

High School Mathematics Competition 2007

First Round, Basic Level

1. A shopkeeper sold a shirt to a customer with a 20 % profit and a pair of trousers with a 20 % loss. The customer paid the same price for both items. Did the shopkeeper get a profit or a loss from the transaction?
2. Without using a calculator, place the numbers 2^{1000} , 3^{750} and 5^{500} in the correct order of magnitude.
3. The length of each side of a 12-gon is s and end every second of its angles is 60° while the other angles are 240° . Determine the area of the polygon.
4. The Prime Minister R and eight other ministers A, B, \dots, H participate in a government meeting. Some of the ministers talk to each other, some do not. The following table, where 1 denotes being on speaking terms and 0 not being on speaking terms, shows which ministers talk to each other and which do not:

	R	A	B	C	D	E	F	G	H
R	–	0	0	1	0	0	1	0	0
A	0	–	1	1	1	1	1	1	1
B	0	1	–	0	0	0	1	1	0
C	1	1	0	–	1	0	1	0	1
D	0	1	0	1	–	0	1	0	0
E	0	1	0	0	0	–	0	0	1
F	1	1	1	1	1	0	–	0	0
G	0	1	1	0	0	0	0	–	0
H	0	1	0	1	0	1	0	0	–

In the meeting, the Prime Minister told a rumor, which then passed from one minister to another (naturally, only through those who were on speaking terms with each other). The last one to hear the rumor was minister D . Who was the fourth minister who heard the rumor? Justify your answer!

Time allowed: 100 minutes.

Each answer on different side of paper.

Write your came clearly on the paper.