Flip 5 fair coins in a row. Let B denote the event exactly 3 Heads.
Let A denote event that flips 1 and 2 are both Heads.

Find $P(A|B)$

B: write down flips that are heads

- 1 2 3, 1 2 4 } are in $A \cap B$
- 1 2 5, 1 3 4, 1 3 5, 1 4 5, 2 3 4, 2 3 5, 3 4 5 } are in $A^c \cap B$

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$P(A|B) = \frac{3}{10}$ $\quad P(A^c|B) = \frac{7}{10}$

$$P(A|B) = \frac{P(A \cap B)}{P(B)} = \frac{P(HHHTT) + P(HHTHT) + P(HHTTH)}{10 \cdot (\frac{1}{2})^5}$$

$$= \frac{3 \cdot (1/2)^5}{10 \cdot (1/2)^5} = \frac{3}{10}$$