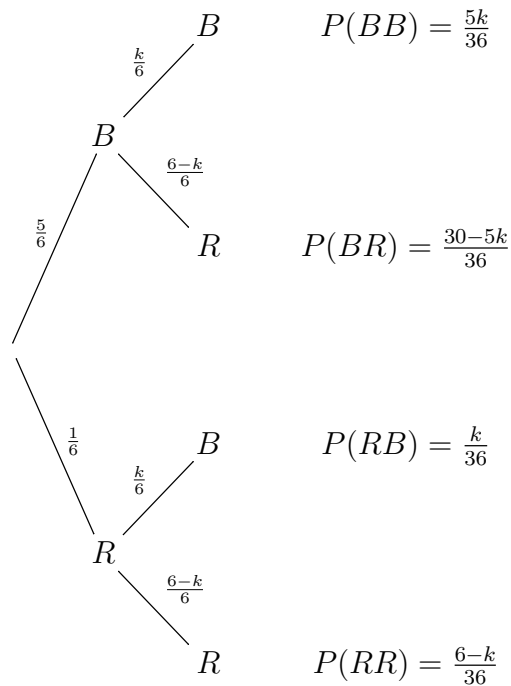# Riddler Express Solution

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Puzzle posed on Sept 14, 2018, solution Sept 15, 2018

Let: k = Number of Blue sides on second die.
Then, make a tree diagram:

$$B \qquad P(BB) = \frac{5k}{36}$$

$$R \qquad P(BR) = \frac{30-5k}{36}$$

$$B \qquad P(RB) = \frac{k}{36}$$

$$R \qquad P(RR) = \frac{6-k}{36}$$

Abby wins on BB or RR:

$$P(RR) + P(BB) = \frac{5k}{36} + \frac{6-k}{36} = \frac{6+4k}{36}$$

Beatrice wins on BR or RB:

$$P(BR) + P(RB) = \frac{30-5k}{36} + \frac{k}{36} = \frac{30-4k}{36}$$

Their chances of winning are equal when:

$$\frac{6+4k}{36} = \frac{30-4k}{36}$$

$$6 + 4k = 30 - 4k$$

$$8k = 24$$

$$k = 3$$

So the second die should have three blue and three red faces.