PREPARATION FOR BIG TEST Mgr. Ľubomíra Tomková
YEAR 3, SUMMER 2007

COMBINATORICS

1. How many different signals with 4 flags are there, if each signal consists of drawing out 4 flags? [24]
2. In the library there are 15 books, among which there is a trilogy. In how many ways can the books be arranged so that the trilogy is kept together in the same order? [13!]
3. How many 4-digit natural numbers do exist if no figure is repeated? [4536]
4. How many 4-digit natural numbers do exist if figures may be repeated? [9000]
5. How many different matches in tennis can 5 players play? [10]
6. In the newsagent there are 10 different types of newspaper and magazines. Find in how many possible ways you can buy:
   a) 5 types of newspaper and magazines, if they may be same [2002]
   b) 6 different types of newspaper and magazines [210]
7. Hockey trainer has to choose 1 out of 3 goalkeepers, 2 out of 7 defenders and 3 out of 12 centers. In how many ways can this be done? [13860]
8. There are 5 white and 7 black marbles in a pocket. In how many ways can we draw:
   a) 2 white marbles [10]
   b) 2 black marbles [21]
   c) 1 white and 1 black marble? [35]
9. How many arrangements of letters of the word SCHOOL do exist? [360]
10. How many arrangements of letters of the word AGENCY do exist? [720]

BINOMIAL EXPANSION THEOREM

1. Write the whole expansion of the binomial $(a^5 - 2b^4)^4$
2. Find the 4^{th} term in the expansion of $(\sqrt{a} + \sqrt{b})^5$
3. For which value of x is the 5^{th} term in the expansion of $(\frac{1}{2\sqrt{x}} - \frac{1}{2})^{10}$ equal to 105?

   $[\frac{1}{8}]$

4. Find that term in the expansion of $(\frac{1}{3} - \sqrt{x})^6$ which contains x^3.

COMPLEX NUMBERS

1. $z_1 = 8 - 5i$, $z_2 = -2 + 3i$
2. $z_1 = -5i$, $z_2 = -2$
3. $z_1 = -4 + 3i$, $z_2 = 1 + i$
4. $z_1 = 6 - 2i$, $z_2 = 3 - 4i$

Calculate $z_1 + z_2$, $z_1 - z_2$, $z_1 \cdot z_2$, $\frac{z1}{z2}$

5. Solve the equation:
   a) $2x^2 - 8x + 10 = 0$
   b) $x + i = \frac{1}{x} + \frac{1}{i}$
6. Find the modulus and argument of
   a) $z_1 = 4 + 3i$
   b) $z_2 = 1 - 3i$
   c) $z_3 = 5 + 2i$

TRIGONOMETRY

In the triangle ABC, calculate all the remaining angles, sides and area, if:

1. $|AB| = 7$ cm, $|BC| = 6$ cm, and the angle $< ABC = 40°$
2. $|AB| = 8$cm, $< ABC = 75°$, $|AC| = 10$ cm
3. $|BC| = 9$ cm, $< CAB = 30°$, $< ACB = 60°$