** Statistical Inquiry (H)**

Intervention Booklet

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Class: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Useful websites:**

**www.mathswatchvle.com**

*(Video explanations and questions)*

Centre ID: twgash

Username: firstname

Password: lastname

**www.methodmaths.com**

*(Past papers online that get instantly marked)*

Centre ID: wga

Username: firstname

Password: lastname

**www.hegartymaths.com**

*(Online tutorials and quizzes)*

Login: first name and last name are backwards and case sensitive

**www.bbc.co.uk/schools/gcsebitesize/maths**

**Sampling**

**Things to remember:**

* Random sampling is where every member of the population has an equal chance of being chosen, which makes it fair.
* With systematic sampling you are unlikely to get a biased sample.
* Stratified sampling is the best way to reflect the population accurately.
* Stratified sample = $\frac{total in group}{total in population} x sample size$

**Questions:**

**1.** In Holborn School there are

 460 students in Key Stage 3
 320 students in Key Stage 4
 165 students in Key Stage 5

 Nimer is carrying out a survey.
 He needs a sample of 100 students stratified by Key Stage.

Work out the number of students from Key Stage 3 there should be in the sample.

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**(Total for Question is 2 marks)**

**2.** Henri is carrying out a survey of the people aged 65 and over in his village.

The table shows information about these people.



Henri is going to take a sample of 30 people stratified by age.

How many people aged 75 – 79 should be in the sample?

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**(Total for Question is 3 marks)**

**3.** 156 students went to London.

Each student visited one of the British Museum or the National Gallery or the Stock Exchange.

The table gives information about these students.



Kate takes a sample of 30 of these students.

The sample is stratified by place visited and by gender.

Work out the number of male students who visited the Stock Exchange in the sample.

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**(Total for Question is 2 marks)**

**4.** There are 1200 students at a school. Kate is helping to organise a party. She is going to order pizza. Kate takes a sample of 60 of the students at the school. She asks each student to tell her **one** type of pizza they want. The table shows information about her results.



Work out how much ham pizza Kate should order.
Write down any assumption you make **and** explain how this could affect your answer.

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  **(Total for question = 3 marks)**

**5.** (a) Max wants to take a random sample of students from his year group.

(i) Explain what is meant by a random sample.

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(ii) Describe a method Max could use to take his random sample.

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 **(2)**

(b) The table below shows the numbers of students in 5 year groups at a school.

|  |  |
| --- | --- |
| **Year** | **Number of students** |
| 9  | 239  |
| 10  | 257  |
| 11  | 248  |
| 12  | 190  |
| 13  | 206  |

Lisa takes a stratified sample of 100 students by year group.

Work out the number of students from Year 9 she has in her sample.

      ...........................................................

**(2)**

**(Total for Question is 4 marks)**

**Averages from Tables**

**Things to remember:**

* The mode is the one with the highest frequency.
* To calculate the median, find where the middle value is located by using $\frac{n+1}{2}$.
* The mean is given by $\frac{Σfx}{Σf}$, ie. the total frequency x midpoint divided by the total frequency.
* Always look back at the data to check your answer looks realistic.

**Questions:**

**1.** Zach has 10 CDs. The table gives some information about the number of tracks on each CD.

|  |  |  |
| --- | --- | --- |
| **Number of tracks** | **Frequency** |  |
| 11 | 1 |  |
| 12 | 3 |  |
| 13 | 0 |  |
| 14 | 2 |  |
| 15 | 4 |  |

(a) Write down the mode.

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 **(1)**

(b) Work out the mean.

...........................................................

 **(3)**

**(Total 4 marks)**

**2.** 30 adults took part in a survey. They were each asked how much money they spent on lottery tickets last week. The table shows the results of the survey.

|  |  |  |
| --- | --- | --- |
| **Money (£)** | **Frequency** |  |
| 0 | 5 |  |
| 2 | 16 |  |
| 4 | 6 |  |
| 20 | 2 |  |
| 30 | 1 |  |

Work out the mean amount of money the 30 adults spent on lottery tickets.

£ ...........................................................

**(Total 3 marks)**

**3.** Josh asked 30 adults how many cups of coffee they each drank yesterday.

 The table shows his results.

|  |  |  |
| --- | --- | --- |
| **Number of cups** | **Frequency** |  |
| 0 | 5 |  |
| 1 | 9 |  |
| 2 | 7 |  |
| 3 | 4 |  |
| 4 | 3 |  |
| 5 | 2 |  |

Work out the mean.

...........................................................

 **(Total 3 marks)**

**4.** Majid carried out a survey of the number of school dinners 32 students had in one week.

 The table shows this information.

|  |  |  |
| --- | --- | --- |
| **Number of school dinners** | **Frequency** |  |
| 0 | 0 |  |
| 1 | 8 |  |
| 2 | 12 |  |
| 3 | 6 |  |
| 4 | 4 |  |
| 5 | 2 |  |

Calculate the mean.

...........................................................

 **(Total 3 marks)**

**5.** Fred did a survey on the areas of pictures in a newspaper.
The table gives information about the areas.

|  |  |
| --- | --- |
| Area (A cm2) | Frequency |
| 0 < *A* ≤ 10 | 38 |
| 10 < *A* ≤ 25 | 36 |
| 25 < *A* ≤ 40 | 30 |
| 40 < *A* ≤ 60 | 46 |

Work out an estimate for the mean area of a picture.

........................................................... cm²

**(Total 4 marks)**

**6.** The table gives some information about the time taken by a group of 100 students to complete an IQ test.

|  |  |  |
| --- | --- | --- |
| **Time (*t* seconds)** | **Frequency** |  |
| 60 < *t* < 70 | 12 |  |
| 70 < *t* < 80 | 22 |  |
| 80 < *t* < 90 | 23 |  |
| 90 < *t* < 100 | 24 |  |
| 100 < *t* < 110 | 19 |  |

(a) Write down the modal class interval.

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 **(1)**

(b) Calculate an estimate for the mean time taken by the students.

........................................................... seconds

**(4)**

**(Total 5 marks)**

**7.** The table gives some information about the time taken by a group of 100 students to complete an IQ test.

|  |  |  |
| --- | --- | --- |
| **Time (*t* seconds)** | **Frequency** |  |
| 60 < *t* ≤ 70 | 12 |  |
| 70 < *t* ≤ 80 | 22 |  |
| 80 < *t* ≤ 90 | 23 |  |
| 90 < *t* ≤ 100 | 24 |  |
| 100 < *t* ≤ 110 | 19 |  |

Calculate an estimate for the mean time taken by the students.

........................................................... seconds

**(Total 4 marks)**

**Petersen Capture-Recapture**

**Things to remember:**

* $\frac{M}{N}= \frac{m}{n}$ so $N= \frac{Mn}{m}$
* N is the population size to be estimated
* M is the number of members of the population that are captured initially and marked
* n is the number of members of the population that are captured subsequently
* m is the number of members of this subsequent captured sample that are marked
* Some assumptions we must make, however, are:
	+ There is no death, immigration or emigration (ie. the population is closed)
	+ The sampling methods used are identical
	+ The marking has not affected the survival rate of the animals

**Questions:**

**1**. Toga wants to estimate the number of termites in a nest.

On Monday Toga catches 80 termites.
He puts a mark on each termite.
He then puts all 80 termites back in the nest.

On Tuesday Toga catches 60 termites.
12 of these termites have a mark on them.

Work out an estimate for the total number of termites in the nest.
You must write down any assumptions you have made.

**(Total for question = 4 marks)**

**2**. A farmer wants to estimate the number of rabbits on his farm.

One day he catches 193 rabbits. He puts a tag on each rabbits then releases them.

Then next day the farmer catches 137 rabbits.

51 of these rabbits have a tag on them.

Work out an estimate for the total number of rabbits on his farm.

Write down any assumptions you have made.

**(Total for question = 4 marks)**

**3**. A scientist wants to estimate the number of fish in a disused canal. He catches a sample of 30 fish from the canal. He marks each fish with a dye and then puts them back in the canal. The next day the scientist catches 20 fish from the canal. He finds that 4 of them are marked with the dye.

(a) Estimate the total number of fish in the canal.

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**(2)**

(b) Write down any assumptions you made.

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 **(2)**

**(Total for question = 4 marks)**

**4.** A gardener wants to estimate the number of snails in his garden.

One day he catches 82 snails. He puts a tag on each snails then releases them.

Then next day the gardener catches 125 snails.

59 of these snails have a tag on them.

Work out an estimate for the total number of snails in his garden.

Write down any assumptions you have made.

**(Total for question = 4 marks)**

**5**. A fisherman wants to estimate the number of fish in his pond.

One day he catches 164 fish. He puts a tag on each fish then releases them.

Then next day the fisherman catches 73 fish.

33 of these fish have a tag on them.

Work out an estimate for the total number of fish in his pond.

Write down any assumptions you have made.

**(Total for question = 4 marks)**