2002 QAMT Competition
# Year 9&10 Paper

Attempt as many problems as you can in the time allowed. Working and explanations (even for the multiple choice problems) should be set out fully in clear English. The judges will take into consideration the quality of expression and ingenuity of your attempts at solutions.

You must put your full name and school on all working handed in.

Q1. (1 point) Which shape cannot be filled, without any overlapping, using copies of the tile shown on the right?

A)   B)   C)

D)   E)
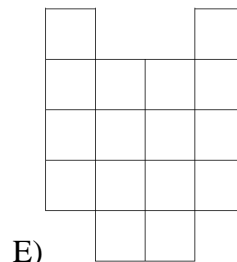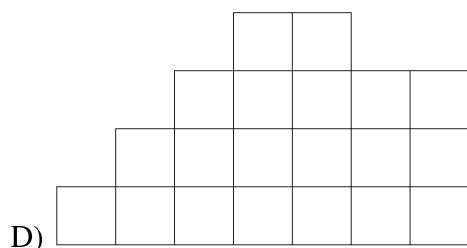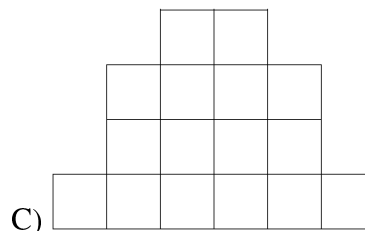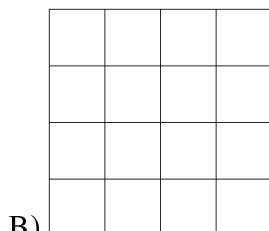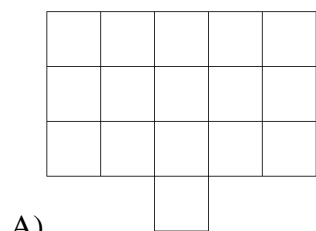
Q2. (1 point) We want to fill in the remaining squares in such a way that each of the numbers 1, 2, 3, 4, 5 and 6 appears in every row and every column. In how many ways can this be done?

1	2	3	4	5	6
2					5
3					4
4					3
5					2
6	5	4	3	2	1

(A) 16,   (B) 24,   (C) 2^{16},   (D) 24^4,   (E)16^2.

Q3. (2 points) Adam, Brett, Chad, Dan and Eve play a game in which each is a frog or kangaroo. Frogs always tell lies while kangaroos always tell the truth.

- Adam says that Brett is a kangaroo.
- Chad says that Dan is a frog.
- Eve says that Adam is not a frog.
- Brett says that Chad is not a kangaroo.
- Dan says that Eve and Adam are different kinds of animals.

How many frogs are there?

(A) 1,   (B) 2,   (C) 3,   (D) 4,   (E) 5

Q4. **(2 points)** What is the sum:

$$\frac{1}{2}+\left(\frac{1}{3}+\frac{2}{3}\right)+\left(\frac{1}{4}+\frac{2}{4}+\frac{3}{4}\right)+\left(\frac{1}{5}+\frac{2}{5}+\frac{3}{5}+\frac{4}{5}\right)+...+\left(\frac{1}{100}+\frac{2}{100}+\frac{3}{100}+...\frac{98}{100}+\frac{99}{100}\right)?$$
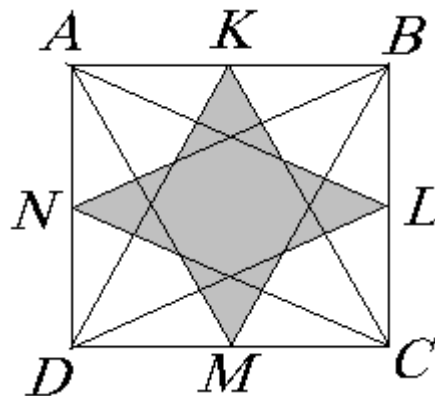
(A) 105,   (B) 245,   (C) 2475,   (D) 3215,   (E) 2635

Q5. (2 points) In the addition sum

$$T\ W\ O$$
$$+\ \underline{T\ W\ O}$$
$$\underline{F\ O\ U\ R}$$

The letters *F, O, R, T, U, W* stand for digits 1, 2, 3, .. 9 (but not zero) with different letters standing for different digits. Find the values of *F, O, R, T, U* and *W* that make the number *F O U R* as small as possible.

Q6. (2 points) This four-pointed star is formed by taking a square with side length 1 metre and joining the midpoints of each side to the corners as shown. What is the area of the star?

TURN OVER