

A-Level Mathematics

Year 1

~ S T A T I S T I C S ~

**Progress
Test
Revision**



Twenty-One Today

Twenty-One short, sharp questions on the first half of the Year 1 statistics course

Question 1

As part of research into how well the local economy is doing after BREXIT, a researcher emails 100 local businesses to request information on how busy they are. Explain why the responses may be biased in favour of businesses that are not busy.

Question 2

For some data it is observed that

$$\text{mean} > \text{median} > \text{mode}$$

Is the skew of the data positive, negative or symmetrical ?

Question 3

- (i) Explain what is meant by a sampling frame ?
- (ii) Give the name of a sampling method that does not require a sampling frame.

Question 4

In a school are 254 boys and 172 girls.

The Head Teacher wishes to inspect the work of 40 pupils, and decides to take a stratified sample.

How many of each gender should the Head Teacher inspect ?

Question 5

In a supermarket, the time it takes, in minutes, for ten customers to serve themselves at a self-service checkout is recorded

9 6 9 10 7 7 12 6 10 7

Find the median

Question 6

Ten Springer Spaniels are weighed, in kg.

13.3 20.4 18.7 21.5 24.3 17.8 12.2 15.8 17.3 16.2

(i) Enter the data into your Statistics Calculator

C L A S S W I Z fx-991EX

SHIFT SETUP ↓ 3 2 to turn frequencies off

MENU 6 statistics

1 1-Variable

type in the data using arrows and = to enter each number

AC to finish

(ii) Complete the following table with the summary statistics

C L A S S W I Z fx-991EX

OPTN 2 to view the summary statistics

$\bar{x}$		mean
$\sum x$		sum of the data
$\sum x^2$		sum the the squared data
$\sigma^2 x$		variance
σx		standard deviation
$s^2 x$		
$s x$		
n		number of items of data
$\min(x)$		minimum data item
Q_1		lower quartile
Med		median
Q_3		upper quartile
$\max(x)$		maximum data item

Note : This is great for checking answers but you must answer exam questions as if you didn't have access to this table of information !

Question 7

For some data it is observed that

$$Q_3 - Q_2 < Q_2 - Q_1$$

Is the skew of the data positive, negative or symmetrical ?

Question 8

The variance, σ^2 , of some data is 2386

What is the standard deviation, σ , of this data ?

Question 9

Given that for a variable, x :

$$\sum x = 24 \qquad \sum x^2 = 78 \qquad n = 8$$

Find

(i) the mean, μ

(ii) the variance, σ^2

(iii) the standard deviation, σ

Question 10

A biologist is investigating how many eggs the osprey lays in each brood cycle.

The results are given in this frequency table.

N° of eggs	1	2	3	4
Frequency	25	21	x	5

If the mean number of eggs is 2, find the value of x

Question 11

The heights of a year group of children were measured.

Height (cm)	Frequency		Mid-Interval
135 - 144	20		139.5
145 - 149	42		147
150 - 154	86		152
155 - 159	58		157
160 - 174	10		167

Use linear interpolation to determine the median height.

Question 12

Check your answer to question 11 using your Statistics Calculator

You will need to use the mid-interval values for x

C L A S S W I Z fx-991EX

SHIFT SETUP ↓ 3 1 to turn frequencies on

MENU 6 statistics

1 1-Variable

type in the data using arrows and = to enter each number

AC to finish

OPTN 2 to view the summary statistics

Show your calculator display to your teacher who will then tick this box ☐

Question 13

On a histogram which of the following is directly proportional to frequency ?

- A** Height **B** Width **C** Area **D** Perimeter **E** Density

Question 14

Jack is measuring lengths of fish.

Is length a continuous or a discrete variable ?

Question 15

(a) Calculate the mean of 1, 2, 3, 4, 5 and 6

(b) Use your part **(a)** answer to write down the mean of

(i) 100, 200, 300, 400, 500 and 600

(ii) 5.2, 6.2, 7.2, 8.2, 9.2 and 10.2

Question 16

Ten students take a spelling test

Their scores, s , are such that

$$\Sigma s = 247 \qquad \Sigma s^2 = 6302$$

Work out the standard deviation for the students scores.

Question 17

Here are the maximum daily temperatures, in °C, recorded in a city in October

18 14 12 16 8 15 127 16 14 10

If you were asked to 'clean the data' what would you do ?

Question 18

Some data are collected.

The lower quartile is 46 and the upper quartile is 68.

An outlier is an observation that falls $1.5 \times$ (interquartile range) either above the upper quartile or below the lower quartile.

Show how to use this rule to determine if 11 is an outlier or not.

Question 19

State whether each of the following is qualitative or quantitative

(i) The colour of a person's shoes

(ii) The size of a person's shoes

Question 20

A researcher wishes to know peoples view on BREXIT.

She stands outside a supermarket with the aim of asking people what they think.

Before she starts, she has decided to ask ten people under the age of 30, ten people between 30 and 50, and ten people over 50.

What type of sampling is this ?

Question 21

For a set of 10 numbers;

$$\sum x = 50 \qquad \sum x^2 = 310$$

For a different set of 15 numbers

$$\sum x = 86 \qquad \sum x^2 = 568$$

Find the mean and the standard deviation of the combined set of 25 numbers