**AQA – Probability – AS Mathematics P2**

**1.** June/2020/Paper_2/No.15

A random sample of ten $CO_2$ emissions was selected from the Large Data Set.

The emissions in grams per kilogram were:

13 45 45 0 49 77 49 49 49 78

**(a)** Find the standard deviation of the sample.

**[1 mark]**

**(b)** An environmentalist calculated the average $CO_2$ emissions for cars in the Large Data Set registered in 2002 and in 2016.

The averages are listed below.

| **Year of registration** | 2002 | 2016 |
|---|---|---|
| **Average $CO_2$ emission** | 171.2 | 120.4 |

The environmentalist claims that the average $CO_2$ emissions for 2002 and 2016 combined is 145.8

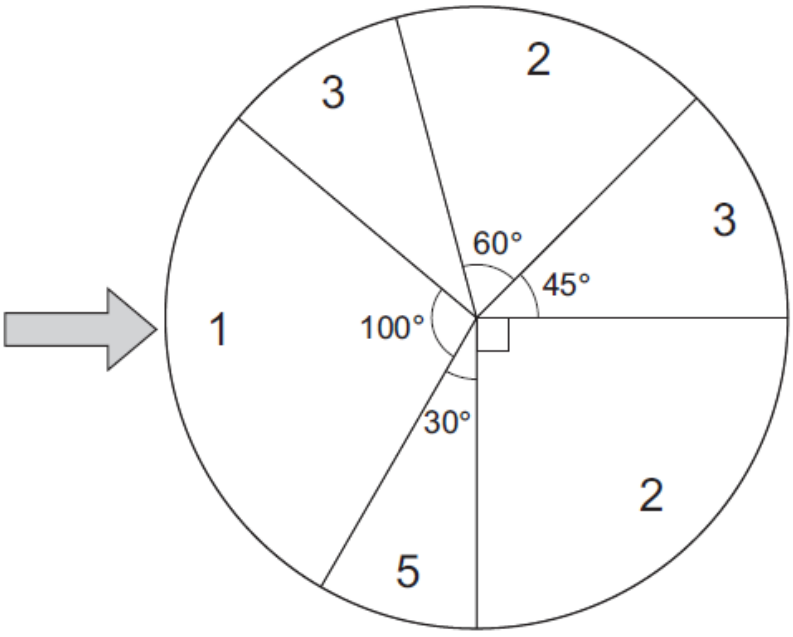
Determine whether this claim is correct.

Fully justify your answer.

**[2 marks]**

**2.** June/2020/Paper_2/No.17

A game consists of spinning a circular wheel divided into numbered sectors as shown below.




On each spin the score, $X$, is the value shown in the sector that the arrow points to when the spinner stops.

The probability of the arrow pointing at a sector is proportional to the angle subtended at the centre by that sector.

**(a)** Show that $P(X = 1) = \frac{5}{18}$

**[1 mark]**

**(b)** Complete the probability distribution for $X$ in the table below.

| $x$ | 1 | | | |
|---|---|---|---|---|
| $P(X = x)$ | $\frac{5}{18}$ | | | |

**[2 marks]**

**3.** June/2020/Paper_2/No.18

**(a)** Bag A contains 7 blue discs, 4 red discs and 1 yellow disc.

Two discs are drawn at random from bag A **without replacement**.

Find the probability that exactly **one** of the discs is blue.

**[2 marks]**

**(b)** Bag A contains 7 blue discs, 4 red discs and 1 yellow disc.

Bag B contains 3 blue discs and 6 red discs.

A disc is drawn at random from Bag A and placed in Bag B.

A disc is then drawn at random from Bag B.

Find the probability that the disc drawn from Bag B is red.

**[3 marks]**

**4.** June/2019/Paper_2/No.13

Denzel wants to buy a car with a propulsion type **other than** petrol or diesel.

He takes a sample, from the Large Data Set, of the $CO_2$ emissions, in g/km, of cars with one particular propulsion type.

The sample is as follows

82 13 96 49 96 92 70 81

**(a)** Using your knowledge of the Large Data Set, state which propulsion type this sample is for, giving a reason for your answer.

**[2 marks]**

**(b)** Calculate the mean of the sample.

**[1 mark]**

**(c)** Calculate the standard deviation of the sample.

**[1 mark]**

**(d)** Denzel claims that the value 13 is an outlier.

**(d) (i)** Any value more than 2 standard deviations from the mean can be regarded as an outlier.

Verify that Denzel's claim is correct.

**[1 mark]**

**(d) (ii)** State what effect, if any, removing the value 13 from the sample would have on the standard deviation.

**[1 mark]**

**5.** June/2019/Paper_2/No.14

A probability distribution is given by

$$P(X = x) = c(4 - x), \text{ for } x = 0, 1, 2, 3$$

where $c$ is a constant.

**(a)** Show that $c = \frac{1}{10}$

**[2 marks]**

**(b)** Calculate $P(X \geq 1)$

**[2 marks]**

**6.** June/2019/Paper_2/No.15

Two independent events, $A$ and $B$, are such that

$$P(A) = 0.2$$

$$P(A \cup B) = 0.8$$

**(a) (i)** Find $P(B)$

**[4 marks]**

**(a) (ii)** Find $P(A \cap B)$

**[1 mark]**

**(b)** State, with a reason, whether or not the events $A$ and $B$ are mutually exclusive.

**[1 mark]**