

## Practice Sample Paper

**Directions:** Work on this to the best of your ability. There will not be an answer key provided online. Use your prior knowledge and notes to answer all of the following questions.

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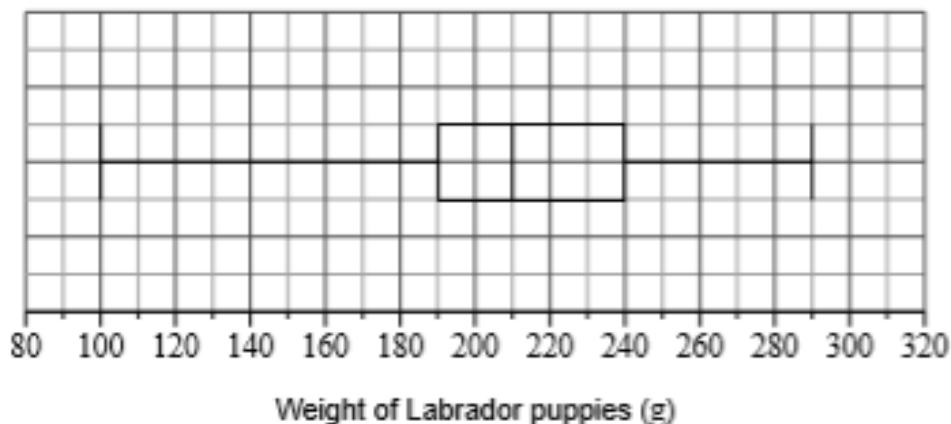
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Answers must be written within the answer boxes provided. Full marks are not necessarily awarded for a correct answer with no working. Answers must be supported by working and/or explanations. Solutions found from a graphic display calculator should be supported by suitable working. For example, if graphs are used to find a solution, you should sketch these as part of your answer. Where an answer is incorrect, some marks may be given for a correct method, provided this is shown by written working. You are therefore advised to show all working.

1. [Maximum mark: 6]

Palvinder breeds Labrador puppies at his farm. Over many years he recorded the weight (g) of the puppies.

The data is illustrated in the following box and whisker diagram.



- (a) Write down the median weight of the puppies. [1]
- (b) Write down the upper quartile. [1]
- (c) Find the interquartile range. [2]

The weights of these Labrador puppies are normally distributed.

- (d) Find the weight of the heaviest possible puppy that is not an outlier. [2]







According to manufacturer specifications, the colours in each variety pack should be distributed as follows.

Colour	Brown	Red	Green	Orange	Yellow	Purple
Percentage (%)	15	25	20	20	10	10

Mr Slugworth opens a pack of 80 sweets and records the frequency of each colour.

Colour	Brown	Red	Green	Orange	Yellow	Purple
Observed Frequency	10	20	16	18	12	4

To investigate if the sample is consistent with manufacturer specifications, Mr Slugworth conducts a  $\chi^2$  goodness of fit test. The test is carried out at a 5% significance level.

(c) Write down the null hypothesis for this test. [1]

(d) Copy and complete the following table in your answer booklet. [2]

Colour	Brown	Red	Green	Orange	Yellow	Purple
Expected Frequency						

(e) Write down the number of degrees of freedom. [1]

(f) Find the  $p$ -value for the test. [2]

(g) State the conclusion of the test. Give a reason for your answer. [2]

## 3. [Maximum mark: 17]

The Malvern Aquatic Center hosted a 3 metre spring board diving event. The judges, Stan and Minsun awarded 8 competitors a score out of 10. The raw data is collated in the following table.

Competitors	A	B	C	D	E	F	G	H
Stan's score ( $x$ )	4.1	3	4.3	6	7.1	6	7.5	6
Minsun's score ( $y$ )	4.7	4.6	4.8	7.2	7.8	9	9.5	7.2

- (a) (i) Write down the value of the Pearson's product-moment correlation coefficient,  $r$ .  
 (ii) Using the value of  $r$ , interpret the relationship between Stan's score and Minsun's score. [4]
- (b) Write down the equation of the regression line  $y$  on  $x$ . [2]
- (c) (i) Use your regression equation from part (b) to estimate Minsun's score when Stan awards a perfect 10.  
 (ii) State whether this estimate is reliable. Justify your answer. [4]

The Commissioner for the event would like to find the Spearman's rank correlation coefficient.

- (d) Copy and complete the information in the following table. [2]

Competitors	A	B	C	D	E	F	G	H
Stan's Rank		8					1	4
Minsun's Rank		8					1	4.5

- (e) (i) Find the value of the Spearman's rank correlation coefficient,  $r_s$ .  
 (ii) Comment on the result obtained for  $r_s$ . [4]

The Commissioner believes Minsun's score for competitor G is too high and so decreases the score from 9.5 to 9.1.

- (f) Explain why the value of the Spearman's rank correlation coefficient  $r_s$  does not change. [1]