

November-December Problems**Grades 6-9*****Deadline (postmark) : Jan 10, 2000***

1. **Crossing the Bridge** Six people must cross a bridge, where they all start at the same side and have 31 minutes to get across. It is night and they need their one flashlight to guide them on any crossing. A maximum of two people can cross at one time. Each person walks at different speed:

Allen can cross in 1 minute

Dan can cross in 6 minutes

Betty can cross in 3 minutes

Ed can cross in 8 minutes

Charles can cross in 4 minutes

Florence can cross in 9 minutes

A pair must walk together at the rate of the slower person's pace. Can everyone get across the bridge in the allotted time of 31 minutes? If so, how ?

2. **The Boat Problem** Eight persons are needed to paddle a boat, 4 on one side and 4 on the other side. The problem is that 3 people can only paddle on the left side and two members can paddle only on the right side. How many different sitting arrangement are there for the 8 person ?

3. **Hmmmmmmmmmm** You have 26 packages labeled *A* to *Z*, each weighing a whole number in pounds in the range from 1 to 26.

- (a) Determine the weight of each package with a simple two-pan balance and four weights of your own choice.
- (b) Repeat part (a) with 3 weights of your own choice.

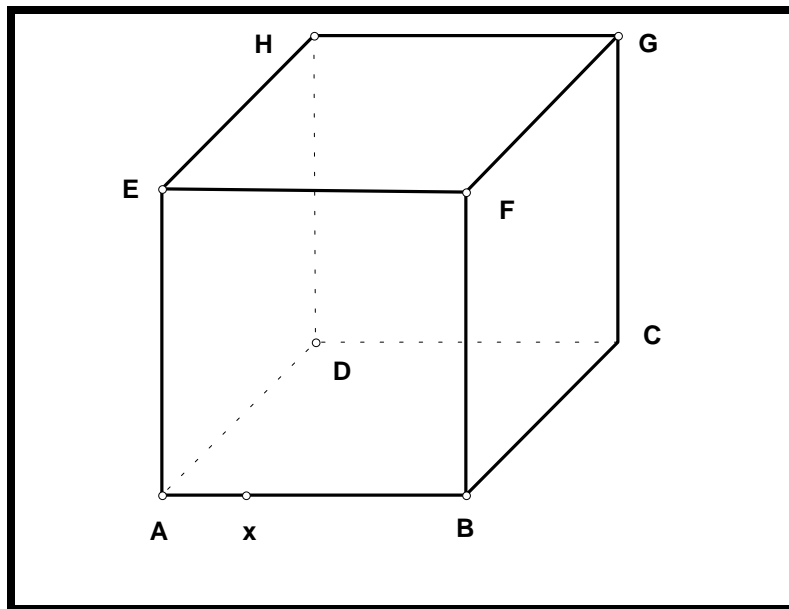
4. **The Bicycle Problem** The radius of the rear wheel of an old-style bicycle is twice the radius of the front wheel. If the circumference of the front wheel be increased by 0.5 feet and the circumference of the rear wheel be decreased by 0.5 feet, then the front wheel will make the same number of revolutions over 150 feet of road as the rear wheel makes over 187.5 feet of road. What is the radius of both the front and rear wheels ?

5. **How to Trap a Knight** A knight is placed on an infinite checkerboard. If it is not allowed to move a square previously visited, how can you make it unable to move in as few moves as possible ?

6. **Grasshopper Problem** There grasshoppers are playing leapfrog. On each turn one grasshopper leaps over one of the others but not over both. Can the grasshoppers return to their original positions after 1999 turns ?

7. **Cannons and Kings** The elves are firing cannonballs from three cannons towards the evil giant's castle. The first two cannons fire 26 more cannonball than the third. The 2nd and 3rd fire 38 more cannonballs than the first. The 1st and 3rd fire 24 more than the second. How many cannonballs does each cannon fire ?

8. **Fly Problem** A fly is sitting on the edge of a box as shown below, $\frac{1}{4}$ th the distance from the corner A to the corner B . The fly would like to walk on each side of the box and return to the starting point traveling the shortest distance. Explain the path of the fly by drawing a layout of the box.



9. **If You're Clever** Find the sum of the following fractions

$$\frac{1}{2 \cdot 3} + \frac{1}{3 \cdot 4} + \frac{1}{4 \cdot 5} + \frac{1}{5 \cdot 6} + \frac{1}{6 \cdot 7} + \frac{1}{7 \cdot 8} + \frac{1}{8 \cdot 9} + \frac{1}{9 \cdot 10}$$

Do not use your calculator: only your brain.

10. **Frank and Francine** Frank and Francine are brother and sister. Francine has twice as many brothers as sisters, and Frank as an equal number of brothers and sisters. How many children are in the family ?