Quiz Solutions

1. (a) \( \tau_A = 9.47 \text{ m/s}^2, \sigma_A = 0.26 \text{ m/s}^2, \sigma_{\tau_A} = 0.09 \text{ m/s}^2 \)
   \( \tau_B = 9.6 \text{ m/s}^2, \sigma_B = 0.7 \text{ m/s}^2, \sigma_{\tau_B} = 0.2 \text{ m/s}^2 \)

   (b) \( R_A = 9.47 \pm 0.09 \text{ m/s}^2 \)
   \( R_B = 9.6 \pm 0.2 \text{ m/s}^2 \)

   (c) A: \( |9.6 - 9.47|/\sqrt{0.2^2 + 0.09^2} = 0.13/0.21 \approx 0.6 \) standard deviation difference, so the two values are in agreement.

   (d) \( \%\sigma_A = \sigma_A / \tau_A \times 100 = 0.26 / 9.47 \times 100 = 2.8\% \)
   \( \%\sigma_B = \sigma_B / \tau_B \times 100 = 0.7 / 9.6 \times 100 = 7.3\% \)

   (e) B more randomly distributed, its values distribute unpredictably about the assumed correct value.

   (f) A more systematically distributed, all values to one side of the assumed correct value.

   (g) A more precise, its relative uncertainty 2.8% is smaller.

   (h) B more accurate, difference fewer standard deviations away.

2. (a) \( C = 6.4 \pm 0.8 \)

   (b) \( C = 1.8 \pm 0.8 \)

   (c) \( C = 9 \pm 2 \)

   (d) \( C = 1.8 \pm 0.5 \)

   (e) \( C = 70 \pm 30 \)

   (f) \( C = 20 \pm 10 \)

   (g) \( C = -0.8 \pm 0.3 \)