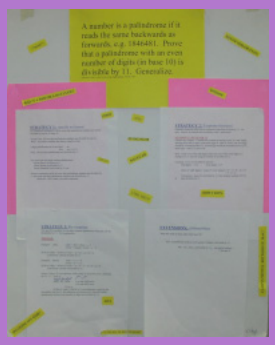
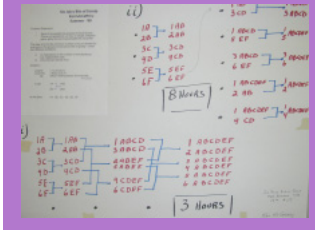
FOCUS ON MATHEMATICS

MATH EXPO!

WWW.FOCUSONMATH.ORG





The *Focus on Mathematics* Project is sponsoring expositions of student projects on topics in mathematics. The Mathematics Exposition will encourage and support student research in each of the *Focus on Mathematics* school districts. This will be a yearly event in which students develop research projects mentored by teachers and mathematicians. Students then present their results to peers, educators, and panels of mathematicians at poster sessions in the districts.

REMEMBER THESE DATES!

- **APRIL 12** – Students begin work on projects.
- **MAY 17** – Poster Sessions are held in schools.
- **JUNE 12** – Selected projects will be presented at a final Mathematics Expo event in downtown Boston.

This effort is being led by mathematicians
Art Heinricher (Worcester Polytechnic Institute) and Glen R. Hall (Boston University).

Students are encouraged to come up with their own ideas, but other project ideas are available.
A preliminary list is available now at **www.focusonmath.org/projects**
All project ideas are welcome!
For more information you may contact Glen Hall at **HardMathCafe@focusonmath.org**

Some Project Suggestions:

BUYING VS. RENTING

Many expensive items, from cars to furniture can be either bought or rented. Suppose your old (fill in the blank--car, refrigerator, TV) breaks down and you need to get a new one. Suppose a new one (or a new/used one in the case of a car) costs $1000 but you don't have $1000 handy, but you do have $75 per month extra income. You have a choice of either:

- Buying the item on your credit card at an interest rate of 3% per month. You must pay the interest each month, and you can pay as much of the principle (the amount you borrowed) as you like.
- Saving the $75 per month in the bank at 2% interest per year until you have enough to pay cash.
- Renting the item.

Which is the best deal?

1. How much will you have to pay total over the next five years if you buy the item on credit?
2. How much rent would you be willing to pay? (That is, how cheap does the rent have to be to make it better to rent than to buy?)
3. Suppose you can resell the item for $150 at the end of five years if you own it. How does this change your answer to the above?
4. Suppose you could find a better credit card that only charges 2% per month. How does this change your answer to the above?

Getting Started: Figure out how much interest you must pay per month if you buy on your credit card and figure out how long it would take to pay off the total amount (remember, as you pay off the money you borrowed, you will pay less interest).
Communicated by Chelsea High School Mathematics Department

BASEBALL CAP

Every baseball cap is made from six pieces of material (not counting attaching the "bill" of the cap). This means that the top of the cap requires six seams to be sewn. It would certainly be cheaper to make the cap from one or two pieces of material.

Questions

1. Can you find a way to make a reasonably fitting baseball cap which requires only one or two seams (not counting attaching the bill)? What goes wrong?
2. Can you make a better fitting cap out of more than six pieces?
3. Why do you bend the bill in order to make a baseball cap fit better?
4. What is the difference between a baseball cap (without the bill) and a disk of material?

Getting Started

You can make caps out of cut pieces of paper. (They aren't very comfortable, aren't effective in the rain, but they are cheap.) Try making using one disk of paper with a triangle cut out. What goes wrong? Try making a cap with 2 semi-circles.
Communicated by G. Hall

SQUARE CHIPS FROM ROUND WAFERS

The silicon wafers used in manufacturing computer chips are round. The chips that go into your computer are rectangular. If a chip manufacturer can increase the radius of the wafer, how many more chips can they produce?
Your Job: Develop the formula that would help the company decide if the cost of increasing the size of the wafer is justified.
Getting Started:
Find out more about computer chip manufacturing. How large are the wafers? How large are real computer chips?
Communicated by A. Heinricher