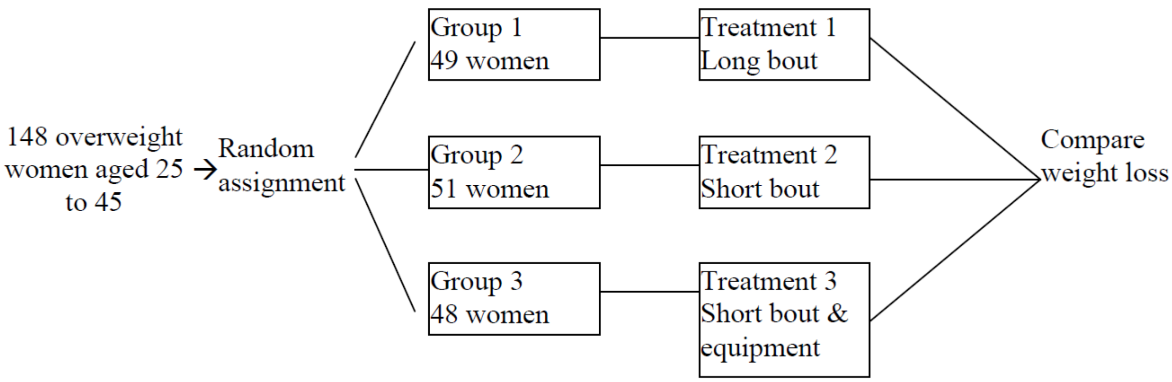
Answers: *Exercising to Lose Weight*

1. Diagram below.



2. There are 149 women among the three groups. Assigning labels 001 to 148 (or 000 to 148) and taking three digits at a time, line 114 gives 029, 091, 041, 056, 037, 103, 049, 061, 079, 078.

3. No. Although the evaluator who determined weight loss could be blinded, it would be hard for those who are doing the exercise not to know what their treatment is.

4. ***State:*** We want to perform a test of $H_0: \mu_1 - \mu_2 = 0$ versus $H_a: \mu_1 - \mu_2 \neq 0$ where $\mu_1 =$ the true mean weight loss under the short-bout exercise treatment for subjects like the ones in the study and $\mu_2 =$ the true mean weight loss under the long-bout exercise treatment for subjects like the ones in the study. We will use the $\alpha = 0.05$ significance level.

Plan: We should use a two-sample t test if the conditions are met.

- *Random*
  Subjects in the study were randomly allocated to the two treatments.
- *Normal*
  Both sample sizes are large (37 and 36 are both at least 30).
- *Independent*
  Due to the random assignment, these two groups of women can be viewed as independent. Individual observations in each group should also be independent: knowing one subject's weight loss should give no information about another subject's weight loss.

Do:

- *Test Statistic*

$$t = \frac{(-5.8-(-3.7))-0}{\sqrt{\frac{7.1^2}{37}+\frac{6.6^2}{36}}} = -1.308$$

- *P-value*
  Using the conservative method, df = 36 – 1 = 35. Using Table B and df = 30, the area beyond $t = 1.308$ is between 0.10 and 0.15. Because this is a two-sided test, the P-value is between 0.20 and 0.30. Using technology, df = 70.86 and P-value = 0.195.

Conclude: This confirms the report's statement. Since the P-value is greater than 0.05, we do not reject H_0. The difference in weight loss is not significant.

5. ***State:*** We want to estimate the difference $\mu_1 - \mu_2$ at the 95% confidence level where μ_1 = the true mean weight loss under the short-bout exercise treatment for subjects like the ones in the study and μ_2 = the true mean weight loss under the long-bout exercise treatment for subjects like the ones in the study.

Plan: From question 4, the conditions for a two-sample *t* interval are met.

Do: Using the conservative method, df = 36 – 1 = 35. Using Table B and df = 30, the 95% critical value is *t** = 2.042. The confidence interval is:

$$\left(-5.8-\left(-3.7\right)\right)\pm 2.042\sqrt{\frac{7.1^2}{37}+\frac{6.6^2}{36}} = -2.1 \pm 3.275 = (-5.375, 1.175)$$

Using technology and df = 70.86, the confidence interval is (–5.298, 1.098).

Conclude:
We are 95% confident that the interval from –5.298 to 1.098 pounds captures the difference in true mean weight loss for subjects using the short-bout and long-bout treatments. This confirms the report's statement because 0 is included as a plausible value for the difference.

6. Since the group sizes are larger and everything else remains the same, the *P*-value should be smaller, making it possible that we would reject H_0 if there were no drop outs. Here are the new calculations:

- *Test Statistic*

$$t = \frac{(-5.8-(-3.7))-0}{\sqrt{\frac{7.1^2}{49}+\frac{6.6^2}{51}}} = -1.53$$

- *P-value*

  Using technology, df = 96.76 and *P*-value = 0.129.
  Even though the *P*-value is smaller, it isn't small enough to provide convincing evidence that the difference in weight loss is significant.