Nested surds

underground mathematics

Problem

For each card below, determine which non-negative values of a, b, c, and d, if any, make the equation true. These can be attempted in any order but you might find that some cards can help inform your decisions about others.

(a) $\sqrt{a} \times \sqrt{b} = \sqrt{ab}$	(b) $\dfrac{\sqrt{a}}{\sqrt{b}} = \sqrt{\dfrac{a}{b}}$
(c) $\sqrt{23 - 6\sqrt{6 - 4\sqrt{2}}} = \sqrt{a} + \sqrt{b}$	(d) $a\sqrt{b} = \sqrt{ab}$
(e) $\dfrac{\sqrt{ab}}{\sqrt{a} + \sqrt{b}} = 1$	(f) $\sqrt{a} - \sqrt{b} = \sqrt{a - b}$
(g) $\sqrt{a} + \sqrt{b} = \sqrt{a + b + \sqrt{4ab}}$	(h) $\dfrac{\sqrt{a} + b}{\sqrt{c} + d} = (\sqrt{a} + b)(\sqrt{c} - d)$
(i) $\sqrt{5 + 2\sqrt{6}} = \sqrt{a} + \sqrt{b}$	