M1.

Alternative method 1

25 × 11 or 275

M1

their 275 ÷ 22 or 12.5

M1dep

15 × 30 ÷ their 12.5

M1

36

A1

Alternative method 2

25 × 11 or 275

M1

15 × 30 ÷ their 275 or [1.6, 1.64]

M1dep

their [1.6, 1.64] × 22

M1

36

A1

Alternative method 3

11 squares

or
275 squares

M1

22 ÷ 11 or 2
or
22 ÷ 275 or 0.08

M1dep

their 2 × 18
or
their 0.08 × 450

M1

36

A1

Alternative method 4

$\frac{15}{25}$ or $\frac{30}{11}$

M1

$\frac{15}{25} \times \frac{30}{11}$ or $\frac{18}{11}$

oe fraction

M1dep

their $\frac{18}{11} \times 22$

M1

36

A1

Alternative method 5

$25 \times h = 22$ or $\frac{22}{25}$ or 0.88

oe

M1

$0.88 \div 11$ or 0.08

oe eg frequency density axis labelled with correct scale

M1dep

their $0.08 \times 30 \times 15$

M1

36

A1

[4 marks]

M2.

Cumulative frequency 46 should be 48

oe

B1

Points should be plotted at end of class intervals

oe

B1

[2]

M3.

(a) Four correct cumulative frequencies

23, 48, 87 and 100

B1

Five correct heights plotted

(…, 12), (…, 23), (…, 48), (…, 87) and (…, 100)

B1

Five points plotted at correct upper boundaries

(15, …), (20, …), (40, …), (55, …) and (70, …)

Must be an increasing function

B1

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

[7]

M4.

5 × 6 or 30
or 20 × 2 or 40
or 1 (cm) square = 10 students

or 1 (small) square = 0.4 students

10 × 8 or 80

or 5 × 12 or 60

or 10 × 6 or 60

M1

5 × 6 + 20 × 2
or 7 × 10
or 0.4 × 175 or 70
or (10 × 8) + (5 × 12) + (10 × 6) or 200

270 − (10 × 8) − (5 × 12) − (10 × 6) or 70

M1dep

$\frac{their\,70}{270} \times 100$

$\frac{their\,200}{270} \times 100$

oe

or $\frac{30}{100} \times 270$ *or 81*

M1

25.9(…) (%) or 26 (%)
200 and 74(.1…)

70 and 81

or 200 and 189

A1

No and 25.9(…)
or No and 26
or No and 200 and 74(.1…)
or No and 70 and 81
or No and 200 and 189

Strand (iii)

*ft **their** 25.9% provided all method marks have been awarded*

*ft **their** 81 provided all method marks have been awarded*

Q1ft

[5]

M5.

$\frac{70 - (17 + 21)}{8}$ or $\frac{32}{8}$ or 4

oe

M1

12 and 20

May be implied from histogram

A1

Correct scale on vertical axis to at least 2.0

e.g.
(0), 0.1, 0.2 …
(0), 0.2, 0.4 …
(0), 1, 2 …

B1

10 − 20 bar drawn at height 1.2

20 − 40 bar drawn at height 1

40 − 50 bar drawn at height 1.7

(6 squares high)
(5 squares high)
(8.5 squares high)
B2 for 2 correct bars drawn
or 3 or 4 correct calculations
B1 for 1 correct bar drawn
or 1 or 2 correct calculations

B3

Additional Guidance
Note: Correct bar heights can be awarded even if scale is incorrect or not given

[6]

M6.10 × 5 or 5 × 7 or 5 × 15 or

10 × 11 or 10 × 9 or

50 or 35 or 75 or 110 or 90

Works out the frequency for 1 bar

oe

M1

their 110 + their 90 or

360 − their 50 − their 35 − their 75 or

$\frac{\text{their 110}}{360} \times 100$ **and** $\frac{\text{their 90}}{360} \times 100$

Works out the number between 20 and 40 minutes

oe

M1dep

200 or

30.(...)% or 31% **and** 25%

A1

0.6 × 360 or 216 or

$\frac{\text{their 200}}{360} \times 100$ or 55.(...)% or 56%

or their 30.(...)% + their 25%

oe

their 200 may be 20

M1

No and 200 and 216

or

No and 55.(...)% or 56%

Strand (iii)

ft their 200 or their 55.(…)% compared with 60% if at least M2 awarded

Q1ft

Alternative method 1

1.4 or 4.4 or 3.6 or 8 squares

oe Must clearly be squares

M1

their 2 + their 1.4 + their 3 + their 4.4 + their 3.6

or 14.4 squares

oe

M1dep

8 and 14.4

A1

0.6 × their 14.4 or 8.6(4)

or

$\frac{\text{their } 8}{\text{their } 14.4} \times 100$ or 55.(...)% or 56%

oe

M1

No and 8 and 8.6(4)

or

No and 55.(...)% or 56%

Strand (iii)

ft their 8 and their 14.4 or their 55.(…)% compared with 60% if at least M2 awarded

Q1ft

Alternative method 2

7 or 11 + 11 or 9 + 9 or 40 strips

oe Must clearly be strips of 5 squares

M1

their 5 + their 5 + their 7 + their 15 + their 11 + their 11 + their 9 + their 9

or 72 strips

oe

M1dep

40 and 72

A1

0.6 × their 72 or 43.2

or

$\frac{\text{their } 40}{\text{their } 72} \times 100$ or 55.(...)% or 56%

oe

M1

No and 40 and 43.2

or

No and 55.(...)% or 56%

Strand (iii)

ft their 40 and their 72 or their 55.(…)% compared with 60% if at least M2 awarded

Q1ft

[5]

M7.(a) Fully correct c.f. diagram using UCBs and 3, 8, 20, 24

(40, 3) (60, 8) (80, 20) (100, 24)

Ignore (20, 0)

Ignore before 1st point and after last point

B2 for one error

e.g. Consistent plotting at mid class intervals with line joining points

Consistent plotting at lower bounds with line joining points

One error on cf values

e.g. 3, 9, 21, 25

)

e.g. 3, 8, 21, 24
Points not joined
B1 for 3, 8, 20, 24
B1 for bar chart indicating correct heights with no lines

B3

(b) Reading off at 18 and 6 with at least one reading in tolerance

eg 77 and 52

Reading at 18 and reading at 6
± ½ square
Condone reading at 18.75 and reading at 6.25 if consistent

M1

25

ft their polygon or curve

A1ft

[5]

M8. 10 × 1.5 or 15

or 5 × 4 or 20

or 15 × 3 or 45

or 10 × 1 or 10

or 5 × 2 or 10

May be on diagram
Counting squares
6 or 8 or 18 or 4 or 4

M1

15 and 20 and 45

or 10 and 10 and 45

(working from end of histogram)

May be on diagram
6 and 8 and 18

or 4 and 4 and 18
(working from end of histogram)

M1

$\frac{15}{45} \times (50 - 35)$ or 5

or $\frac{30}{45} \times (50 - 35)$ or 10

$\frac{6}{18} \times (50 - 35)$ or 5

or $\frac{12}{18} \times (50 - 35)$ or 10

oe
i.e. identifies that 15 or 30 is needed for median depending on which end they work from in middle bar
or identifies that 6 squares or 12 squares is needed for median depending on which end they work from in middle bar

M1dep

40

A1

[4]

M9.

(a) Plotted at mid class intervals

±½ sq

B1

Heights correct and joined with straight line

Ignore ends
±½ sq
SC1 for one point omitted but all the rest fully correct

B1

(b) Two valid comparisons about average, spread, distribution of ages.

Examples

using means (m = 46.5, f = 43.4) suggests male older

using median (male 47.6, female 46.5) suggests male older

on average the female club members were older (female mode 50-60, male mode 40-50)

there is a wider age range/more variation in age for the male club members

the oldest male is older than the oldest female/males have some over 60 but females don't/only the males go over 60

both distributions have more older members/both distributions have fewer younger members

the number of male members decline from about 50 whereas for females the number keeps on increasing

B2

[4]

M10.

$\frac{40}{360}$ → 2 or 1 student = 20°

Oe

***Not** 20% = 1 student*

M1

2 × 9 or 360 ÷ 20 or 18

Calculating number failing first time

M1

their 18 ÷ 40 × 100 or 45
or 40% = their 18 or 20% = 9

M1

0.6 × their 45
Or 18 + 9

M1

27

A1

[5]

M11.

(a) 20 × 0.8 or 10 × 2.6 or 10 × 4.2
or 20 × 1.2

Attempt at class width × freq density
oe

M1

16 + 26 + 42 + 24

At least 3 correct
oe

M1

108

A1

(b) Bar from 120 to 130 at height 0.6

B1

[4]