Teatime Teaser Answers

1. The heads of the twiddled bolts move neither inward nor outward. The situation is comparable to that of a person walking up an escalator at the same rate that it is moving down.
2. Four airplanes will do the trick. One solution: Planes 1, 2, 3 and 4 take off together. After going 1/6 of the distance around the earth, planes 1 and 4 transfer half their remaining fuel to planes 2 and 3. As 2 and 3 continue for another 1/6 of the way, planes 1 and 4 return to base. Plane 3 now transfers half its fuel to 2, while plane 4 refuels at the base. This permits 3 to cover half the distance back to the base, where it is met by 4. Plane 4 gives half its fuel to 3, and both planes return to base. Meanwhile plane 2, with a full tank, continues on its way until its fuel is gone. This occurs at a point 5/6 of the total distance. Either plane 1 or plane 4, flying of course in a direction opposite to that of previous take-off flights, can meet plane 2. Half of the fuel is transferred, and plane 2 continues to the base escorted by the plane that met it.
3. If you place the point of a compass at the centre of a black square on a chessboard with two-inch squares, and extend the arms of the compass a distance equal to the square root of 10 inches, the pencil will trace the largest possible circle that touches only black squares.
4. Writing a three-digit number twice is the same as multiplying it by 1,001. This number has the factors 7, 11 and 13, so writing the chosen number twice is equivalent to multiplying it by 7,11 and 13. Naturally when the product is successively divided by these same three numbers, the final remainder will be the original number.
5. The quickest way to solve this problem is to run the scene backward in time. A minute before the crash the 9,000 mile-per-hour missile is clearly 150 miles from the meeting point and the 21,000 mile-per-hour missile is 350 miles from the same point, making the distance between them 500 miles.
6. Number the top coin in the pyramid 1, the coins in the next row 2 and 3, and those in the bottom row 4, 5 and 6. The following four moves are typical of many possible solutions: Move 1 to touch 2 and 4, move 4 to touch 5 and 6, move 5 to touch 1 and 2 below, move 1 to touch 4 and 5.
7. Because two people are involved in every handshake, the total score for everyone at the convention will be evenly divisible by two and therefore even. The total score for the men who shook hands an even number of times is, of course, also even. If we subtract this even score from the even total score of the convention, we get an even total score for those men who shook hands an odd number of times. Only an even number of odd numbers will total an even number, so we conclude that an even number of men shook hands an odd number of times.
8. In the triangular pistol duel the poorest shot, Jones, has the best chance to survive. Since his two opponents will aim at each other when their turns come, Jones's best strategy is to fire into the air until one opponent is dead. He will then get the first shot at the survivor, which gives him a strong advantage. Computing the actual survival probabilities is somewhat tricky, but I have the assurance of several experts that Jones, who hits his target 50 per cent of the time, has a survival chance of 47/90; Smith, who is 100 per cent

accurate, comes next with a chance of 27/90 or 3/10; and Brown, who is 80 per cent accurate, is last with a chance of 16/90. Perhaps there is a moral of international politics in this somewhere.

Source: Gardner, M. (1958). "Mathematical Games." Scientific American 199(3)