \mathbb{N}$; a, b ina uimhir phríomha..

Babhta Réitigh

1	What is the value of 2025 plus 2025 thousandths?
2	Find: $\lim_{h\to 0}\frac{e^{x+h}-e^{x}}{h}$
3	Calculate the p-value, correct to 4 decimal places, for a test statistic of $z = 2.32$.
4	Find the exact coordinates of the centroid of the triangle with vertices $(-4,3), (5,1)$ and $(-2,-6)$.
5	Find the least $n \in \mathbb{N}$ such that $S_n > 1.99$, where: $$S_n = 1 + \frac{1}{2} + \frac{1}{4} + \cdots + \frac{1}{2^n}$$
6	If $x * y = x^2 + 2y + 3$, find the two values of a for which $a * a = 6$.
7	An empty bath can be filled using the cold tap alone in 2.5 hours. It will take the hot tap 2.75 hours to fill the empty bath alone. How long will it take to fill the empty bath if both taps are used to fill it together. Give your answer in hours and minutes, correct to the nearest minute.
8	In a particular experiment, the probability of success on a single Bernoulli trial is 0.6. Find the probability that the twentieth success occurs on the twenty-fifth trial. Give your answer correct to three significant figures.
9	A total of n points are equally spaced around a circle and are labelled with the integers 1 to n, in order. Two points are called diametrically opposite if the line segment joining them is a diameter of the circle. If the points labelled 7 and 35 are diametrically opposite, find the value of n.
10	The y-intercepts of three parallel lines are $2, 3$ and 4. The sum of the x-intercepts of the three lines is 36. What is the slope of these parallel lines?

ANSWERS

R1	Q1	$(1,-2,-1)$
	Q2	$f'(x) = -\frac{1}{(x-1)^2}$ or equivalent. 0 tangents.
R2	Q1	$\frac{1}{30}$
	Q2	$14p + 10$
R3	Q1	24
	Q2	$\frac{1}{3}$
R4	Q1	$(0,0), (1,1), (-1,-1), (2,2), (-2,-2), (3,3), (-3,-3)$
	Q2	5
R5	Q1	4.62
	Q2	$\pm\left(\frac{1}{\sqrt{2}} + \frac{1}{\sqrt{2}}i\right)$ or $\pm\left(\frac{\sqrt{2}}{2} + \frac{\sqrt{2}}{2}i\right)$
R6	Q1	12.5 units squared
	Q2	Wednesday
R7	Q1	$\frac{\sqrt{11}}{5}$
	Q2	$\frac{1}{2025}$
	Q3	$a = 1, b = 2, c = -1.$
	Q4	$\frac{1}{4}$
R8	Q1	$a = 2000, b = 6$
	Q2	$\left(5, \frac{5\sqrt{3}}{3}\right)$
	Q3	5
	Q4	$31(2)^{20}$
Tiebreak	1	2027.025
	2	e^x
	3	0.0204
	4	$\left(-\frac{1}{3}, -\frac{2}{3}\right)$
	5	8
	6	$a = 1, a = -3.$
	7	1 hour 19 minutes
	8	0.0159
	9	56
	10	$-\frac{1}{4}$