M1.

(a) Four correct cumulative frequencies

**B1** 

Five correct heights plotted

**B**1

Five points plotted at correct upper boundaries

В1

Straight lines or smooth curve going through the five points

ft their 5 plotted points.

Must be an increasing function

B1ft

## **Additional Guidance**

Ignore anything to the left of *their* (15, 12) Ignore anything to the right of *their* (70, 100), must be an increasing function tolerance  $\pm \frac{1}{2}$  square

Accept histograms / bars for heights plotted but upper boundary points must be identified either by plots or curve / polygon

(b) their LQ plotted and their median plotted and their UQ plotted

ft their cf graph provided increasing function

tolerance 
$$\pm \frac{1}{2}$$
 square  $(\pm 1)$ 

B1ft for 2 correctly plotted

B2ft

Box plot with 8 and 69 correct

Correct diagrammatic representation

**B1** 

## **Additional Guidance**

Allow values plotted as points for B2ft

## **M2.**(a) Fully correct box plot with

minimum = 65

LQ = 70

median = 80

UQ = 85

maximum = 95

B1 for 3 correct

**B2** 

## **Additional Guidance**

Minimum and maximum values can be marked with a cross or a plus

(b) LQ = 75

Need not be plotted

**B1** 

UQ = 90

Need not be plotted

**B1** 

Minimum = 60 **or** maximum = 100

**or** median = [75,90]

Need not be plotted

**B1** 

Minimum = 60 **and** maximum = 100 **and** median = [75,90] **and** correct box plot drawn

**B**1

Box plot takes precedence over any written answers

[6]

**M3.**(a) [64, 66]

**B1** 

(b) [53, 55]

B1 [2]

M4.

(a) Cumulative frequencies attempted

8, 18, 32, 40, may be implied by heights on graph

M1

Their heights plotted

Must be increasing function

**M1** 

Plots at correct horizontal position

Must be increasing function

**M1** 

All correct and joined

**A1** 

(b) Read off from their 20 (= 26)

Allow from 20.5

ft their increasing graph

B1 ft

(c) Read off from their 10 (= 21) and their 30 (= 29.5)

ft their increasing graph

**M1** 

ft their UQ - their LQ

A1ft

(d) Comparison of box plots:
Position of Median, UQ and LQ marked on diagram

ft their (b)

**B**1

UQ and LQ marked on diagram ft their (c)

A1ft

(On average Jane) is faster due to lower median oe ft their box plot

B1ft

Jane's times are less consistent due to larger IQR oe ft their box plot

B1ft

**Alternative** 

Jane's median = 23

**B1** 

Jane's IQR = 13

IQR found from box plot

**B**1

(On average) Jane is faster due to lower median oe ft 7(b) correct comparison of their median values

B1 ft

Jane's times are less consistent due to larger IQR oe ft 7(c) and Jane's IQR

B1 ft

[11]

**M5.**(a) 5

**B1** 

(b) [100.5, 101.5]

**B1** 

(c) [105.5, 106.5] or [92.5, 93.5]

**M1** 

[12, 14]

A1 [4]

**M6.**(a) Correct box drawn and median and quartiles at 20, 50, 80

$$\pm \frac{1}{2}$$
 square

**B1** 

IQR box formed and whiskers correctly joined to 15 and 90

$$\frac{1}{2}$$
 square

В1

(b) 120 is  $\frac{3}{4}$  or 40 is  $\frac{1}{4}$  seen or implied

May be implied by M1 scored

Condone lower quartile = 40 or  $Q_1 = 40$ 

**B1** 

 $120 \div 3 \times 4 (\div 2)$  or 160 seen oe

or 
$$120 - 40$$

$$\frac{2}{3} \times 120 \text{ or } 40 \times 2$$

**M1** 

80

SC2 median linked with 80 in working

**A1** 

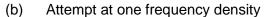
**M7**.(a) 20 **B1** (b) 9 **B1** (c) 11 and 3 seen Could be written on diagram **M1** 8 **A1** (d) Comment on average and the implication, eg waiting times decreased after new window as median lower ft their medians if valid conclusion reached **B1** Comment on range or inter-quartile range and the implication, eg Spread of waiting times decreased after new window as range decreased or Not much effect on waiting times as IQR about the same ft their values if a valid conclusion reached **B1** [6]

**M8.**(a) Correct box plot

B1 for three or four correct points

Tolerance  $\pm \frac{1}{2}$  square

**B2** 



May be on diagram

$$17 \div 10 (= 1.7)$$

or 
$$12 \div 5 (= 2.4)$$

or 
$$3 \div 15 (= 0.2)$$

or 
$$9 \div 30 (=0.3)$$

Tolerance  $\pm \overline{2}$  square

M1

Three or four correct frequency densities

At least three from 1.7, 2.4, 0.2 and 0.3

**A1** 

Fully correct histogram

**A1** 

[5]

M9.

(a)  $0.25 \times 20 (=5)$ 

Or It represents 25% (or 1/4) of the meetings / distribution

Comment referring to 25% or 1 / 4

**B1** 

 $15 \times 3$ (b)

**M1** 

$$5 + 45 (= 50)$$

**A1** 

(c)  $5 \times 1.6$  or  $10 \times 2.4$  or  $5 \times 3.2$ 

0.25 x 1.6 or 0.5 x 2.4 or 0.25 x 3.2

**M1** 

8 + 24 + 16

0.4 + 1.2 + 0.8 at least 2 correct

**M1** 

48 **and** B

2.4 and 2.5 and B

A1 [6]

M10.1 B
B2 for 2 correct

2 D
B1 for 1 correct but not all the same

3 A

С

4

**B3** 

[3]