Indian Mathematicians Round

These mathematicians lived in the first two millenia A.D.

1a   Aryabhata the Elder
     Born: 476   in Kusumapura (now Patna), India
     When did he die?

1b   Aryabhata gave an accurate approximation for pi. He
     wrote in the Aryabhatiya:-

     "Add four to one hundred, multiply by eight and then
     add sixty-two thousand. the result is approximately
     the circumference of a circle of diameter twenty
     thousand. By this   rule   the   relation   of   the
     circumference to diameter is given."

     How accurate is this, in the form n/1000000 (where n
     is the nearest integer)?

1c   Aryabhata believed that the apparent rotation of the
     heavens was due to the axial rotation of the Earth. This is a quite remarkable view of
     the nature of the solar system which later commentators could not bring themselves to
     follow and most changed the text to save Aryabhata from what they thought were
     stupid errors!
     He gave the circumference of the earth as 4 967 yojanas. How many miles per yojana?

2a   Brahmagupta
     Born: 598 in (possibly) Ujjain, India
     Died: 670 in India

     He wrote
     "The product or quotient of two fortunes is one fortune.
     The product or quotient of two debts is one fortune.
     The product or quotient of a debt and a fortune is a debt.
     The product or quotient of a fortune and a debt is a debt."

     What modern terms would we use for 'fortune' and 'debt'?

2b   Brahmagupta also solved quadratic indeterminate equations of the type
     $ax^2 + c = y^2$ and $ax^2 - c = y^2$

     For example he solved $8x^2 + 1 = y^2$. Can you find the first two solutions?
     (A hint: x & y are less than 20 for both solution pairs).

3   Bhaskara
     Born: 1114 in Vijayapura, India
     Died: 1185 in Ujjain, India

     Bhaskara is also known as Bhaskara II or as Bhaskaracharya, this latter name meaning
     "Bhaskara the Teacher".

     He worked on equations leading to more than one solution. Try this ....

     "Inside a forest, a number of apes equal to the square of one-eighth of the total apes in
     the pack are playing noisy games. The remaining twelve apes, who are of a more
     serious disposition, are on a nearby hill and irritated by the shrieks coming from the
     forest. What is the total number of apes in the pack?"

4   Srinivasa Aiyangar Ramanujan

Born: 22 Dec 1887 in Erode, Tamil Nadu state, India
Died: 26 April 1920 in Kumbakonam, Tamil Nadu state, India

Srinivasa Ramanujan was one of India's greatest mathematical geniuses. He made substantial contributions to the analytical theory of numbers and worked on elliptic functions, continued fractions, and infinite series.

1729 is known as the Hardy-Ramanujan number after a famous anecdote of the British mathematician G. H. Hardy regarding a hospital visit to Srinivasa Ramanujan.

"I remember once going to see him when he was ill at Putney. I had ridden in taxi cab number 1729 and remarked that the number seemed to me rather a dull one, and that I hoped it was not an unfavorable omen. "No," he replied, "it is a very interesting number; it is the smallest number expressible as the sum of two cubes in two different ways."

What are the two ways?

....

References:

qs 1,2 & 3:   http://www-gap.dcs.st-and.ac.uk/~history/Indexes/Indians.html
q4:   http://en.wikipedia.org/wiki/1729_(number)