

**Extended Mathematics**  
**Topic : Statistics**  
**Year : May 2013 - May 2024**  
**Paper -2**  
**Answers**

Question 1

(a)	$10 < h \leq 13$	1	
(b)	12.1[2]    www	4	<b>M1</b> for at least 5 correct mid-values seen  <b>M1</b> for $\sum fx$ where $x$ is in the correct interval
(c)	70, 115, 153, 185, 200	2	<b>M1</b> for their $\sum fx \div 200$  <b>B1</b> for 3 or 4 correct

Question 2

(a)	7 correct plots	2	<b>P1</b> for 5 or 6 correct
(b)	Negative	1	
(c)	ruled line of best fit within tolerance	1	

Question 3

(a)	19–19.1	1	
(b)	3	2	<b>M1</b> for 47 seen
(c)	4.9 to 5.7	2	<b>B1</b> for [UQ] 21.7 to 22.2 and [LQ] 16.5 to 16.8
(d)	$\frac{45}{50}$ oe	2	<b>B1</b> for 45 seen or <b>SC1</b> for $\frac{5}{50}$ isw

Question 4

160	2	<b>M1</b> for $\frac{8}{18} \times 360$ oe
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### Question 5

(a)	4.05 to 4.2	1	
(b)	2.6 to 2.75	2	<b>B1</b> for 9.6 seen
(c)	2.05 to 2.25	2	<b>B1</b> for [UQ] 5.0 to 5.1 and [LQ] 2.85 to 2.95 seen
(d)	$\frac{5}{48}$	2	<b>M1</b> for 5

### Question 6

(a)	34	1	
(b)	16	2	<b>B1</b> for 24 or 40 seen
(c)	30	1	
(d)	120	1	

### Question 7

84

2	<b>M1</b> for $\frac{7}{6+8+9+7}$ or $\frac{360}{6+8+9+7}$
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### Question 8

(a)	correct working	2	<b>M1</b> for 1 holiday = 5 or $360 \div 72 = 5$ and <b>B1</b> for $24 \times 5 [= 120]$ or <b>M2</b> for $\frac{24}{72} \times 360 [= 120]$ oe
(b)	6 nfw	3	<b>M1</b> for $150 + 120 + x + 2x = 360$ oe <b>A1</b> for 30 identified as the required angle

### Question 9

(a)	3.08 to 3.22 nfw	2	<b>B1</b> for 502.5 to 502.62 or 505.7 to 505.8
(b)	$\frac{16}{200}$ oe	2	<b>B1</b> for 16 soi or <b>M1</b> for $\frac{their 16}{200}$
(c)	18.5    26    3	2	<b>B1</b> for 18.5 and 26 <b>B1</b> for 3

### Question 10

30

2	<b>M1</b> for $2x + 3x + 4x + 90 = 360$ oe
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Question 11

(a)	56	2	<b>B1</b> for 16 soi or <b>M1</b> for $72 - \text{their } 16$
(b) (i)	63 or 63 to 63.5	1	
(ii)	22 or 21.6 to 23      nfw	2	<b>B1</b> for 49.8 to 50.2 seen or 71.8 to 72.8

Question 12

(a)	6	1	
(b)	2	2	<b>M1</b> for 7 identified as the UQ or 5 identified as the LQ or both lines drawn from the 150 and 50 across and down to the horizontal axis
(c)	180	2	<b>M1</b> for answer 20 or line or mark on graph indicating 20

Question 13

(a)	44	2	<b>M1</b> for 48 soi
(b)	24	2	<b>M1</b> for 40 or 16 or both lines drawn from 15 <b>and</b> 45 across and down to the horizontal axis
(c)	5	2	<b>M1</b> for answer 55 or line or mark on graph indicating 55

Question 14

(a)	7	1	
(b)	Any number except 3, 7 or 20	1	

Question 15

(a)	6.2	1	
(b)	5.8	2	<b>M1</b> for 24 soi
(c)	70	2	<b>M1</b> for 10 soi

Question 16

(a)	3.5 nfw	3	<b>M1</b> for $\Sigma fx$ soi  <b>M1</b> (dep) for $\div 24$
(b)	2 nfw	3	<b>M2FT</b> for $\frac{\text{their } 84 + x}{25} = 3.44$ or better or <b>M1</b> for $25 \times 3.44$

Question 17

628

2

**M1** for  $\frac{785}{1+4}[\times 4]$

Question 18

44.1 or 44.07...

4

**M1** for 4 of mid-values  
15 30 45 55 75 soi

**M1** for  $\sum fx$  for any  $x$  in intervals including boundaries

**M1 dep** for  $\sum fx \div 70$

**Dep** on 2nd **M** mark earned

Question 19

(a) 1.5 nfww

2

**B1** for 2.5 or 1

(b) 3.5

2

**B1** for 114 soi

(c) 18

2

**B1** for 102 soi

Question 20

(a) 240

2

**M1** for any three pairs of products from  
 $2.5 \times 12$ ,  $2.5 \times 26$ ,  $5 \times 15$ ,  $5 \times 10$ ,  $10 \times 2$

(b) 29.2 or 29.16 to 29.17

2

**M1** for  $(5 \times 10 + 10 \times 2) / \text{their (a)}$   
or  
for their total of the bars above 10 minutes  $\div \text{their (a)}$

Question 21

68 76 78 78

3

**B1** for four values with a mode of 78

**B1** for four values with a median of 77

**B1** for total of four values is 300

Question 22

1 3.5 1

4

**B3** for 2 correct

**B2** for 1 correct

or **M1** for 2, 7, [...] and 2 seen [FDs]

### Question 23

(a)	Points plotted at (4.5, 33) and (6.5, 35)	1	
(b)	Positive	1	
(c)	Correct ruled line	1	
(d)	33.5 to 37.5	1FT	FT from <i>their</i> line providing positive gradient

### Question 24

(a)	80 to 84	2	M1 for 116 to 120
(b)	Correct curve or ruled lines	3	B2 for 7 or 8 correct points B1 for 5 or 6 correct points
(c)	26	2	B1 for 156 or 130 or for <i>their</i> 130 from <i>their</i> <b>increasing</b> curve (or lines)

### Question 25

(a)	140 000	1	
(b)	Points correctly plotted at (40, 80) and (80, 150)	1	
(c)	Correct ruled line of best fit	1	
(d)	80 000 to 110 000	1	FT their straight line provided it has positive gradient

### Question 26

15 and 22

2 M1 for  $1.5 \times 10$  or  $1.1 \times 20$

### Question 27

(a)(i)	4	1	
(a)(ii)	3.2	3	M1 for $\sum fx$ , allow one error or omission and M1dep for $\frac{\text{their } 128}{40}$
(b)	27	2	M1 for $\frac{3}{40}$ or $\frac{360}{40}$

### Question 28

(a)	10 nfw	2	B1 for UQ = 30 or LQ = 20 clearly identified
(b)	4	2	B1 for 116 indicated

### Question 29

(a)	25	1	
(b)	12	2	B1 for 16 or 28
(c)	5	2	B1 for 75

### Question 30

Correct pie chart e.g.



**4** B3 for correct chart no labels  
or for 2 correct sectors with or without labels  
  
or B2 for 3 correct angles seen ( $171^\circ$ ,  $135^\circ$  and  $54^\circ$ )  
or 3 correct percentages (47.5%, 37.5% and 15%)  
  
or M1 for method  
e.g.  $\frac{57}{120} \times 360$ ,  $57 \times 3$  or  $\frac{57}{120} \times 100$  oe  
or one correct sector on the pie chart

### Question 31

Negative

**1**

### Question 32

(a)(i)	5	1	
(a)(ii)	2.4 to 2.6	2	B1 for [LQ=] 3.4 to 3.6 or [UQ=] 6
(b)	26, 74	2	B1 for each

### Question 33

(a)	32	1	
(b)	Positive	1	

### Question 34

Mode

**1**

### Question 35

12.8  
4.4  
0.8

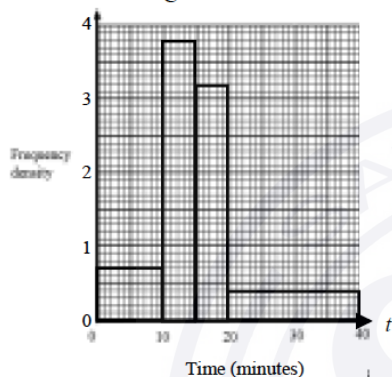
**3** **B2** for 2 correct heights or 3 correct freq densities  
  
or **B1** for 1 correct height or 2 correct freq densities

### Question 36

(a)  $10 [ < t \leq ] 15$

**1**

(b) Correct histogram



**3** **B1** for each correct block  
If 0 scored, **SC1** for correct frequency densities 3.8, 3.2, 0.4 so by correct heights

### Question 37

(a) 12.88

**1**

(b) two correct points plotted

**1**

(c) ruled line of best fit

**1**

(d) negative

**1**

### Question 38

135

**2**

**M1** for  $\frac{12}{12+7+9+4} [\times 360]$   
or  $\frac{360}{12+7+9+4} [\times 12]$  oe

### Question 39

(a) 23

**1**

(b) One extreme value oe

**1**

### Question 40

(a)	11.5	1
(b)(i)	12	1
(b)(ii)	8.5	1

### Question 41

7.2	3	<b>M1</b> for $5 \times 8 + 6 \times 5 + 7 \times 11 + 8 \times 7 + 9 \times 5 + 10 \times 4$ <b>M1dep</b> for $\div 40$
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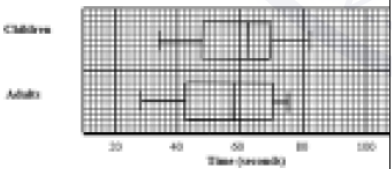
### Question 42

(a)	<table><tr><td>1</td><td>3</td><td>5</td><td>8</td></tr><tr><td>2</td><td>1</td><td>4</td><td>6</td><td>8</td></tr><tr><td>3</td><td>6</td><td>8</td><td>8</td></tr><tr><td>4</td><td>5</td><td>8</td></tr></table>	1	3	5	8	2	1	4	6	8	3	6	8	8	4	5	8	2	M1 for correct but not ordered or for two correct rows ordered
1	3	5	8																
2	1	4	6	8															
3	6	8	8																
4	5	8																	
(b)	27	1																	

### Question 43

28.33 or 28.3 or 28.33...	4	<b>M1</b> for midpoints soi <b>M1</b> for use of $\sum fx$ <b>M1 dep</b> for $\sum fx \div 60$
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### Question 44

(a)	22	2	<b>B1</b> for 48 and 70
(b)		2	<b>M1</b> for a box with two whiskers and at least two correct from Min 28, LQ 42, Med 58, UQ 70, Max 75

### Question 45

(a)	66	1
(b)	Positive	1
(c)	Ruled line of best fit	1



Question 46

(a)	27.625	4	<b>M1</b> for 5, 12.5, 17.5, 30, 57.5 <b>M1</b> for $\sum fx$ where $x$ is in correct interval including boundaries  <b>M1</b> dep on second <b>M1</b> for $\frac{\sum fx}{100}$
(b)	6 and 2.4	3	<b>B2</b> for either correct or <b>M1</b> for [fd =] 1.5 or 0.6 oe or <b>B1</b> for [multiplier] 4

Question 47

(a)	4 points correctly plotted	2	<b>B1</b> for 2 or 3 points correctly plotted
(b)	Negative	1	
(c)	Correct ruled line of best fit	1	
(d)	10 to 12	1	<b>FT</b> <i>their</i> straight line of best fit

Question 48

13 nfw

3 **M2** for  $251 + 7x = 7.6(32 + x)$  or better  
or **M1** for  
$$\frac{5 \times 4 + 6 \times 5 + 7x + 8 \times 11 + 9 \times 7 + 10 \times 5}{32 + x} = 7.6$$

Question 49

Negative

1

Question 50

(a)	<table><tr><td>1</td><td>5 7 8 9 9</td></tr><tr><td>2</td><td>2 4 4 5 9</td></tr><tr><td>3</td><td>1 5 6 8</td></tr></table>	1	5 7 8 9 9	2	2 4 4 5 9	3	1 5 6 8	2	<b>B1</b> for two rows correct or for a fully correct unordered stem-and-leaf diagram or for a correct diagram with one leaf incorrect or omitted
1	5 7 8 9 9								
2	2 4 4 5 9								
3	1 5 6 8								
(b)	24	1							

Question 51

(a)	It is not possible to tell if there is correlation as there are not enough points.	1
(b)	C	1

Question 52

Mode	16
Median	11
Range	17

3 B1 for each

Question 53

(a)	28	1
(b)	21	1
(c)	35	1

Question 54

41  
43  
20

3 B1 for each

Question 55

lost	drawn
0.6 oe	0.3 oe

3 B2 for 0.6 oe or 0.3 oe  
or M1 for 1 – 0.1 or 0.9 seen

Question 56

(a)	22	1
(b)	30	1

Question 57

Positive

1

Question 58

(a)	27 000	1	
(b)	Point plotted at (175, 9)	1	
(c)	Correct single ruled line of best fit	1	
(d)	300 to 350	1	<b>FT</b> <i>their</i> straight line of best fit provided positive gradient

Question 59

(a)	0	(3 4) 7 8	2	<b>B1</b> for two rows correct or for fully correct unordered stem-and-leaf diagram or for a correct diagram with one error or omission
	1	1 1 2 2 7 8		
	2	1 3		
(b)	1.15		1	

Question 60

54	2	<b>M1</b> for $\frac{360}{8+5+4+3}[\times 3]$ or $\frac{3}{8+5+4+3}[\times 360]$ oe
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Question 61

104	2	<b>M1</b> for $0.5 \times 136$ oe or $0.25 \times 144$ oe
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Question 62

(a)	A correct cumulative frequency diagram	3	<b>B1</b> for correct horizontal placement for 7 plots <b>B1</b> for correct vertical placement for 7 plots <b>B1FT dep</b> on at least B1 for reasonable increasing curve or polygon through <i>their</i> 7 points If 0 scored <b>SC1 FT</b> for 6 out of 7 points correctly plotted
(b)	33 to 34.5	1	<b>FT</b> <i>their</i> increasing cumulative frequency graph

Question 63

(a)	3.5	2	<b>M1</b> for values in correct order 1.5 2 2 3 4 4.5 5 18  or 3 and 4 identified as middle numbers
(b)	One extreme value oe	1	

Question 64

(a)	<table><tr><td>0</td><td>(1 3) 4 5 5 8</td></tr><tr><td>1</td><td>1 2</td></tr><tr><td>2</td><td>3 4</td></tr></table>	0	(1 3) 4 5 5 8	1	1 2	2	3 4	2	<b>B1</b> for a correct diagram with one error or omission or for a fully correct unordered stem-and-leaf diagram
0	(1 3) 4 5 5 8								
1	1 2								
2	3 4								
(b)	6.5	1							

Question 65

(a)	12.2	1	
(b)	12.1	2	<b>B1</b> for 157.3 oe or <b>M1</b> for <i>their</i> total $\div 13$

Question 66

10

2  
**M1** for  $\frac{7.5}{18 \div 6}$  oe or better  
 or [frequency densities] 3 and 4  
 or 45 and  $4h$   
 or 45 and 40

Question 67

(a)	4800	1	
(b)	Point plotted at (54 000, 6100)	1	
(c)	Positive	1	

Question 68

(a)	27	1	
(b)	15	1	
(c)	25	1	

Question 69

138.425

4	<b>M1</b> for mid-points soi (110, 125, 140, 170)  <b>M1</b> for use of $\Sigma fh$ with $h$ in correct interval including both boundaries  <b>M1</b> for (dep on 2nd M1) for $\Sigma fh$ , 200
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Question 70

Positive

1
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Question 71

(a) 11

2	<b>B1</b> for 16 or 27 seen
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(b) 6

2	<b>M1</b> for 194 seen
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Question 72

(a) tangent ruled at  $x = 3$

1
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(b) 4.8 to 5.8

2	dep on a close attempt at a tangent  <b>M1</b> for $\frac{\text{rise}}{\text{run}}$ also dep on close attempt at tangent
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Question 73

(a) Correct table

2	<b>B1</b> for two rows correct or for fully correct unordered stem-and-leaf diagram
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2	2 8
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3	6 9
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4	1 4 8 9
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5	2 4 7 7
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(b) 46

1
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