The complex number u is defined by $u = \dfrac{\sqrt{2} - a\sqrt{2}\,i}{1 + 2i}$, where a is a positive integer.

(a) Express u in terms of a, in the form $x + iy$, where x and y are real and exact. [3]

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It is now given that $a = 3$.

(b) Express u in the form $re^{i\theta}$, where $r > 0$ and $-\pi < \theta \leqslant \pi$, giving the exact values of r and θ. [2]

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(c) Using your answer to part **(b)**, find the two square roots of u. Give your answers in the form $re^{i\theta}$, where $r > 0$ and $-\pi < \theta \leqslant \pi$, giving the exact values of r and θ. [3]

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