!!Math Club!!

Mr. Allee & Dr. Dave

Fairview Elementary

2024–2025

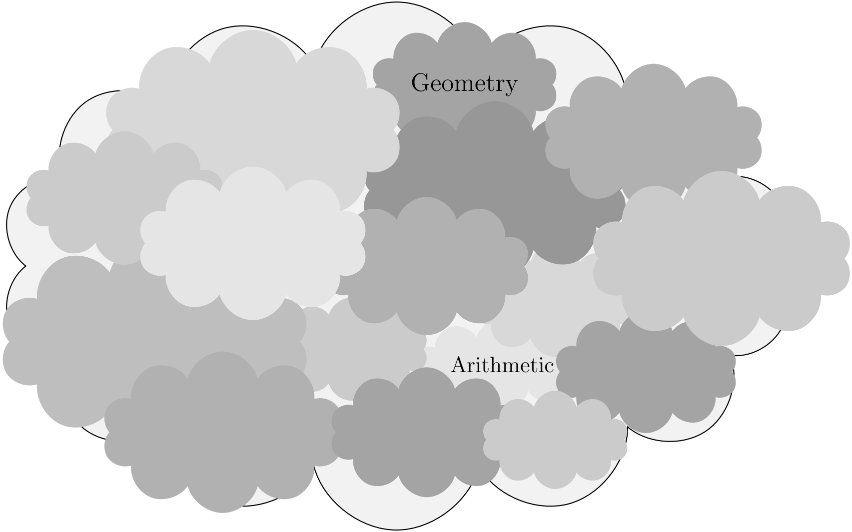
Introductions

Say your:

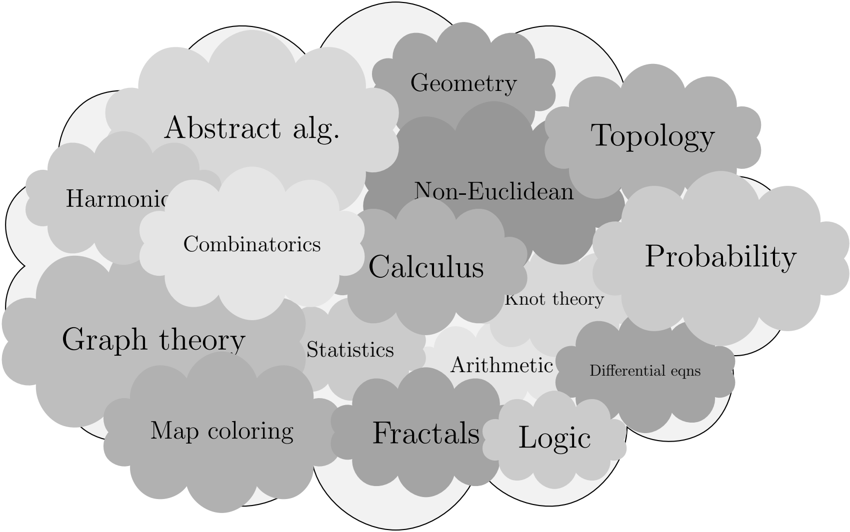
- Name/nickname (what you want us to call you)
- Grade
- Something in math you don't know
- Example: Dr. Dave; grade 21+; don't know any knot theory

What is math?

What is math?



What is math?


Geometry
Abstract alg.
Topology
Harmonic
Non-Euclidean
Combinatorics
Probability
Calculus
Knot theory
Graph theory
Statistics
Arithmetic
Differential eqns
Map coloring
Fractals
Logic

Some math from Dr. Dave's research

$$
\begin{aligned}
&\mathrm{P}\{\hat{b}_1(f) \le P^a f - P^b f \le \hat{b}_2(f) \text{ for all } f \in \mathcal{F}\} \\
&= \mathrm{P}\{\overbrace{(\mathbb{P}_n^a - \mathbb{P}_n^b)f - \left|\tilde{T}\right|_{1-\alpha}^{\mathcal{F}\vee} \hat{\sigma}_f/\sqrt{n_a}}^{\hat{b}_1(f) \text{ from (23)}} \le P^a f - P^b f \le \overbrace{(\mathbb{P}_n^a - \mathbb{P}_n^b)f + \left|\tilde{T}\right|_{1-\alpha}^{\mathcal{F}\vee} \hat{\sigma}_f/\sqrt{n_a}}^{\hat{b}_2(f) \text{ from (23)}},\ \forall f \in \mathcal{F} \\
&= \mathrm{P}\{-\left|\tilde{T}\right|_{1-\alpha}^{\mathcal{F}\vee} \hat{\sigma}_f/\sqrt{n_a} \le [(P^a - P^b) - (\mathbb{P}_n^a - \mathbb{P}_n^b)]f \le \left|\tilde{T}\right|_{1-\alpha}^{\mathcal{F}\vee} \hat{\sigma}_f/\sqrt{n_a} \text{ for all } f \in \mathcal{F}\} \\
&= \mathrm{P}\{-\left|\tilde{T}\right|_{1-\alpha}^{\mathcal{F}\vee} \le \overbrace{\sqrt{n_a}[(P^a - P^b) - (\mathbb{P}_n^a - \mathbb{P}_n^b)]f/\hat{\sigma}_f}^{-\hat{T}_f \text{ from (15)}} \le \left|\tilde{T}\right|_{1-\alpha}^{\mathcal{F}\vee} \text{ for all } f \in \mathcal{F}\} \\
&= \mathrm{P}\{\left|\hat{T}_f\right| \le \left|\tilde{T}\right|_{1-\alpha}^{\mathcal{F}\vee} \text{ for all } f \in \mathcal{F}\} \\
&= \mathrm{P}\{\quad \overbrace{\sup_{f \in \mathcal{F}} \left|\hat{T}_f\right|}^{\left|\hat{T}\right|^{\mathcal{F}\vee} \text{ from (15)}} \quad \le \left|\tilde{T}\right|_{1-\alpha}^{\mathcal{F}\vee}\} \\
&\to 1 - \alpha
\end{aligned}
$$

because $\left|\hat{T}\right|^{\mathcal{F}\vee} \xrightarrow{d} |T|^{\mathcal{F}\vee}$ by Corollary 3 and $\left|\tilde{T}\right|_{1-\alpha}^{\mathcal{F}\vee} \xrightarrow{p} |T|_{1-\alpha}^{\mathcal{F}\vee}$ by Theorem 9, and because $|T|^{\mathcal{F}\vee}$ has a continuous distribution.

Exercises

$\Downarrow$

Skills

$\Downarrow$

Competence

Problems

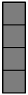
$\Downarrow$

Exploration

$\Downarrow$

Curiosity

A magic trick

Instructions: cover/shade any four vertical 
or any four horizontal 

Then, Dr. Dave will immediately tell you their sum!

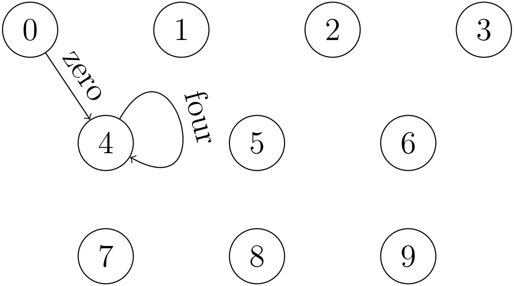
A magic trick

Cover four horizontal or vertical

0	3	9	1	7	0	3	9	1	7	0	3
4	5	2	8	1	4	5	2	8	1	4	5
7	6	0	4	3	7	6	0	4	3	7	6
8	4	6	2	0	8	4	6	2	0	8	4
1	2	3	5	9	1	2	3	5	9	1	2
0	3	9	1	7	0	3	9	1	7	0	3
4	5	2	8	1	4	5	2	8	1	4	5
7	6	0	4	3	7	6	0	4	3	7	6
8	4	6	2	0	8	4	6	2	0	8	4
1	2	3	5	9	1	2	3	5	9	1	2
0	3	9	1	7	0	3	9	1	7	0	3
4	5	2	8	1	4	5	2	8	1	4	5

Number spelling chains

Instructions: 1) pick a number, 2) spell it, 3) count the number of letters, 4) draw an arrow from the first number to its number of letters, 5) repeat...

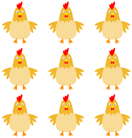


What's the longest chain you can make?

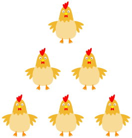
Do they always end on 4???

A square triangle?

Imagine you have some, uh, chickens: 

For certain numbers of chickens, you can arrange them into a square, like 

For others, you can arrange them into a triangle, like



$\implies$ Is there any number of chickens that you can arrange into both a square and a triangle??