

STEP III, 2012 Q5 EC

5. This was only very slightly more popular than question 4, though with the same level of success. A lot of candidates scored just the first 5 marks, getting as far as completing the simplification in part (i) (b), but then, being unable to apply it for the final result, and then making no progress with part (ii). The biggest problem was that candidates ignored the definitions given at the start of the question, most notably that “ a and b are rational numbers”. The other common problem was that candidates chose a simple value for θ such as $\frac{\pi}{4}$ or $\frac{\pi}{3}$ rather than for $\cos \theta$ such as $\frac{4}{5}$. In part (ii), quite frequently, candidates substituted $x = p + \sqrt{2}q$, and $y = r + \sqrt{2}s$ and some then successfully found solutions. For part (ii) (c), a method using $\cosh \theta$ and $\sinh \theta$ was not unexpected, although the comparable one with $\sec \theta$ and $\tan \theta$ was quite commonly used too.



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