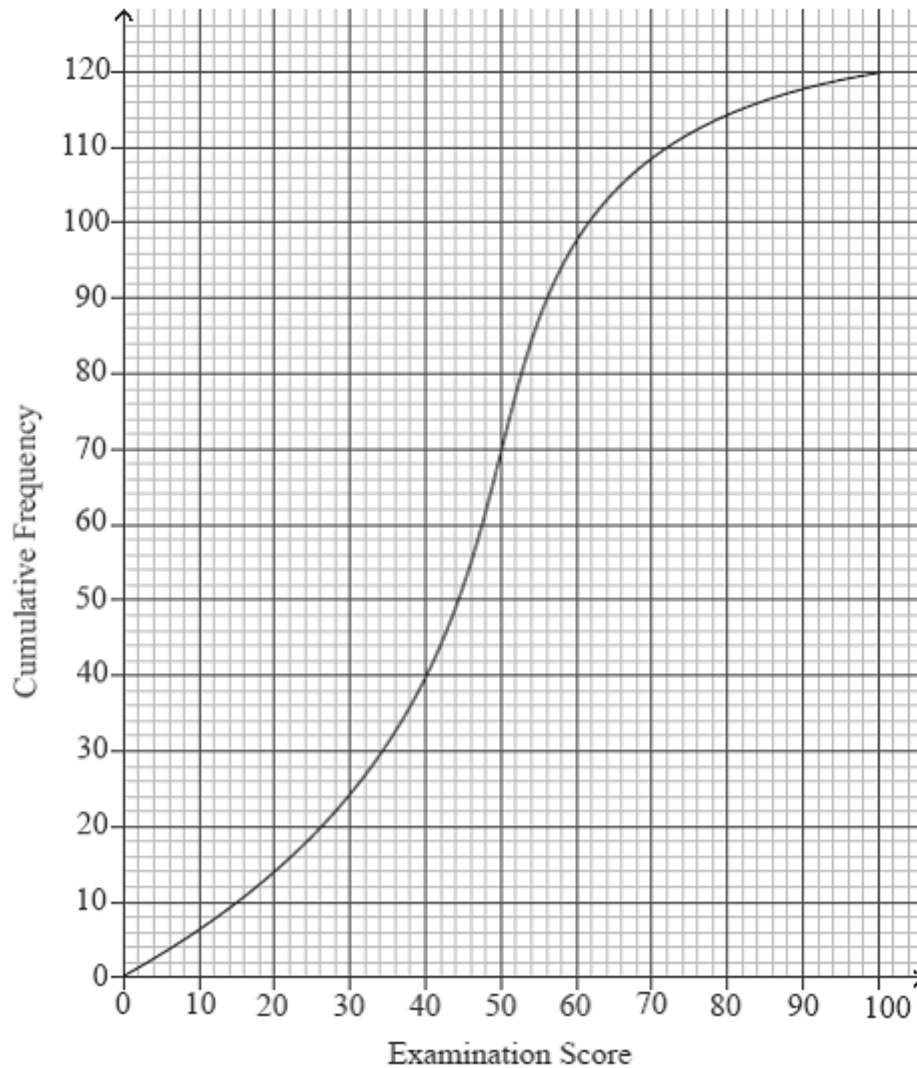


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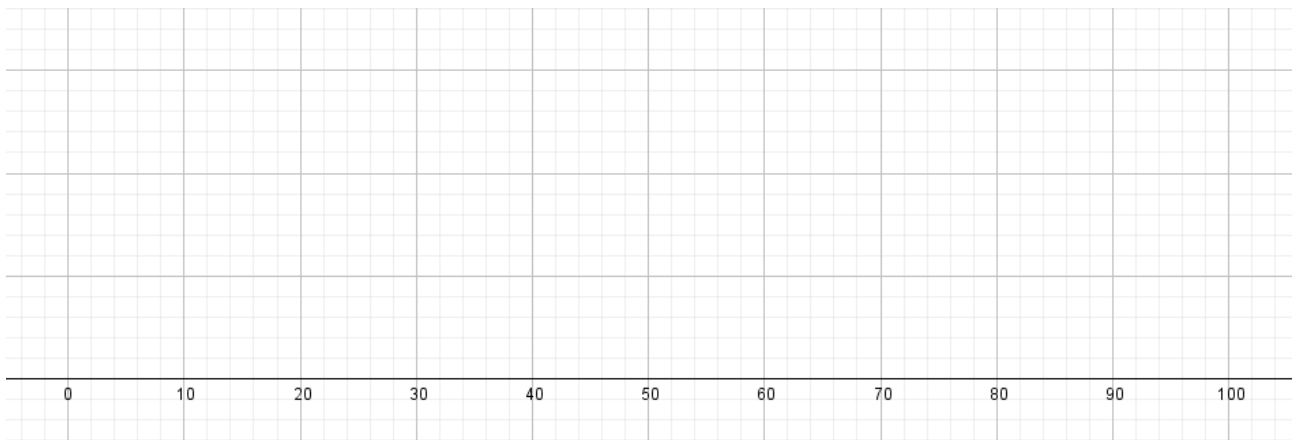
1. (6 points) 120 Mathematics students in a school sat an examination. Their scores (given as a percentage) were summarized on a cumulative frequency diagram. This diagram is given below.



- (a) (1 point) A score of at least 30% is required to pass the examination. Estimate the number of students who passed the exam.

(b) (1 point) The highest grade is awarded to the top 10% of the students. Write down the score required to get the highest grade.

(c) (4 points) Given that the minimal score was 2 and maximal score was 98, draw a box & whisker diagram to represent the exam scores of the students:



2. (7 points) Consider the polynomial

$$P(x) = 2x^3 + Ax^2 + Bx - 10$$

where $A, B \in \mathbb{R}$. One of the roots of this polynomial is $1 + 3i$.

(a) (2 points) Find the other two roots.

(b) (2 points) Show that $A = -5$ and $B = 22$.

(c) (2 points) Show that

$$2(x + 1)^3 - 5(x + 1)^2 + 22(x + 1) - 10 \equiv 2x^3 + x^2 + 18x + 9$$

(d) (1 point) Write down the solutions to the equation:

$$2x^3 + x^2 + 18x + 9 = 0$$

3. (7 points)

(a) (3 points) A polynomial $P(x) = x^3 + px^2 + qx + 3$ is divisible by $(x + 1)$ and leaves a remainder of -3 when divided by $(x - 2)$. Calculate the values of p and q .

(b) (4 points) Another polynomial $Q(x)$ is also divisible by $(x + 1)$ and leaves a remainder of -3 when divided by $(x - 2)$. Find the remainder when $Q(x)$ is divided by $x^2 - x - 2$.