Cumulative Frequency Mark Scheme
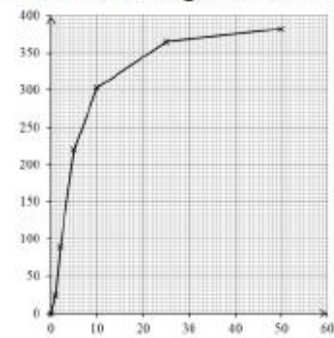
Q1.

Question	Scheme	Marks
(a)(i)	15	B1
(ii)	$16 - 12$ $= 4$	M1 A1
(iii)	17	B1 (4)
(b)	20 cao	B1 (1)
(c)	$48 - 37$ or $9 + 1 + 1$ $= 11$	M1 A1 (2) [7]

	Notes	
(a)(ii)	M1 for attempt at $Q_3 - Q_1$ with at least one correct value. (Note subtraction can be implied by candidate's answer. e.g. 12, 17 followed by answer 5)	
(b)	Accept 20 on its own only. e.g. $20 - 22$ is B0	
(c)	M1 for 37 seen OR for 9 and 1 and 1 seen (with no other figures – addition not required for this mark)	

Q2.

Question number	Answer	Additional guidance	Mark
(a)	B1 e.g. only 14 values are less than 160, or 15th (value) is in this class, or $14 < 30/2$	B1 for recognising that the middle value has not been reached until after 160. Allow use of n or $n+1$ for '15th' allow15.5th, or 15th & 16th allow $14 < 31 \div 2$	(1)
(b)	 B1ft (Median) was lower / has increased (by 54 minutes) or 110 $<$ '164' or difference is '54' B1ft e.g. Matches/finals/games now take longer / were quicker (on average)	Allow correct answers, or correct ft from answer in (b) 1st B1ft for correct statistical comparison (words or figures) 2nd B1ft for correct contextual interpretation (must mention matches, o.e.), but note that 'they take longer' alone is B0 (Condone 'slower'/'faster' for 'take more time' / 'take less time' For both marks follow through their answer to part (b)	(2)

Q3.

Question	Answer	Additional guidance	Mark
(a)	B1 89, 220, 303, 365, 382	B1 for all correct cumulative frequencies	(1)
(b)	B1 for correct horizontal plots B1 ft for correct vertical plots B1 ft for correct cumulative frequency graph allow with straight lines or curve 	B1 for correct horizontal plots B1 ft for correct vertical plots ($\frac{1}{2}$ square tolerance for plots) SC if B0 B0 then six correct points out of seven is B1 B1 ft for correct cumulative frequency graph allow with straight lines or curve must be increasing curve for the ft	(3)
(c)	B2 ft Hamish's conclusion is correct because the train median is higher than the median of the car which is 4.3	B2 ft for correct conclusion from their graph with supporting figure for median Allow median in the range 4 to 5 or ft their graph providing their graph is increasing (B1 ft for median in range 4 to 5 or correct conclusion with incorrect supporting figure)	(2)
(d)	B1 A cumulative frequency step polygon is more appropriate because data is discrete	B1 for any correct description why a cumulative frequency step polygon is more appropriate	(1)

Q4.

Question	Scheme	Marks
(a)	35 or 36	B1
		(1)
(b)	$45 - 8 = 37$	M1 A1
		(2)
(c)	Cumulative frequency at 86 metres is 38	M1
	So 12 are taller than 86 metres	A1
	$\dfrac{12}{50} \times 100 = 24(\%)$	A1
		(3)
		[6]

	Notes	
(a)	35.5 is B0	
(b)	M1 for the subtraction of two values read off the graph at 60 and 110 ($45 - k$ or $k - 8$ scores this mark) A1 cao	
(c)	M1 for a vertical line drawn up at 86 or 38 seen or marked on cumulative frequency axis or 76% 1st A1 for $50 - 38$ (= 12) or $100 - 76$ (may be implied by correct answer) 2nd A1 for 24 (%)	

Q5.

Question number	Answer	Additional guidance	Mark
	B2 Accept answers in the range $6.0 \le Q_1 \le 6.5$, $Q_2 = 10$, $15.0 \le Q_3 \le 15.5$	B2 for all three values correct (quartiles in ranges) OR B1 for one value correct	(2)

Q6.

Question	Scheme	Marks
(a)(i)	30 (accept 29)	B1
(ii)	95 – 87 = 8	M1 A1 (3)

(b)	For a suitable reason from:
	   • Only people from the USA were included in the survey (o.e.)
	   • Percentages may be different in UK and USA (o.e.)
	   • Data is out of date (from 2012)
	   • Small sample size
	
	     … so it is not sensible (to use the results for the prediction)
		B1
		
		dB1
		(2)

*(c)	Median is 39 (for tablet owners) Median for tablets owners is higher/tablet owners are older (on average) IQR is (51.5 – 28 =) 23.5 (years) … so similar variation in ages / IQR is (slightly) higher	B1 B1ft B1 B1ft (4) [9]

Notes		

(a)(ii)	M1 for subtraction of two figures between 80 and 100 (not inclusive) which may
	     be seen on their graph
	     e.g. 87 – 95 on its own is M0 but condone 87 – 95 = 8 for M1A1
	A1 for 7, 8 or 9	

(b)	1st B1 for a suitable reason why it may not be sensible 2nd B1 dependent on first B1 for correct conclusion SC: For a complete argument that it is sensible to use the results e.g. 'People from USA and UK have similar social/economic background so could be sensible' B1B0.	
*(c)	QWC: Must use correct statistical terms. 1st B1 for median identified as 39 (allow ±0.5) or difference of 3 2nd B1 for correct comparison. Allow ft on their median if stated. 3rd B1 for IQR found as 23.5 (allow answers in the range [22.5 - 24.5]) 4th B1 **dependent on a figure stated for IQR**, for correct comparison. Allow ft on their IQR. More than one mark can be scored in a single comment, e.g. 'median is 3 years older' scores 1st B1, 2nd B1 and e.g. 'both IQRs are 23' scores 3rd B1, 4th B1 SC: 'both IQRs are the same' scores 3rd B1, 4th B1 (For 2nd and 4th B1 assume comment is about tablet owners if not stated.)	

Q7.

Question	Scheme	Marks
	30, $(39 \leq M < 40)$, $(49 < UQ \leq 50)$	B2 (2)