## Joint and Conditional Probability Quick Reference Guide

A joint probability is the probability that two or more events will occur together.

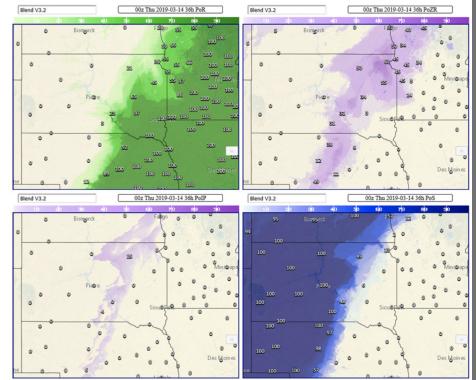
A **conditional probability** is the probability that an event will occur given that another event takes place. It is a type of joint probability where you have two events and one is assumed to occur.



The probability of blizzard conditions is a **joint probability** of four events occurring together:

- Falling or blowing snow
- Sustained winds or frequent gusts ≥ 35 mph
- Visibility 1/4 mile or less
- Three hours or more duration

NBM v3.2 Conditional Precipitation Type Probability (%) Rain (upper-left), Freezing Rain (upper-right), Ice Pellets (lower-left), Snow (lower-right). 36-hr Forecast valid 12 UTC 15 Mar 2019.



Post-processed ensemble or model blend output might show **conditional probabilities** of precipitation type – the condition being that accumulating precipitation occurs. Even though the *conditional* probability of snow over the western part of this domain might be 100% (bottom-right image), the *overall* probability of measurable snow might be low due to dry air.

> Forecasting Guide: <u>sites.google.com/noaa.gov/nws-fdtd/guide</u> NOAA/NWS Forecast Decision Training Division, Boulder, CO