International Young Mathematicians' Convention (IYMC)
2012 Individual Contest –*Senior level*

ANSWER SHEET

Name		*Team Code*		*Candidate number*		*Score*	

Time：60 minutes

Instructions:

- Write down your name, team code and candidate number on the answer sheet.
- Write down all answers on the answer sheet. Only **Arabic NUMERICAL** answers are needed.
- Answer all 8 problems. Each problem is worth 10 point and the total is 80 points.
- For problems involving more than one answer, points are given only when ALL answers are corrected.
- No calculator or calculating device is allowed.
- Answer the problems with pencil, blue or black ball pen.
- All materials will be collected at the end of the competition.

1		**5**	
2		**6**	
3		**7**	○
4		**8**	

International Young Mathematicians' Convention (IYMC)
2012 Individual Contest –Senior level

1. If $15xy^2$ and $21xy$ are perfect squares, where x and y are positive integers, what is the smallest value of $x + y$?

2. Determine $y - x$ if x and y are real numbers that satisfy $2^x - 2^y = 1$ and $4^x - 4^y = \frac{5}{3}$.

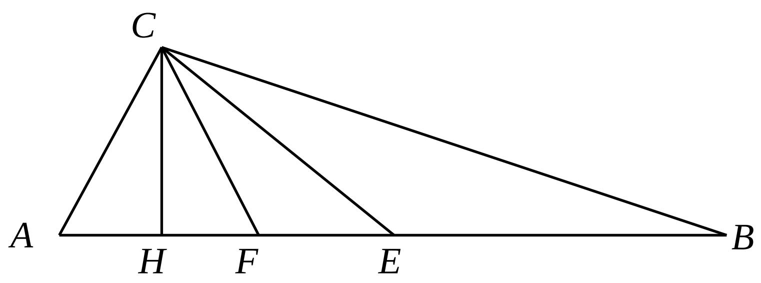
3. A password consists of four distinct digits such that their sum is 19 and such that exactly two of these digits are primes. For example 0397 is a possible password. How many possible passwords are there?

4. For any positive integer n, we define $n!$ as the product of the integers from 1 to n, and call it the factorial of n. Also $0!$ is defined as 1. Some numbers are equal to the sum of the factorials of their digits. For example $40585=4!+0!+5!+8!+5!$. Find such a number with three digits.

5. All six faces of a cube are completely painted. It is cut into 64 identical cubes. One of these cubes is chosen at random and rolled. Find the probability that none of the five faces showing is painted.

6. Solve the equation $\sqrt{4+\sqrt{4-\sqrt{4+\sqrt{4-x}}}} = x$, where all square roots are taken to be positive.

7. In the figure, $BC>AC$, $AE=EB$, $CH \perp AB$, $\angle ACF=\angle FCB$ and $\angle HCF=\angle FCE$. Find the measure of $\angle ACB$, in degrees.



8. How many ordered triple (x, y, z) of integers satisfy $xyz = 2012$?