

Past-paper walk-through

Setting Up a Test for the Difference of Two Population Means ■ 7.8

eXercise

Questions in this set

- 2026 Q4
- 2025 Q6
- 2022 Q5
- 2018 Q4
- 2014 Q5

Reading the mark scheme

- **B1** a mark that stands on its own – the point is either made or not.
- **M1** a *method* mark: the right approach, even if the number is wrong.
- **A1** an *answer* mark, and it usually needs its M mark first.
- **C1** a working mark on the way to the answer.
- **//** separates answers the examiner accepts equally.
- **ecf** = error carried forward: a later part is marked on your own earlier answer.
- **owtte** = “or words to that effect” – the wording need not match.

Question 4

2026 ■ Q4

A farmer wants to know whether there is a difference in the mean number of oranges that grow on trees fertilized with the current fertilizer, Brand C, or a new fertilizer, Brand N. The farmer randomly assigns 58 trees to be treated with Brand C and 58 trees to be treated with Brand N. The number of oranges from each tree is recorded. The summary statistics by fertilizer brand are shown in the table.

****Summary Statistics for the Number of Oranges by Fertilizer Brand****

n	Mean	Standard Deviation	Brand
58	141	15	Brand C
58	148	19	Brand N

At the $\alpha = 0.05$ significance level, do the data provide convincing statistical evidence that the mean number of oranges on trees fertilized with Brand C is different from the mean number of oranges on trees fertilized with Brand N for all trees similar to those in the study?

Question 4

	n	Mean	Standard Deviation
Brand C	58	141	15
Brand N	58	148	19

Question 6

2025 ■ Q6

Question 6

Stefan, a psychologist, conducted a study to investigate the effect of time of day on reading comprehension in children. One hundred children volunteered, with their parents' consent, to participate in the study. Fifty of the children were randomly assigned to read a story at 9 a.m. and then answer 25 questions about it. The remaining 50 children were assigned to read the same story at 3 p.m. and answer the same 25 questions. The reading comprehension for each child was measured by a reading score, which was determined by the number of questions that were answered correctly about the story. Stefan is interested in comparing the mean reading scores for the two times of day. Table 1 shows the results of Stefan's study.

Table 1: Summary Statistics of Reading Scores

Question 6

	<i>n</i>	Mean	Standard Deviation
9 a.m.	50	15.2	4.12
3 p.m.	50	17.9	4.43

Question 6

Stefan found the conditions for inference were met and conducted a two-sample t -test for the difference in two population means. Let μ_{AM} represent the mean reading score for all children, similar to those in the study, who would read the story at 9 a.m. Let μ_{PM} represent the mean reading score for all children, similar to those in the study, who would read the story at 3 p.m. Stefan's hypotheses are as shown.

$$H_0 : \mu_{AM} = \mu_{PM}$$

$$H_a : \mu_{AM} \neq \mu_{PM}$$

(a) The p -value for Stefan's hypothesis test was 0.002. State an appropriate conclusion, at the 5 percent significance level, for Stefan's test in the context of the investigation. Justify your answer.

Question 6

Cohen's d Coefficient	Practical Importance
$0 \leq d \leq 0.20$	Not very meaningful in real life
$0.20 < d < 0.80$	Somewhat meaningful in real life
$d \geq 0.80$	Very meaningful in real life

Question 6

	n	Mean	Standard Deviation
9 a.m.	50	15.2	4.12
3 p.m.	50	17.9	4.43

Question 6

$$\text{as } s_p = \sqrt{\frac{s_1^2 + s_2^2}{2}},$$

Question 6

2025 ■ Q6