

1. Three whole numbers form a *Pythagorean triple* if the square of the biggest one equals the sums of the squares of the other two. For instance:

$$3^2 + 4^2 = 5^2$$

$$5^2 + 12^2 = 13^2$$

$$7^2 + 24^2 = 25^2$$

$$9^2 + 40^2 = 41^2$$

Can you find as many Pythagorean triples as you want?

2. Using the trick which shows  $.0909090909\dots = \frac{1}{11}$  find the value of the infinite sum

$$\frac{1}{3} + \frac{1}{3 \cdot 3} + \frac{1}{3 \cdot 3 \cdot 3} + \frac{1}{3 \cdot 3 \cdot 3 \cdot 3} + \dots$$

3. Mathematicians sometimes find it useful to invent an imaginary number called  $i$  which is a square root of  $-1$ , so  $i^2 = -1$ . Assuming the usual rules still hold, what is  $(i + 1)^2$ ? Can you find the square root of  $i$ ?