

An outreach project in the Mathematics Department

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October 29, 2009

Mathematics Involves

- ▶ Computation
- ▶ Procedures
- ▶ Following the rules
- ▶ Getting the right answer
- ▶ Memorizing as much as possible
- ▶ Solving problems

Mathematics Involves

- ▶ Reasoning
- ▶ Proofs
- ▶ Creativity
- ▶ Patience
- ▶ Frustration
- ▶ Problem solving

History

- ▶ Conversation with Phil Walthers
- ▶ Weekly meetings, $\approx 1 \frac{1}{4}$ hours
 - ▶ 3 to 9 middle school kids
 - ▶ Solve a *hard* math problem
- ▶ The point? Motivated kids interacting with mathematicians
- ▶ Around the country

Example problems

What is the smallest number that has exactly 13 factors?

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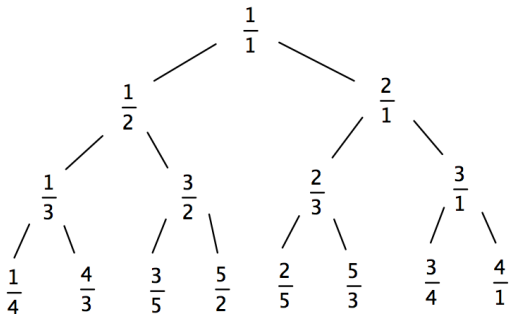
Answer = 4096

(Note that 72 has 12 factors.)

Example problems

What is the remainder when 3^{71} is divided by 13?

Example problems



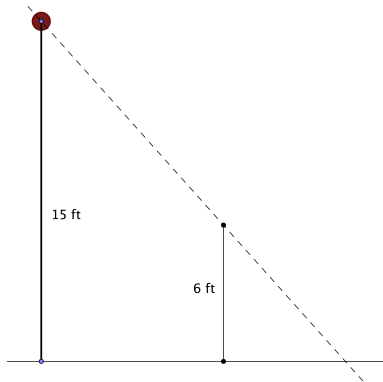
Example problems

A 6 ft tall man is walking away from a 15 ft tall streetlight (with the light at the top). The man is walking at a speed of 5 ft/sec. When the man is 20 feet away from the base of the light pole, how fast is the tip of the mans shadow moving along the ground?

Note. This is a standard calculus problem.

Answer = $8\frac{1}{3}$ m/s

Example problems



How does this all look?

We want:

Share ideas, listen to each other,
be patient, focus on the journey, reflect

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We sometimes see:

Want to be first, may stop after the “answer,”
remind me of middle school students,
have tremendous insight

About these kids...

- ▶ They are *very* quick. Thankfully ...
- ▶ State math contests
- ▶ Problem solving is not just inspiration
- ▶ Both a joy and a challenge

Challenges

- ▶ Problems must be hard, but. . .
- ▶ Intimidating for new students to join
- ▶ Encouraging “right” kind of group-work & discourse
- ▶ Avoiding the “contest mentality”
- ▶ What is a solution?

Goals

- ▶ Get more kids involved
(Phil and Kent)
- ▶ Use to recruit future college students
- ▶ Involve Math Teaching majors
- ▶ Keep things relatively simple

The End

Questions?