Sample Size Questions- Answer Key

In light of their findings, the researchers wish to design a new study to study the effects of weight loss on sleep quality among obese persons. Participants will be **randomized in equal numbers to a weight loss intervention or a control group**. **Change in nightly minutes slept** over the duration of the study will be the **study outcome**. The researchers will use **60 minutes** as their **estimate of the standard deviation of change in sleep time** in both intervention and control groups.

19. How large must the **intervention group** be if the researchers seek to provide a 95% confidence interval for the mean change in sleep time in that group that is no more than 30 minutes wide? (*Circle only one response.*)
    a) n=4 in the intervention group
    b) n=16 in the intervention group
    c) n=42 in the intervention group
    d) n=62 in the intervention group

    For a 95% CI that is 30 minutes wide, the half-width of the CI equals 15 such that:

    $$\mathbf{1.96 \cdot \frac{s}{\sqrt{n}} = 15}$$

    Solving for n, we have

    $$\mathbf{\sqrt{n} = \frac{1.96 \cdot s}{15} = \frac{1.96 \cdot (60)}{15} = 7.84}$$

    $$\mathbf{n = 62}$$

    e) n=168 in the intervention group

2. The researchers will test for a **difference in mean change in sleep time** between intervention and control groups, setting the probability of Type I error equal to 0.05. They seek to achieve power=0.90 for their test. What, if any, additional information do they need to calculate the needed sample size, beyond that already given (i.e. in the text preceding question 19, in question 19, and in the preceding two sentences)? (*Circle only one response.*)
    a) α **Already given**.
    b) β **Already given**.
    c) Δ
    We would use the sample size formula for two equal-sized groups:

    $$n = \frac{\left(z_{\alpha/2} + z_{\beta}\right)^2 \left(\sigma_1^2 + \sigma_2^2\right)}{\Delta^2}$$ **We are told that α=0.05, β= 0.10, σ_1= σ_2=60. All that we need is Δ, the difference in mean change in sleep time between the intervention and control groups.**
    d) The mean change in sleep time hypothesized in the control group. **Not needed. In this test, Ho: no difference in mean change in sleep between the interventions and control groups verus Ha: a specific difference, Δ, in mean change in sleep between the two groups,**
    e) No additional information is needed: It all has been provided above.