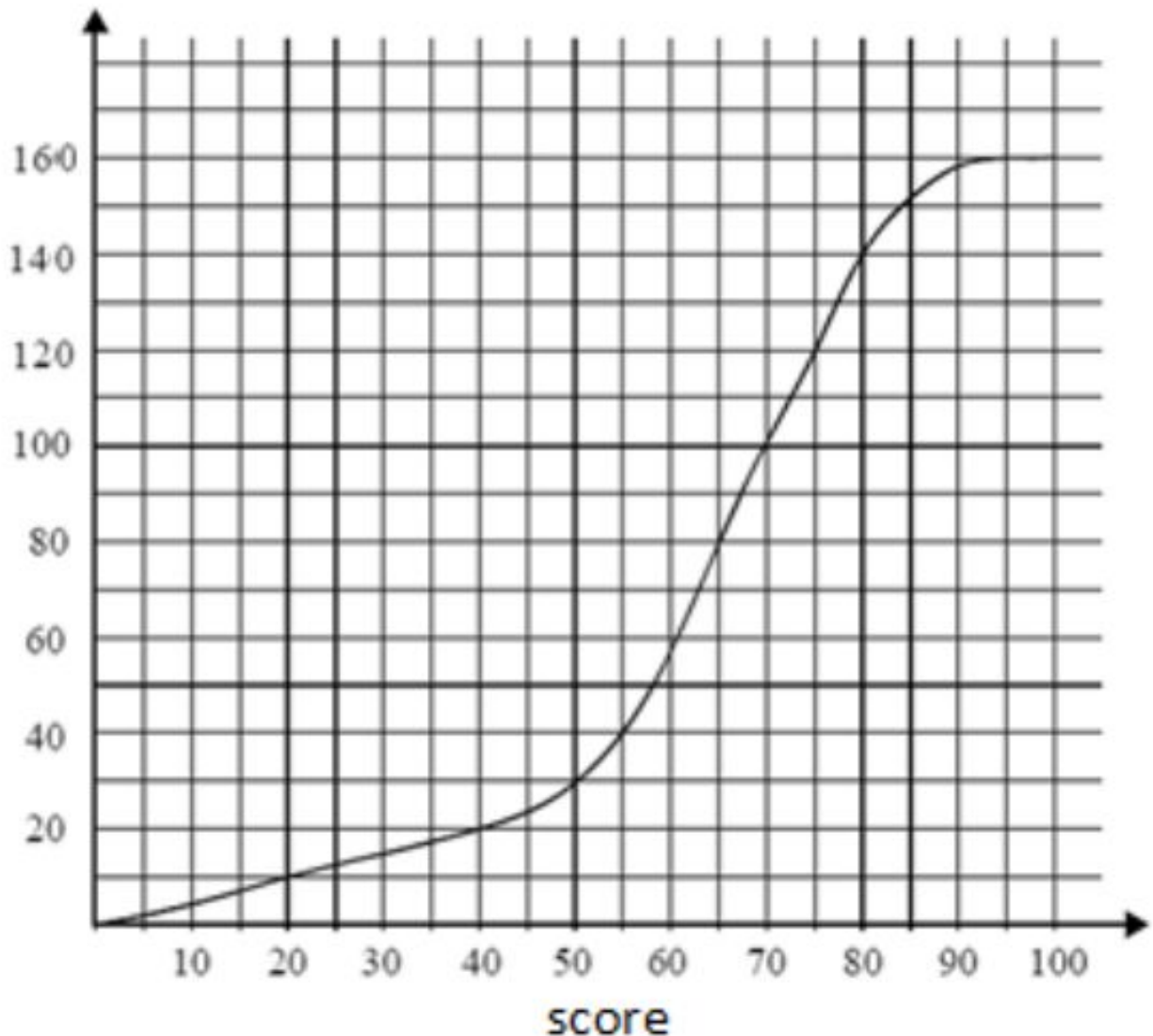


Math SL EXPLORATION LAB 7

Skills LAB - Working with Cumulative Frequency Graphs

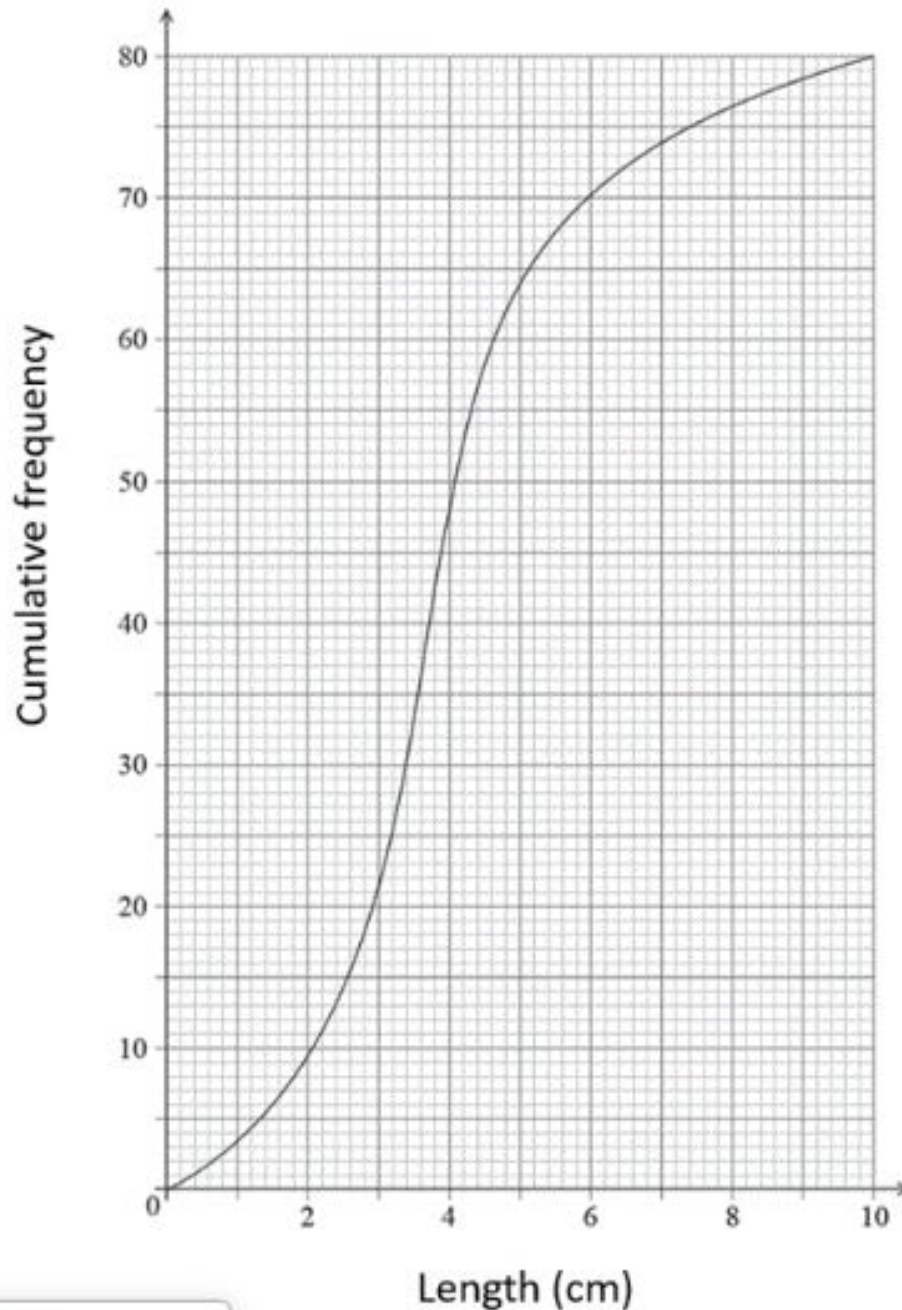
1. A test is given to 160 students. Each student earned a score on a 100-point scale. The cumulative frequency graph for the scores is shown.
 - a. Write down the number of students who earned a score of 50 points or less.
 - b. The middle 50% of test results lie between marks a and b . Find a and b .
 - c. Estimate the minimum score of the top 5% of the students.



Math SL EXPLORATION LAB 7

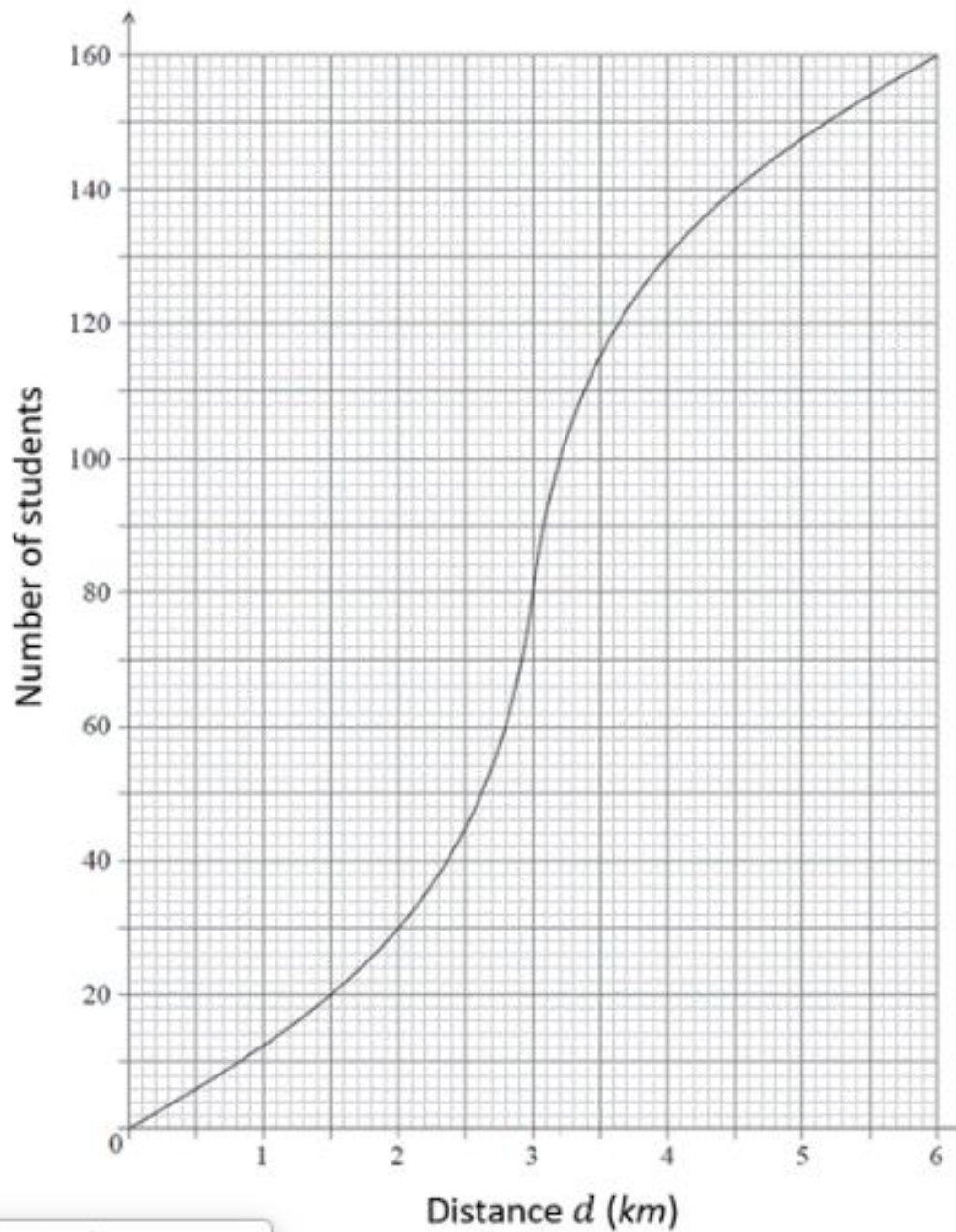
2. The following cumulative frequency diagram shows the lengths of 80 pieces, measured in cm.
- Find the median length and the interquartile range.
 - Hence, construct a box and whisker plot of the data.
 - The following frequency table also gives the lengths of the 80 pieces of string. Find the values of p and q .

Length x cm	$0 \leq x \leq 4$	$4 < x \leq 7$	$7 < x \leq 10$
Frequency	q	26	p



Math SL EXPLORATION LAB 7

3. The following cumulative frequency diagram shows the distance students need to travel to go to school.
- Find the median distance a student needs to travel to go to school.
 - Find the percentage of students who travel between 2 km and 4 km to go to school.
 - Find the percentage of students who travel more than 4.5 km to go to school.
 - Construct a grouped frequency table with an interval width of 20 students and hence, estimate the mean distance travelled.



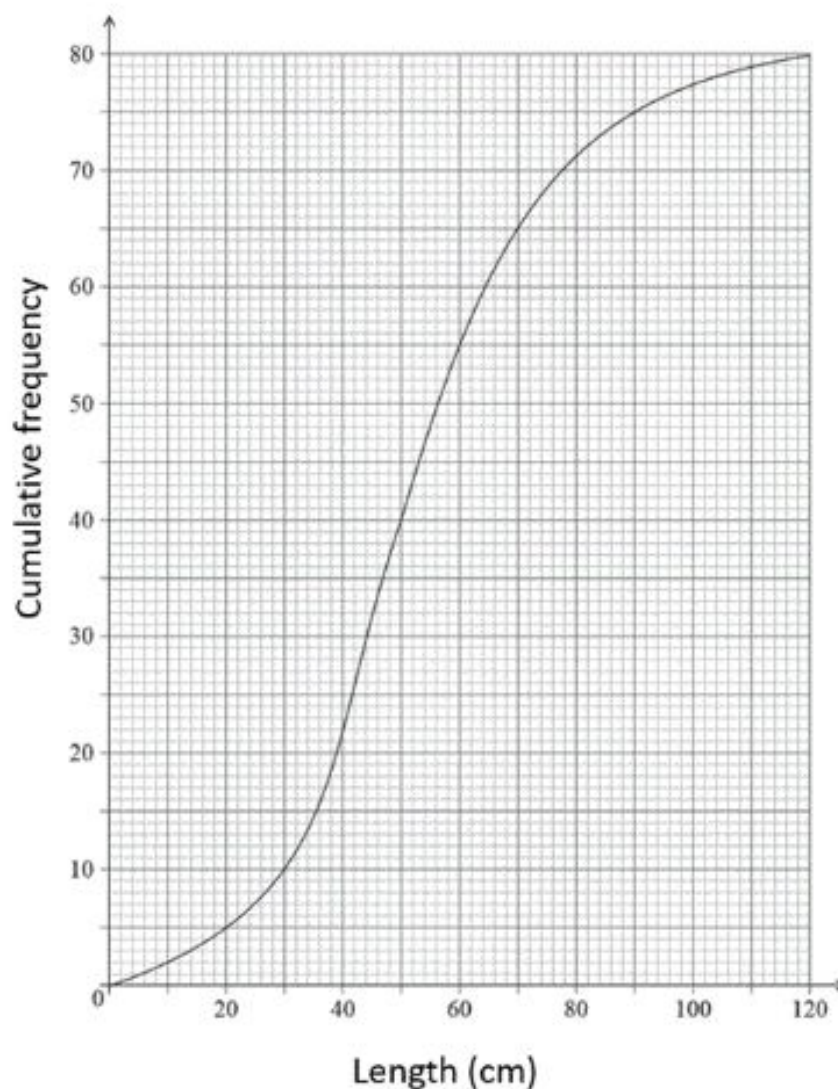
Math SL EXPLORATION LAB 7

4. The length of 80 flower stems in a garden are shown in the following CFG.
- Write down the median length.
 - What percentage of flowers are 60 cm or greater?

The same data is presented in the following table:

Length x cm	$0 \leq l \leq 30$	$30 < l \leq 60$	$60 < l \leq 90$	$90 < l \leq 120$
Frequency	10	p	20	q

- Find the value of p and find the value of q .
- Use the values from the table to estimate the mean and standard deviation of the flower stem lengths.
- Flowers that have stem lengths greater than 60 cm are considered mature flowers. Given that a randomly selected flower is mature, find the probability that its stem length is 90 cm or greater.



Math SL EXPLORATION LAB 7

5. Binomial Probability Distributions - An example

A box has black marbles and white marbles in it. In this probability experiment, one trial consists of the following “event” $\Rightarrow$ you take a marble, record its colour and place the marble back into the box. You repeat this four times, so in total, our “probability experiment” consists of four events.

- a. Are the events dependent or independent?
- b. Prepare a tree diagram in order to “visualize” the various outcomes that will result from this experiment.
- c. List all possible outcomes from your tree diagram.
- d. In how many ways can you finish the experiment with:
 - i. 4 white marbles and 0 black marbles,
 - ii. 3 white marbles and 1 black marbles;
 - iii. 2 white marbles and 2 black marbles,
 - iv. 1 white marble and 3 black marbles,
 - v. No white marbles and 4 black marbles,
- e. Expand the binomial $(B + W)^4$.
- f. How are the answers to Q5d and 5e related? Why?
- g. Now suppose that the original box that you started with had 16 black marbles and 9 white marbles.
- h. Determine $P(W)$ and determine $P(B)$.
- i. Mr S would now like to use probabilities to make predictions about what should happen in an experiment like this. Determine how probable the following events are:
 - i. $P(\text{three white marbles})$
 - ii. $P(\text{two black marbles})$
 - iii. $P(\text{at least one white marble})$
- j. EXTENSION: Now suppose Mr S asks you to repeat the experiment 7 times. Determine how probable the following events are:
 - i. $P(\text{three white marbles})$
 - ii. $P(\text{two black marbles})$
 - iii. $P(\text{at least one white marble})$

Math SL EXPLORATION LAB 7

6. In a history class, Stefanie and Isa both write a multiple choice quiz. There are 10 questions. Each question has five possible answers. What is the probability that
- a. Stefanie will pass the test if he guesses an answer to each question.
 - b. Isa will pass the test if she studies so that she has a 75% chance of answering each question correctly.
7. A customer orders 50 components from a factory that has a 99% quality production rate (99% of the products are defect-free). Find the probability that:
- a. none of the components in the order are defective
 - b. there is at least one defective product in the order.
 - c. There are at least two defective products in the order.
8. Approximately 3% of the eggs in a store are cracked. If you buy two dozen eggs, what is the probability that
- a. none of your eggs are cracked
 - b. at least one of your eggs is cracked
 - c. exactly two of your eggs are cracked
9. The probability the Eman will sink a free throw is 70%. If Eman attempts 30 free throws, what is the probability that
- a. she sinks exactly 21 shots
 - b. she sinks at least 21 shots
 - c. she sinks at most 21 shots
 - d. she sinks between 18 and 20 shots, inclusive.