

## STEP II, 2013, Q7 MS

Question 7.

A solution of the equation should be easy to spot and a simple substitution will establish the new solution that can be generated from an existing one. This therefore allows two further solutions to be found easily by repeated application of this result.

In part (ii) write  $x = 2m + 1$  and  $y = 2n$  and then substitute into (\*). With some simplification the required relationship will be established.

Since  $b$  is a prime number there is only two ways in which it can be split into a product of two numbers ( $1 \times b^3$  and  $b \times b^2$ ). The right hand side of the equation is clearly a difference of two squares and therefore a pair of simultaneous equations can be solved to give expressions for  $a$  and  $c^2$ . Finally, the expression for  $c^2$  is similar to the relationship established in part (ii), so solutions to the original equation can be used to generate values of  $a$ ,  $b$  and  $c$  which satisfy this equation.



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