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.

Working out space

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.