



S30-30min Box Plots: 30-minute Pack

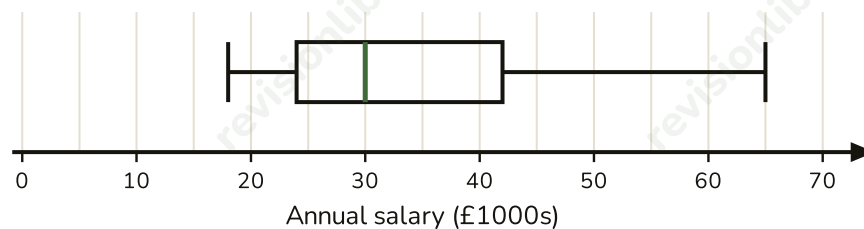
EDEXCEL 1ST0 · Calculator allowed · about 30 minutes

Total Marks

Name: _____ Date: ____ / ____ / ____

Answer ALL questions. Show all your working.

- 1** The box plot shows the annual salaries, in £1000s, of the 60 employees at a small company.



- (a) Write down the median annual salary. (1)

.....

- (b) Work out the range of annual salaries, giving your answer in £. (2)

.....

- (c) Work out the interquartile range of annual salaries, giving your answer in £. (2)

.....

- (d) Write down the percentage of employees who earn a salary between the lower quartile and the upper quartile. (1)

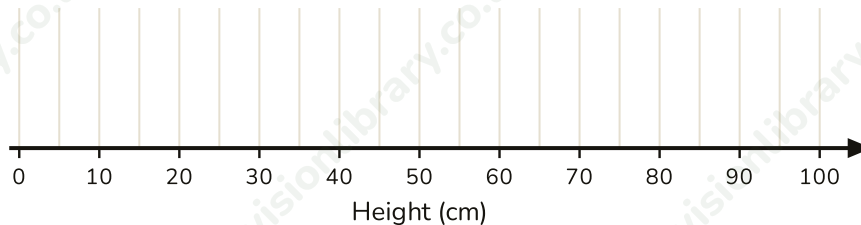
.....

(Total for Question 1 is 6 marks)

- 2 The five-number summary for the heights, in cm, of 20 sunflowers grown by a gardening club is given in the table.

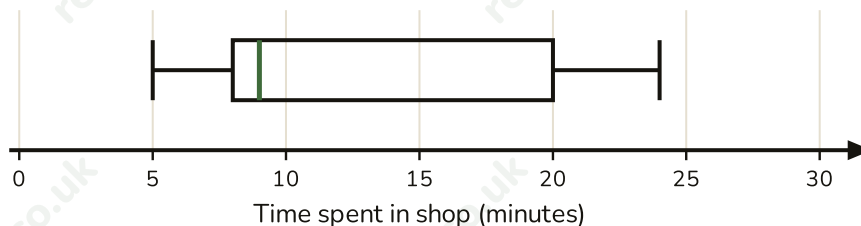
Minimum	Lower quartile	Median	Upper quartile	Maximum
40	55	68	80	95

On the grid, draw a box plot to show this information.



(Total for Question 2 is 3 marks)

- 3 The box plot shows the amount of time, in minutes, that 50 customers spent in a shop.



(Total for Question 3 is 3 marks)

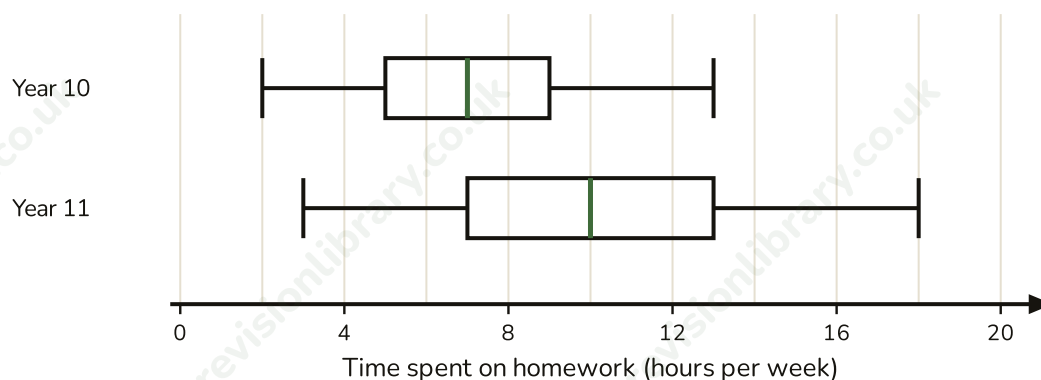
4 A student wants to investigate whether Year 11 students spend more time than Year 10 students on homework each week.

(a) Write a suitable hypothesis for the student's investigation. (1)

(b) Give one thing the student should keep the same for both year groups when collecting the data, so that the comparison is fair. (1)

(c) The student collects the data and summarises it using the two box plots shown, for time spent on homework (hours per week). (3)

Compare the amount of time spent on homework by Year 10 and Year 11, using the median and the interquartile range.



(d) State whether the student's data supports the hypothesis from part (a). (1)

(Total for Question 4 is 6 marks)

- 5** The times, in minutes, taken by 13 people to complete a charity fun run are shown below, in order:

32, 35, 36, 38, 39, 40, 41, 42, 44, 45, 47, 48, 71

- (a)** Write down the median time. (1)

- (b)** Work out the lower quartile. (2)

- (c)** Work out the upper quartile. (2)

- (d)** Work out the interquartile range. (1)

- (e)** A value is an outlier if it is more than $1.5 \times \text{IQR}$ above the upper quartile. Show that 71 minutes is an outlier. (2)

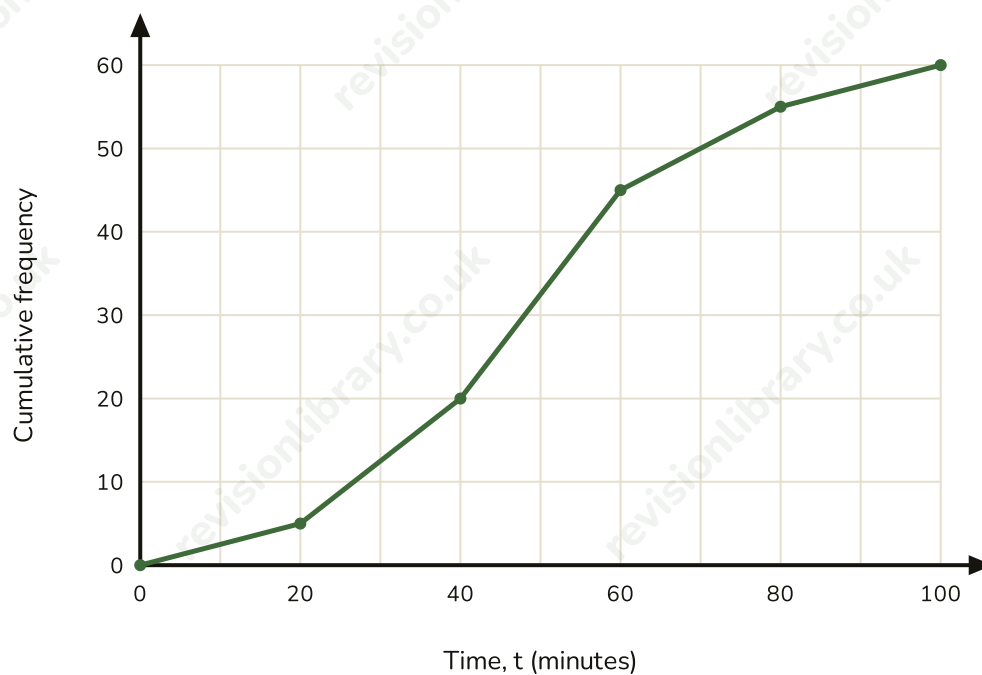
- (f)** State the value that the upper whisker of a box plot for this data would be drawn to. (1)

(Total for Question 5 is 9 marks)

- 6** 60 students took a puzzle-solving test. The grouped frequency table shows their completion times.

Time, t (minutes)	Frequency
$0 < t \leq 20$	5
$20 < t \leq 40$	15
$40 < t \leq 60$	25
$60 < t \leq 80$	10
$80 < t \leq 100$	5

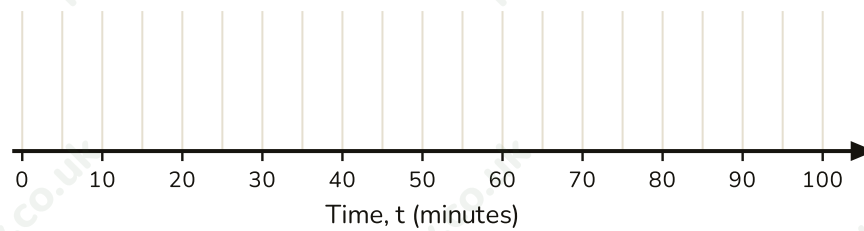
The cumulative frequency graph for this data is shown below.



- (a) Use the graph to find an estimate for the median completion time. (1)
- (b) Use the graph to find estimates for the lower quartile and the upper quartile. (2)
- (c) Work out an estimate for the interquartile range. (1)
-

- (d) Given that the fastest student finished in 10 minutes and the slowest student finished in 95 minutes, draw a box plot to show this information, using your estimates from parts (a) and (b).

(3)



(Total for Question 6 is 7 marks)

Mark scheme · S30-30min Box Plots: 30-minute Pack

Question 1

- (a) **B1** £30,000 cao
- (a) **Answer: £30,000**
- (b) **M1** 65 - 18, oe
- (b) **A1** £47,000 cao
- (b) **Answer: £47,000**
- (c) **M1** 42 - 24, oe
- (c) **A1** £18,000 cao
- (c) **Answer: £18,000**
- (d) **B1** 50% oe (half)
- (d) **Answer: 50%**

Question 2

- **B1** whiskers drawn correctly to the minimum (40) and maximum (95)
- **B1** box drawn from the lower quartile (55) to the upper quartile (80)
- **B1** median (68) marked correctly inside the box, box plot drawn accurately to scale
- **Answer: Box plot: min 40, LQ 55, median 68, UQ 80, max 95 (cm).**

Question 3

- **B1** compares median - LQ ($9 - 8 = 1$) with UQ - median ($20 - 9 = 11$), noting UQ - median is much larger
- **B1** correctly states the distribution is positively skewed (skewed to the right)
- **B1** valid contextual interpretation, e.g. most customers left quite quickly, but a few stayed much longer, stretching the upper part of the distribution
- **Answer: Positively skewed (skewed to the right).**

Question 4

- (a) **B1** a testable statement comparing the two groups, e.g. 'Year 11 students spend more time on homework per week, on average, than Year 10 students', oe
- (a) **Answer: Year 11 students spend more time on homework per week, on average, than Year 10 students.**
- (b) **B1** any valid control, e.g. ask about the same week/time period, use the same question wording, use the same sample size, oe
- (b) **Answer: Ask both year groups about the same week (the same time period).**
- (c) **B1** Year 11 has the higher median ($10 > 7$), so Year 11 students typically spend more time on homework
- (c) **B1** Year 11 has the larger IQR ($13 - 7 = 6$ compared with $9 - 5 = 4$ for Year 10), so the amount of time Year 11 students spend is more spread out/less consistent
- (c) **B1** valid overall statement in context linking both measures
- (c) **Answer: Year 11 spends more time on homework on average (median 10 hours vs 7 hours) but with more variation between students (IQR 6 hours vs 4 hours).**
- (d) **B1** Yes, ft from (a)/(c): Year 11's median (10 hours) is higher than Year 10's (7 hours), so the data supports the hypothesis
- (d) **Answer: Yes, the data supports the hypothesis, since Year 11's median homework time is higher than Year 10's.**

Question 5

- (a) **B1** 41 cao
- (a) **Answer: 41 minutes**
- (b) **M1** identifies 36 and 38 as the two middle values of the lower 6 values
- (b) **A1** 37 cao
- (b) **Answer: 37 minutes**
- (c) **M1** identifies 45 and 47 as the two middle values of the upper 6 values
- (c) **A1** 46 cao
- (c) **Answer: 46 minutes**
- (d) **B1** 9 cao, ft from (b) and (c)
- (d) **Answer: 9 minutes**
- (e) **M1** upper boundary = $46 + 1.5 \times 9 (= 59.5)$
- (e) **A1** $71 > 59.5$, so 71 minutes is an outlier
- (e) **Answer: $71 > 59.5$, so 71 minutes is an outlier.**
- (f) **B1** 48 cao, ft
- (f) **Answer: 48 minutes**

Question 6

- (a) **B1** awrt 46-50
- (a) **Answer: 48 minutes (accept 46-50)**
- (b) **B1** lower quartile awrt 31-35
- (b) **B1** upper quartile awrt 58-62
- (b) **Answer: Lower quartile approximately 33 minutes; upper quartile approximately 60 minutes.**
- (c) **B1** 27 (ft from (b))
- (c) **Answer: 27 minutes**
- (d) **B1** whiskers drawn to the minimum (10) and maximum (95)
- (d) **B1** box drawn from the lower quartile (awrt 33) to the upper quartile (awrt 60), ft from (b)
- (d) **B1** median (awrt 48) marked correctly inside the box, ft from (a), drawn accurately to scale
- (d) **Answer: Box plot: min 10, LQ approx. 33, median approx. 48, UQ approx. 60, max 95 (minutes).**