SIXTH FORM

At the local KFC ‘restaurant’ wings come in boxes of 3 sizes:

6 pieces

More than enough.

9 pieces

Bit greedy?

20 pieces

Why?

What is the **LARGEST** number of chicken wings that **cannot** be ordered.

(We cannot for example get 1, 2 3, 4, 5, 11 or 13 chicken wings)

Hint: ***Answer to the Ultimate Question of Life, the Universe, and Everything*** *from the supercomputer, Deep Thought, specially built for this purpose. It takes Deep Thought 7½ million years to compute and check the answer, which turns out to be almost the same thing.*

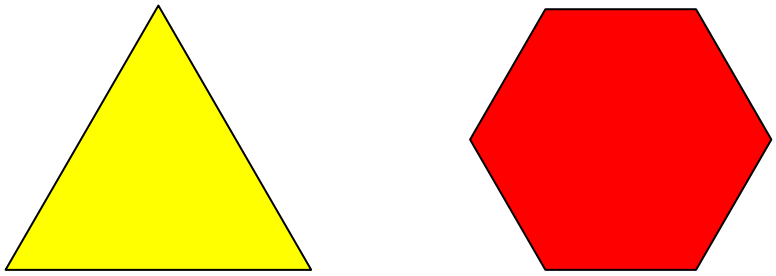
YEAR 7

1. Using the digits 1,1,2,2,3,3,4,4 and 5 I wrote a nine digit number such that:

   - the 1's are next to each other ;
   - the 2,s are separated by a digit;
   - the 3,s are separated by two digits;
   - the 4's are separated by three digits;
   - the 5 is in the middle.

   What could be the number I wrote?

2. The perimeter of an equilateral triangle is equal to the perimeter of a regular hexagon. Find the ratio of their areas.



3. The sum of two numbers is 12 and their product is 22·31. What are the two numbers?

Years 8 and 9

1. Mrs. Docking is buying Christmas presents for her eight children to give to one another.
   Each Child gives a present to each of the others.
   How many presents must she buy?

2. There are 8 identical looking balls one of which is heavier than the others. How, by only weighing twice can you work out which is the heavy ball?

3. Find a number less than 100 that gives :

   a remainder of 1 when divided by 4
   a remainder of 2 when divided by 5
   a remainder of 3 when divided by 6.

YEARS 10 AND 11

1. If $x + y = 7$ and $xy = 4$,

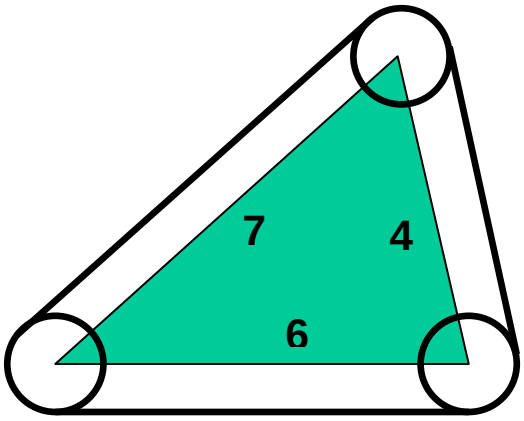
   find the value of $x^2 + y^2$.

2. There are four pairs of positive integers (x,y), such that

   $$x^2 - y^2 = 105$$

   Find them.

3. Three rollers, each of radius 1, are mounted from their centres to the vertices of a triangular frame with sides 4, 6 & 7.



A belt fits tightly around the rollers. Find the length of the belt.