

GCSE Statistics

Focus on Lower Performing Topics

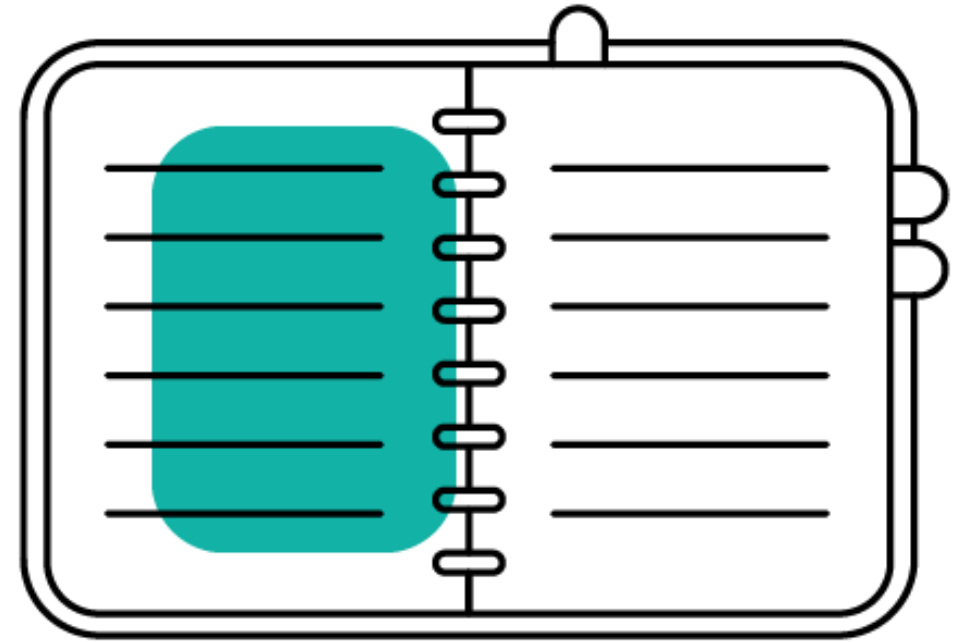
Melanie Muldowney



Agenda

In this session we are going to look at:

- Lower performing topics
- Key ideas / Issues
- Share some ideas / resources to help in the classroom



Methodology



Q	Part	Position in	Performance	Difference	Skill tested	Mean score	Max score	Mean %	5	4	3	2	1	U	AI	
Q01	a	1	1	0	Pictogram - Completing	0.93	1	93	0.98	0.98	0.97	0.92	0.81	0.51	0.1	
Q03	ai	10	2	8	Tabulation - Reading	0.90	1	90	0.97	0.94	0.92	0.89	0.80	0.42	0.50	
Q01	b	2	3	-1	Pictogram - Using	1.73	2	87	1.92	1.87	1.82	1.68	1.35	0.64	1.73	
Q03	aii	11	4	7	Tabulation - Reading	0.83	1	83	0.93	0.90	0.86	0.80	0.65	0.26	0.83	
Q04	d	19	5	14	Calculate range	1.61	2	81	1.97	1.93	1.80	1.40	0.73	0.09	1.61	
Q02	ai	5	6	-1	Bar charts - completing	0.79	1	79	0.97	0.94	0.85	0.69	0.38	0.07	0.79	
Q10	a	41	7	34	Histograms- using	1.56	2	78	1.94	1.88	1.74	1.34	0.66	0.14	1.56	
Q02	b	7	8	-1	Bar charts - completing	1.51	2	76	1.88	1.77	1.62	1.36	0.80	0.16	1.51	
Q03	c	13	9	4	Tabulation - Comparing	1.50	2	75	1.77	1.70	1.58	1.39	1.01	0.28	1.50	
Q04	b	17	10	7	Calculate median	1.49	2	75	1.84	1.74	1.59	1.35	0.80	0.13	1.49	
Q05	a	21	11	10	Sample space diagrams - completing	1.49	2	75	1.92	1.80	1.57	1.24	0.70	0.22	1.49	
Q03	e	15	12	3	Identify trends in data	0.74	1	74	0.90	0.86	0.80	0.67	0.39	0.09	0.74	
Q09			40	36	4	Population pyramid							1.27	5	25	
Q08	bi		36	37	-1	Arithmetic mean							0.69	3	23	
Q06	cii		28	38	-10	Systematic sampling							0.40	2	20	
Q02	d		9	39	-30	Justify the appropriateness							0.39	2	20	
Q04	c		18	40	-22	Justify the rationale for using median							0.19	1	19	
Q06	b		26	41	-15	Systematic sampling							0.12	1	12	
Q06	ei		30	42	-12	Planning data collection							0.12	1	12	
Q10	b		42	43	-1	Histograms - using							0.16	2	8	
Q08	c		39	44	-5	Select and justify appropriate diagrams							0.13	2	7	
Q10	c		43	45	-2	Skewness							0.11	2	6	
													24.22	35	46	
Q04	a	16	31	-15	Definitions of different types of data	0.34	1	34	0.53	0.39	0.31	0.24	0.20	0.10	0.34	
Q08	biii	38	32	6	Arithmetic mean	0.33	1	33	0.68	0.46	0.27	0.12	0.04	0.01	0.33	
Q11	b	45	33	12	Formal notation for independent events	1.10	4	28	3.10	1.47	0.50	0.16	0.02	0.01	1.10	
Q07	b	34	34	0	Pie chart	0.54	2	27	1.29	0.76	0.33	0.10	0.02	0.00	0.54	
Q05	bii	23	35	-12	Sample space diagrams - using	0.26	1	26	0.61	0.34	0.17	0.08	0.03	0.00	0.26	
Q09		40	36	4	Population pyramid	1.27	5	25	2.65	1.68	1.05	0.48	0.11	0.00	1.27	
Q08	bi	36	37	-1	Arithmetic mean	0.69	3	23	1.73	0.91	0.43	0.16	0.04	0.00	0.69	
Q06	cii	28	38	-10	Systematic sampling	0.40	2	20	1.02	0.58	0.22	0.05	0.02	0.00	0.40	
Q02	d	9	39	-30	Justify the appropriateness	0.39	2	20	0.85	0.49	0.29	0.16	0.05	0.01	0.39	
Q04	c	18	40	-22	Justify the rationale for using median	0.19	1	19	0.32	0.21	0.16	0.14	0.09	0.03	0.19	
Q06	b	26	41	-15	Systematic sampling	0.12	1	12	0.31	0.17	0.07	0.03	0.00	0.00	0.12	
Q06	ei	30	42	-12	Planning data collection	0.12	1	12	0.29	0.15	0.07	0.03	0.01	0.00	0.12	
Q10	b	42	43	-1	Histograms - using	0.16	2	8	0.46	0.17	0.08	0.06	0.03	0.01	0.16	
Q08	c	39	44	-5	Select and justify appropriate diagrams	0.13	2	7	0.40	0.15	0.05	0.02	0.01	0.00	0.13	
Q10	c	43	45	-2	Skewness	0.11	2	6	0.29	0.14	0.08	0.03	0.01	0.00	0.11	
													24.22	35	46	
													36.20	32.74	28.43	22.35
													13.40	3.77	24.22	

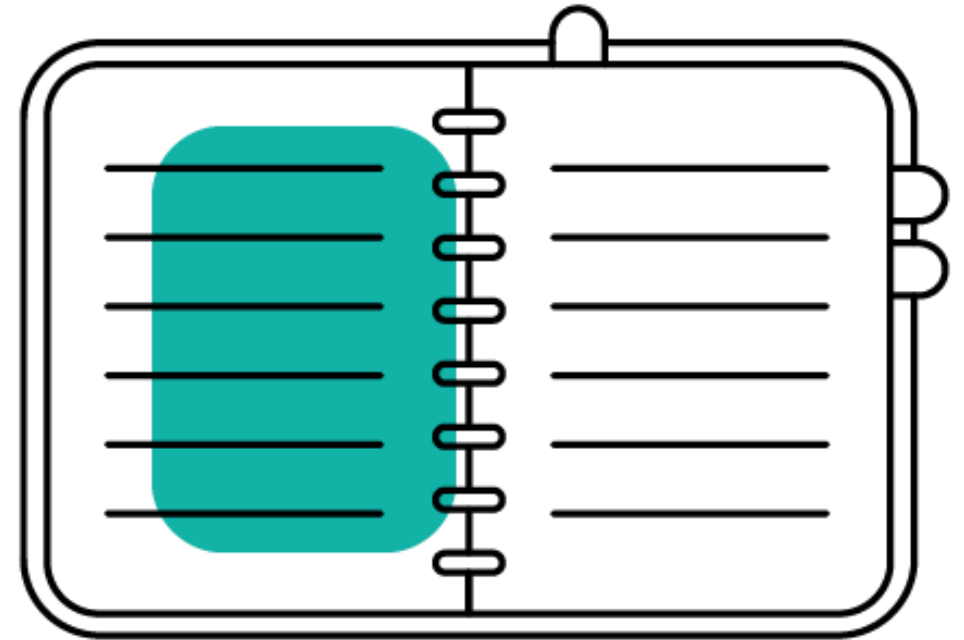
Q	Part	Position in paper	Performance	Difference	Skill tested	Mean score	Max score	Mean %	9	8	7	6	5	4	3	U	ALL
Q04	a	10	1	9	Histograms- using	1.95	2	98	1.99	1.97	1.96	1.95	1.95	1.92	1.89	1.58	1.95
Q01	aii	2	2	0	Rates of change over time - using	0.96	1	96	0.99	0.98	0.98	0.97	0.96	0.90	0.85	0.72	0.96
Q01	ai	1	3	-2	Rates of change over time - using	1.85	2	93	1.98	1.96	1.93	1.89	1.81	1.63	1.28	0.97	1.85
Q08	b	31	4	27	Use action and warning lines i	1.70	2	85	1.94	1.87	1.82	1.73	1.64	1.43	1.01	0.41	1.70
Q02	bii	6	5	1	Arithmetic mean	0.84	1	84	0.99	0.98	0.94	0.90	0.76	0.58	0.39	0.13	0.84
Q07	b	26	6	20	Hypothesis testing	0.82	1	82	0.99	0.97	0.93	0.86	0.75	0.53	0.28	0.12	0.82
Q08	d	33	28	5	Use action and warning lines i							0.32		1		32	0
Q08	c	32	29	3	Use action and warning lines i							1.55		5		31	4
Q06	di	23	30	-7	Use trends to make predictions							0.61		2		31	1
Q08	a	30	31	-1	Sample means a							0.61		2		31	0
Q05	d	17	32	-15	Systematic sampling							0.90		3		30	1
Q05	ai	13	33	-20	Reasons for employing judgement sampling							0.26		1		26	0
Q06	ci	21	34	-13	Interpret seasonal trends in context							0.44		2		22	1
Q09	b	35	35	0	Characteristics of a binomial distribution							0.87		4		22	3
Q06	cii	22	36	-14	Interpret seasonal trends in context							0.18		1		18	0
												27.38		39		52	45
Q07	c	27	24	3	Select and justify appropriate diagrams	1.22	3	41	2.48	2.09	1.87	1.09	0.98	0.23	0.07	0.03	1.22
Q01	b	3	25	-22	Rates of change over time - using	0.81	2	41	1.08	0.87	0.83	0.77	0.77	0.68	0.65	0.42	0.81
Q07	d	28	26	2	Comparative pie chart	0.72	2	36	1.90	1.60	1.01	0.44	0.12	0.02	0.01	0.00	0.72
Q02	c	8	27	-19	Select and justify appropriate diagrams	0.68	2	34	1.27	1.03	0.82	0.67	0.43	0.22	0.09	0.02	0.68
Q08	d	33	28	5	Use action and warning lines i	0.32	1	32	0.59	0.45	0.35	0.28	0.23	0.19	0.19	0.14	0.32
Q08	c	32	29	3	Use action and warning lines i	1.55	5	31	4.19	3.47	2.21	0.95	0.25	0.07	0.03	0.00	1.55
Q06	di	23	30	-7	Use trends to make predictions	0.61	2	31	1.90	1.55	0.81	0.25	0.05	0.01	0.00	0.00	0.61
Q08	a	30	31	-1	Sample means a	0.61	2	31	0.99	0.77	0.63	0.58	0.50	0.41	0.27	0.06	0.61
Q05	d	17	32	-15	Systematic sampling	0.90	3	30	1.96	1.46	1.11	0.80	0.49	0.26	0.10	0.02	0.90
Q05	ai	13	33	-20	Reasons for employing judgement sampling	0.26	1	26	0.65	0.45	0.32	0.21	0.11	0.06	0.03	0.00	0.26
Q06	ci	21	34	-13	Interpret seasonal trends in context	0.44	2	22	1.63	1.12	0.47	0.16	0.03	0.01	0.00	0.00	0.44
Q09	b	35	35	0	Characteristics of a binomial distribution	0.87	4	22	3.26	2.07	1.01	0.35	0.09	0.03	0.01	0.00	0.87
Q06	cii	22	36	-14	Interpret seasonal trends in context	0.18	1	18	0.73	0.46	0.17	0.05	0.01	0.00	0.00	0.00	0.18
												27.38		39		52	45.22
												41.86		38.15		33.78	28.39
												21.81		14.77		6.51	27.38

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	
	Q	Part	Position in paper	Performance	Difference	Skill tested	Mean score	Max score	Mean %	5	4	3	2	1	U	ALL	
1																	
2	Q01	b	2	1	1	Probability statements of likelihood	0.92	1	92	0.99	0.98	0.97	0.91	0.76	0.41	0.92	
3	Q01	c	3	2	1	Probability scale	0.85	1	85	0.98	0.95	0.89	0.78	0.65	0.31	0.85	
4	Q03	a	8	3	5	Tally	1.65	2	83	1.89	1.84	1.71	1.55	1.20	0.51	1.65	
5	Q04	a	13	4	9	Probability from a list	0.76	1	76	0.95	0.92	0.83	0.65	0.31	0.08	0.76	
6	Q03	b	9	5	4	Select an appropriate diagram	0.74	1	74	0.88	0.82	0.79	0.69	0.51	0.14	0.74	
7	Q02	b	6	6	0	Bar charts - mode from	0.72	1	72	0.95	0.87	0.74	0.57	0.38	0.18	0.72	
8	Q06	a	17	7	10	Bar charts - completing	1.37	2	69	1.80	1.63	1.47	1.11	0.58	0.12	1.37	
9	Q04	c	15	8	7	Calculate using range	0.68	1	68	0.98	0.90	0.71	0.42	0.20	0.08	0.68	
10	Q01	d	4	9	-5	Probability scale	0.66	1	66	0.93	0.83	0.66	0.45	0.30	0.10	0.66	
11	Q10	b	35	10	25	Choropleth map - reading	0.66	1	66	0.92	0.84	0.69	0.47	0.25	0.07	0.66	
12	Q06	b	18	11	7	Bar charts - interpreting	0.60	1	60	0.85	0.74	0.60	0.45	0.23	0.08	0.60	
13	Q02	a	5	12	-7	Bar chart with probabilities	0.57	1	57	0.90	0.79	0.56	0.31	0.11	0.02	0.57	
14	Q03	c	10	13	-3	Calculate mode	0.56	1	56	0.87	0.73	0.54	0.36	0.19	0.04	0.56	
15	Q10	a	34	14	20	Difference between primary and secondary data	0.49	1	49	0.80	0.67	0.47	0.25	0.10	0.02	0.49	
39	Q08	T		30	38	-8	Interpret Spearman's rank correlation coefficient							0.25		2	13
40	Q12	a		41	39	2	Determine relative risks							0.36		3	12
41	Q08	g		31	40	-9	Reliability and validity							0.20		2	10
42	Q12	b		42	41	1	Interpret relative risks							0.07		1	7
43	Q07	a		20	42	-22	Definition of population							0.04		1	4
44	Q11	d		40	43	-3	Use stratification							0.10		3	3
45	Q08	e		29	44	-15	Interpret Spearman's rank correlation coefficient							0.02		1	2
46														27.29		80	34
47																	
30	Q07	e	24	29	-5	Select an appropriate diagram	0.53	2	27	0.93	0.66	0.47	0.30	0.14	0.03	0.53	
31	Q03	e	12	30	-18	Rationale for selecting types of average	0.52	2	26	0.79	0.64	0.52	0.35	0.17	0.05	0.52	
32	Q13	b	44	31	13	Cumulative frequency graph - comparing	0.82	4	21	2.28	1.03	0.40	0.13	0.03	0.00	0.82	
33	Q07	b	21	32	-11	Definition of convenience sample	0.19	1	19	0.40	0.24	0.14	0.07	0.03	0.00	0.19	
34	Q07	c	22	33	-11	Disadvantages of sampling	0.19	1	19	0.45	0.25	0.13	0.06	0.02	0.00	0.19	
35	Q05		16	34	-18	Planning data collection	1.02	6	17	2.39	1.36	0.67	0.26	0.10	0.01	1.02	
36	Q09	b	33	35	-2	Select an appropriate diagram	0.17	1	17	0.40	0.22	0.11	0.04	0.01	0.00	0.17	
37	Q11	c	39	36	3	Box plots - comparing	0.74	5	15	2.17	0.98	0.26	0.05	0.01	0.00	0.74	
38	Q08	a	25	37	-12	Select an appropriate diagram	0.13	1	13	0.33	0.16	0.07	0.04	0.02	0.00	0.13	
39	Q08	f	30	38	-8	Interpret Spearman's rank correlation coefficient	0.25	2	13	0.51	0.35	0.21	0.08	0.03	0.00	0.25	
40	Q12	a	41	39	2	Determine relative risks	0.36	3	12	0.90	0.50	0.21	0.06	0.02	0.00	0.36	
41	Q08	g	31	40	-9	Reliability and validity	0.20	2	10	0.65	0.25	0.06	0.02	0.01	0.00	0.20	
42	Q12	b	42	41	1	Interpret relative risks	0.07	1	7	0.22	0.09	0.03	0.01	0.00	0.00	0.07	
43	Q07	a	20	42	-22	Definition of population	0.04	1	4	0.07	0.05	0.03	0.02	0.01	0.00	0.04	
44	Q11	d	40	43	-3	Use stratification	0.10	3	3	0.37	0.09	0.02	0.01	0.00	0.00	0.10	
45	Q08	e	29	44	-15	Interpret Spearman's rank correlation coefficient	0.02	1	2	0.06	0.02	0.01	0.00	0.00	0.00	0.02	
46							27.29	80	34	47.04	34.83	24.37	15.38	8.41	2.79	27.29	
47																	

Q	Part	Position in paper	Performance	Difference	Skill tested	Mean score	Max score	Mean %	9	8	7	6	5	4	3	U	ALL
Q01	b	2	1	1	Choropleth map - reading	0.92	1	92	0.99	0.97	0.95	0.94	0.91	0.84	0.70	0.50	0.92
Q02	b	5	2	3	Box plots - reading	2.69	3	90	2.92	2.93	2.88	2.83	2.67	2.11	1.16	0.50	2.69
Q04	a	10	3	7	Cumulative frequency- drawing	1.57	2	79	1.91	1.83	1.72	1.60	1.42	1.18	1.03	0.62	1.57
Q01	a	1	4	-3	Difference between primary and secondary data	0.77	1	77	0.92	0.87	0.86	0.80	0.72	0.56	0.36	0.25	0.77
Q05	a	12	5	7	Stem and leaf diagram	2.27	3	76	2.71	2.51	2.41	2.27	2.12	1.89	1.54	0.94	2.27
Q06	b	7	20	-13	Controlling extraneous variables	1.75	2	88	1.75	1.65	1.55	1.51	1.25	1.05	0.92	0.44	2.35
Q07	c	23	30	-7	Calculate price index								0.50		2		25
Q06	b	19	31	-12	Extraneous variables								0.47		2		24
Q03	b	9	32	-23	Interpret relative risks								0.21		1		21
Q09	b	28	33	-5	Interpret regression equations								0.19		1		19
Q09	e	31	34	-3	Comment on appropriateness								0.37		2		19
Q09	d	30	35	-5	Compare regression equations								0.21		2		11
Q09	c	29	36	-7	Use regression equations								0.27		3		9
Q11	c	36	37	-1	Formal notation for independent events								0.09		1		9
													38.25		80		48
Q07	d	24	22	2	Use appropriate measure of central tendency	0.39	1	39	0.73	0.61	0.48	0.34	0.26	0.18	0.09	0.03	0.39
Q02	d	7	23	-16	Use stratification	1.10	3	37	2.21	1.90	1.52	1.04	0.45	0.14	0.01	0.00	1.10
Q11	d	37	24	13	General addition law	0.70	2	35	1.82	1.42	0.94	0.47	0.20	0.08	0.02	0.00	0.70
Q07	e	25	25	0	Calculate geometric mean	0.98	3	33	2.04	1.78	1.38	0.84	0.40	0.11	0.03	0.00	0.98
Q05	e	16	26	-10	Comment on appropriateness	0.32	1	32	0.64	0.52	0.41	0.28	0.16	0.09	0.04	0.01	0.32
Q08		26	27	-1	Data Collection process	1.92	6	32	4.16	3.26	2.32	1.63	1.05	0.55	0.18	0.08	1.92
Q11	b	35	28	7	Formal notation for conditional probability	0.29	1	29	0.87	0.69	0.38	0.15	0.04	0.01	0.02	0.00	0.29
Q06	c	20	29	-9	Controlling extraneous variables	0.28	1	28	0.79	0.55	0.35	0.19	0.08	0.02	0.00	0.00	0.28
Q07	c	23	30	-7	Calculate price index	0.50	2	25	1.80	1.27	0.58	0.19	0.04	0.01	0.01	0.00	0.50
Q06	b	19	31	-12	Extraneous variables	0.47	2	24	1.04	0.76	0.56	0.43	0.27	0.11	0.03	0.00	0.47
Q03	b	9	32	-23	Interpret relative risks	0.21	1	21	0.40	0.29	0.25	0.20	0.17	0.09	0.02	0.02	0.21
Q09	b	28	33	-5	Interpret regression equations	0.19	1	19	0.81	0.50	0.18	0.04	0.01	0.00	0.00	0.00	0.19
Q09	e	31	34	-3	Comment on appropriateness	0.37	2	19	0.94	0.64	0.44	0.28	0.20	0.09	0.04	0.00	0.37
Q09	d	30	35	-5	Compare regression equations	0.21	2	11	1.13	0.50	0.17	0.04	0.01	0.00	0.00	0.00	0.21
Q09	c	29	36	-7	Use regression equations	0.27	3	9	1.10	0.57	0.25	0.14	0.07	0.03	0.01	0.01	0.27
Q11	c	36	37	-1	Formal notation for independent events	0.09	1	9	0.48	0.21	0.05	0.02	0.00	0.00	0.00	0.00	0.09
						38.25	80	48	64.13	55.00	45.82	36.78	27.16	16.92	9.14	4.81	38.25

Specifically ...

- (1) Histograms – using (common item) ...
useful for GCSE too
- (2) Skewness (common item)
- (3) Sampling:
 - Definitions ... population etc
 - Systematic sampling
 - Cluster Sampling
- (4) Binomial distribution / Probability
- (5) Relative risk
- (6) Spearman's Rank
- (7) Regression equations
- (8) Formal probability notation (became linked with (4))



Resources

Note about over-teaching

Biggest request is “not just exam questions”

- This is difficult but will get better over time.

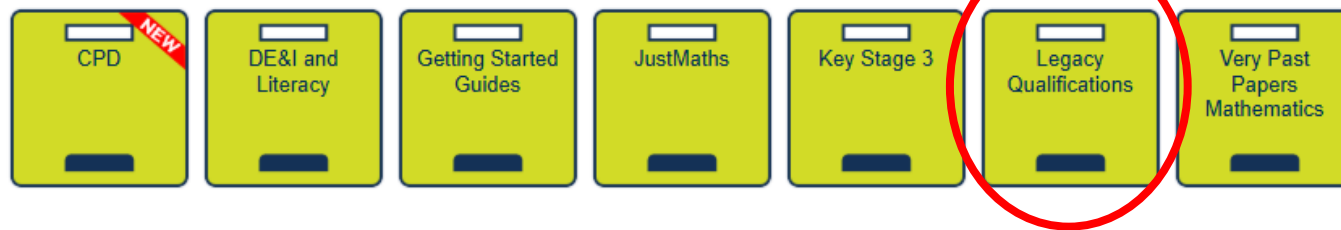
Exam wizard and

Of course ... the emporium

Our Qualifications



Additional Support



Emporium Social Fe

Continued Profess
Development

UPCOMING EVEN

DEC All day
10 GCSE Maths
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DEC 4:00 pm - 5:00
10 GCSE Statis
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DEC All day
11 Maths in Co
Marking Gui

DEC All day
16 GCSE Maths

... Not the usual folder

[Maths Emporium](#) > [Level 3 Core Maths \(Mathematics in Context\)](#) > [12 Teaching and Learning Materials](#) > Topic based worksheets

Category: Topic based worksheets


These are worksheets including exam-style practice questions and questions in context in both word and PDF formats. The PDF version includes worked examples for each section.

 [01 Mean and Standard Deviation – Worksheet \(word\)](#)



 [01 Mean and Standard Deviation – Worksheet with worked examples \(pdf\)](#)



 [02 Histograms – Worksheet \(word\)](#)

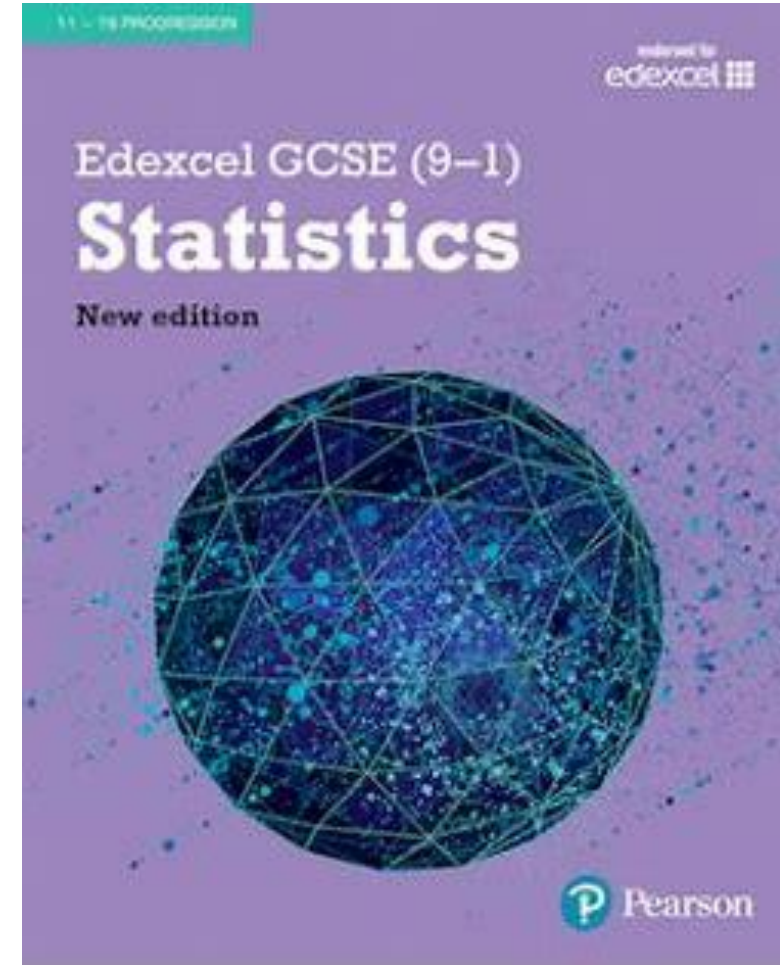


... Textbook

But old ones are not defunct

Or for other boards

- Avoid “recycling questions”



Topic 1 – Using Histograms

Key ideas :

Age old problem

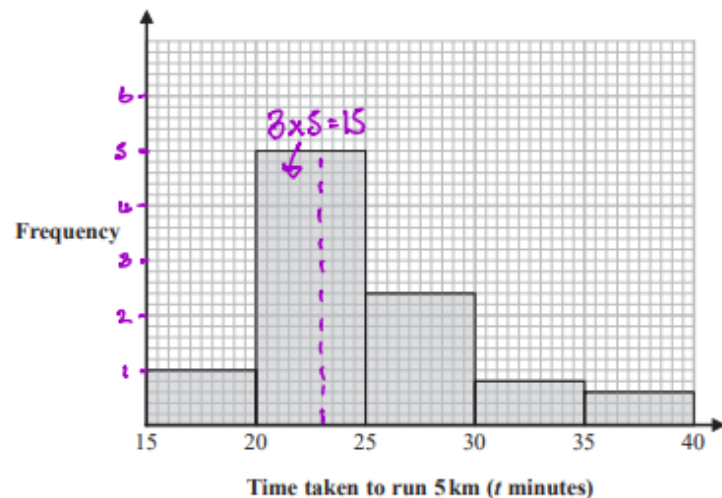
Can do “the maths”

Higher order skills

i.e. Interpreting

Topic 1 – Using Histograms

- 10 The time taken, in minutes, for some runners to complete a 5 km run was recorded. The incomplete histogram and incomplete grouped frequency table give information about the times taken, in minutes, for these runners to complete the 5 km run.



Time taken to run 5 km (t minutes)	Frequency
$15 < t \leq 20$	5
$20 < t \leq 25$	25
$25 < t \leq 30$	12
$30 < t \leq 35$	4
$35 < t \leq 40$	3

(Source: www.parkrun.org.uk)

- (a) Use the information in the histogram to complete the table.

(2)

- (b) Estimate the number of runners that took less than or equal to 23 minutes to complete the race.

$$20 - 23 \text{ minutes} = 3 \times 5 = 15$$

$$15 + 5 = 20$$

20

(2)

- (c) Identify and interpret the skew shown on the histogram.

There is a positive skew.

eg. More than half of the runners take less than the mean time to complete the 5 km

(2)

(Total for Question 10 is 6 marks)

Topic 1 – Using Histograms

Key ideas :

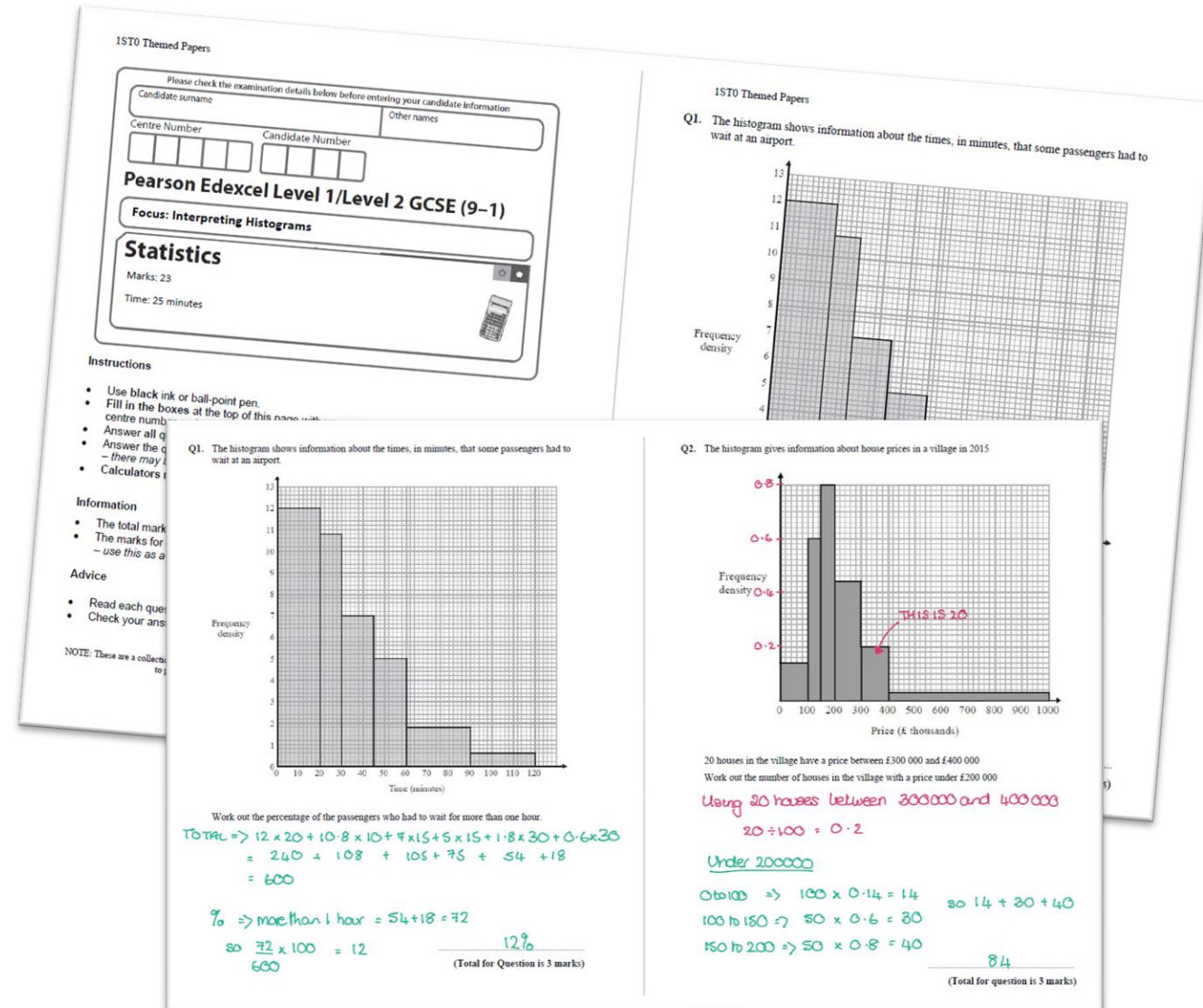
Age old problem

Can do “the maths”

Higher order skills

i.e. Interpreting

Resources:



Topic 2 – Skewness

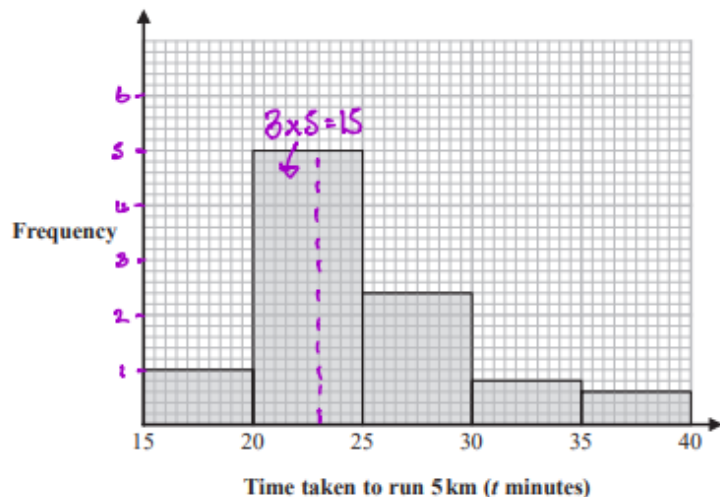
Key ideas :

- Can identify skewness

- Interpreting is the issue

Topic 2 – Skewness

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There is a positive skew.
eg. More than half of the runners take less than the mean time to complete the 5 km

(Total for Question 10 is 6 marks)

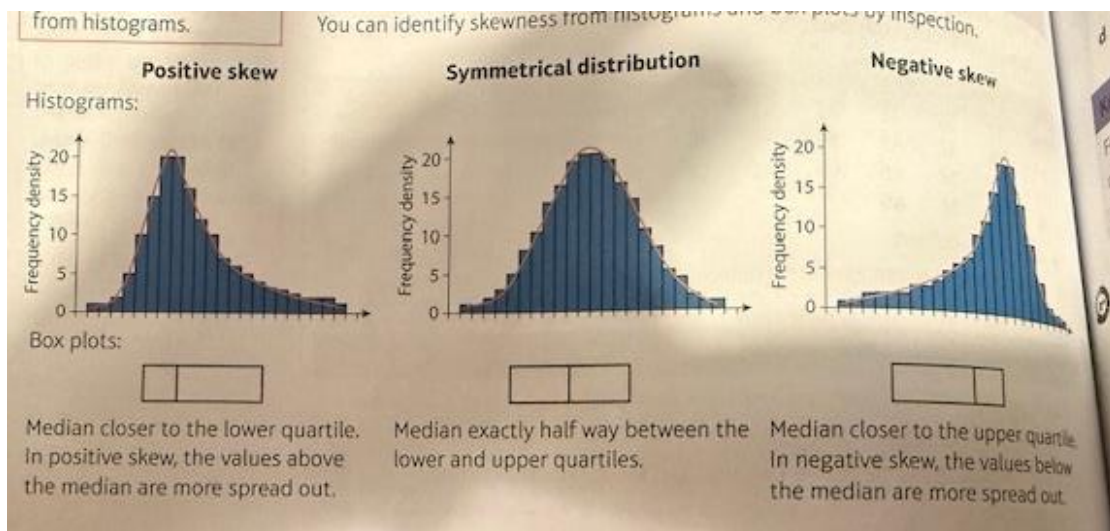
Topic 2 – Skewness

Key ideas :

Can identify skewness

Interpreting is the issue

Resources:



1510 1 named papers

Please check the examination details below before entering your candidate information

Candidate surname: _____ Other names: _____

Centre Number: _____ Candidate Number: _____

Pearson Edexcel Level 1/Level 2 GCSE (9-1)

Focus: Skewness

Statistics

Marks: 59

Time: 60 minutes

Instructions

- Use black ink or ball-point pen.
- Fill in the boxes at the top of this page with your name.
- Answer all questions.
- Answer the questions in the space provided.
- Calculators may be used.

Information

- The total mark for this paper is 60.
- The marks for each question are shown in brackets.
- Use this as a guide as to how much time to spend on each question.

Advice

- Read each question carefully before you start to write.
- Check your answers if you have time.

NOTE: These are a collection of past paper questions to provide additional practice.

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1510 1 named papers

Q1. Malcolm asked each student in his class how many minutes of music they listen to each day. He drew this box plot for the information.

(a) Write down the percentage of these students who listen to more than 30 minutes of music each day. _____ % (1)

(b) Find the range. _____ minutes (2)

(c) Describe the skew of the distribution. _____ (1)

Malcolm also asked each teacher in his school how many minutes of music they listen to each day.

(b) Calculate the interquartile range for the data in the table. You must show your working.

$13.3 - 12.1 = 1.2$ (2)

(c) Describe the skew of the distribution represented by the box plot. Give a reason for your answer.

There is no skew, the distribution is symmetrical because the median is exactly in the middle of the IQR and the whiskers. (2)

(Total for question = 7 marks)

Q4. Some researchers investigated the hand span, in centimetres, of adult pianists by their level: international, national and amateur.

The box plots below give information about the hand spans for national level and amateur level pianists.

(a) Circle the word in the list below that describes hand span, in centimetres, as a type of data.

qualitative ordinal continuous bivariate (3)

(c) median international > national > amateur
IQR amateur > national > international

Topic 3 – Sampling (3)

Key ideas :

- SEC no longer part of Maths GCSE

- Explicitly teach it (KS3?)

- Definitions etc ... V Dry!

Topic 3 – Sampling (1)

- 6 The manager of a gym is reviewing the current opening times of the gym. The manager thinks that if the gym is open for more hours it will affect the number of people using the gym.

(a) Suggest a hypothesis that the manager could use.

eg. The longer the gym is open, the more people will use it.

(1)

The manager wants to get the opinions of the people who have a membership at the gym by giving them a questionnaire.

The manager obtains a numbered list of the 1500 people with a membership and decides to take a sample of 10% of the gym members.

The manager chooses the person who is numbered 0004 as the random starting point on the list and then picks every 20th person.

(b) Name the sampling method that the manager plans to use.

Systematic
(1)

Topic 3 – Sampling (2)

- 5 The management of a factory is considering changing the working hours of their employees.

Muhammad and Rose want to get the views of the employees in the factory.

Employees in the factory work on the production line or in the warehouse or in the office.

20 employees work on the production line.

15 employees work in the warehouse.

25 employees work in the office.

Muhammad plans to use a questionnaire.

He plans to take a sample of the employees and ask them the questions on his questionnaire.

For his sample, he decides to ask all of the employees who work on the production line.

- (a) (i) Name this sampling technique.

cluster

(1)

Topic 3 – Sampling (3)

7 Chris is a manager at a theme park.

He wants to find out what food options visitors would like to be able to buy in the theme park.

(a) State the population for this investigation.

all visitors to the theme park.

(1)

Topic 3 – Sampling (3)

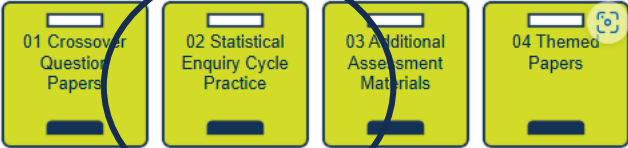
Key ideas :

SEC no longer part of GCSE
Explicitly teach it (KS3?)
Definitions etc ... V Dry!

Resources:

[Maths Emporium](#) > [GCSE Statistics](#) > 08 Practice Papers & Mark schemes

Category: 08 Practice Papers & Mark schemes



IST0 Themed Papers

Please check the examination details below before entering your candidate information

Candidate surname

Centre Number

Candidate Number

Other names

Pearson Edexcel Level 1/Level 2 GCSE (9-1)

Focus: Higher Tier Sampling and Bias

Statistics

Marks: 41

Time: 40 minutes

Instructions

- Use black ink or ball-point pen.
- Fill in the boxes at the top of this page with your name, centre number and candidate number.
- Answer all questions.
- Answer the questions in the spaces provided. There may be more space than you need.
- Calculators may be used.

Information

- The total mark for this paper is 41.
- The marks for each question are shown in brackets.
- Use this as a guide.

Advice

- Read each question carefully.
- Check your answers.

NOTE: These are a collection of papers to provide practice.

IST0 Themed Papers

Q1. Matthew is collecting information about road safety in his town. He wants to collect information from drivers who live in his town. Matthew plans to ask drivers at his local car park about their views on road safety. He plans to collect a quota sample of 20 drivers from each of three age groups. Matthew's three age groups of drivers are 39 years old or younger 40 years old to 59 years old 60 years old or older

(a) Comment on whether Matthew's plans are appropriate.

Matthew's plans are not appropriate. He is only using one location within the town and the quota sample may not be the same proportions as the town.

Matthew wants to know how many drivers, who live in his town, drive faster than the speed limit on the motorway. Matthew knows that he will have to ask a sensitive question so he plans to use the random response technique to find out this information.

(b) Design a random response question that Matthew could use on a questionnaire in order to collect this information.

Flip a coin. If tails tick Yes below. If heads answer the below question truthfully: Do you drive faster than the speed limit on a motorway?

(Total for question = 5 marks)

IST0 Themed Papers

Q1. Matthew is collecting information about road safety in his town. He wants to collect information from drivers who live in his town. Matthew plans to ask drivers at his local car park about their views on road safety. He plans to collect a quota sample of 20 drivers from each of three age groups. Matthew's three age groups of drivers are 39 years old or younger 40 years old to 59 years old 60 years old or older

(a) Comment on whether Matthew's plans are appropriate.

Matthew wants to know how many drivers, who live in his town, drive faster than the speed limit on the motorway. Matthew knows that he will have to ask a sensitive question so he plans to use the random response technique to find out this information.

IST0 Themed Papers

Q2. Suha is carrying out market research in the town centre. She has been asked to interview a total of 60 people of different ages and genders, as shown in the table.

	Age 18-30 years	Age 31-55 years	Age 56 years and over
Male	10	10	10
Female	10	10	10

(a) Write down the statistical name of this sampling method.

Quota sampling

(b) Give one advantage and one disadvantage of this sampling method.

Advantage

e.g. ensures both genders are represented or ensures a variety of ages are represented.

Disadvantage

e.g. it's not random or it is still open to interview bias when selecting people

(Total for question = 3 marks)

Topic 4 – Interpreting binomial distribution & Formal probability notation

Key ideas :

The maths for multiple independent events is difficult

Confusion around independent and mutually exclusive events

Topic 4 – Interpreting binomial distribution & Formal probability notation

- 9 Peter drops his children off at a breakfast club every Monday morning and every Tuesday morning.

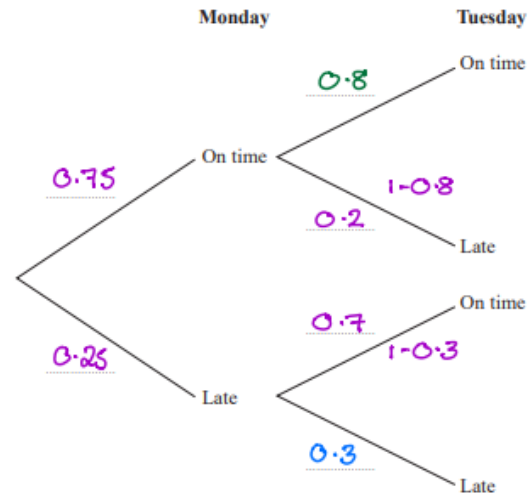
He either drops them off on time or late.

The probability that Peter drops his children off on time on a Monday morning is three times the probability that he drops them off late on a Monday morning. 0.75 0.25

The probability that Peter drops them off on time on a Monday morning **and** on a Tuesday morning is 0.6

The probability that Peter drops them off late on a Tuesday morning given that he has dropped them off late on a Monday morning is 0.3

- (a) Complete the tree diagram below.



(4)

$$P(0,0) = 0.6 = 0.75 \times x$$

$$x = \frac{0.6}{0.75} = 0.8$$

Peter drops his children off at the breakfast club every Monday morning and Tuesday morning over a 4-week period.

Assume that the probability of dropping them off on time on both a Monday morning and a Tuesday morning remains constant and that each week is independent.

- (b) Work out the probability that, over a 4-week period, he drops his children off on time on a Monday morning and on time on a Tuesday morning on 3 or more occasions.

$$\begin{aligned} \text{using } P(\text{on time on both days}) &= 0.6 \\ \text{so } P(\text{not on time on both days}) &= 0.4 \\ P(X=3) &= 4 \times 0.6^3 \times 0.4 \\ &= 0.3456 \dots \\ P(X=4) &= 0.6^4 \\ &= 0.1296 \end{aligned}$$

$$\begin{aligned} \text{so } 0.3456 \dots + 0.1296 \\ &= 0.4752 \end{aligned}$$

$$0.475 \text{ (3dp)}$$

(4)

(Total for Question 9 is 8 marks)

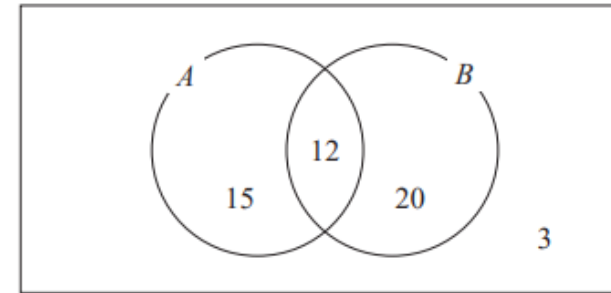
Topic 4 – Interpreting binomial distribution & Formal probab

11 The Venn diagram shows information about 50 books on a reading list.

A is the event that the book is a science fiction book.

B is the event that the book is an audio book.

The numbers in the Venn diagram show the number of books.



One of the books is chosen at random.

(a) Find $P(A)$.

$$\frac{27}{50}$$

(1)

(b) Find $P(A|B)$.

$$\frac{12}{32}$$

(1)

Mike concludes that A and B are independent events.

(c) Is Mike correct?

Give a reason for your answer.

No, he is wrong. $P(A) \neq P(A|B)$

Topic 4 – Interpreting binomial distribution & Formal probability notation

Key ideas :

The maths for multiple independent

Confusion around independence

Resources:

Pearson Edexcel Level 1/Level 2 GCSE (9-1)
Focus: Higher Tier Binomial Distribution
Statistics
Marks: 38
Time: 40 minutes

Pearson Edexcel Level 1/Level 2 GCSE (9-1)
Focus: Higher Tier Mixed Probability (Notation Focus)
Statistics
Marks: 47 marks
Time: 50 minutes

Pearson Edexcel Mathematics in Context (7MC0)
Topic Worksheet: Conditional probability
Total Marks – 38

1ST0 Themed Papers
Q1. A game is played with 4 ordinary 6-faced dice. Each die is to be rolled once and the number of dice that land on a six is recorded.
(a) Write down two conditions needed so that a binomial distribution is a suitable model for the number of sixes recorded.
e.g. two from →
• the rolls of the dice are independent.
• there are only two outcomes, in this case it would be "6" or "not a 6".
• the probability of getting a 6 does not change.
(b) Calculate the probability that all of the 4 dice land on a six. Give your answer as a fraction.
$$P(X=4) = \left(\frac{1}{6}\right)^4 = \frac{1}{1296}$$

(c) Calculate the probability that at least 2 of the 4 dice land on a six. Give your answer as a fraction.
$$P(X \geq 2) = 1 - \left(\frac{625}{1296} + \frac{500}{1296}\right) = \frac{19}{144}$$

1ST0 Themed Papers
Q2. 100 planes landed at Heathrow Airport in a 3 hour period. 40 of the planes were from Europe. 20 of the planes were late, including 5 planes from Europe.
(a) Complete the Venn diagram using the information above.
$$\frac{60 \times 15}{46} = \frac{900}{46}$$

(b) One of these planes is chosen at random. Find the probability that:
(i) the plane was not from Europe. $\frac{60}{100}$
(ii) the plane was on time and was from Europe. $\frac{35}{100}$
(c) Find the probability that the plane was from Europe. $\frac{5}{20}$
(Total for Question is 8 marks)

1ST0 Themed Papers
Q3. A company contracts two manufacturers, A and B, to make an item that the company sells. Manufacturer A makes 65% of the items for the company to sell. It is found that 9% of the items made by manufacturer A do not meet the company's required standard. It is found that 12% of the items made by manufacturer B do not meet the company's required standard. An item is to be picked at random.
(a) Complete the probability tree diagram for this item.
$$P(M|N) = 0.65 \times 0.09 + 0.35 \times 0.12 = 0.1005$$

$$P(M|N) = \frac{0.65 \times 0.09}{0.1005} = \frac{29}{20} = 0.5820$$

(b) Find $P(M|N)$.

Topic 5 – Relative Risk

Key ideas :

Students can do the maths

Interpreting is the issue

Topic 5 – Relative Risk

- 12 Khatia organises two different training courses, Course A and Course B, to help people to learn to type. She wants to compare the two different courses to see which is better. At the end of each course the people are given a skills test.

The table shows the number of participants who passed and failed the skills test for each of the two courses.

	Passed	Failed	Total
Course A	35	15	50
Course B	48	32	80

Risk of failing
 $\frac{15}{50}$
 $\frac{32}{80}$

- (a) Find the relative risk of failing the skills test having taken Course A compared to Course B.

$$\frac{15}{50} \div \frac{32}{80} = 0.75$$

0.75

(3)

- (b) Give an interpretation of your answer to part (a).

eg. The risk of failing the skills test on Course A is lower than the risk of failing on Course B.

(1)

(Total for Question 12 is 4 marks)

Topic 5 – Relative Risk

Key ideas :

Can do the maths

Interpreting is the issue

Resources:

The images show three versions of a Pearson Edexcel Level 1/Level 2 GCSE (9-1) Statistics exam paper, specifically the Higher Tier Relative Risk focus. The top-left image is the front cover, the top-right image is the question page, and the bottom image is the answer page with handwritten solutions.

Question 1 (from the top-right image):

Thomas found information about the weather on the Isle of Skye for the 31 days of May 2019 and the 31 days of July 2019. The table gives, for the Isle of Skye, some information about the number of days with rainfall during May.

Month	May	July
Absolute risk of rainfall on a day	0.452	

(a) Using the information in the table, find the number of days with rainfall in May 2019. You must show your working.

(b) Find the number of days with rainfall in July 2019 compared with a day in May is 1.29. You must show your working.

Solutions (from the bottom image):

(a) $0.452 \times 31 = 14.012$ days (1)

(b) $0.452 \times 1.29 \times 31 = 18.07568$ days (2)

Total for question = 4 marks

Question 2 (from the bottom image):

The ambulance service has a target of responding to 75% of life-threatening calls in 8 minutes or less. The table shows the actual response rates for two locations in the UK in 2014.

Location	Percentage of life-threatening calls responded to in 8 minutes or less
Littlehampton	73%
York	89%

For a life-threatening call made in 2014:

(i) write down the absolute risk that an ambulance takes more than 8 minutes to respond in Littlehampton, 0.25 (1)

(ii) work out the relative risk that an ambulance takes more than 8 minutes to respond in York, compared with the target. 0.07 (2)

Total for question = 3 marks

Topic 6 – Spearman's Rank

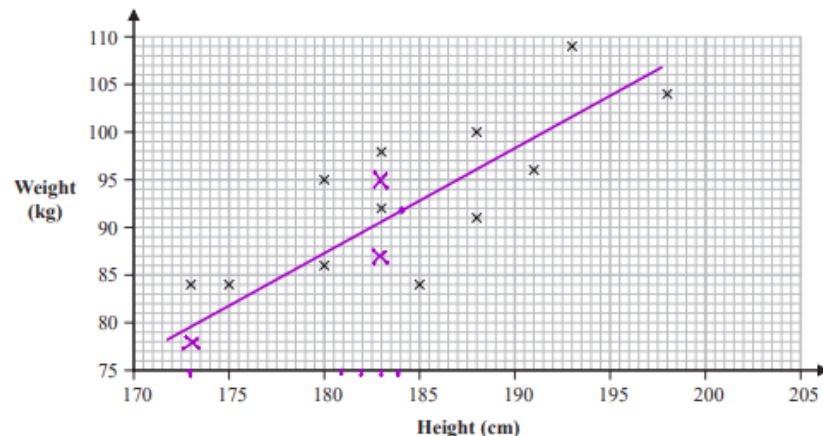
Key ideas :

Once again, contextual interpretation (many candidates wrote 'no correlation') is an issue.

Topic 6 – Spearman's Rank

- 8 Timur is investigating the heights and weights of rugby players. He collected data from the internet about the heights and weights of players from the Wales rugby squad.

The players from the Wales rugby squad are classed as Forwards or Backs. Timur draws a scatter diagram for the heights and weights of some of the Backs from the Wales rugby squad.



- (a) Explain why a scatter diagram is appropriate for the type of data Timur collected.

The data is bivariate and allows us to see if there is a correlation between two variables. (1)

The data for three of the players was not plotted on the scatter diagram. The height and weight of each of these players is given in the table below.

Player	A	B	C
Height (cm)	183	183	173
Weight (kg)	95	87	78

- (b) Complete the scatter diagram by plotting the points for players A, B and C.

- (c) Describe and interpret the type of correlation shown by the scatter diagram.

There is a positive correlation in that as the height increases the weight increases. (2)

The double mean point for the heights and weights of all of the Backs is (184, 92).

- (d) Draw a line of best fit through the double mean point. ✓ (2)

Timur also collected the heights and weights of players from the England rugby squad. He found the Spearman's rank correlation coefficient for the heights and weights of the Forwards from the England rugby squad.

The correlation coefficient was 0.00

- (e) Interpret this correlation coefficient in context.

There is no relationship between the heights and weights of the forwards. (1)

Timur used statistical software to find the following information about the heights (x cm) and weights (y kg) of the Backs from the Wales rugby squad and the Backs from the England rugby squad.

	Spearman's rank correlation coefficient	Gradient of line of best fit
Wales rugby squad Backs	0.81 ↑	0.96
England rugby squad Backs	0.65	1.02 ↑

(Source: www.englandrugby.com)

- (f) Compare the Spearman's rank correlation coefficients and interpret this comparison in the context of the question.

The correlation between the height and weight of the Wales rugby squad backs is stronger than for England's; which means the heights and weights for Wales are more closely related. (2)

Timur uses the information in the table to conclude that the weight of the England rugby squad Backs increases faster than the weight of the Wales rugby squad Backs as their height increases.

- (g) Assess the validity of Timur's conclusion with reference to the statistical results.

eg. Timur is correct as the gradient of the line of best fit for the England rugby squad backs is greater so their weight increases faster than Wales for each cm of height. (2)

Topic 6 – Spearman's Rank

Key ideas :

Once again, contextual interpretation (many candidates wrote 'no correlation' but no context) is an issue.

Resources:

The resources shown are:

- Pearson Edexcel Mathematics in Context (7MC0) Topic Worksheet: Spearman's Rank** (Total Marks – 43). The cover lists contents and useful links.
- Pearson Edexcel Level 1/Level 2 GCSE (9–1) Statistics** (Marks: 83 marks, Time: 90 minutes). The exam paper includes instructions, information, and advice.
- Worked Solutions** for the Spearman's Rank question. It shows a table of dancer ranks and a calculation for the rank correlation coefficient.

Worked Solutions Table:

Dancer	Judge X (rank)	Judge Y (rank)	d	d ²
A	2	4	2	4
B	5	2	3	9
C	1	5	4	16
D	4	1	3	9
E	6	8	2	4
F	7	7	0	0
G	8	3	5	25
H	3	6	3	9

Calculation:

$$1 - \frac{6 \times 76}{8(8^2 - 1)} = 0.0952380...$$

Interpretation: 0.095 is close to zero so there is little correlation meaning the judges are not in agreement.

Question 2: There were 8 divers in a diving competition. Two judges ranked the 8 divers on their first dive. Both Rosie and Stefan calculated the Spearman's rank correlation coefficient for the Judges' ranks. Rosie got a value of 0.952. Stefan got a value of -1.25. Stefan did not calculate the value correctly.

Answer: Explain how you know this. The values must lie between -1 and 1 so -1.25 is incorrect.

Topic 7 – Regression Equations

Key ideas :

- Interpretation
- Interpretation
- Interpretation

Topic 7 – Regression Equations

- 9 Researchers wanted to find a method to predict the height of ancient Egyptians based upon bones from their skeletons.

They calculated the Pearson's product moment correlation coefficient between the length of particular bones and the height of the skeleton for some male skeletons and for some female skeletons.

They also found regression equations for the relationship between bone length (x centimetres) and height (y centimetres) for each of these bones in male skeletons and in female skeletons.

The table gives information about these product moment correlation coefficients and these regression equations.

	Product moment correlation coefficient	Regression equation
Males		
Femur	0.826	$y = 2.257x + 63.93$
Tibia	0.850	$y = 2.554x + 69.21$
Humerus	0.656	$y = 2.594x + 83.85$
Radius	0.649	$y = 2.641x + 100.91$
Females		
Femur	0.891	$y = 2.340x + 56.99$
Tibia	0.938	$y = 2.699x + 61.08$
Humerus	0.806	$y = 2.827x + 70.94$
Radius	0.580	$y = 2.509x + 96.73$

(Source: www.semanticscholar.org)

- (a) Which bone measurement would you recommend using to estimate the height of an ancient Egyptian?
Give a reason for your answer.

The tibia length because the PMCC is the highest for both males and females.

- (b) Interpret in context the figure 2.594 in the regression equation for the humerus of male skeletons.

It means that for every additional 1cm of length of the humerus the height is estimated to increase by 2.594 cm.

(1)

- (c) Use the regression equations to compare the relationships between bone length and height for the different bones.
Include in your answer comparisons between male and female ancient Egyptians.

eg As all bone lengths increase the height increases.

eg The female height is estimated to increase more than males for every additional cm of length, with femurs, tibias and humerus.

eg However for the radius the male height is estimated to increase more than females for every additional cm of length.

(3)

Dina suggests comparing the y -intercepts for the regression equations.

- (d) Is Dina's suggestion appropriate?

eg This is not appropriate as the y intercept would relate to a bone length of 0cm which is unrealistic.

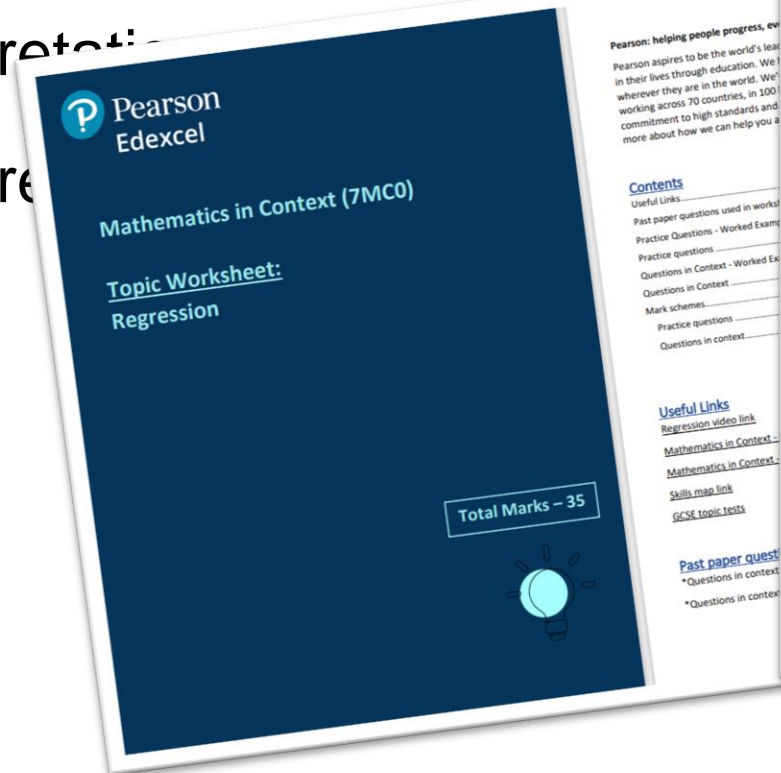
(2)

Topic 7 – Regression Equations

Key ideas :

- Interpretation
- Interpretation
- Interpretation

Resources:



IST0 Themed Papers

Please check the examination details below before entering your candidate information

Candidate surname: _____ Other names: _____

Centre Number: _____ Candidate Number: _____

Pearson Edexcel Level 1/Level 2 GCSE (9–1)

Focus: Higher Tier Scatter Graphs & Regression

Statistics

Marks: 69

Time: 70 minutes

Instructions

- Use black ink or ball-point pen.
- Fill in the boxes at the top of this page with your name, centre number and candidate number.
- Answer all questions.
- Answer the questions in the spaces provided – there may be more space than you need.
- Calculators may be used.

Information

- The total mark for this paper is 69.
- The marks for each question are shown in brackets – use this as a guide as to how much time to spend on each question.

Advice

- Read each question carefully before you start to write your answer.
- Check your answers if you have time.

NOTE: These are a collection of past paper questions, to provide additional focused practice.

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IST0 Themed Papers

Q1. Daily newspaper sales fell between 2002 and 2012

The table gives daily sales for some national newspapers in these two years.

Newspaper	Daily sales 2002 (hundred thousands)	Daily sales 2012 (hundred thousands)
The Sun	34.6	26.1
Daily Star	7.9	6.1
Daily Record	5.6	2.8
Daily Mail	23.5	19.3
Express	9	6
Telegraph	9.5	5.8
The Times	6.6	4
FT	4.5	3
The Guardian	3.8	2.1
The Independent	1.9	0.9

(Data source: Audit Bureau of Circulations)

Here is a scatter diagram for this information.

IST0 Themed Papers

Q1. Daily newspaper sales fell between 2002 and 2012

The table gives daily sales for some national newspapers in these two years.

Newspaper	Daily sales 2002 (hundred thousands)	Daily sales 2012 (hundred thousands)
The Sun	34.6	26.1
Daily Star	7.9	6.1
Daily Record	5.6	2.8
Daily Mail	23.5	19.3
Express	9	6
Telegraph	9.5	5.8
The Times	6.6	4
FT	4.5	3
The Guardian	3.8	2.1
The Independent	1.9	0.9

(Data source: Audit Bureau of Circulations)

Here is a scatter diagram for this information.

IST0 Themed Papers

Rupert says there is a strong relationship between daily sales in 2002 and 2012 for all these newspapers.

(a) Does the scatter diagram support what Rupert says? Explain why you think this.

Yes it does support what Rupert says. There is a strong positive correlation.

(2)

The daily sales for the Daily Mirror were

2 150 000 in 2002 21.5

1 100 000 in 2012 11

(b) Plot the point for the Daily Mirror on the scatter diagram.

(3)

(c) (i) Describe how the point for the Daily Mirror fits with the other data.

This point is an anomaly and does not fit the pattern of the other data.

(ii) Discuss the change in sales for the Daily Mirror, between 2002 and 2012, compared with other newspapers.

The sales for the Daily Mirror changed more than the other newspapers.

(4)

(Total for Question = 6 marks)

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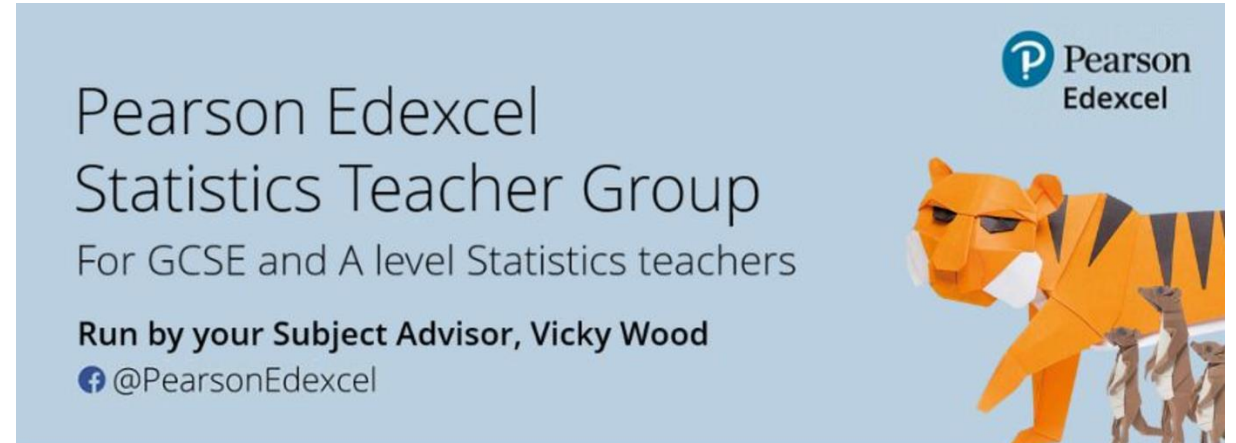
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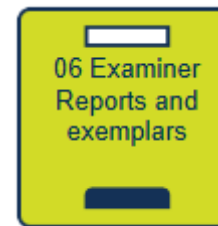
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Category: GCSE Statistics

GCSE Statistics documents for the current 9-1 specification (1ST0)



New Exemplars for GCSE Statistics



For the summer 2024 exam series we have produced our exemplars in a new PowerPoint format and for the first time have created them for GCSE Statistics.

These are ready made slide decks with marking guidance on selected questions from the exam series. They use real candidate responses and have been annotated by the chair of examiners.

These have been designed for teachers to use for CPD but could also be used with students in the classroom.

Question 6(a), (b) and (c) – Response B

6 The manager of a gym is reviewing the current opening times of the gym. The manager thinks that if the gym is open for more hours it will affect the number of people using the gym.

(a) Suggest a hypothesis that the manager could use.

The manager could open the gym for more hours for a week to see if it will affect the number of people using the gym. (1) **B0**

The manager wants to get the opinions of the people who have a membership at the gym by giving them a questionnaire.

The manager obtains a numbered list of the 1500 people with a membership and decides to take a sample of 10% of the gym members.

The manager chooses the person who is numbered 0004 as the random starting point on the list and then picks every 20th person.

(b) Name the sampling method that the manager plans to use. **B0** random systematic random stratified (1)

(c) (i) Give one reason why this is a good plan.

because it's random because he is unsure of who he has selected the sampling is fair. **B1** (1)

(ii) Will the manager's plan give a 10% sample of the gym members? Give a reason for your answer.

B1 no because $1500 \div 20 = 75$ and 75 is not $\frac{1}{10}$ of 1500. **B1** (2)

3/5

Part (a)
B0 This is not a hypothesis. It is more like a plan.

Part (b)
B0 Incorrect.

Note: The mark scheme states that "random" is not to be allowed as an answer.

Part (c)(i)
B1 "The sampling is fair" ... implies it is unbiased and scores the mark.

Part (c)(ii)
B2 The candidate has calculated the number of members if selecting every 20th person. This answer is then referenced to the other method (10%), and although it has not been calculated, this is enough to score the mark as a reason. 'No' is enough as a conclusion and the second mark is also scored.

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GCSE Statistics

6th January 2025

- Reordered Papers
- New 'Aiming for' Practice Papers

Spring Term 2025

- New GCSE Maths and GCSE Statistics Crossover Question Papers

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Thursday 6 January 2025 4–5pm

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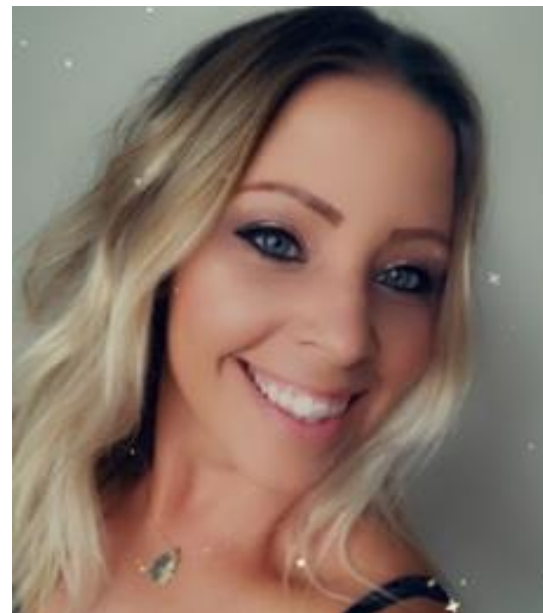
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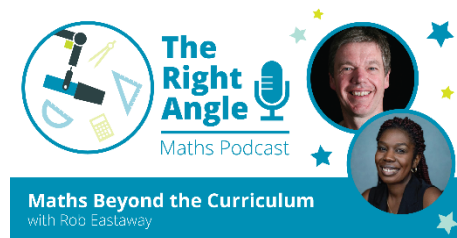
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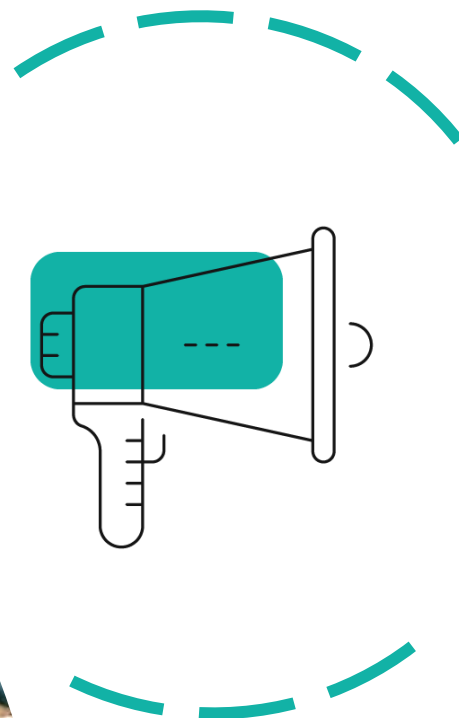
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