EXPERT TUITION

Maths Questions By Topic:

Statistics

Mark Scheme

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Table Of Contents

New Spec

Paper 1 ..... Page 1

Paper 2 ..... Page 15

Paper 3 ..... Page 27

Old Spec A (Linear)

Paper 1 ..... Page 41

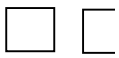
Paper 2 ..... Page 58

Question	Answer	Mark	Mark scheme	Additional guidance
1	Error identified	C1	error correctly identified **Acceptable examples** bar for brown is too high 16 should be 15 brown needs to be one less brown is wrong the graph does not match the table **Not acceptable examples** no title the gaps between the bars are wrong	
2 (a)	16	B1	cao	
(b)	12	M1	for 22 **or** 10 **or** (11 – 5) × 2 oe **or** 1.5 × 8 oe	If the scale is misread in part (a), allow ft marks in parts (b) and (c) for all marks provided consistently used.
		A1	cao	
(c)	Pictogram	C3	for Thursday = 8 drawn oe **and** Friday = 24 drawn oe	Some interpretation of shapes will be needed
		(C2	for Thursday = 8 drawn oe **or** for Friday = 24 drawn oe **or** Thursday = 8 **and** Friday = 24 **or** for Thursday = 24 drawn oe **and** Friday= 8 drawn oe)	
		(C1	for 32 ÷ 4 (= 8) **or** 32 ÷ 4 × 3 (= 24) **or** 32 ÷ 8 **or** for a total of 32 drawn for Thursday and Friday)	

Question	Answer	Mark	Mark scheme	Additional guidance
3	Correct pictogram drawn	C1	deduces that 1 ellipse represents 12 (eggs) oe	eg. ½ ellipse represents 6 (eggs), ¼ ellipse represents 3 (eggs)
		C1	2 ellipses for Tuesday oe	some interpretation of shapes will be needed
		C1	2¼ ellipses for Wednesday oe	
		C1	correctly represented key	
			Alternative (using 1 ellipse to represent a different number of eggs)	
		C2	for a correctly shown key, eg. 1 drawn ellipse represents 4 (eggs) oe **and** one day in agreement with their key.	eg. a correctly represented key plus, $4\frac{1}{2}$ ellipses for Monday oe
		C1	for a second day in agreement with their key	eg. 6 ellipses for Tuesday oe
		C1	for a third day in agreement with their key.	eg. $6\frac{3}{4}$ ellipses for Wednesday oe
4	Completed table	M1	for correctly entering **two** of 11, 2, 5, 10 (= 30 – 20)	4 2 4 10 1 8 11 20 5 10 15 30
		M1	(indep) for using the rule for the top row eg. ([10 males] – [2 male tennis]) ÷ 2 (=4)	Award 2nd M1 if top row is correct
		A1	for complete correct table	

Question	Answer	Mark	Mark scheme	Additional guidance
5 (a)	Explanation	C1	for explanation **Acceptable examples** the number of points only goes up to 4 because the median is 2 no-one scored 5 points (implies number of points scored was less than 5) **Not acceptable examples** she was right since 5 is the middle number she has used the wrong column (insufficient) the median is 3	Explanations must relate to median number of points and not median of the frequency values
(b)	Explanation	C1	for explanation identifying the error in the working **Acceptable examples** $0 \times 1 = 0$ or 0×1 is not 1 Anything times zero is zero **Not acceptable examples** the correct answer is 37	

Question	Answer	Mark	Mark scheme	Additional guidance
6	20 or 24 or 168	B1	for identification of the range of the girls (20) **or** the range (24) **or** the median (168) of the boys	
	Comparison	C2	for a correct comparison of medians **and** a correct comparison of ranges supported by correct figures. eg the median height for girls (165) is less than the median height for boys (168) and the range for girls (20) is less than the range for boys (24) At least one comparison must be in context referring to height or quoting cm.	Simply quoting values for median, range is insufficient; they must be compared.
		(C1	for a correct comparison of medians **or** a correct comparison of ranges that could ft their incorrect figure(s))	Context not necessary for C1

Question	Answer	Mark	Mark scheme	Additional guidance
7 (a)	24	B1	cao	
(b)		C1	for showing diagrams that represent 12 pictorially	Shapes can come from a combination of shapes, but must sum to 12. Any orientation.
(c)	84	M1	for a complete method to find the total number eg $3 \times 8 + 3.5 \times 8 + 2.5 \times 8 + 12$ or $(3 + 3\frac{1}{2} + 2\frac{1}{2} + 1\frac{1}{2}) \times 8$ or $24 + 28 + 20 + 12$ or $9 \times 8 + 3 \times 4$ NB ft from (b)	Accept one error in the totals for each month, eg 24 + 28 + 18 + 12 for the award of this mark. Do not award for omission of figure for April. If work in (a) or (b) consistently shows a misinterpretation of the scale the M mark can still be awarded if also consistent
		A1	cao	
8	No with fully correct figures	M1	for $(360 - 60) \div 2$ (= 150) or $\frac{60}{360} \times 480$ (= 80) oe	Angle of 150° may be seen on diagram
		M1	(dep) for method to find required number of students in School **A** eg $\frac{"150"}{360} \times 480$ (= 200) or (480 – "80") ÷ 2 (= 200)	
		M1	for method to find required number of students in School **B**, eg $\frac{"90"}{360} \times 760$ (= 190) or 760 ÷ 4 (= 190)	ft the angle of 90 eg from 360 – 160 – 110 calculated incorrectly, or measured incorrectly from the diagram within the range 88 to 92
		C1	for No with correct figures **Acceptable examples** No, 200 and 190 He is wrong, School A has 10 more **Not acceptable examples** Yes …. No, School A had 20 more [incorrect figures]	

Question	Answer	Mark	Mark scheme	Additional guidance
9	No (supported)	P1	for process to find total weight of the 4 red bricks, eg. 5 × 4 (= 20) **or** for process to find total weight of the 5 blue bricks, eg. 9 × 5 (= 45)	May be seen next to statements 20 must be clearly referenced to the red bricks. 5 + 9 + 6 = 20 scores no marks
		P1	for process to find total weight of all 10 bricks, eg. "20" + "45" + 6 (= 71)	
		C1	No with correct supporting evidence **Acceptable examples** No, it is 7.1 She is wrong, it is 0.1 more No, (the total weight is) 71 not 70 **Not acceptable examples** Yes …. No, it is 71	Candidates working in grams will need to give 7100 and 7000 for example as comparable figures.

Question	Answer	Mark	Mark scheme	Additional guidance
10 (a)	7	P1	for process to find the number of blue flowers, eg 30 – 8 – 10 – 5	Allow one error
		A1	cao	
(b)	white	B1	for white or ft from (a)	Must be seen clearly for ft
11	14	P1	for process to find total number of boys, 40 – 22 (= 18) **OR** the number of girls who travel by bus 10 – 6 (= 4)	
		P1	for process to find the number of girls who cycle to school 22 – "4" – 9 (=9) **OR** the number of boys who walk to school "18" – 6 – 7 (= 5)	
		P1	full process to find the total number of students who walked to school eg "5"+ 9 or 40 – (6+ 7 + "4" + "9")	Note 16 is 7+9 and 10 is 6+4 6+7 is 13 and 4+9=13 may be seen as intermediate steps
		A1	cao	

	W	C	B	
boy	5	(7)	(6)	18
girl	(9)	9	4	(22)
	14	16	(10)	(40)

Question	Answer	Mark	Mark scheme	Additional guidance
12		M1	for use of scaling, eg at least one of 12, 5, and 6 **or** 23 **OR** for using the representation, eg $\frac{30}{4}$ (= 7.5) or 5.75	May be seen on diagram.
		M1	for subtracting their total number of trees from 30, eg 30 – "23" (= 7) **OR** for subtracting the total number of squares from 7.5, eg 7.5 – "5.75" (= 1.75)	"23" must be from addition of 12, 5 and 6 Award 2 marks for 7 seen provided unambiguous "5.75" must be from addition of correct decimals/fractions
		C1	oe	May be alternative representations, eg one square + half square + quarter square or squares may be divided into 4 sections. Any orientation acceptable.
13 (a)	32, 48, 24, 8, 37, 11	C1	starts to interpret information, eg 48 or 8 in correct place	
		C1	for 80 – 48 (= 32) and "32" – 8 (= 24)	
		C1	completes frequency tree correctly SC: award C2 if all correct frequencies are shown as fractions of 80.	
(b)	$\frac{37}{61}$	M1	ft for $\frac{a}{\text{"61"}}$ with $a <$ "61" or $\frac{\text{"37"}}{b}$ with $b >$ "37"	Incorrect notation with "37" and "61"can earn the method mark but not the accuracy mark.
		A1	ft from diagram in (a)	Accept any equivalent fraction, decimal form 0.60(65...) or 0.61 or percentage form 60(.65...)% or 60% or 61%

Question	Answer	Mark	Mark scheme	Additional guidance
14 (a)	100	B1	for answer in the range 95 to 100	
(b)	660	M1	for reading at least 3 of the required figures from the graph eg 3 of "100", 260, 120, 340, 160, 440 **OR** for 260 – "100" (= 160) **or** 340 – 120 (= 220) **or** 440 – 160 (= 280) **OR** for"100" + 60 (= 160) **or** 80 + 100 + 40 (= 220) **or** 40 + 100 + 100 + 40 (= 280)	Figures may be seen on graph
		M1	(dep) for adding their 3 differences eg "160" + "220" + "280"	
		A1	for 660 or ft their answer to part (a)	
(c)	Tablets	B1	Tablets	
	and statement	C1	Statement eg the bars get proportionally longer over time (most in 2017 and least in 2015) **or** they (more than) double each year **or** for an increase of 280 **or** numbers range from 60 to 340	Values quoted for tablets must be correct. Ignore any calculations relating to laptops and/or desktop computers whether correct or not. Award previous mark if "tablets" is not specifically stated but can be implied from statement.
(d)	Statement (supported)	C1	for statement, eg (No because) we do not know costs or prices or profit.	Answer of 'Yes' gets C0 Answer of 'No' without justification gets C0

Question	Working	Answer	Mark	Notes
15 (a)		Jake with reason	C1	Explanation referring to spread eg range **or** Jakes figures are closer together **or** highest and lowest values for both.
(b)		Reason	C1	Reason eg stem not used or it should be 26
16 (a)	**12** 7 19 18 **8** 26 **30** 15 **45**	Correct table	B3 (B2 (B1	Fully correct table for 5, 6, 7 or 8 figures correct) for given values entered correctly in the table **or** for a correct row **or** column)
17 (a)		365	M1 M1 A1	fx with x consistent within intervals eg 200 × 1 , 300 × 11 , 400 × 5 , 500 × 0 , 600 × 3, if 200, 3300, 2000, 0, 1800 are seen without working then condone 1 error (dep) $\Sigma fx \div \Sigma f$ eg "7300" ÷ 20 Cao
(b)		Comment	C1	for comment about outliers affecting mean

Question		Working	Answer	Mark	Notes
18	(a)		168°, 120°, 72°	M1	for correct working to find an angle (could be implied by one angle drawn correctly on the pie chart)
				A1	for all three angles drawn ±2°
				B1	(dep on M1) for correct labels (languages)
	(b)		No and reason	C1	NO and reason given e.g. "don't have actual figures for Lowry"
19	(a)		10,19	B1	cao
	(b)		Positive	C1	positive (correlation)
	(c)		12 to 13	M1	for an appropriate line of best fit drawn, or a point marked at (x, 16.4) or a horizontal line drawn from 16.4 across to (x, 16.4) where x is in the range 12 to 13
				A1	hours given in the range 12 to 13
	(d)		explanation	C1	(yes) e.g. as the majority of points for high temperature appear when there are more hours of sunshine (positive correlation)

Question	Working	Answer	Notes
20 (a)		5	B1
(b)		Correct pie chart with labels	C1 For apples shown as 'half' ie 180^o on pie chart C1 All angles calculated correctly (Angles of 180^o, 80^o, 100^o) **or** pie chart with correct angles C1 Fully correct pie chart with labels of apple, pear and plum
21		400	P1 Start to process eg. 1200 ÷ 60 A1 400 oe (accept number of whole pizzas eg. 400÷4 = 100 with 4 people per pizza) C1 Eg. Assumption that sample is representative of population – it may not be all 1200 people are going to the party – need less pizza if they don't, assume 4 people per pizza – if different may need more/fewer pizzas

Question	Working	Answer	Notes
22		chart	C1 for key or suitable labels to identify boys and girls C1 for 4 correct sport labels or a linear scale C1 for diagram or chart (combined or separate), correctly showing data for at least 3 sports C1 for fully correct diagram or chart with axes correctly scaled and labelled
23	(5) 3 (4) (12) 6 (7) 5 18 11 10 (9) (30)	table	C1 for at least 2 correct numbers C1 for at least 4 correct numbers C1 for completed table

Question	Working	Answer	Notes
24 a		chart	C1 For key or suitable labels to identify male and female C1 For linear scale C1 For chart (combined or separate) correctly showing data for at least 2 of swim, run, cycle C1 Fully correct chart with axes correctly scaled and labelled.
b		60	M1 $\frac{8+5+5}{30}$ or ft their diagram A1 60%
25 a		32	B1 32 cao
b		Correct reason	C1 Comment about grouped data in context

Question	Answer	Mark	Mark scheme	Additional guidance
26	7	P1 P1 A1	for 6 + 4 + 5 + 8 + 7 + 5 (= 35) for "35" ÷ 5 cao	Working may be seen on the diagram Allow one error in the 6 readings; intention to add must be clear.
27	120	M1 M1 A1	for sensible use of proportion eg $\frac{135}{90}$ (= 1.5) **or** $\frac{90}{135}$ (= $\frac{2}{3}$) **or** 135 × 4 (= 540) **or** 135 ÷ 9 (=15) **or** 80 ÷ 90 (= 0.888...) for a complete method eg 80 × "1.5" **or** 80 ÷ "$\frac{2}{3}$" **or** "540" × $\frac{80}{360}$ **or** "15" × 8 **or** "0.888..." × 135 cao	ie 135 ÷ 9 but not 135 ÷ 10 without 80 ÷ 9
28	13	P1 P1 A1	for at least two of 3×5 (=15) or 2.5×8 (=20) or 1.5×14 (=21) or 1×10 (=10) **or** for 3×5 + 2.5×8 + 1.5×14 + 1×10 (=66) for process to find length of all 2m planks, eg. 92 – (3×5 + 2.5×8 + 1.5×14 + 1×10) (= 26) or 92 – "15" – "20" – "21" – "10" (= 26) cao	Note 66 on its own will score this mark If no calculations are seen for products allow one error in "15", "20", "21", "10" 13 in the correct place in the table should be accepted as the final answer

Question	Answer	Mark	Mark scheme	Additional guidance
29	Two reasons	C2 (C1	for two correct reasons for one correct reason) **Acceptable examples** No label for mark The vertical axis jumps from 0 to 71 The bars are not all the same width Toms bar is twice as wide as the others No axes Toms bar should not take up 4 squares Toms bar shaded 2 not 1 block Tom has 2 bars shaded but the others only have one bar shaded It is not labelled Tom has gone over 2 squares Toms bar is bigger than the others Toms bar is not correct The numbering is not correct **Not acceptable examples** There is no title Different sized gaps between the bars The bars are not symmetrical The bars are not the same size	Allow if one reason is fully correct and the other reason is not. For column accept strip, bar, block, line, cubes in an unambiguous explanation
30	Correct pie chart	M1 A1 A1	for a method to find at least one angle eg $\frac{50}{(50+45+25)}\times 360$ (= 150) **or** $\frac{45}{(50+45+25)}\times 360$ (= 135) **or** $\frac{25}{(50+45+25)}\times 360$ (= 75) oe for at all 3 angles correctly calculated **OR** at least one correct and accurately drawn angle (from no more than 3 sectors) for a fully correct labelled pie chart	Do not award for drawing if the intention is to show more than 3 sectors 3 angles correct in table is enough for this mark irrelevant of diagram Labels as “City” from table not just angle size.

Question	Answer	Mark	Mark scheme	Additional guidance
31 (a)	5	M1	for listing numbers in order, eg 3 4 4 6 8 9 **or** answer of 4, 6 **or** answer of 8.5	Condone one error or additional number
		A1	cao	
(c)	3, 6	P1	for at least one 3 **or** 5×5 (= 25)	Numbers may be seen on the cards (but the answer line takes precedence)
		A1	for 3, 6 or 6, 3	
32	Two statements	C2	Two different statements **Acceptable** There is no 'frequency' label / *y*-axis is not labelled / no title for the *y*-axis The polygon should not be closed / have a line at the bottom / have first and last points connected (15, 6) has been plotted incorrectly / at (15, 8) / (The first point is at) 8 rather than 6 / First point is on an incorrect frequency **Not acceptable** There is no title / Points should be joined with a curve *x*-axis doesn't start at 0 There is no label The axes have not been labelled (*x* and *y*) The points haven't (all) been plotted correctly $10 < w \leq 20$ and $30 < w \leq 40$ have been plotted wrong The first point is plotted incorrectly, its at (15, 7) not (15, 6) The points have been joined up wrong / Points should not be joined in the shape of a triangle / They've connected all the points Done the midpoints rather than the numbers on the right side / The points are in the middle	Ignore additional statements provided no contradiction
		(C1	for one statement eg from those above)	

Question	Answer	Mark	Mark scheme	Additional guidance
33 (i)	238	P1	for working with proportion eg $\frac{17}{50} \times 700$ oe	
		A1	cao	
(ii)	statement	C1	for statement **Acceptable** Sample is representative (otherwise answer wrong) Random sample (otherwise answer will be different) The 50 people are from the 700 (otherwise not accurate) 17 out of **every** 50 want a sports bag (otherwise answer will be different / wrong) There is no bias That the other 650 will want the same gifts as the 50 **Not acceptable** There would be more than 17 people who want the sports bag I rounded my answer 17 out of 50 want a sports bag A repeat of the calculation done in (i) Most of the people would want a sports bag References as what might change in the future (eg a change in membership) That all 700 people wanted a type of gift rather than no gift (otherwise would have changed my answer)	

Question	Answer	Mark	Mark scheme	Additional guidance
34 (a)(i)	24	B1	cao	
(ii)	18	B1	cao	
(b)	Diagram	M1	for 36 ÷ 9 or for using ratio 1 : 8 or setting up $w + 8w$ (=36)	Fully correct diagram with no method shown gets all 3 marks
		A1	for 4 and 32	
		C1	for correct diagram or ft (dep on M1) for drawing "4" and "32"	SC: B2 for 4 full circles for Wed **and** half a circle for Thursday SC: B1 for either Wed correct or for Thurs correct in the diagram if M0 scored
35 (i)	65	M1	for working with proportion eg. 10 ÷ 30 × 195 (= 65)	Condone use of 200 for 195
		A1	cao	
(ii)	statement	C1	for statement **Acceptable examples** sample is representative (otherwise answer wrong) random sample (otherwise answer will be different) the 30 students are from the 195 (otherwise not accurate) 10 out of every 30 want to go to the Theme Park (otherwise answer will be different/wrong) there is no bias **Not acceptable examples** There would be more than 10 people who want to go to the Theme Park I rounded my answer	

Question	Answer	Mark	Mark scheme	Additional guidance
36	statements	C1	for lobf incorrect **Acceptable examples** lobf lobf does not suit all points/not a lobf lobf wrong since hits *x* axis/is inaccurate/should be amongst the crosses lobf goes through the origin/through one point **Not acceptable examples** no correlation/there is no title	
		C1	for height scale not linear **Acceptable examples** 150 missing Height not linear / Height numbers going up wrong **Not acceptable examples** 150 graph does not start at 140/graph does not start at 0 height should start at 170	

Question		Answer	Mark	Mark scheme	Additional guidance
37		Correct pie chart	M1	for method to find at least one angle eg B: 360 ÷ "36" × 11 (= 110) **or** P: 360 ÷ "36" × 17 (= 170) **or** HD: 360 ÷ "36" × 8 (= 80)	Accept numbers if present in Number of fan column eg 0 added to a number is acceptable for this mark.
			A1	for at all 3 angles correctly calculated **OR** at least one accurately drawn angle	
			A1	for a fully correct labelled pie chart	Labels as "snacks" from table not just angle size.
38		5	P1	for start to process eg 7 × 20 (= 140) **and** 3 × 21 (= 63) **or** (7 × 20) + (3 × 21) + 22 (= 225)	May be written near table 7 × 20 (= 140) **and** 3 × 21 (= 63) minimum requirement for P1
			P1	for a complete process to find the missing frequency eg (320 – "225") ÷ 19 **or** 320 – "225" = (95) **and** "95" ÷ 19	May be seen as two calculations
			A1	cao	Please check the table. Correct answer in the table without working award 3 marks

Question	Working	Answer	Mark	Notes
39 (a)		$\frac{33}{60}$	M1	for method to find number of students who did not walk to school eg 15 + 12 + 6 or 60 – 27 (=33) or 0.55 or for $1-\frac{27}{60}$
			A1	for $\frac{33}{60}$ or equivalent fraction
(b)		Pie chart drawn	M1	for method to find the angle for at least one sector eg $\frac{27}{60}\times 360$, $\frac{12}{60}\times 360$, $\frac{6}{60}\times 360$, $27\div\frac{60}{360}$, $12\div\frac{60}{360}$, $6\div\frac{60}{360}$ oe (0.166..) NB: could be implied by one angle drawn accurately.
			M1	for drawing at least one sector accurately (from 4 sectors) eg 162°or 72°or 36°
			A1	for an accurately drawn pie chart
			B1	(dep on 4 sectors with at least one accurately drawn) for showing labels Walk Car Bicycle
40 (a)		Statement	C1	States one thing wrong eg vertical scale is not linear oe
(b)		Trend described	C1	eg the trend is upwards, positive (trend) oe
41 (a)		31.4	P1	for working with circumference formula, eg π × 80 (=251.(….)) oe
			A1	for answer in the range 31.4 to 31.5 accept 10π
(b)		No (supported)	C1	Mean distance stays the same with reason, eg total distance remains unchanged or same number of points

Question	Working	Answer	Mark	Notes
42 (a)		Walk	B1	cao
(b)		7 on chart	B1	for bar of height 7 drawn for girls walking
(c)		4	B1	cao
(d)		96	M1	for method to find number of Year 6 students in the survey e.g. 5 + 9 + 6 + 4 + 9 + 7 + 4 + 1 + 2 + 1 (= 48) or 14 + 10 + 16 + 5 + 3 (= 48)
			A1	for 96 or ft from (b), eg 82 if no bar in (b)
43 (a)		Monday wrong	C1	for seeing difference in tally marks and frequency for Monday
(b)		Comment	C1	for suitable comment, eg extra picture for Tuesday needed or explains that 0.5 of a CD is not possible

Question	Working	Answer	Notes
44			C1 Any one correct statement eg. No key, *y* axis label, 4 missing on *y* axis C1 Any 2nd correct statement C1 Any 3rd correct statement
45		13	M1 Puts numbers in order or clear attempt to find 5th number **or** (9 + 1)/2 **or** selects 11 A1
46 (a)		$22 \leq f < 24$	B1
(b)		21.9	M1 $x \times f$ using midpoints M1 (dep on previous mark) "$x \times f$" ÷ 40 A1 accept 22 if working seen

Question	Working	Answer	Notes
47 (i)			C1 for correct criticism of use of mean, eg "there is no dress size of 15.3" mode (=14) is most useful since it shows the most popular size
(ii)			C1
48 (a)		12| 3 5 9 13| 0 3 3 5 7 8 14| 7 7 8 9 15| 0 1 Key: 12|3 represents 123	C1 for an unordered diagram with just one error or for an ordered diagram with no more than two errors C1 for a fully correct diagram C1 for a correct key (units may be omitted but must be correct if included)
(b)		$\frac{6}{15}$	M1 for correct interpretation from their diagram (or from original information) of the number over 140 or for $\frac{n}{15}$, $n < 15$ A1 for $\frac{6}{15}$ oe or ft their diagram
49		Mean of 96 or net deviation of 0 so target met	M1 for correct interpretation of the graph, with at least one correct reading or a line drawn through 96 with at least one correct deviation M1 complete method to find mean of six months sales, eg. (110+84+78+94+90+120)÷6 (= 96) or the mean of six deviations, eg. (14–12–16–2–6+24)÷6 (= 0) C1 for a correct answer of 96 or 0 with correct conclusion
50 (a)		$160 < h \leq 170$	B1 for identifying the correct class interval
(b)		1. Points should be plotted at mid-interval values 2. The polygon should not be closed	C1 for a correct error identified C1 for a correct error identified

Question	Working	Answer	Notes
51 (a)		Banana	B1 cao
(b)		20	B1 cao
(c)		explanation	C2 for full explanation, eg table shows exactly ½ ; pie chart shows less than ½ as angle is less than 180^o (C1 for partial explanation or reference to just pie chart or just table)
52 (a)		Trend described	C1 for "percentage of people who use the shop decreases" oe
(bi)		13 - 17	P1 for process to draw trend line on graph A1 for 13 - 17
(bii)		No + reason	C1 for comment, eg "no, because 2020 is beyond the time period covered by the given data"

Question	Answer	Mark	Mark scheme	Additional guidance
53	4 **5** 23 **32** **8** 9 7 24 **12** **14** 30 **56**	B3 (B2 (B1	for a fully correct table for at least 7 figures correctly placed) for the given values correctly placed in the table or one correct row or column)	Given values in bold Given values: 5, 32, 8, 12, 14, 56

Question	Answer	Mark	Mark scheme	Additional guidance
54	1 | 57899 2 | 0224558 3 | 235	B2 (B1 B1	for a fully correct ordered diagram for a fully correct unordered diagram or for an ordered diagram with one error or omission) (indep) for correct key (units not required but must be correct if stated) eg 2|5 represents 25 (cm)	Can be in reverse vertical order (with matching leaves) eg 3,2,1 One number in the wrong position is one error.
55 (a)	(100,18)	B1	cao	
(b)	12.8 to 14.8	M1 A1	for a method to read off eg line of best fit **or** line up from 370 **or** for a point on the grid at (370, *y*) where *y* lies between 12.8 and 14.8 for an answer in the range 12.8 to 14.8	
(c)	Decision and statement	C1	for decision and statement **Acceptable examples** No, as this point can be disregarded from the general trend No, ignore this point No, the correlation is positive No, because even with an outlier you can still have a negative or positive correlation. No, there is still a correlation. No, as you can use the rest of the data to determine a correlation. No, as outlier does not affect the majority No as a line of best fit can still be drawn No, it is an anomaly **Not acceptable examples** Yes, …. Outliers can be ignored [no decision] No, the outlier can be ignored so the correlation is negative No there are other things that can affect the test	

Question		Answer	Mark	Mark scheme	Additional guidance
56	(a)	5	B1	cao	
	(b)	5, 6	B1	cao	
57	(a)	80	B1	cao	
	(b)	8	B1	cao	
	(c)	Yes and reason	C1	for yes and reason **Acceptable examples** Yes, because 27 is greater than 7 Yes, because the drop is 20 more Yes, the gradient is steeper (in the first 3 mins) and is then less steep (in the last 3 mins) Yes, because the drop is 20 less in the last 3 mins Yes, because the drop is more **Not acceptable examples** No …. Yes, because the drop is 20 less	"Yes" may be implied from wording Ignore any references to actual readings from the graph

Question	Answer	Mark	Mark scheme	Additional guidance
58 (a)	Correct frequencies 8, 3, 5, 2	B2	all frequencies correct	Correct tallies alone scores B1 Correct frequencies with no tallies scores B2
		(B1	Starts to work with tallies, eg 2 tallies fully correct, or 2 frequencies fully correct)	Tallies need not be crossed
(b)	Bar chart	M1	for labelling pet names on the horizontal axis or bars **OR** a linear scale on the vertical axis.	Accept unambiguous abbreviations for labels, eg D, R, C, H Horizontal axis does not need "pet" label
		M1	for at least two correct bars ft their table in (a)	Condone bars of unequal width Condone no gaps or inconsistent gaps Bars must be unambiguously correct for their scale
		A1	for a fully correct bar graph ft from their frequencies or tallies in (a).	All four bars must be correct with labels, ft, to award this mark. Vertical axis must have a suitable label, accept unambiguous abbreviations, eg freq or number Condone no gaps, or inconsistent gaps. Condone bars of unequal width Horizontal axis does not need "pet" label
(c)	dog	B1	cao or ft from frequencies in (a) **or** chart in (b)	Mark to the benefit of the candidate if table and graph are different.
59	43	M1	for identifying 74 and 31 as the key numbers	It is insufficient to identify these on the diagram (eg as 1, 4) –43 as an answer implies M1
		A1	cao	

Question	Answer	Mark	Mark scheme	Additional guidance
60	35 to 42	M1 A1	for drawing a suitable line of best fit **or** for a line from $x = 34$ **or** for a point marked on the grid at $(34, y)$, y in the range 33 to 44 answer in the range 35 to 42	Line at $x = 34$ does not have to be full length of grid but should be in or reach the data set. Acceptable values for the data set are $y = 33$ to $y = 44$
61	18.6	M1 M1 A1	for finding 4 products within intervals (including end points) for Σ"fx" ÷ (1+ 2 + 7 + 8) **or** (7.5×1 +12.5×2 + 17.5×7 +22.5×8) ÷ (1+ 2 + 7 + 8) **or** ("7.5" + "25" + "122.5" + "180") ÷ "18" **or** "335" ÷ "18" for 18.6(111…)	<table><tr><th>Min fx</th><th>Max fx</th></tr><tr><td>5</td><td>10</td></tr><tr><td>20</td><td>30</td></tr><tr><td>105</td><td>140</td></tr><tr><td>160</td><td>200</td></tr></table> Σ"fx" **must** come from 4 products fx within intervals (including end points)

Question	Answer	Mark	Mark scheme	Additional guidance
62 (a)	2	B1	cao	
(b)	81	M1	for working with values from the table eg (0 × 4), (1 × 3), … with at least 3 products shown correct **or** (0 +), 3, 14, 15, 24, 25 with at least 3 correct	Check working space or next to the table. Zero points may not be seen so accept without 0 × 4, 0
		A1	cao SC B1 for 85	
63 (a)	$40 < h \leq 50$	B1	accept 40 – 50 oe	
(b)	polygon drawn (15,7), (25,13) (35,14), (45,12) (55,16), (65,18)	B2	for fully correct polygon with points plotted at the midpoints	Joining must be with line segments
		(B1	for points plotted correctly but not joined by straight lines **or** joining points at correct heights consistently within intervals including plotting at end values **or** correct frequency polygon with one point incorrect **or** correct frequency polygon with first and last points joined directly)	for example, at 10, 20, 30,…or at 20, 30, 40,… Ignore any histogram drawn and any part of frequency polygon outside range of first and last points plotted

Question	Answer	Mark	Mark scheme	Additional guidance
64	statement	B2	Two different statements **Acceptable** eg should be joined with straight lines (not curve)/should use a ruler 1st (quarter) not shown/plotted/labelled/not all quarters labelled does not show all 4 seasons 9.5 missing from vertical axes/not linear vertical (number) axis does not start at 0/the *y* axis starts at 6 the graph does not begin at 0, it starts at 6 it is not clear what 2, 3, 4 on the *x*-axis mean the scale of years doesn't make sense there is lack of clarity about what the numbers on the *x* axis represent graph is curved line **Not acceptable** eg no value plotted for 2 in 2016 it does not start at 0 (no reference to vertical axis)/missing 0 they should not have connected the dots like that the numbers on the *x* axis are repeated the numbers along the *x* axis 2, 3, 4 the years on the *x* axis have not been written properly does not follow a sequence it needs a discontinuity wiggle on the axis no title	Ignore additional statements provided no contradiction
	statement	(B1	One statement eg from those above.)	

Question	Answer	Mark	Mark scheme	Additional guidance
65	Correct pie chart	M1	for method to find at least one angle eg P: 360 ÷ 60 × 24 (=144) **or** C: 360 ÷ 60 × 16 (=96) **or** M: 360 ÷ 60 × 20 (=120)	Use the overlay Working may be seen in or by the table
		A1	for all 3 angles correctly calculated **OR** at least one accurately drawn angle	If three equal sectors of 120° with no working award 0 marks
		A1	fully a correct labelled pie chart	Labels as "vegetables" from table not just angle size. Accept P, C, M
66 (a)	5	M1	"2" ÷ 40 × 100	"2" comes from their reading of the height of the 20 to 24 column
		A1	cao	
(b)	9.5 shown	M1	for frequencies of 11, 8, 13, 6 and 2 (allow one error) **or** for midpoints 2, 7, 12, 17 and 22	May be seen on chart
		M1	for finding at least 4 products *fx* consistently within interval (including end points)	
		M1	for Σ"*fx*" ÷ ("11" + "8" + "13" + "6" + "2") **or** (11×2 + 8×7 + 13×12 + 6×17 + 2×22) ÷ 40 **OR** Σ"*fx*" (=380) **and** 9.5 × ("11" + "8" + "13" + "6" + "2") (=380)	Evidence of two different calculations that should lead to 380 are required for this mark
		C1	for correct figures showing the answer or accurate figures to compare from correct working eg 380 from two calculations	

Question		Answer	Mark	Mark scheme	Additional guidance
67	(a)	6 | 4799 7 | 0015667 8 | 0011247 9 | 14	B2	for correct ordered stem and leaf	
			(B1	for fully correct unordered or ordered with one error or omission)	
			B1	(indep) for key (units not required but must be correct if stated) eg 6 | 4 = 64 (marks)	
	(b)	Explanation	C1	for identifying "6" students failed (ft their diagram) **OR** for 20 ÷ 4 (= 5)	Explanation does not need to state that Omar is wrong, but just needs to provide two comparable values (that are not the same) unless ft values show that Omar is not wrong in which case a statement is needed.
			C1	for comparing $\frac{1}{4}$ with $\frac{6}{20}$ or $\frac{3}{10}$ (ft their diagram) **OR** for comparing "6" with 5	
68	(a)	Incorrect order of operation	C1	for identifying an incorrect order of operation, eg should be 12 – 8 **or** "should multiply first"	Showing that 12 – 2 × 4 is 4 (and not 40) is insufficient for this mark; the explanation should focus on what Jenny has done wrong.
	(b)	Statement	C1	for stating that the range is the difference between the greatest and least values, oe **or** stating that he didn't put numbers in order	Stating the correct calculation for the range (8 – 1) or stating the (correct) range as 7 is sufficient for this mark.
69	(a)	negative	B1	cao	Ignore any description of a relationship and any reference to strength of correlation
	(b)	Explanation	C1	for a correct explanation, eg "not in line with the trend of the other points" "does not fit in with the correlation" "is far away from the other points or line of best fit"	
	(c)	Comment	C1	for an explanation eg "point would be outside of the range of the scatter diagram"	

Question	Working	Answer	Mark	Notes
70		Correct pictogram with key	C3 [C2 [C1	for a fully correct pictogram, including key for 2 circles drawn for Friday or $3\frac{3}{4}$ circles (or equivalent) drawn for Saturday] for deducing that one circle represents 4 cycles (or 20 ÷ 5) or $\frac{1}{2}$ circle represents 2 cycles or $\frac{1}{4}$ circle represents 1 cycle]
71 (a)		$160 < h \leq 170$	B1	correct class interval
(b)		Line segments joining the points (135, 4), (145, 11), (155, 24), (165, 22) and (175, 19)	C2 [C1	for fully correct frequency polygon for points plotted correctly at midpoints of intervals OR joining points with line segments at the correct heights and consistent within the intervals (including end values) OR correct frequency polygon with one point incorrect OR correct frequency polygon with first and last point joined] NB: ignore any histogram drawn and any part of frequency polygon outside range of first and last points plotted

Question	Working	Answer	Mark	Notes
72 (a)		Reason	C1	reason, eg must order numbers first
(b)		10	M1 A1	for 22 − 12 or 12 − 22 or 12 to 22 cao
(c)		16	M1 A1	for adding the numbers and dividing by 7 cao
73		12	B1	cao

Question		Working	Answer	Notes	
74	(a)		$\frac{15}{29}$	M1	for $\frac{15}{a}$ where $a > 15$ or $\frac{b}{29}$ where $b < 29$ **or** correct fraction for girls from a different class
				A1	
	(b)	11A +1G, 11B −1G 11C −1G, 11D + 1G	No + reason	M1	For complete method to find the sum of the signed differences in numbers of boys and girls or the totals of boys and girls in year 11
				C1	'No' with correct argument eg. there are 38 boys and 38 girls
	(c)		Yes + reason	C1	'Yes' with eg as many calculations using the angles would be required oe
75	(a)	Draws LOBF Finds ht÷base = $\frac{85-20}{0-25} = -2.6$	No + reason	M1	Interpret question eg. draw line of best fit
				M1	Start to test eg. gradient e.g. $\frac{85-20}{0-25} = -2.6$
				C1	Gradient within range ±(2 - 3) and 'no'
	(b)		The LOBF would have to be used outside the data	C1	Convincing explanation

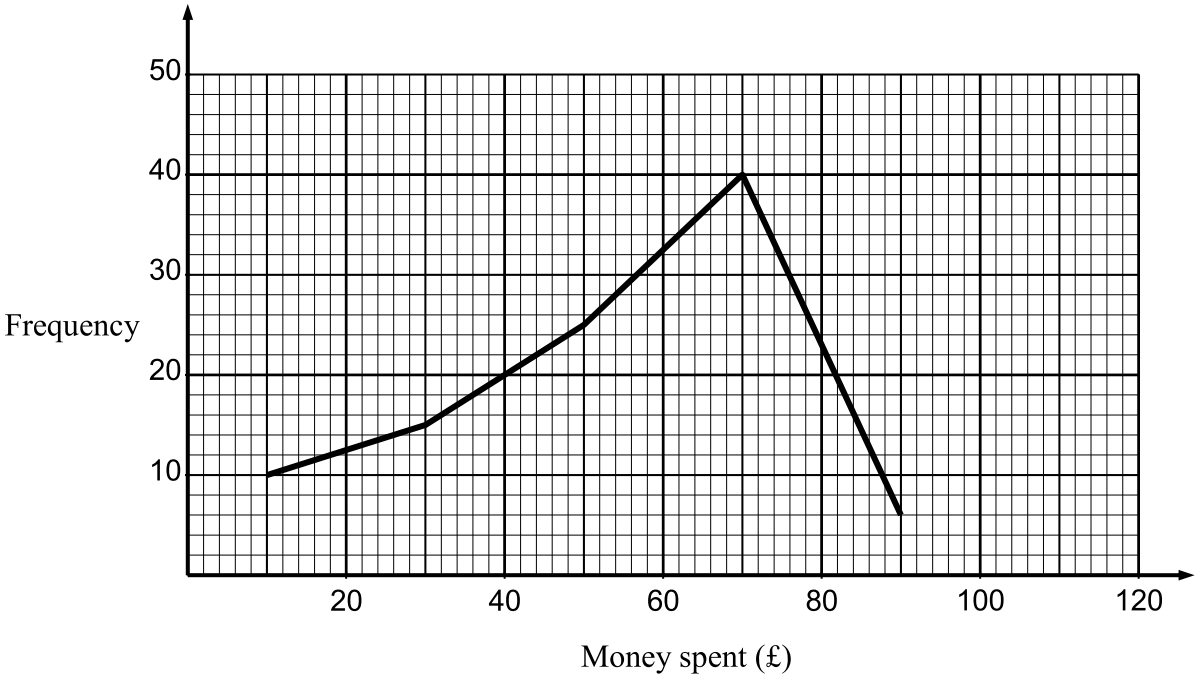
Question	Working	Answer	Notes
76 (a)		(4,10)	B1 cao
(b)(i)		Line drawn	B1 Straight line drawn passing between (2, 16) and (2, 28) AND (13, 80) and (13, 92)
(b)(ii)		Positive	C1 positive OR description of dynamic relationship
(c)		Value between 60 and 70	C1 a correct value given
(d)		Statement	C1 for referring to the danger of extrapolation outside the given range or for a given point
77 (a)	(720+408+304+252) ÷ 50 1684 ÷ 50	33.68	M1 for finding 4 products *fw* consistently within interval (including end points) M1 (dep on 1st M) for 'Σ*fw*'÷50 A1 (accept 33.7 from correct working)
(b)		Manager with reasons	M1 for strategy to compare number of small size sold to number ordered C1 clear comparison that small size is not ¾ and so Jenny is not correct or the manager is correct

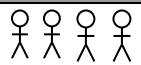
Question	Working	Answer	Notes
78 (a)		56	B1 cao
(b)		32	B1 cao
(c)		Reason	C1 starts argument eg 8 cars or 8/27 C1 completes argument eg with 1/3 = 9/27
79 (a)		No and reason	C1 No and reason eg the mean must be less than 6
(b)		explanation	C1 Should have divided by 30, not by 6
80 (a)		improvement	C1 appropriate improvement eg do not have axes starting at (0, 0)
(b)		explanation	C1 explanation eg pine cone has a very short width for its length

Question		Working	Answer	Mark	Notes
81	(a)		8	1	B1 cao
	(b)		30	2	M1 for 8 + 4 + 6 + 12 or 7 × 4 + 2 A1 cao
	(c)		4 circles on Friday	1	B1 cao
82	(a)		28	1	B1 cao
	(b)		42	1	B1 cao
	(c)		24	2	M1 for complete method to find the difference between males and females condone one error in reading frequencies **or** one error in totalling correct frequencies eg (Males 28 + 16 + 24 + 8) – (Females 16 + 12 + 18 + 6) or 76 − 52 A1 cao **or** M1 for finding the differences for each pair of columns condone one error in reading frequencies eg (28 − 16) + (16 − 12) + (24 − 18) + (8 −6) or 12 + 4 + 6 + 2 A1 cao
83	(a)		Newcastle	1	B1 cao
	(b)		6	1	B1 accept −6
	(c)		−4	1	B1 cao
	(d)		1	2	M1 for (4 −2 + 3 − 4 + 4) ÷ 5 A1 cao

Question		Working	Answer	Mark	Notes
84	(a)		$\frac{1}{6}$	2	B2 cao (B1 for any equivalent fraction)
	(b)		75	3	M1 for method to work out degree equivalent of 1 person e.g 60 ÷ 30 (= 2) M1 for a complete method to work out number of women e.g. (360 − 60 − 60 − 90) ÷ "2" oe A1 cao **or** M1 for complete method to work out angle of women sector eg 360 − 60 − 60 − 90 (= 150) M1 for a complete method to work out number of women e.g ("150" ÷ 60) × 30 oe A1 cao
	(c)		Can't tell or No (supported)	1	B1 for a convincing reason e.g. there is no information about the population size this week
85	(a)		Frequency polygon	2	B2 correct frequency polygon (B1 for points plotted correctly but not joined **or** for points plotted at the correct heights, consistently placed within the class intervals (including ends) and joined **or** for an otherwise correct frequency polygon with no more than one point incorrect **or** correct frequency polygon with first and last points joined directly) **NB**: ignore parts of graph drawn to the left of the 1st point or the right of the last point; ignore any histograms drawn.
	(b)		$60 < A \leq 80$	1	B1 ft from their frequency polygon

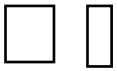
85a



Question	Working	Answer	Mark	Notes
86 (a)			1	B1 for 4 people unambiguously drawn for Cricket
(b)		27	2	M1 ft from their pictogram for 4 + 6 + 9 + 8 or 2 × (2 + 3 + 4.5 + 4) A1 cao
87 (a)		9.4	1	B1 cao
*(b)		Diagram or chart	4	B1 for a key, or suitable labels, to identify regular yoghurt and low fat yoghurt. B1 for diagram(s) or chart(s) set up for comparison, showing data for protein, carbohydrate and fat, e.g. dual bar chart, line graph, etc B1 for correct heights for regular yoghurt **or** low fat yoghurt, dependent on a linear scale C1 for a fully correct diagram or chart to include labels for protein, carbohydrate and fat and vertical axis correctly scaled and labelled
88 (a)		$50 < a \leq 60$	1	B1 for correctly identifying the modal class interval e.g. 50 – 60 oe
(b)		Polygon	2	B2 for fully correct frequency polygon - points plotted at the midpoint (B1 for all points plotted accurately but not joined with straight line segments **or** all points plotted accurately and joined with last joined to first to make a polygon **or** all points at the correct heights and consistently within or at the ends of the intervals **and** joined (can include joining last to first to make a polygon) **NB**: ignore parts of graph drawn to the left of the 1st point or the right of the last point; ignore any histograms drawn.

Question		Working	Answer	Mark	Notes
89	(a)		February	1	B1 cao
	(b)		Onions	1	B1 cao
	(c)		Lettuces	1	B1 cao
90	(a)		$\frac{120}{360}$	2	M1 for $360 - 45 - 105 - 90$ (= 120) oe A1 for $\frac{120}{360}$ oe OR M1 for measuring angle as 118 – 122 A1 ft for $\frac{"120"}{360}$ oe
	(b)		18000	2	M1 for 4500×4 oe A1 cao

Question		Working	Answer	Mark	Notes
91	(a)		Charlie	1	B1 cao
	(b)		8	1	B1 cao
	(c)		11	1	B1 cao
	(d)		2 ½ circles drawn	1	B1 for 2 ½ circles drawn oe

Question		Working	Answer	Mark	Notes
92	(a)			1	B1 for 6 TVs drawn for Sunday
	(b)		37	2	M1 for attempt to find the total for 4 days (eg 8+10+13+6) by adding individual days with at least 3 days correct A1 cao
93	(a)		Gulf	1	B1 cao
	(b)		Avris	1	B1 cao
	(c)		19 200	1	B1 cao
94			13 −1 13 26	4	B1 cao B1 cao B1 cao B1 cao SC: If B0 scored award M1 for appropriate working shown
95	(a)		1	1	B1 cao
	(b)		54	2	M1 *fx* (at least 3 seen from 0×2, 1×12, 2×8, 3×6, 4×2) or for an answer of 56 A1 cao
96	(a)		16	2	M1 for 360 ÷ 45 oe or 2 × 8 or Roach identified as 6 or Bream identified as 8 A1 cao
	(b)		No	1	B1 for 'No' and correct explanation, e.g. the pie charts only show that the proportions OR explains that she could be correct if the total number of fish is the same in each chart OR explains that we don't know if she is correct because the total number of fish is not known.

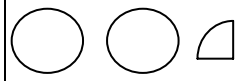
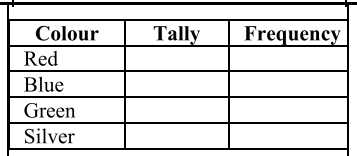
Question		Working	Answer	Mark	Notes
97	(a)		Relationship	1	B1 for a description of a dynamic relationship eg "The older the car the lower the price" or "The newer the car the greater the price" oe (accept negative correlation)
	(b)		6400 to 7000	2	B2 for an answer in the range 6400 to 7000 OR M1 for a single straight line segment with negative gradient that could be used as a line of best fit or vert. line from 3.5 or a point plotted at (3.5, *y*), *y* in the range 6400 to 7000 A1 for 6400 to 7000

Question		Working	Answer	Mark	Notes
98	(a)		4,8,3,3,2	2	M1 for at least 2 tallies or 2 frequencies correct A1 for 5 correct frequencies
	(b)		correct graph	3	M1 for bar chart or other suitable chart with at least 2 correct frequencies drawn for their scale (ft from (a)) M1 for all bars labelled and vertical axis correctly scaled A1 for accurately representing their data, with all labels, ft from (a)
99	(a)		18	1	B1 cao
	(b)		56	1	B1 cao
	(c)		33	2	M1 for 23 and 56 identified A1 cao
100	(a)		$\frac{5}{12}$	2	M1 for $\frac{150}{360}$ or equivalent fraction A1 cao
	(b)		42	2	M1 for $60 \div 12$ (= 5) **or** $210 \div 60$ (= 3.5) oe A1 cao
	(c)		not enough information	1	B1 for 'not enough information' ticked **and** appropriate explanation given

Question		Working	Answer	Mark	Notes
101			55	3	M1 for 29 + 17 + 19 (=65) or 34 + 43 + 43 (=120) M1 for "120" – "65" A1 cao OR M1 for 34 – 29 (=5) or 43 – 17 (=26) or 43 – 19 (=24) M1 for "5" + "26" + "24" A1 cao OR M1 for three other consistent differences found M1 adding their differences A1 cao
102	(a)		3	1	B1 for 3, accept – 3
	(b)		1	2	M1 for evidence of adding all 7 or all 6 non zero temperatures **and** dividing by 7 A1 cao
*103			Diagram or chart	4	M1 for key or suitable labels to identify Majorca and Crete M1 for 5 correct month labels OR a linear scale M1 for diagram or chart (combined or separate) set up for comparison, correctly showing data for at least three months C1 for fully correct diagram or chart to include all axes correctly scaled and labelled
104			168, 72, 120	4	M1 for evidence of method for at least one angle (could be implied by working or one correct angle on pie chart or in table) A2 for all angles drawn correctly ±2° (A1 for at least one angle drawn correctly or all angles correct in table) B1 for sectors labelled with results (dependent on at least one angle drawn correctly and exactly three sectors)

Question		Working	Answer	Mark	Notes
105	(a)		8	1	B1 cao
	(b)		10	1	B1 cao
	(c)		$1\frac{3}{4}$ circles	1	B1 cao
106	(a)		35	1	B1 cao
	(b)		Thursday	1	B1 for Thurs(day)
	*(c)	Jack 25+30+45+30=130 Grahan 40+25+35+40=140	Graham and reason	3	M1 for intention to add either Jack's total or Graham's total (allow one error reading from chart) A1 for 130 and 140 or 2(h) 10 and 2(h) 20 with working C1 (dep on M1 and two totals) for clearly stating Graham as their answer or ft from their 2 totals. **OR** M1 for the intention to find the difference between the times on each of the 4 days A1 for 10 or -10 with working C1 (dep on M1 and a net difference) for clearly stating Graham as their answer or ft from their difference [SC B1 for Graham with 130 and 140 or 10 if M0 scored]
107	(a)		2	1	B1 cao
	(b)		0,1,2	2	M1 for any two of 0, 1, 2 correct with no extras **or** for showing 3,4,6,7 as consecutive numbers in an ordered list (ignore numbers before or after 3,4,6,7 and allow an extra 4 written within the list 3,4,4,6,7). A1 fully correct answer in any order

Question		Working	Answer	Mark	Notes
108	(a)		12	1	B1 cao
	(b)		9	2	M1 for complete method to find total number of white bread sandwiches **or** 28 **or** total number of brown bread sandwiches **or** 19 A1 cao **OR** M1 for method to find difference between white and brown ham **or** ±1 **or** white and brown egg **or** ±8 (may result in positive or negative number) A1 cao
109			7	3	M1 for 4×10 **or** 40 **or** $\frac{12+6+15+x}{4}$ **or** a correct equation M1 for a complete correct method A1 cao

Question		Working	Answer	Mark	Notes
110	(a)		8	1	B1 cao
	(b)		11	1	B1 cao
	(c)		$2\frac{1}{4}$ circles	1	B1 for $2\frac{1}{4}$ circles oe
111	(a)		4	1	B1 cao
	(b)		13	1	B1 cao
	(c)		11 and 14	1	B1 cao
	(d)		4	2	M1 for 14–10 or 10 –14 or –4 or 10 to 14 or 14 to 10 A1 cao
	(e)	4 + 3 + 2 + 5 + 3	17	2	M1 for adding at least 4 correct heights out of 4 or 5 heights A1 cao
112			Data collection table	3	B3 for correct table with all three aspects without repeats Aspect 1: colour (of car) or for at least 3 of red, blue, green, other etc. Aspect 2: 'tally' or tally marks or 'frequency' or 'number of cars' Aspect 3: 'frequency' or 'total(s)' or 'number of cars' (B2 for two aspects) (B1 for one aspect)

Question		Working	Answer	Mark	Notes
113	(a)			2	B1 for 6 tins drawn for Thursday B1 for 3 + ½ tins drawn for Friday. Use professional judgement re sketch of semicircle
	(b)		15	2	M1 for (4.5 – 3)×10 or 1.5×10 or 4.5×10 – 3×10 or 45 – 30 or 10 + 5 A1 for 15
114	(a)		Tuesday	1	B1 for Tuesday (accept 8)
	(b)		– 6	1	B1 cao
	(c)		Wednesday or 8	2	B2 for Wednesday or 8 OR M1 for an attempt to find the difference in at least 3 of: 5 and 4, 8 and 6, 6 and -2, -1 and -4, -3 and -6; ie the answers need not be correct. A1 for Wednesday or 8
115	(a)		21	1	B1 cao
	(b)		17	1	B1 cao
	(c)	55 – 15	40	2	M1 for 55 – 15 (accept 15 – 55 or 15 to 55 or 55 to 15 or 15, 55 but not 15 + 55) A1 cao
116	(a)		Positive (correlation)	1	B1 for positive (correlation) [do not accept a relationship]
	(b)		83 to 87 inc.	2	B2 for an answer in the range 83 to 87 inc. OR M1 for a single straight line segment with positive gradient that could be used as a line of best fit or for an indication on the diagram from 148 on the height axis A1 ft from their line of best fit

Question		Working	Answer	Mark	Notes
117	(a)		4, 7, 4, 3, 2	2	M1 for at least 3 correct tallies **or** at least 3 correct frequencies A1 for all frequencies correct
	(b)		7	1	B1 for 7 **or** ft from frequencies in (a) or tallies if no frequencies
	(c)		Diagram drawn	3	M1 for bar chart or other suitable chart with at least 3 correct heights for their scale (can f.t.) A1 for all 5 bars correctly labelled and vertical axis correctly scaled A1 for fully correct **or** ft frequencies in (a) **OR** M1 for pictogram with at least 3 correct rows (can f.t.) A1 for correct labels on all 5 rows and correctly key A1 for fully correct **or** ft frequencies in (a) **OR** M1 for pie chart with at least 3 correct sectors ± 2° (can f.t.) A1 for all 5 sectors correctly labelled A1 for fully correct **or** ft frequencies in (a)
118	(a)		– 5	1	B1 cao
	(b)		6	1	B1 for 6 or – 6
	(c)		3	1	B1 cao
119	(a)		Walk	1	B1 cao
	(b)	24 ÷ 4 =	6	2	M1 for 24 ÷ 4 oe or ¼ oe seen A1 cao

Question		Working	Answer	Mark	Notes
120	(a)		6	1	B1 cao
	(b)		44	1	B1 cao
	(c)		31	2	M1 for $60 - 29$ **or** $29 - 60$ **or** any correct method that is attempting to find the difference between 29 and 60 (allow 1 arithmetic error) A1 cao

Question		Working	Answer	Mark	Additional Guidance
121 FE	(a)		Correct table	6	B1 Table with at least 2 columns with car, lorry, van, motorbike and bus rows M1 tally column completed or headed frequency column with at least two entries correct A1 correct frequencies (7, 4, 5, 6, 2)
			WITH EITHER		**WITH EITHER**
			Bar chart		B1 labelled axes with a uniform scale M1 bars labelled all the same width A1 bars all correct (ft from a)
			OR		**OR**
			Pictogram		B1 labelled pictogram M1 5 classes + key A1 all correct (ft from a)
			OR		**OR**
			Pie Chart		B1 circle with 5 sectors labelled M1 correct calculation of at least one angle A1 all sectors correct (ft from a)
	(b)	25% of 24 = 6	Yes as 5< 6	2	M1 finding 25% of 24 A1 Yes as 5 < 6, (ft from a)
	(c)		Survey at different places Survey at different times Do a bigger survey	2	B2 2 or more reasons (B1 1 reason) Ignore irrelevant reasons
					Total for Question: 10 marks

Question	Working	Answer	Mark	Notes
*122		Diagram or chart	4	M1 for a key, or suitable labels, to identify Year 7 and Year 8 M1 for diagram or chart (combined or separate) set up for comparison, correctly showing data for at least 3 days, e.g. dual bar chart, line graph M1 for correct heights, dependent on a linear scale (condone up to 2 errors) C1 for a fully correct diagram or chart to include labels for days of the week and vertical axis correctly scaled and labelled.
123 (a)		6	1	B1 cao
(b)		5.5	2	M1 for listing the numbers in order or an answer of 4 A1 for 5.5
(c)		7	2	M1 for 9 – 2 or 2 – 9 or 2 to 9 A1 cao
124 (a)		positive	1	B1 cao
(b)		17 – 21.5	2	M1 for a single line segment with positive gradient that could be used as a line of best fit or a horizontal line from 21 or a point plotted at (x, 21) where x is in the range 17 – 21.5 A1 for answer in range 17 – 21.5

Question	Working	Answer	Mark	Notes
125 (a)		white	1	B1 cao
(b)		Sunflower	1	B1 cao
(c)		Poppy	1	B1 cao
126 (a)		32	2	M1 for reading off frequencies (condone one error) A1 cao
(b)		7	1	B1 cao
(c)		8	2	M1 for 10 − 2 or 2 − 10 or −8 A1 cao
127		36	1	B1 cao for Cazda
		120°	1	B1 cao for Zusuki
		42	2	M1 for correct method from using 105° eg 18÷45×105, "36"÷90×105 or from table eg Cazda "36"×4−(18+36+48) A1 for 42 or ft values from their table.
128 (a)		9.6	2	M1 for complete method to calculate the mean eg (12+6+7+10+13) ÷ 5 A1 for 9.6 oe
(b)		5	2	M1 for $\frac{12}{240}\times 100$ oe A1 cao

Question	Working	Answer	Mark	Notes
129 (a)		8	1	B1 cao
(b)		Tuesday, Thursday	2	M1 for method to find total number of apples sold eg 4 + 6 + 8 + 9 + 3 (=30) A1 cao
130 (a)		19	1	B1 cao
(b)		21.5	2	M1 for evidence of adding all 10 numbers and dividing by 10 eg (20+14+21+19+27+31+19+19+24+21)÷10 or 215 ÷10 or $x \div 10$ seen where $205 \leq x \leq 225$ A1 cao
(c)		96	3	M1 for 320 × 2.4 (= 768) or for 1000 ÷ 2.4 (= 416.6 or 416) M1 for (1000 – 320 × 2.4) ÷ 2.4 or for 1000 ÷ 2.4 – 320 or an answer of 96.6(66....) or 96.7 or 97 A1 cao
131	**34** 44 78 42 **28** 70 76 **72** **148**	Complete table	3	B3 all correct (B2 for 5, 6, 7 or 8 correct) (B1 for any 2 of the 4 given correctly placed)
132 (a)		32.5	2	M1 for median value is 10.5^{th} evidenced by 10^{th} and 11^{th} seen or "31, 34" written or (31 + 34) ÷ 2 (condone missing brackets) or both 31 and 34 identified in the stem and leaf diagram or in a fully ordered list A1 for 32.5 (accept $32\frac{1}{2}$)
(b)		32	2	M1 for 47 – 15 or 15 – 47 A1 cao
(c)		7	1	B1 cao

Question	Working	Answer	Mark	Notes
133		Polygon drawn	2	B2 for correct frequency polygon (B1 for points plotted at correct midpoints of intervals or joining points at correct heights consistently within intervals including plotting at end values or correct frequency polygon with one point incorrect or correct frequency polygon with first and last points joined directly) NB ignore any histogram drawn and any part of frequency polygon outside range of first and last points plotted

Question		Working	Answer	Mark	Notes
*134			Diagram or chart drawn	4	M1 for key or suitable labels to identify Tyler and Fletcher M1 for 4 correct month labels OR a linear scale M1 for diagram or chart (combined or separate) set up for comparison, correctly showing data for at least three months C1 for fully correct diagram or chart to include all axes correctly scaled and labelled
135	(a)		Plus Power	1	B1 cao
	(b)		TMF Energy	1	B1 cao
	(c)		2.9	2	M1 for 11.1 – 8.2 or 8.2 – 11.1 or 8.2 to 11.1 A1 cao
136	(a)		4	1	B1 cao
	(b)		3	2	M1 for listing the numbers in order or an answer of 5 A1 cao
	(c)		2	2	M1 for adding the numbers and dividing by 11 A1 cao
137	(a)		Point plotted	1	B1 cao
	(b)		positive	1	B1 cao
	(c)		18 - 22	2	M1 for a single line segment with positive gradient that could be used as a line of best fit or a vertical line from 10 or a point plotted at (10, y) where y is in the range 18 - 22 A1 18 - 22
	(d)		45	1	B1 cao

Question		Working	Answer	Mark	Notes
*138			D C F S R 7 5 3 1 4 Suitable chart or diagram	3	M1 bar chart or other suitable chart with sections for at least 2 pets M1 sections for each pet and vertical axis correctly scaled / 2 correct frequencies C1 fully correct chart or diagram, including correct frequencies and all labels
139	(a)		300	1	B1 cao
	(b)		100	3	M1 for intention to find the total number of adults or the total number of children M1(dep) for subtracting the two totals A1 for answer in range 90 to 110 OR M1 for intention to find the difference between the number of adults and the number of children for two months M1 (dep) for correctly processing all the differences A1 for answer in range 90 to 110
140	(a)		12	1	B1 cao
	(b)		6	2	M1 for 18 –12 or 12 –18 or 12 to 18 A1 cao
	(c)		15	2	M1 for listing the numbers in order or identifying the middle two numbers as 15 or an answer of 14 A1 cao
	(d)	174÷12	14.5	2	M1 for adding the numbers and dividing by 12 A1 cao

Question		Working	Answer	Mark	Notes
141	(a)		5	1	B1 cao
	(b)		Saturday	1	B1 cao
	(c)	4+6+5+2+4+7+6 = 34 5+3+4+3+4+6+3 = 28 34 – 28 -1 + 3 + 1 + -1 + 0 + 1 + 3	6	2	M1 for intention to find the total hours for Skegness or for Blackpool. A1 cao OR M1 for intention to find differences for each day. A1 cao
142	(a)		Newcastle	1	B1 cao
	(b)		3	1	B1 cao
	(c)		–1	2	M1 for intention to find middle of –5 and 3 eg, may see –5 and 3 identified on a correct number line **or** (–5 + 3) ÷ 2 **or** –5 + (3 – –5) ÷ 2 **or** 3 – (3 – –5) ÷ 2 A1 cao
143	(a)		1	1	B1 cao
	(b)		1.8	2	M1 for adding all 10 scores **and** dividing by 10 eg 18 ÷10 A1 cao
	*(c)		Greater and explanation	2	M1 (ft from (b)) adding all 12 scores and dividing by 12 or for comparing 4 and 2 with '1.8' or comparing 4 + 2 with 2 × '1.8' C1 (ft from (b)) for correct conclusion and correct explanation NB: if M1 A1 awarded in (b) comparison must be with 1.8
144	(a)		Relationship	1	B1 for description of relationship eg "As the length of the pine cone increases the width increases" oe (accept positive correlation)
	(b)		6.1 to 6.4	2	M1 for a single straight line segment with positive gradient that could be used as a line of best fit or a vertical line from 8.4 or a point at (8.4, *y*) where *y* is from 6.1 to 6.4 A1 for given answer in the range 6.1 to 6.4

Question		Working	Answer	Mark	Notes
145	(a)		French	1	B1 cao
	(b)		Ella	1	B1 cao
	(c)		Penny	1	B1 cao
146			13	2	M1 for ordering the 9 numbers or for indicating the middle number A1 cao
147	(a)		30	1	B1 cao
	(b)		63	2	M1 for [(4 × 0)] + (5 × 1) + (10 × 2) + (7 × 3) + (3 × 4) + (1 × 5) Or [0] + 5 + 20 + 21 + 12 + 5 condone one error or omission or for 67 given as total A1 cao
	(c)		2.1	2	M1 for an attempt to divide the number of customers by the number of tables A1 for 2.1 or ft from (a) and (b)
148	(a)		Points plotted	1	B1 for points plotted at (12, 6) and (13, 2)
	(b)		Description	1	B1 for description; e.g. as the temperature goes up the number of units of gas used goes down oe accept negative correlation.
	(c)		5 – 7	2	M1 for use of graph e.g. a single straight line segment with negative gradient that could be used as a line of best fit **or** an indication on the diagram from 12 on the *y* axis. A1 for 5 – 7

Question	Working	Answer	Mark	Notes
149 (a)		PK 340	1	B1 cao
(b)		35	1	B1 cao
(c)		25	2	M1 for 102 – 77 **or** 77 – 102 A1 cao accept – 25
*150		Correct chart or diagram	4	B1 for a key or suitable labels to identify bicycles and motorbikes or clear differentiation between categories B1 for 5 correct labels for days clearly in the appropriate place B1 for a diagram(s) or chart(s)(combined or separate) set up for comparison, correctly showing data for at least three days e.g. dual bar chart, line graphs, pie charts, pictograms, etc C1 fully correct diagram or chart to include all axes labelled.
151 (a)		2	1	B1 cao
(b)		4	2	M1 for showing a clear intention to add all ten numbers **and** to divide by 10 A1 cao
(c)		55	2	M1 for evidence of at least 4 attempts to multiply number of birds by frequency eg. 0×3 , 2×1 , 3×2 , 4×3 , 5×4 , 3×5 A1 cao

Question		Working	Answer	Mark	Notes
152			$\frac{40}{200}$	3	**(uses frequencies)** M1 for 40 or 200 or any correct day total M1 for $\frac{40}{T}$, $T > 40$ or $\frac{n}{200}$, $n < 200$ A1 for $\frac{40}{200}$ oe accept 20% OR **(uses boxes)** M1 for 2 or 10 M1 for $\frac{2}{T}$, $T > 2$ or $\frac{n}{10}$, $n < 10$ A1 for $\frac{2}{10}$ oe accept 20% OR **(uses rectangles)** M1 for 8 or 40 M1 for $\frac{8}{T}$, $T > 8$ or $\frac{n}{40}$, $n < 40$ A1 for $\frac{8}{40}$ oe accept 20% [SC B2 for 40 out of 200 oe]
*153			diagram or chart	4	B1 for a key or suitable labels to identify Kitty and George B1 for diagram(s) or chart(s) set up for comparison, showing data for at least 3 months, eg dual bar chart, line graph etc B1 for correct heights for Kitty **or** George, dependent on a linear scale C1 for a fully correct diagram or chart to include 4 months labelled and eg 'cars' or 'frequency' axis correctly scaled and labelled

Question		Working	Answer	Mark	Notes
154	(i)	2 2 3 3 3 4 4 5 5 6 (▲ under 4)	3.5	6	M1 for ordering the data condone one extra or one omission A1 for 3.5 or $3\frac{1}{2}$
	(ii)		4		M1 for 6 – 2 or 2 – 6 A1 cao
	(iii)		3.7		M1 for (2+2+3+3+3+4+4+5+5+6) ÷ 10 condone missing brackets or 37÷10 A1 for 3.7 or $3\frac{7}{10}$ [SC B1 for 31.6 or 33.4]
155			coin / tally / freq £1 / lll / 3 50p / / (0) 20p / ~~llll~~1 / 6 10p / lll / 3 5p / ll / 2 2p / / (0) 1p / ll / 2	2	B2 for all frequencies correct condone missing 0s (B1 for at least 3 correct non zero frequencies or at least 3 correct non zero tallies or at least 2 correct non zero tallies with their frequencies correct)
156			11	3	M1 for $52 \times \frac{3}{4}$ (=39) oe or $\frac{120}{360} \times 150$ (=50) oe M1 for $52 \times \frac{3}{4}$ (=39) oe and $\frac{120}{360} \times 150$ (=50) oe A1 cao

Question		Working	Answer	Mark	Notes
157	(a)		Thursday	1	B1 cao
	(b)		7	1	B1 cao
	*(c)		Nick	3	M1 for the intention to add Dave's 4 times or Nick's 4 times A1 for 58 and 64 C1 (dep on M1 and two totals) for clearly stating Nick as their answer or ft from their two totals OR M1 for the intention to find the difference between the times on each of the 4 days A1 for 6 or −6 C1 (dep on M1 and a net difference) for clearly stating Nick as their answer or ft from their difference [SC: B1 for "Nick spent 6 minutes more than Dave on his phone" if M0 scored.]
158	(a)		3, 6, 9, 3	3	B3 for a table showing all 4 correct frequencies in the correct place. (condone the absence of or any incorrect tallies) [(B2 for 2 or 3 correct tallies or 2 or 3 correct frequencies even in the wrong columns) (B1 for 1 correct tally or 1 correct frequency even in the wrong column)] [SC: B2 for 3/21 and 6/21 and 9/21 and 3/21 shown in the frequency column]
	(b)		3	1	B1 for 3 or ft table in (a)
159	(a)		6am	1	B1 for 6am (accept −4) Do not accept 6 alone.
	(b)		3	1	B1 for 3 (allow − 3)
	(c)	−1−5	−6	2	M1 for −1 − 5 or intention to subtract 5 from -1 (may be shown on a diagram) A1 cao

Question		Working	Answer	Mark	Notes
160			85 29 54 **168** **93** 31 47 171 13 5 **9** **27** 191 **65** **110** 366	3	B3 for fully correct table (B2 for 3 or 4 or 5 correct entries, B1 for 1 or 2 correct entries)
161	(a)		$\frac{40}{360}$	1	B1 for $\frac{40}{360}$ oe (ignore any incorrect simplification) Accept 0.11…. if no fraction shown
	(b)		4	3	M1 for a correct method to find the angle of the 'weeding' sector If measured, accept an angle between 138 and 142 inc. M1 (dep) for a correct method to find the number of degrees per hour (= 20) or the number of hours ($\frac{1}{20}$ (3 mins) per degree A1 cao for 4

<table>
<tr><th colspan="2">Question</th><th>Working</th><th>Answer</th><th>Mark</th><th>Notes</th></tr>
<tr><td>162</td><td>(a)</td><td><table><tr><td>Fruit</td><td>Tally</td><td>Freq</td></tr><tr><td>Currant</td><td>𝍸</td><td>5</td></tr><tr><td>Prune</td><td>𝍸</td><td>5</td></tr><tr><td>Raisin</td><td>𝍸 |</td><td>6</td></tr><tr><td>Sultana</td><td>𝍸 |||</td><td>8</td></tr></table></td><td>Correct tally</td><td>2</td><td>M1 for at least 2 tallies or frequencies correct
A1 for 4 correct frequencies</td></tr>
<tr><td></td><td>(b)</td><td>Angles:
Currants (75°) Prunes (75°)
Raisins (90°) Sultanas (120°)</td><td>Diagram drawn</td><td>3</td><td>M1 for bar chart or other suitable chart with at least 2 correct heights for their scale or ft from (a)
M1 for all bars correctly labelled and vertical axis correctly scaled
A1 for fully correct bar chart or ft from (a)

OR

M1 for pictogram, at least 2 correct rows or ft from (a)
M1 for correct labels on all rows and key
A1 for fully correct pictogram or ft from (a)

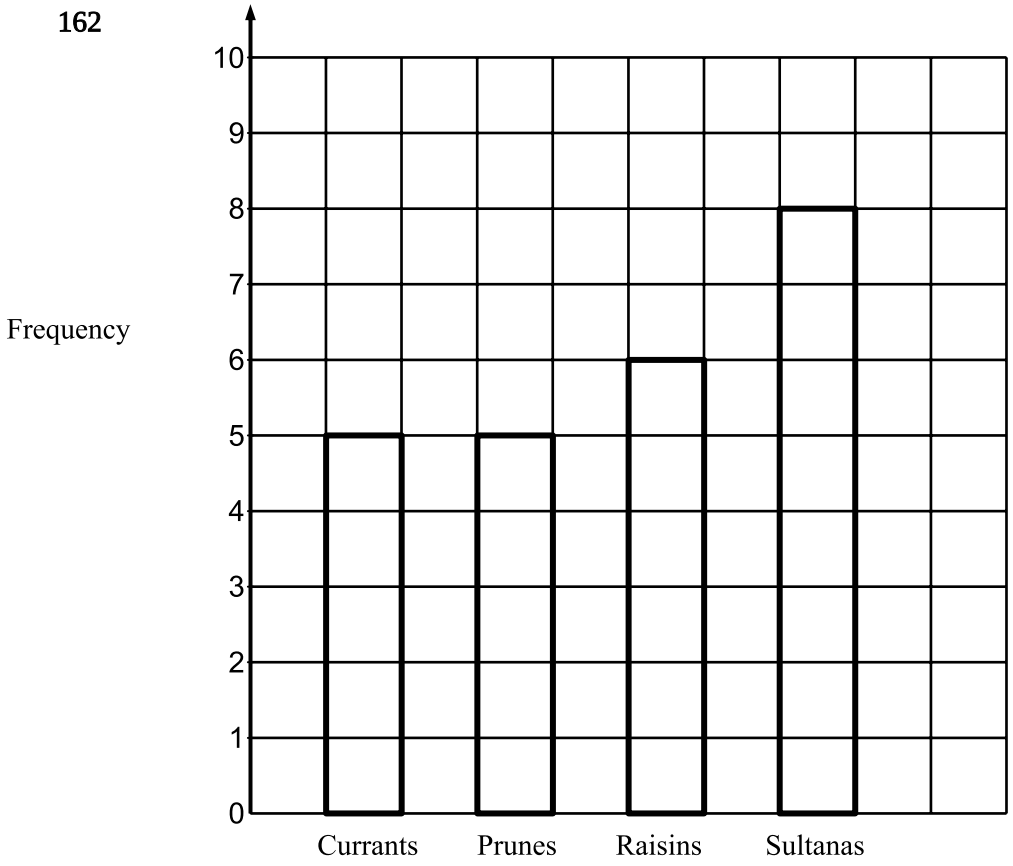
OR

M1 for stick graph with at least 2 sticks of correct height for their scale or ft from (a)
M1 for all sticks correctly labelled and vertical axis correctly scaled
A1 for fully correct stick graph or ft from (a)

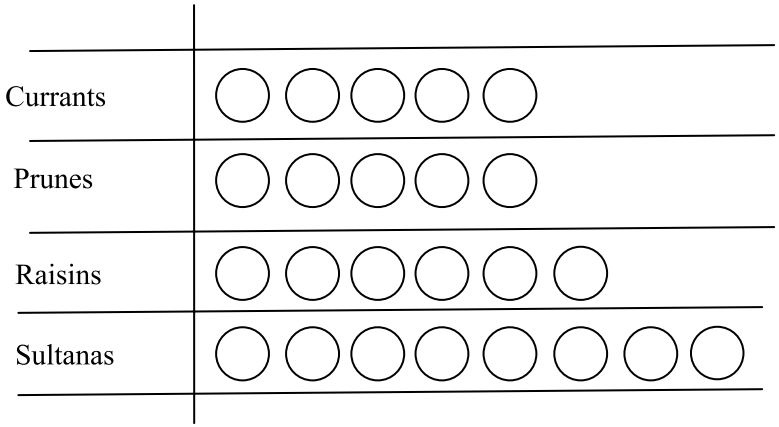
OR

M1 for pie chart with at least 2 correct sectors (±2°) or 2 angles correctly calculated
or ft from (a)
M1(dep) for all sectors correctly labelled
A1 for fully correct pie chart or ft from (a)</td></tr>
</table>

162

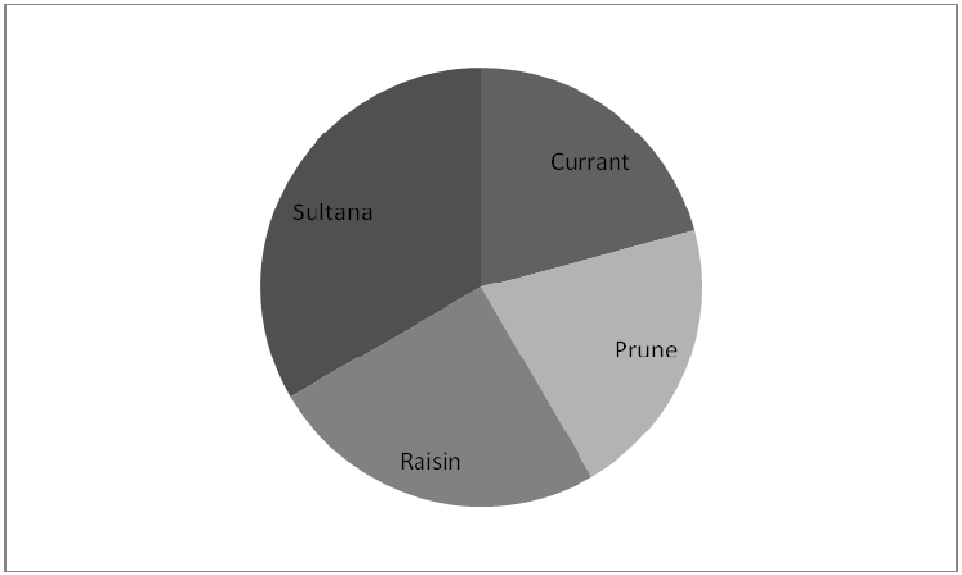


162 (alt)



Key: ◯ = 1 person

162 (alt)



<table>
<tr><th colspan="2">Question</th><th>Working</th><th>Answer</th><th>Mark</th><th>Notes</th></tr>
<tr><td>163</td><td>(a)</td><td>3 4 4 5 5 6 8 9 10</td><td>5</td><td>2</td><td>M1 for ordering the 9 numbers
A1 cao</td></tr>
<tr><td></td><td>(b)</td><td>(4 + 8 + 5 + 9 + 10 + 5 + 6 + 3 + 4)÷9
54 ÷ 9</td><td>6</td><td>2</td><td>M1 for (4 + 8 + 5 + 9 + 10 + 5 + 6 + 3 + 4) ÷ 9 or 54 ÷ 9
A1 cao</td></tr>
<tr><td>164</td><td></td><td><table><tr><th>Bird</th><th>Frequency</th><th>Angles</th></tr><tr><td>Magpie</td><td>15</td><td>75</td></tr><tr><td>Thrush</td><td>10</td><td>50</td></tr><tr><td>Starling</td><td>20</td><td>100</td></tr><tr><td>Sparrow</td><td>27</td><td>135</td></tr></table>Angles $\frac{15}{72}\times360$, $\frac{10}{72}\times360$, $\frac{20}{72}\times360$, $\frac{27}{72}\times360$
OR
$\frac{75}{15}\times10$, $\frac{75}{15}\times20$, $\frac{75}{15}\times27$</td><td>Correct pie chart</td><td>3</td><td>M1 for any one of $\frac{15}{'72'}\times360$, $\frac{10}{'72'}\times360$, $\frac{20}{'72'}\times360$, $\frac{27}{'72'}\times360$ oe
(‘72’ must clearly come from adding frequencies)
A1 for 75 seen from correct working or 50 seen or 100 seen or 135 seen or
one sector of angle 50° or 100° or 135° labelled correctly with bird’s name or
all sectors correctly drawn
A1 for correct pie chart fully labelled with birds' names

OR

M1 for $\frac{'75'}{15}\times10$ or $\frac{'75'}{15}\times20$ or $\frac{'75'}{15}\times27$
('75' must be in the range 73 - 77)
A1 for 50 seen or 100 seen or 135 seen or
one sector of angle 50° or 100° or 135° labelled correctly with bird’s name or
all sectors correctly drawn
A1 for correct pie chart fully labelled with birds' names

NB. Allow a tolerance of ±2° on all drawn angles</td></tr>
</table>

Question		Working	Answer	Mark	Notes
165	(a)		24	1	B1 cao
	(b)		10	1	B1 cao
	(c)		2 circles 3 ½ circles	2	B1 for 2 circles in Thursday B1 for 3 ½ circles oe in Friday
166	(a)		Kanon	1	B1 cao
	(b)		Office, Quikprint	1	B1 cao
	(c)		Smart	1	B1 cao
167	(a)		4	1	B1 cao
	(b)	34 ÷ 10	3.4	2	M1 for attempt to sum all values and divide by 10 **or** 34 ÷ 10 A1 3.4, $3\frac{4}{10}, 3\frac{2}{5}$
	(c)		5	2	M1 for 6 – 1 **or** 1– 6, **or** –5 A1 cao
168	(a)	84 ÷ 7 (=12) 120 ÷ 12	10	2	M1 for 84÷7 (=12) or 7 ÷ 84 (=0.083..) A1 cao
	(b)		Don't know + reason	1	B1 'Don't know' or 'No' with reason eg. Need to know how many medals Russian Federation won **or** pie chart shows proportion not number of medals won
169	(a)		negative	1	B1 for negative
	(b)		10.3 - 11.7	2	M1 for a single straight line segment with negative gradient that could be used as a line of best fit **or** an indication on the diagram from 2.5 on the *x* axis A1 for an answer in the range 10.3 – 11.7 inclusive