Prime Numbers 6

(use calculator as directed by your teacher)

To test for a prime number, you only need to check for prime factors up to half the value of the number you are testing. Can we improve this method still further?

1. Consider all the factors of 100.

$1 \times 100 = 100$
$2 \times 50 = 100$
$4 \times 25 = 100$
$5 \times 20 = 100$
$10 \times 10 = 100$

Each of these multiplication facts gives us **2 factors** (eg 2x50=100 so 2 & 50 are factors).

Since we are only looking for 1 factor, the smaller of the two in each multiplication fact will do.
We will never require to try the factor 20, since we will have already discovered that 5 divides in exactly.

Look at the list of multiplication facts for 100. What will be the largest factor we should test for?

2. For each of the following numbers, list all the multiplication facts (in order as above) and write down the highest factor that we can find which does not appear with any of the lower factors in your list (it will always be in the last of your ordered multiplication facts);-

a) 20 b) 81 c) 144 d) 36 e) 64 f) 26

3. Copy and complete this conclusion: "When testing for a prime number we need only consider prime factors less than or equal to the ..... "

Example: Test to see if 311 is prime.

answer: $\sqrt{311} = 17.6$ therefore 17 is the highest prime factor we need to test.

try 2, 311÷2 = let's not bother since only even numbers divide by 2
try 3, 311÷3 = 103r2
try 5, 311÷5 = this number does not end with 0 or 5 so obviously 5 is not a factor
try 7, 311÷7 = 44r3
try 11, 311÷11 = 28r3
try 13, 311÷13 = 23r12
try 17, 311÷17 = 18r5 **so 311 is prime**

4. Test the following numbers to see if they are prime,

a) 191 b) 151 c) 201 d) 263 e) 267 f) 113

g) 301 h) 349 i) 381 j) 395 k) 599 l) 609

m) 408 n) 421 o) 199 p) 501 q) 613 r) 1469