



INVESTIGATION



Primes from Squares

$$29 = 5^2 + 2^2$$
$$17 = 4^2 + 1^2$$

MathSphere

Primes from Squares

It is possible to write some prime numbers as two square numbers added together - what we call 'the sum of two squares'.

Eg. $29 = 25 + 4 = 5^2 + 2^2$
 $17 = 16 + 1 = 4^2 + 1^2$

Some prime numbers cannot be written this way, such as 7, 11 and 19.

Find as many prime numbers as you can that can be written this way.

What fraction of all prime numbers can be written as the sum of two squares?

You might like to begin with a table of results:

Prime Number	Written as sum of squares
2	
3	
5	
7	
11	
13	
17	$4^2 + 1^2$
19	
23	
29	$5^2 + 2^2$
31	
37	
41	
43	

Answer Guide

This is quite an easy mini investigation and good revision of prime and square numbers.

It is not too difficult to find primes that are the sums of squares: 2, 5, 13, 17, 29 and 37 are the first few that can be so written.

If enough examples are taken, it will be found that one half of all primes may be written this way.