A Rope Around the Earth Puzzle

(1) Imagine a rope that fits tightly around a smoothed-out Earth. The rope is positioned at the Equator. The Circumference of the Earth is considered to be 40 074 km or 24 900 miles, with the radius considered to be 6 378 km or 3 963 miles. Lets cut the rope and insert 3m (or if you prefer use 10 feet). Question: Since the rope now is longer than the circumference of the Earth, it will fit loosely around the Earth and leave a bit of a gap between it and the Earth. How big is that gap?
(2) As a bonus question: A gambler approaches you with the following: He shows you three cards that he has in a bag. Card A is red on one side and blue on the other; card B is red on both sides; and card C is blue on both sides. He puts the cards into the bag and shakes them up. Then he carefully slides one card out so that you cannot see the other side. You are looking at a card with the Blue side up. What colour do you think is the other side, and what are the odds that you are correct?

Have fun, answers next week.

Answers to last week's puzzles

(1) Whoever of the 6 children would come closest to guessing the number of coins contained in a piggy-bank was promised the whole contents by their father. The 6 guesses were 50, 47, 40, 53, 37, and 30. Of these, one child was 9 out, another 4, an the others 1, 6, 11 and 12. Can you tell from this information how many coins there must have been in the bank? (Answer on the way)
(2) A newspaper ran a twin-matching contest in their paper. They printed pictures of 100 people over a period of a few weeks. Whoever got the most twins matched was offered a large prize. When the contest was over, 98.1% had four or more sets wrongly matched. The number of entries with 3 sets wrong was 18 more than the number that had 1 set wrong. The number with 2 sets wrong was the same as the number that submitted perfect answers. If the circulation of the newspaper was less than 4 000, how many people entered the contest. (Answer on the way)
(3) Using the Boolean Algebra from August 2, 2009, one can solve this puzzle:

"There is a Jack Brent that got married down in Dallas," remarked Sam, looking up from his paper. "That must be Joe's son. Same name and he is 21." Gwen shook her head. "It's quite a while and you've forgotten" she told her husband. "His son is Jim, and he would be 18 by now". Ann had never met the Brents, but she had heard plenty about them. "His name certainly wasn't Jack," she informed her mother. "Anyways he's at least 25 by now."

Of course all three were wrong one way or another, but each had made a correct statement about either the age or the name. So, how old is Jack's son, and what was his name? (Hint: let Jack = a, Jim = b, and 'not Jack' = c).

ANSWER: Joe's son's name was Jim and he was 21 years old.

Solution: Let Jack = a, Jim = b, and 'not Jack' = c, 18 years old = d, 21 years old = e, and 25 years old = f. Then Sam said, "ae", Gwen said, "bd", and Ann said "cf". Since each made one true and one false statement, we have: ae = bd = cf = 0, and a + e = 1, b + d = 1, and c + f = 1.

Since Joe's son cannot have two names nor two ages, ab, ac, de, ef, and df all have a value of zero.
Lets work out (a + e)(b + d) (c + f) = (1)(1)(1) = 1. We will expand this out below:

Now combine (a + e)(b + d) = 1, yields when multiplied out: ab + ad + be + ed = 1.
Dropping out the zero items (in red), we are left with ad + be = 1. Now form the equation:

(c + f)(ad + be) = 1 to yield: acd + bce + adf + bef = 1. Crossing out the zero terms in red: bce = 1. Since each term must equal to 1, we have b = 1, c = 1, and e = 1. Since 1 means “true” then “b” is true and his name is “Jim”. Also “c” is true and his name is “not Jack” (that’s correct it is “Jim”). And finally, “e” is true and he is 21 years old.
QED