Self-directed Clarifying Activity – Assessment Type 1: Skills and Applications Tasks – Statistics

1. **Use the annotated performance standards and student work sample to compare your interpretation of the performance standards and recalibrate your assessment decision (if necessary).**

Assessment Decision = C

Please see annotations below

	Mathematical Knowledge and Skills and Their Application	Mathematical Modelling and Problem-solving	Communication of Mathematical Information
B	Some depth of knowledge of content and understanding of concepts and relationships. Use of mathematical algorithms and techniques (implemented electronically where appropriate) to find some correct solutions to complex questions. Accurate application of knowledge and skills to answer questions set in applied and theoretical contexts.	Attempted development and appropriate application of mathematical models. Mostly accurate and complete solutions to mathematical problems set in applied and theoretical contexts. Complete interpretation of the mathematical results in the context of the problem. Some depth of understanding of the reasonableness and possible limitations of the interpreted results, and recognition of assumptions made.	Effective communication of mathematical ideas and reasoning to develop mostly logical arguments. Mostly accurate use of appropriate notation, representations, and terminology.
C	Generally competent knowledge of content and understanding of concepts and relationships. Use of mathematical algorithms and techniques (implemented electronically where appropriate) to find mostly correct solutions to routine questions. Generally accurate application of knowledge and skills to answer questions set in applied and theoretical contexts.	Appropriate application of mathematical models. Some accurate and generally complete solutions to mathematical problems set in applied and theoretical contexts. Generally appropriate interpretation of the mathematical results in the context of the problem. Some understanding of the reasonableness and possible limitations of the interpreted results, and some recognition of assumptions made.	Appropriate communication of mathematical ideas and reasoning to develop some logical arguments. Use of generally appropriate notation, representations, and terminology, with some inaccuracies.

Name: _____

Stage 1 Mathematics B Test

Statistics

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1. A number of people were surveyed by telephone and asked the questions below. Classify the data obtained for each question as categorical, discrete numerical or continuous numerical:

   a) The age group of the person

   ~~Categorical~~ discrete numerical ✓

   b) Their area of employment (including retirement)

   Categorical ✓

   c) The names of magazines read regularly

   Categorical ✓

   d) The amount of money spent weekly on magazines

   Continuous numerical ✓

Mathematical Knowledge and Skills and Their Application
Generally competent knowledge of content and understanding of concepts and relationships.

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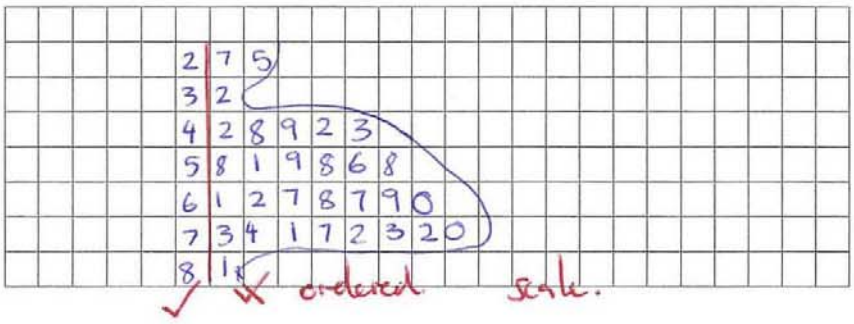
2. The data below is the height (in mm) of tomato seedlings measured 2 weeks after the planting:

73	61	74	58	51	59	62	32	27	42
71	77	67	48	58	49	25	68	72	73
42	81	72	67	56	69	70	60	58	43

a) Produce a stemplot for this data



b) Find the

   i. Median

   60.5 ✓

   ii. Range

   81 - 25 = 56 ✓

c) Comment on the shape of the distribution

Symmetrical ✓

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3. The times (in minutes) taken to walk a certain trail in the National Park are recorded below.

135	187	173	215	223	195	147	205	168	201
183	128	231	192	182	207	142	146	177	160
201	183	180	165	211	191	174	155	169	215

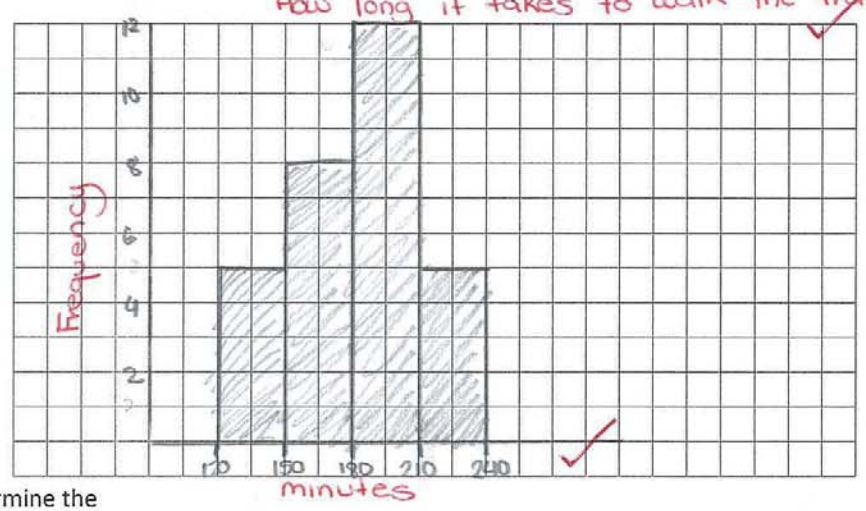
a) Determine the minimum and maximum values for the data set.

min = 128 max = 231 ✓

b) Produce appropriate interval classes to place all the data values in and prepare a frequency distribution table.

?	Tally	Frequency
120 - 149	𝍸	5
150 - 179	𝍸 |||	8
180 - 209	𝍸 𝍸 ||	12
210 - 239	𝍸	5 ✓

c) For this data, draw a frequency histogram.



✓

Communication of Mathematical Information
Mostly accurate use of appropriate notation, representations, and terminology.

d) Determine the

i. Mean
181.36 ✓

ii. Median
182.5 ✓

/10

4. For the ordered data set: 39, 40, 43, 44, 45, 46, 47, 48, 51, 51, 55, 61, 62, 65, 67

a) Find the

i. Median
47.5 ✗

ii. Q1
44 ✓

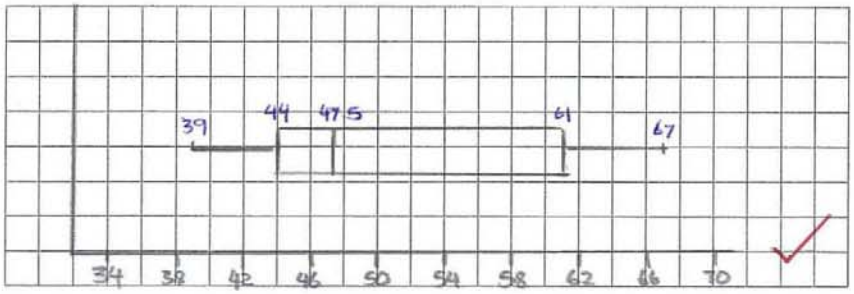
iii. Mode
50.93 ✗

iv. Q3
61 ✓

b) Calculate the interquartile range

61 - 44 = 17 ✓

c) Draw a boxplot of the data



✓

Mathematical Modelling and Problem-solving
Some accurate and generally complete solutions to mathematical problems set in applied and theoretical contexts.

/6

5. Show (without technology) that the mean, mode and median of the set of scores below are the values 4.82, 4 and 4.

a) 2, 3, 3, 4, 4, 4, 4, 6, 7, 7, 9

mean
2+3+3+4+4+4+4+6+7+7+9
= 53 ÷ 11
= 4.82 ✓

median = middle
2, 3, 3, 4, 4, (4) 4, 6, 7, 7, 9
= 5 on each side ✓

mode = most frequent
2 = 1
3 = 2
4 = 4 = 4 ✓
6 = 1
7 = 2
9 = 1

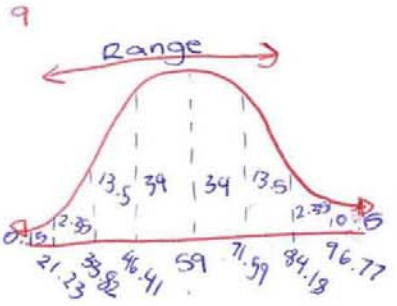
/3

6. Find the standard deviation of the following samples, and hence compare the spread of each distribution: (you may include a diagram to support your comments)

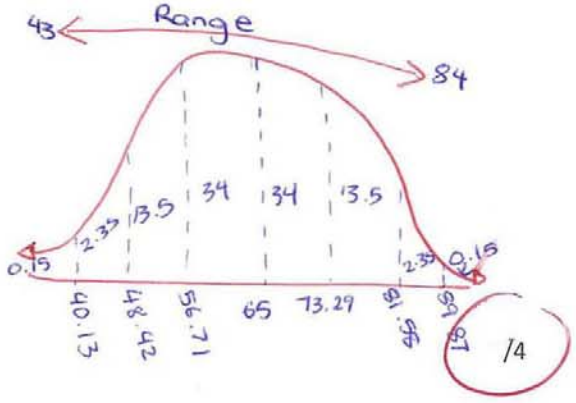
a) 48, 73, 57, 43, 62, 71, 84, 68, 65, 53, 77
standard deviation = 12.59 ✓

b) 50, 54, 62, 47, 59, 65, 71, 59, 51, 69, 49
Standard deviation = 8.29 ✓

a



b



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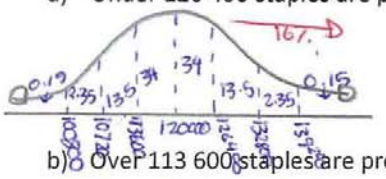
7. A staple-producing machine produces, on average, 120 000 staples a day with a standard deviation of 6400. If we assume that production is normally distributed and the year comprises 260 working days, calculate the approximate number of working days that:

a) Under 126 400 staples are produced



260 ÷ 100
2.6 × 16
= 41.6 days
= 42 days ✗

b) Over 113 600 staples are produced

34% + 34% + 13.5% + 2.35% + 0.15%
= 84% ✓

260 ÷ 100
2.6 × 84
= 218.4 days
= 218 days ✓

c) Between 107 200 and 126 400 staples are produced

13.5 + 34 + 34
= 81.5% ✓

260 ÷ 100
2.6 × 81.5
= 211.9 days
= 212 days ✓

Mathematical Knowledge and Skills and Their Application
Use of mathematical algorithms and techniques (implemented electronically where appropriate) to find some correct solutions to complex questions.

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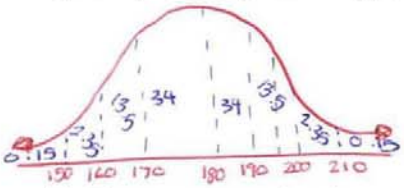
8. A fruiterer has analysed the distribution of apple weights in his orchard, and found that the apple weights are normally distributed with a mean weight of 180g and a standard deviation of 10g. Find:

a) The probability that An apple will be picked at random with weight greater than 195g



6.75 + 2.35 + 0.15
= 9.25% ✗

b) The percentage of apples you would expect to have weight between 175g and 190g

17% + 34%
= 51% ✗

Mathematical Knowledge and Skills and Their Application
Generally accurate application of knowledge and skills to answer questions set in applied and theoretical contexts.

A fruit stall has a weekly delivery from the fruiterer. They reject any apples less than 169g in weight.

c) If this week's delivery is 2000 apples, how many would the fruit stall reject?

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