

Solutions

2.1 B Mean 20; variance $100 \cdot 0.2 \cdot 0.8 = 16$, so standard deviation 4.

Compare the rejected options: 20 and 20; 20 and 16; 5 and 2; Exactly 20 with no deviation. Use the stated model and conditions.

2.2 C K depends on v^2 , so the fractional uncertainty doubles.

Compare the rejected options: 1.5%; 3%; 9%; 12%. Use the stated model and conditions.

2.3 5. Poisson variance equals mean, and standard deviation is its square root.

2.4 False. Units do not determine dimensionless factors or validate the physical model.

3.1 Net count is 800. Independent Poisson variances add despite subtraction: $\sigma = \sqrt{900 + 100} = \sqrt{1000} = 31.62$ counts, relative 0.03953. Doubled intervals give net 1600 and variance 2000, so relative uncertainty is divided by $\sqrt{2}$. Award net, variance addition, uncertainty and time scaling. This assumes stable rates and no dead-time correlations.