1. A researcher is investigating the growth of two types of tree, Birch and Maple. The height, to the nearest cm, a seedling grows in one year is recorded for 35 Birch trees and 32 Maple trees. The results are summarised in the back-to-back stem and leaf diagram below.

Totals	Birch		Maple	Totals
(2)	9 8	2	5 7 7 8 9	(5)
(8)	9 9 9 6 5 3 1 1	3	0 2 6 6 8 9 9	(7)
(9)	9 8 8 7 6 3 1 1 1	4	1 1 1 ***k*** 7 8	(6)
(9)	7 7 7 5 4 3 2 1 0	5	0 1 2 3 4 4 4	(7)
(3)	7 6 5	6	3 4 6	(3)
(3)	6 5 4	7	0 7	(2)
(1)	5	8	0 0	(2)

Key: 5 | 6 | 3 means 65 cm for a Birch tree and 63 cm for a Maple tree

The median height that these **Maple** trees grow in one year is 45 cm.

(a) Find the value of ***k***, used in the stem and leaf diagram.

(1)

(b) Find the lower quartile and the upper quartile of the height grown in one year for these **Birch** trees.

(2)

The researcher defines an outlier as an observation that is

$$\text{greater than } Q_3 + 1.5 \times (Q_3 - Q_1) \text{ or less than } Q_1 - 1.5 \times (Q_3 - Q_1)$$

(c) Show that there is only one outlier amongst the Birch trees.

(2)

The grid on page 3 shows a box plot for the heights that the Maple trees grow in one year.

(d) On the same grid draw a box plot for the heights that the Birch trees grow in one year.

(4)

(e) Comment on any difference in the distributions of the growth of these Birch trees and the growth of these Maple trees.
State the values of any statistics you have used to support your comment.

(1)

The researcher realises he has missed out 4 pieces of data for the **Maple** trees. The heights each seedling grows in one year, to the nearest cm, in ascending order, for these 4 Maple trees are 27 cm, a cm, 48 cm, $2a$ cm.

Given that there is no change to the box plot for the **Maple** trees given on page 3

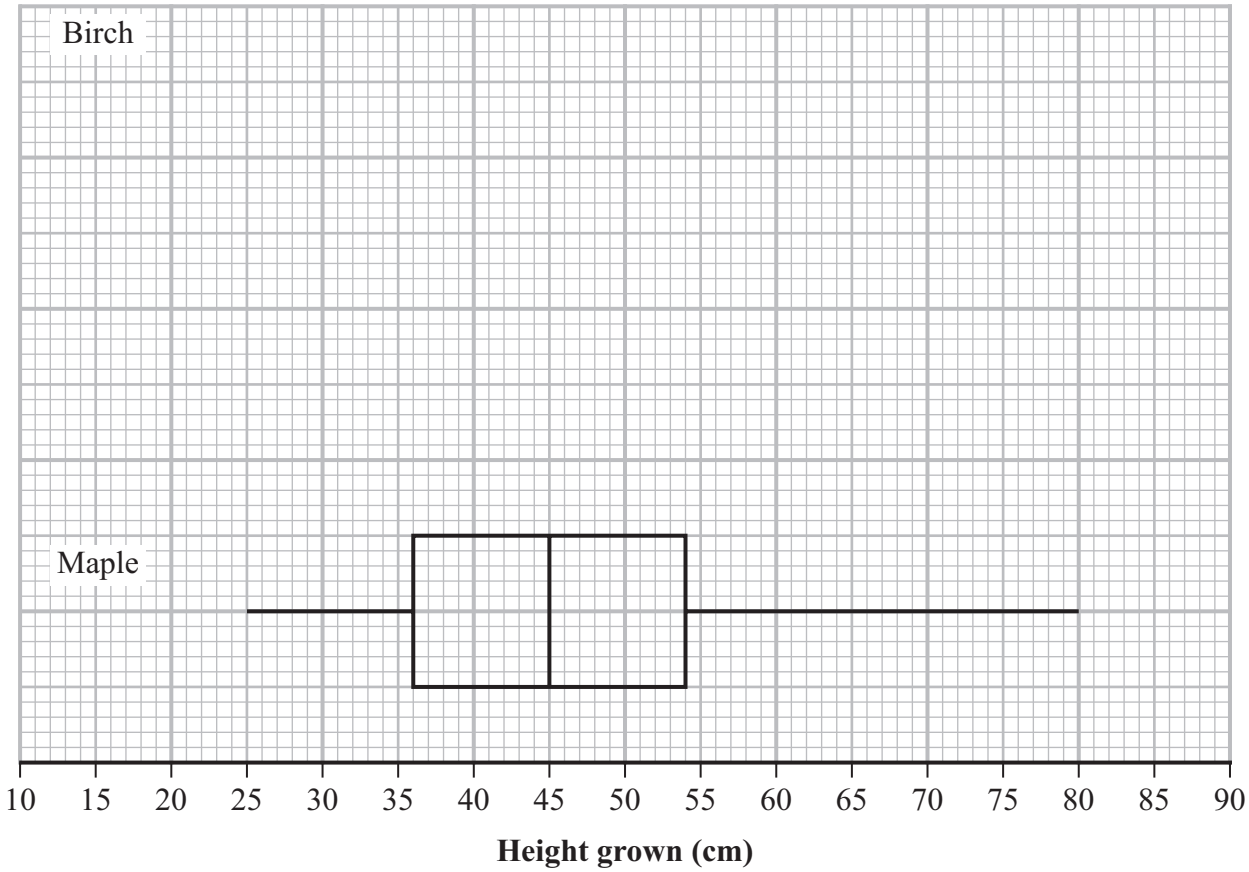
(f) find the range of possible values for a
Show your working clearly.

(3)

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Question 1 continued



Turn over for spare grid if you need to redraw your answer for part (d)

Question 1 continued

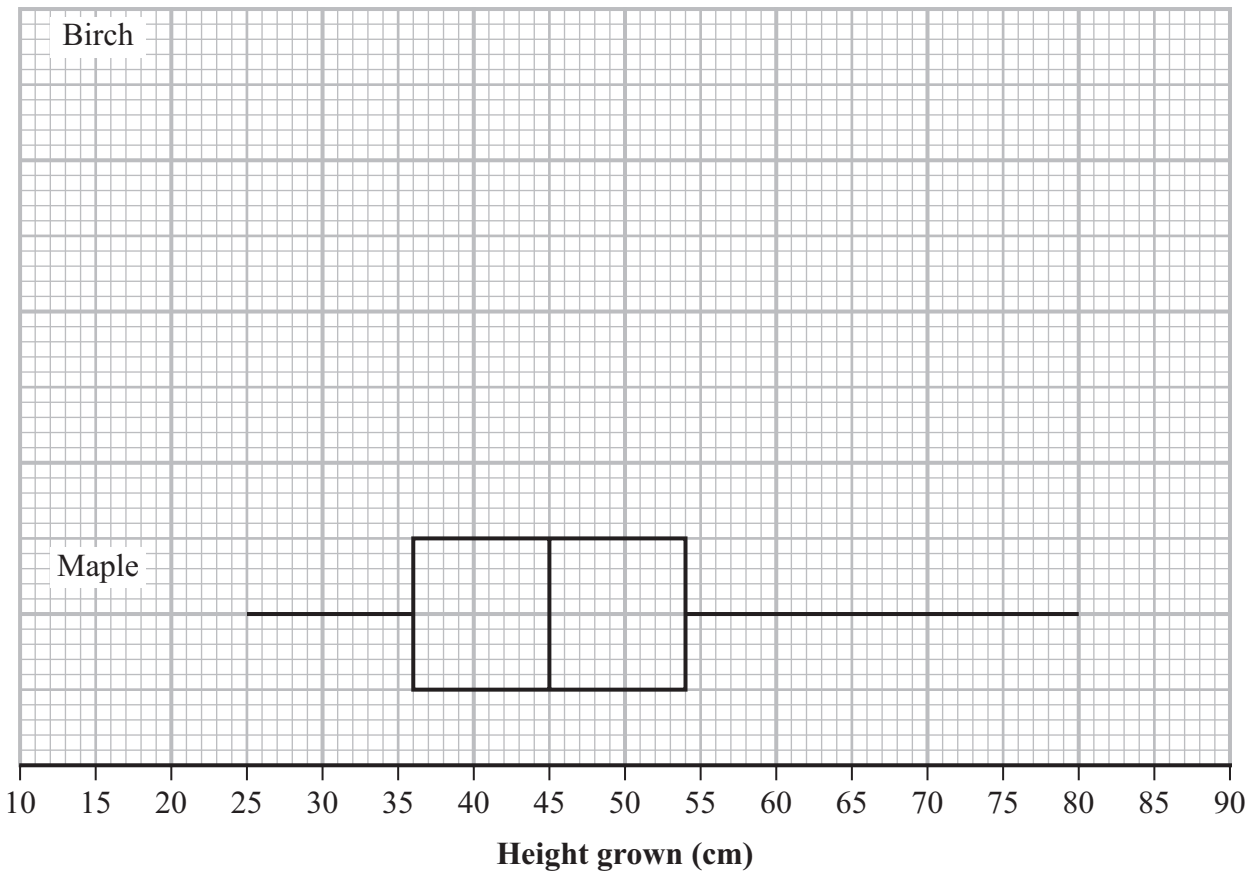
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Question 1 continued

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(Total for Question 1 is 13 marks)

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