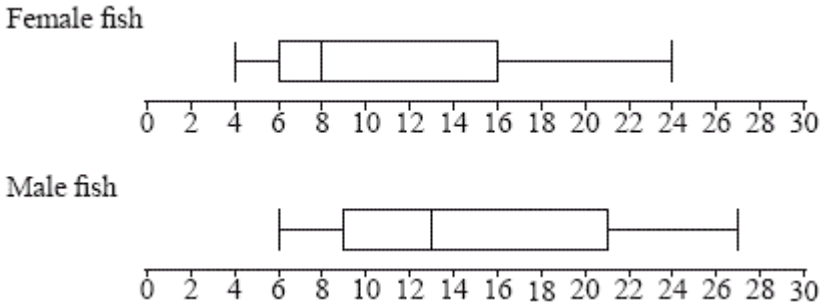
SHOW ALL WORK AND WRITE ALL ANSWERS IN THE SPACES PROVIDED.

Maximum marks will be given for correct answers. Where an answer is wrong, some marks may be given for correct method, provided this is shown by written working. Working may be continued below the box, if necessary. Solutions found from a graphic display calculator should be supported by suitable working, e.g. if graphs are used to find a solution, you should sketch these as part of your answer.

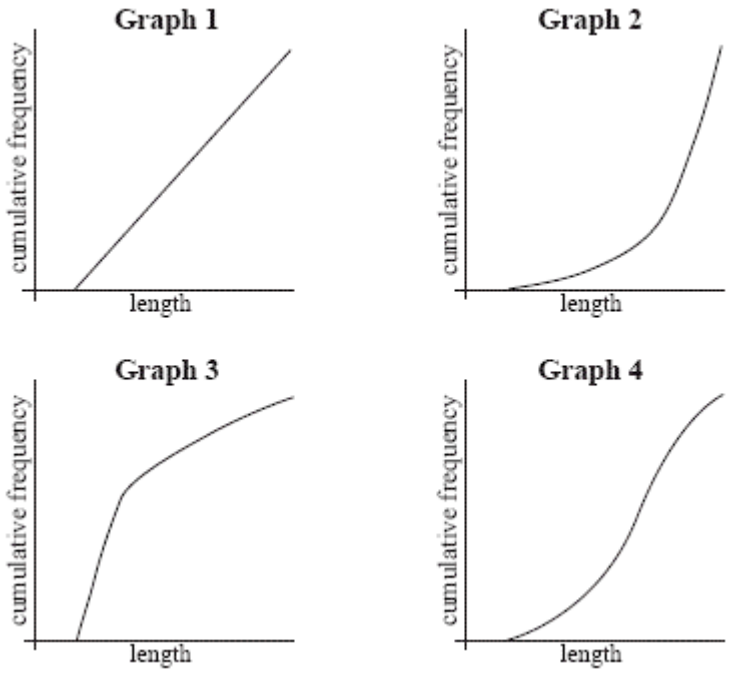
1. A scientist has 100 female fish and 100 male fish. She measures their lengths to the nearest cm. These are shown in the following box and whisker diagrams.



(a) Find the range of the lengths of **all** 200 fish.

(3)

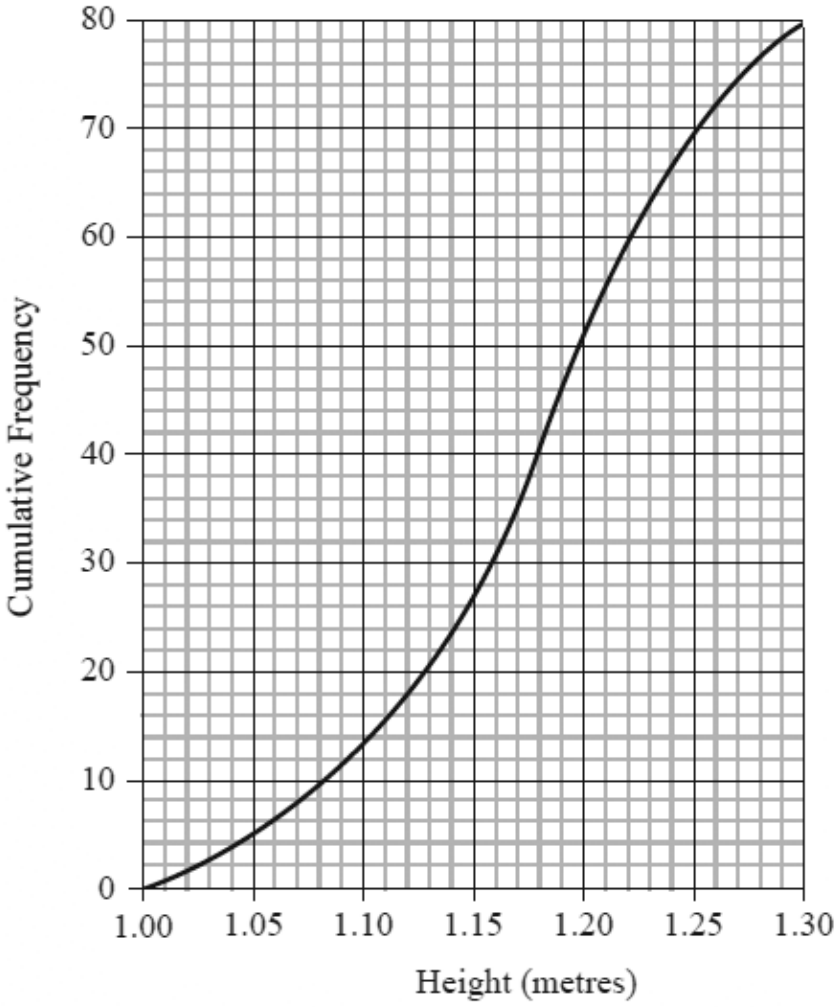
(b) Four cumulative frequency graphs are shown below.



Which graph is the best representation of the lengths of the **female** fish?

(2)
(Total 5 marks)

2. The heights in metres of a random sample of 80 boys in a certain age group were measured and the following cumulative frequency graph obtained.



(a) (i) Estimate the median of these data.

(ii) Estimate the interquartile range for these data.

(3)

(b) (i) Produce a frequency table for these data, using a class width of 0.05 metres.

(3)

(c) A boy is selected at random from these 80 boys.

(i) Find the probability that his height is less than or equal to 1.15 metres.

(ii) Given that his height is less than or equal to 1.15 metres, find the probability that his height is less than or equal to 1.12 metres.

(5)

(Total 13 marks)

3. In a class of 20 students, 12 study Biology, 15 study History and 2 students study neither Biology nor History.

(a) Illustrate this information on a Venn diagram.

(2)

(b) Find the probability that a randomly selected student from this class is studying both Biology and History.

(1)

(c) Given that a randomly selected student studies Biology, find the probability that this student also studies History.

(1)

(Total 4 marks)

4. Let A and B be events such that $P(A) = 0.6$, $P(A \cup B) = 0.8$ and $P(A \mid B) = 0.6$.

Find $P(B)$.

(Total 6 marks)

5. There are six boys and five girls in a school tennis club. A team of two boys and two girls will be selected to represent the school in a tennis competition.

(a) In how many different ways can the team be selected?

(3)

(b) Tim is the youngest boy in the club and Anna is the youngest girl. In how many different ways can the team be selected if it must include both of them?

(2)

(c) What is the probability that the team includes both Tim and Anna?

(1)

(d) Fred is the oldest boy in the club. Given that Fred is selected for the team, what is the probability that the team includes Tim or Anna, but not both?

(4)

(Total 10 marks)

1.3	Combinations	$\binom{n}{r} = \frac{n!}{r!(n-r)!}$
	Permutations	${}^{n}P_{r} = \frac{n!}{(n-r)!}$

5.2	Probability of an event A	$\mathrm{P}(A) = \frac{n(A)}{n(U)}$
	Complementary events	$\mathrm{P}(A) + \mathrm{P}(A') = 1$
5.3	Combined events	$\mathrm{P}(A \cup B) = \mathrm{P}(A) + \mathrm{P}(B) - \mathrm{P}(A \cap B)$
	Mutually exclusive events	$\mathrm{P}(A \cup B) = \mathrm{P}(A) + \mathrm{P}(B)$

5.4	Conditional probability	$\mathrm{P}(A \mid B) = \frac{\mathrm{P}(A \cap B)}{\mathrm{P}(B)}$
	Independent events	$\mathrm{P}(A \cap B) = \mathrm{P}(A)\,\mathrm{P}(B)$