

Answers for Problems:

1. Samantha is 16 and thus twice as old as Allison was when Samantha was as old as Allison is today. How old is Allison?

12

2. A ranger, a poacher a mother lion and her two cubs and a mother elephant and her two calves have to cross the Mara river in a raft. The poacher can't be left in the presence of any of the animals without the ranger present. Further, the mother lion insists that her cubs can't be in the presence of the mother elephant without her presence and the mother elephant demands that her calves not be in the presence of the mother lion without her there to protect them. Only the mother lion, mother elephant and the ranger can pilot the raft, which can only hold two members of the party at a time. What is the procedure that will result in everyone crossing safely?

- 1) Ranger takes poacher over and then goes back.**
- 2) Ranger takes calf 1 over and brings the poacher back.**
- 3) The mother elephant takes calf 2 over and comes back alone.**
- 4) The mother elephant and lion go over together and the lion comes back.**
- 5) The ranger and poacher go over and the mother elephant comes back.**
- 6) The mother lion and elephant go over and the mother lion comes back.**
- 7) The mother lion takes over cub 1 and the ranger and poacher come back.**
- 8) The ranger takes over cub 2 and goes back.**
- 9) The ranger brings over the poacher.**

3. The sum of the monkey's age and her mother's age is 4 years. In addition, the monkey's mother is twice as old as the monkey was when the monkey's mother was half as old as the monkey will be when the monkey is three times as old as the monkey's mother was when the monkey's mother was three times as old as the monkey. What are the ages of the monkeys?

Monkey is 1.5 years old, Mother is 2.5 years old

4. Your friend is studying for his grueling physics final exam and is known to study 20% of the time at one of three libraries and 40% of the time at home. He did not bring his cellphone so you have no way of contacting him, but you have already checked two of the libraries. What is the probability that your friend is studying at home?

2/3

5. There is a power failure and you need a flashlight. In a drawer, you have four dead batteries (which you like to keep for some reason), a pack of four new batteries and a flashlight that requires two batteries. As you open the four-pack of new batteries in the dark, they spill into the drawer, so now you have a mixture of four good and four dead batteries and you can't tell which is which. You can test them only by placing two batteries into the flashlight and seeing if it works. What battery checking protocol will minimize the number of tests needed to find two good batteries?

Split the eight batteries into three groups, two groups with 3 batteries and one group with 2 batteries. Test the battery 1 with 2 and 3, and then battery 2 with battery 3. If none provide a working pair move to the next group of three, repeat this process; battery 4 with 5 and 6, and 5 with 6. If none of these combinations work the set of two batteries must be two good batteries.

What is the minimum number of tests needed?

7 tests

6. During World War II war, Russian cities near the front were blacked out. In some cases, this meant that the citizens boarded up their windows. Vanya has a 120" by 120" window in the front of his house that needs to be boarded up. He has a 90" by 160" piece of plywood which happens to have the same area of the window. Can you cut the plywood into TWO pieces such that they fit together to form a 120" by 120" square? Show the cut in the space below.

