

Dr Oliver Mathematics

GCSE Statistics Worksheet

This booklet consists of 20 questions across a variety of examination topics.
The total number of marks available is 161.

1. Consider the following fifteen pieces of data.

24	58	36	75	29	44	34	42
50	34	63	47	39	11	38	

- (a) Calculate the mean and standard deviation for these data. (4)
 - (b) Construct a stem and leaf diagram for these data. (3)
 - (c) Find the median and the interquartile range for these data. (3)
 - (d) Show that there is only one outlier and state its value. (2)
 - (e) Construct a box and whisker plot for these data. (3)
 - (f) Comment on the skewness of the data. Explain your answer. (2)
 - (g) Giving a reason for your answer, state whether you would recommend using the answers to part (a) or to part (c) to summarise these data. (2)
2. The individual letters of the word

STATISTICS

are written on 10 cards which are then shuffled.

One card is selected at random. Find the probability that it is

- (a) a vowel, (1)
- (b) a *T*, given that it is a consonant. (2)

The 10 cards are then shuffled again and the top three are turned over. Find the probability that

- (c) all three of them have a *T* on them, (3)
 - (d) at least two of the cards show a consonant. (6)
3. Alan and Bob decide to construct comparative pie charts for their respective CD collections. Alan owns 280 CDs and Bob owns 235 CDs. (3)

If Alan's pie chart has a radius of 6 cm what radius should Bob use?

4. (a) State five characteristics of the normal distribution. (5)

The table shows the mean and the standard deviation of two normal distributions.

Distribution	Mean	Standard Deviation
A	48	4
B	40	10

- (b) On the same axis, sketch these two distributions. (3)

It is not known if a particular value has come from distribution A or distribution B.

- (c) For the value of 60, explain which distribution it is more likely to have come from. (3)

5. The table shows the heights and masses of seven pupils.

Height, h cm	Mass, m kg
134	62
138	61
144	64
146	67
157	67
157	72
160	69

- (a) Calculate Spearman's rank correlation for these data. (4)

- (b) Comment on the correlation between the heights and the masses of the students. (1)

- (c) Plot these data on a scatter diagram. (3)

The mean height is 148 cm.

- (d) Calculate the mean mass. (2)

The line of best fit passes through the point (154, 68).

- (e) Draw the line of best fit on your scatter diagram. (2)

- (f) Predict (2)

(i) the mass of a student that is 140 cm tall,

(ii) the height of a student that has a mass of 75 kg.

- (g) Which of your answers to part (f) is the most reliable? Explain your answer. (1)

- (h) Find the equation of the line of best fit. (3)
- (i) Interpret the gradient of the line of best fit. (1)
6. (a) State three conditions that need to be met for the binomial distribution to be applicable. (3)

A football player believes that he will score from a penalty kick five times out of six.

- (b) Calculate the probability that he will score with at least four of his next five penalty kicks. (3)
7. A student counts the number of letters of each word on a page of text. Her results are summarised in the table below.

Number of letters	1 – 3	4 – 5	6 – 8	9 – 11	12 – 15
Frequency	14	21	18	12	8

- (a) Construct a histogram for these data. (3)
- (b) Estimate the mode for these data. (2)
8. A bag contains six blue discs, four red discs, and two yellow discs. Three discs are chosen at random without replacement. Calculate the probability of getting
- (a) three blue discs, (2)
- (b) two discs of one colour and one of another, (3)
- (c) one disc of each colour. (3)
9. Give three reasons for carrying out a pilot survey prior to a more detailed study. (2)
10. The table shows the results when a student rolled a dice 100 times.

Outcome	1	2	3	4	5	6
Frequency	15	18	17	19	13	18

- (a) Find the mean for these data. (2)
- (b) Find, to 3 significant figures, the standard deviation of these data. (2)
11. Among the evening classes offered by a college are Art and Creative Writing. The stem and leaf diagram below shows the ages of the people enrolled on each of these courses.

Art

Creative Writing

				9	1				
3	2	1	1	2					
	9	8	8	2	8	9	9		
4	4	2	0	3	4				
	7	7	6	3	5	7	8		
4	3	3	1	4	0	1	2	2	
	9	5	4	5	5	7	8		
	4	3	1	5	1	1	2	3	3
	7	6	5	5	5	8			
				2	6	2	3		
				8	7	6			
				4	7				
					7	9			
					8				
					8	6			

Key: 9|1 means 19 years old

Key: 2|8 means 28 years old

- Find the median and quartiles for those studying Art. (3)
 - Find the median and quartiles for those studying Creative Writing. (3)
 - Represent these data using box plots. (7)
 - Compare and contrast the ages of those taking each class. (4)
12. Sarah conducts an experiment and obtains the following values.

x	1	2	3	4	5	6
y	5.1	3.6	2.9	2.7	2.7	2.4

Sarah believes that the values are related by a formula of the form

$$y = \frac{a}{x} + b,$$

where a and b are constants.

- Plot a graph of y against $\frac{1}{x}$. (2)
 - Use your line to estimate the values of a and b . (5)
13. The table shows the times taken for a group of 30 students to complete a homework task.

Time, t minutes	Frequency
$0 < t \leq 10$	3
$10 < t \leq 15$	11
$15 < t \leq 25$	9
$25 < t \leq 40$	7

(a) Estimate the mean. Give your answer to 3 significant figures. (3)

(b) Estimate the standard deviation. Give your answer to 3 significant figures. (3)

14. A school has the following numbers of students in each year group.

Year	7	8	9	10	11
Students	115	123	118	89	105

A student needs a sample of 50 students and is considering using a systematic sample.

(a) Describe how a systematic sample of 50 students could be chosen. (3)

Upon reflection the student decides to take a stratified random sample of 50 students.

(b) How many students should be selected from each year? (3)

(c) Describe how the individual students could then be selected. (2)

15. Design a questionnaire to collect data about the amount of time that members of Year 10 spend on revising for their GCSE Statistics examination. (2)

16. A class contains thirty students. The mean time that it took them to complete a puzzle was $25\frac{1}{3}$ seconds. There were seventeen boys in the class and the mean time for the boys to complete the puzzle was 24 seconds. What was the mean time for the girls? (3)

17. Susan draws comparative pie charts to represent the fiction and non-fiction books that she owns. The radius for the fiction pie chart is 5 cm and the radius for the non-fiction pie chart is 5.5 cm. Given that Susan owns 242 non-fiction books how many fiction books does she have? (3)

18. The table shows how many people died in a given town last year.

Group	Population	Deaths	Standard Population
Under 16	17 500	341	22%
16 – 35	24 000	204	24%
36 – 60	35 000	188	31%
Over 60	15 500	569	23%

- (a) Calculate the crude death rate (per 1000 people) for the town. (2)
- (b) Calculate the standardised death rate (per 1000 people) for the town. (4)
- (c) What is the advantage of the standardised death rate over the crude death rate? (1)
19. Each Wednesday evening Frank and Martha play one game of cribbage followed by one game of backgammon. The probability that Frank wins the game of cribbage is $\frac{5}{8}$ and the probability that Martha wins the game of backgammon is $\frac{4}{7}$.
- (a) Draw a tree diagram to represent the possible outcomes of an evening's play. (4)
- (b) What is the probability that, on any given Wednesday, Frank wins exactly one game? (3)

Over a period of x weeks Martha won both the game of cribbage and the game of backgammon 24 times.

- (c) Estimate the number of weeks in which she did not win either game. (3)
20. A company's accountant has compiled the following table to show the company's sales across a twelve-month period.

Month	Jan	Feb	Mar	Apr	May	Jun
Sales (£000)	1 210	1 320	1 490	2 200	1 230	1 340
Month	Jul	Aug	Sep	Oct	Nov	Dec
Sales (£000)	1 510	2 280	1 250	1 360	1 530	2 300

- (a) Calculate four-month moving averages for these data. (2)
- (b) Plot these moving point averages on a graph and draw a trend line through them. (4)
- (c) Use your trend line to estimate the sales for the next January. (3)