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| **Year 12 Core Maths** **End of Year Assessment 2020** |
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| Time: | **60 minutes** |
| Marks: | **38 marks** |
| Comments: |  |
|  |

**Q1.**

Estimate how many hours of sleep the average person in the UK has in their lifetime.

State any assumptions you make.

You **must** show your working.

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**(Total 5 marks)**

**Q2.**

A company runs 5 gyms in a city.

Each gym has 140 members.

(a)  The owner of the company wants to conduct a face-to-face survey among the members.

She decides to use a cluster sample.

Is this a suitable sampling method to use?

Give reasons for your answer.

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**(2)**

For a different survey, the owner needs to consider the different genders of the 700 members.

There are 580 males and 120 females.

(b)  What type of sampling method should she use?

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(c)  She requires a sample of 175 members.

How many more males than females should be in her sample?

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**(3)**

**(Total 6 marks)**

**Q3.** The boys from class 10A did a cross-country run.

Here are their times in minutes.

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| --- | --- | --- | --- | --- | --- |
| 24.6 | 22.3 | 29.2 | 36.4 | 31.3 | 35.0 |
| 25.4 | 34.5 | 42.0 | 39.6 | 19.5 |   |

(a)  What was the median time in minutes? Circle your answer.

|  |  |  |  |
| --- | --- | --- | --- |
| 22.5 | 30.9 | 31.3 | 35.0  |

 **(1)**

(b)  Work out the interquartile range of the times for the boys from class 10A.

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**(2)**

(c)  The rest of the year 10 boys in the school also did the cross-country run.

The box and whisker diagram shows the distribution of their times.



Compare the performance of the boys in class 10A with the rest of the year 10 boys.

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**(4)**

**(Total 7 marks)**

**Q4.**

Ben has booked a holiday and paid the deposit.

He has to pay the balance of £2173 in seven months’ time.

Ben’s net pay is £838 per month.

He pays

12% of this pay into a private pension

£250 to his parents towards living costs.

He decides to save  of his remaining money to pay for the holiday.

Will Ben have saved enough to pay the balance in seven months’ time?

You **must** show your working.

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**(Total 4 marks)**

**Q5.**

In an enterprise project Anish buys sweatshirts for £22.50 each.

He has to decide what price, P, he wants to put on each sweatshirt.

If he doesn’t sell them all, he will reduce this price, P, by 10%

He still wants to make 20% profit on each reduced price sweatshirt.

What should the price, P, be for each sweatshirt?

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**(Total 3 marks)**

**Q6.**

Ralf is training for a long-distance swim.

He records his times for 50 training swims of 800 metres.

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| --- | --- |
| **Time, *t* (minutes)** | **Frequency** |
| 14.0 ≤ *t* < 14.5 |  2 |
| 14.5 ≤ *t* < 15.0 |  5 |
| 15.0 ≤ *t* < 15.5 |  7 |
| 15.5 ≤ *t* < 16.0 | 12 |
| 16.0 ≤ *t* < 16.5 | 16 |
| 16.5 ≤ *t* < 17.0 | 8 |

(a)  Calculate an estimate of the mean time for the 50 swims.

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Answer \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ minutes

**(2)**

(b)  Explain how you can check if your answer is sensible.

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**(1)**

(c)  Calculate an estimate of the standard deviation of the times for the 50 swims.

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Answer \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ minutes

**(2)**

(d)  A swimming coach helps with Ralf’s training for 6 weeks.

Here is some information about his 800-metre training swims after the coaching.

|  |  |
| --- | --- |
| Mean time | 14.2 minutes |
| Standard deviation | 0.53 minutes |

Compare his performance before and after the coaching.

Show working to support your answer.

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**(3)**

**(Total 8 marks)**

**Q7.**

Sophie is a 400-metre runner.

She records her training times in seconds.

Her training times can be modelled by the distribution N(59.6, 1.5 2).

(a)  Write down the standard deviation of Sophie’s training times.

Answer \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ seconds

**(1)**

(b)  Work out the probability that Sophie’s next training time will be between 59.0 seconds and 59.8 seconds.

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**(4)**

**(Total 5 marks)**