Junior Individual Solutions - NWO High School Mathematics Competition 2008

Multiple Choice Questions.

1. E.
2. C.
3. B.
4. D.
5. D.
6. B.
7. C.
8. D.
9. D.
10. A.
11. C.
12. B.
13. C.
14. C.
15. E.

Full Solution.

1. Clearly the last digits are 1 and 7, and a bit of trial and error gives 137 and 731.
2. The 15 minutes saved means 7.5 minutes in each direction. That is, her father met her 7.5 minutes earlier than usual. So she must have been walking for 52.5 minutes.
3. Note that $S = 11 \cdots 1$ (4016 1's). So the answer is 4016.
4. If a divides n^2, then so does n^2/a. So, the divisors of n^2 are paired up, but n is paired with n. This gives us an odd number of divisors.
5. Cut out links 4 and 11. Then you will have chains of 1, 1, 3, 6 and 12 links. You can then check that you can produce each number from 1 to 23.