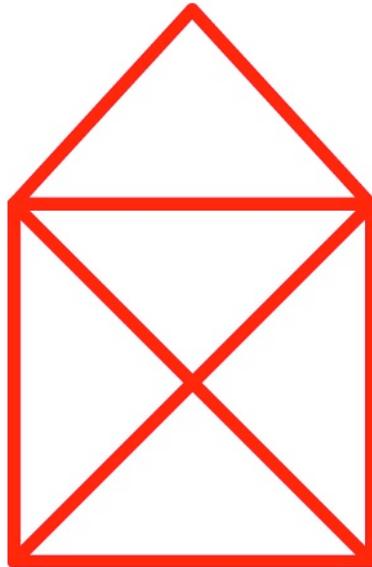


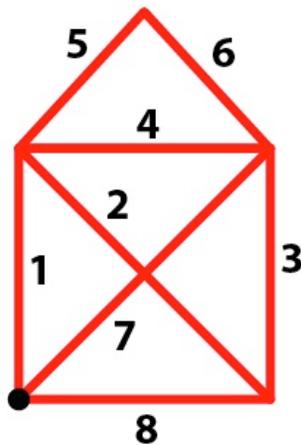
SUMMER MATHS QUIZ SOLUTIONS – PART 1

EASY 1

This is Santa Claus's house. Starting at one of the corners, can you draw his house without lifting your pencil and without drawing any line twice?



Solution: Here is one way, starting at the lower left corner. It's impossible if you don't start in one of the two lower corners.



EASY 2

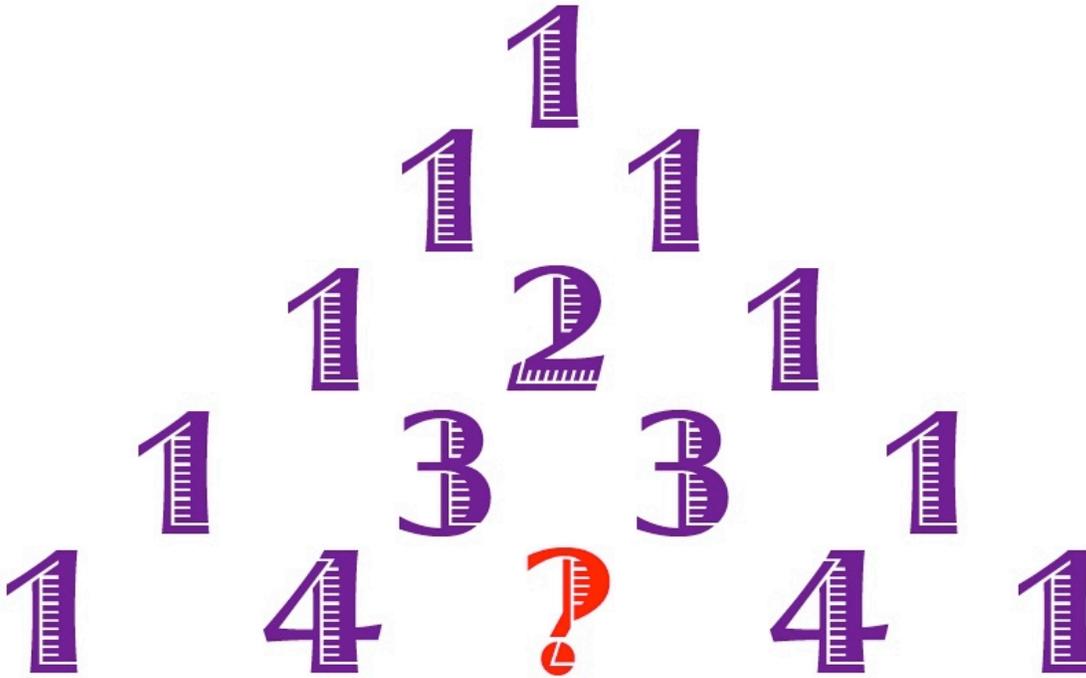
Here is a beautiful set of five Russian Matryoshka dolls. What is the smallest number of coins you need so that you can put a different number of coins in each of the dolls?



Solution: Put a coin in each of the dolls except for the smallest doll, and then nest the dolls. So, four coins will do. If you regard this as cheating, then you'll need ten coins total: none for the first doll, one for the second doll, and so on.

EASY 3

What number does the question mark stand for?



Solution: The number is 6. Google “Pascal’s Triangle”.

EASY 4

A trumpet has three valves. Satchmo can produce different musical notes by pressing different combinations of the valves. If he doesn't change the way he blows into the trumpet, how many different notes can Satchmo play? What if he plays on a trumpet with four valves?



Solution: Each valve has two positions. So, with three valves there are $2 \times 2 \times 2$ different combinations, giving a maximum of 8 possible notes. Similarly, there would be a maximum of 16 notes on a 4-valve trumpet. We say “maximum” because there may be less: different combinations may give the same note (which seems to be the case for real trumpets).

EASY 5

You go to a party and count a total of 20 partiers. If everybody shakes hands with everybody else, how many handshakes are there?



Solution: There are 20 partiers, and each partier shakes hands with the other 19 partiers, which gives us 20×19 . However, that counts each handshake twice, so the total number of handshakes is $20 \times 19 / 2 = 190$.

EASY 6

In the movie *Die Hard with a Vengeance*, Bruce Willis and Samuel L. Jackson are challenged with various puzzles, which they must solve in order to stay alive. The first one is: *As I was going to St. Ives, I meet a man with 7 wives, every wife had 7 sacks, every sack had 7 cats, every cat had 7 kittens. Kittens, cats, sacks and wives, how many were going to St. Ives? My phone number is 555- Can you save Bruce and Sam by completing the telephone number?*



Solution: The traditional answer, and the movie answer, is 1 (giving the phone number 5550001). The idea is the narrator is going to St. Ives, and he meets the man and his entourage coming *from* St. Ives.

You may regard this, as do 1.5 Maths Masters, as cheating: it's perfectly possible to meet someone who is going the same way. (How fast would the entourage be moving!?) In this case, you just have to sum up: 1 narrator + 1 man + 7 wives + 7^2 sacks + 7^3 cats + 7^4 kittens = 2802 "people".

This is one of the oldest mathematical puzzles in recorded history. The version above dates from the 18th Century, but Fibonacci gave a version in the 13th Century, and it appears as Problem 79 in the Rhind Papyrus, dated to around 1650 BC.

EASY 7

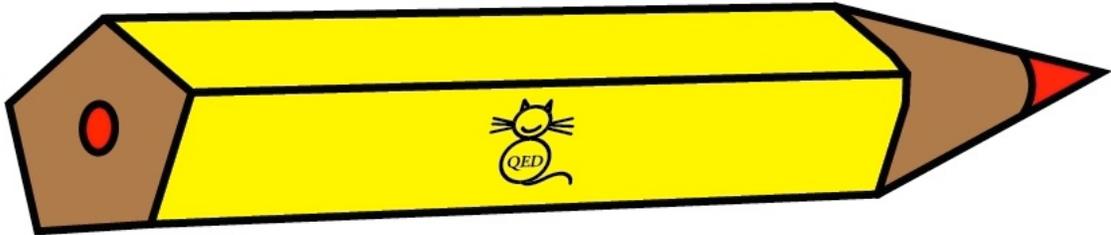
Between midnight and noon, how many times does the minute hand of a watch overtake the hour hand?



Solution: The minute hand overtakes the hour hand ten times. Note that each pass takes a little over an hour to complete. You could argue that there's an initial "overtake" at midnight, taking the total to 11. But, with the actual wording of the question, probably ten is the better answer.

EASY 8

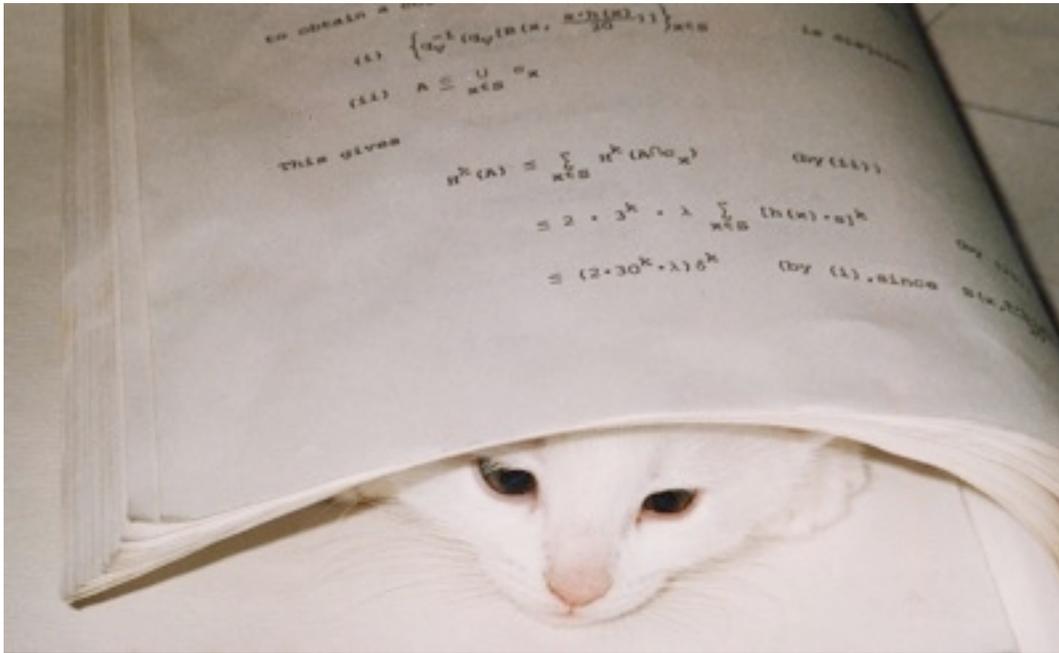
A pencil with a pentagonal cross-section has a famous logo printed on one of its five sides. If you roll the pencil across the table what are the chances that it will stop with the logo facing up?



Solution: Not $1/5$! Two of the five sides are facing upwards, though still at an angle. So, a fair solution is $2/5$. You could also argue that no side ever faces exactly upwards, so that the chances are actually 0.

EASY 9

The Maths Masters own five cats: Archimedes, Euclid, Fermat, Penrose and Zeno. Archimedes is older than Euclid. Fermat is older than Zeno but younger than Penrose. Zeno is older than Euclid. Penrose is younger than Archimedes. List our cats in order, from oldest to youngest.



Solution: Archimedes, Penrose, Fermat, Zeno, Euclid.

EASY 10

What's the next number in this sequence?



Solution: Our intended answer is 37, because $6 + 11 + 20 = 37$. That is, start with 1, 2 and 3, and then the rule is “add the three previous numbers to get the next one”.

There are many other “natural” answers you could give as the answer: check out the [Encyclopedia of Integer Sequences](#). Also, if you wish, you can argue that *anything* is a solution. See our [very first Maths Masters column](#).