



PERTH MODERN SCHOOL
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Independent Public School

Course Methods Year 12 test four 2022

Student name: _____ Teacher name: _____

Task type: _____ **Response**

Time allowed for this task: _____ **40** _____ mins

Number of questions: _____ **6** _____

Materials required: _____ **Upto 3 calculators/classpads allowed**

Standard items: _____ Pens (blue/black preferred), pencils (including coloured), sharpener, correction fluid/tape, eraser, ruler, highlighters

Special items: _____ Drawing instruments, templates, **one page of A4 notes doublesided**

Marks available: _____ **44** _____ marks

Task weighting: _____ **10** _____%

Formula sheet provided: Yes

Note: All part questions worth more than 2 marks require working to obtain full marks.

Q1 (4 marks) 4.2.5

The exam results, out of a 100, for a Methods exam at a particular school was found to be Normally Distributed. It was found that 21% of the students scored a result greater than 85 and 17% scored a mark less than 55. Determine the mean and standard deviation.

Q2 (2, 2, 3 & 2 = 9 marks) 4.3.8

A 95% confidence interval was determined for the proportion of faulty factory parts made at a company. The interval length is 0.106 and the sample size is 400.

Determine the **expected length** of the interval for each change in isolation to 3 decimal places.

- a) A sample size of 300 was used.
- b) A 90% confidence was used.
- c) An 88% confidence AND a sample size of 150 was used.
- d) The true proportion of faulty parts does not lie in the stated interval. Does this suggest a sampling error was made? Justify.

Q3 (2, 2, 2, 3, 3, 3 & 3 = 18 marks) 4.2.5, 4.2.3, 3.3.1, 3.3.6, 3.3.7

A parcel making factory makes boxes of the same width and heights but the lengths vary and are found to be Normally Distributed with a mean of 135 mm and a standard deviation of 27 mm.

- a) Determine the percentage of boxes that are longer than 166mm.

The boxes can be classified as the following.

Box	Short	Long	Very Long	Gigantic
Length	0 to 45 mm	45 to 100 mm	100 to 140 mm	Greater than 140mm
Probability		0.097	0.476	

- b) Complete the missing probabilities in the above table.
- c) Comment on the appropriateness of the Normal Model for the lengths of the boxes.
- d) If 30 boxes were taken off the assembly line, determine the probability that exactly 13 were gigantic lengths.
- e) Determine the probability that it would take 20 boxes in a row off the assembly line before 8 gigantic boxes were found.

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Q3 cont

If the costs of each box were determined as follows.

Box	short	long	Very long	gigantic
Cost \$	\$3.21	\$4.12	\$5.20	\$6.30

- i) Determine the mean cost to two decimal places. Show all working.
- ii) Determine the standard deviation to two decimal places. Show all working.

Q4 (3, 2, 3, 3 & 2 = 13 marks) 4.3.4, 4.3.5, 4.3.6, 4.3.9, 4.3.10

In Australia it has been found that 16% of people are left-handed. Samples of people are surveyed to ascertain the proportion that are left-handed. Let \hat{p} denote the proportion of people in the sample who are left handed.

- a) State the approximate distribution of \hat{p} for sample sizes of 100.
- b) Determine the approximate probability that in a sample of 300 people that the proportion of left handed people is greater than 0.21.

Q4 cont-

In a recent survey it was found that 18 people out of a sample of 200 were left handed.

c) For a 99% confidence interval, what is the margin of error based on this recent sample of 200?

d) Determine a 95% confidence interval based on the recent sample of 200 people.

e) Does the recent sample support the assumed proportion of 16% for left handed people?
Explain.

Working out space