

# Mathematics

Edexcel IAL

S1

Worksheet Answers

Measures of Location and Spread

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## Mathematical Modelling:

### Exercise:

- 1 The statistical tests provide a clear and objective means of deciding the differences between the model's prediction and experimental data. These tests will show if and how the model can be refined even further.
- 2 Predictions based on the model are compared with the experimental data. By analysing this, the model and is adjusted and refined. The process is repeated.
- 3 Stage 1: The recognition of a real-world problem  
Stage 4: Experimental data is collected from the real world  
Stage 6: Statistical concepts are used to test how well the model describes the real-world problem

## Measures of Location and Spread

### Exercise 1:

- 1 a Quantitative as it is numerical  
b Qualitative as it is a descriptive word  
c Quantitative as it is numerical  
d Quantitative as it is numerical  
e Qualitative as it is a descriptive word
- 2 a Not True                      b True  
c True                              d Not True
- 3 a 5.95 and 6.95              b 9.45
- 4 a 1.4 and 1.5                 b 1.35

### Exercise 2:

- 1 a 700 g                      b 600 g                      c 700 g  
d The mean will increase; the mode will remain unchanged; the median will decrease.
- 2 a 42.7  
b The mean will increase.
- 3 a May: 23 355 m, June: 21 067 m  
b 22 230 m
- 4 a 8 minutes              b 10.2 minutes      c 8.5 minutes  
d The median would be best. The mean is affected by the extreme value 26.
- 5 a 2                      b 1                      c 1.47                      d the median
- 6 6.31 petals
- 7  $p = 1$

### Exercise 3:

- 1 a €351 to €400              b €345                      c €351 to €400
- 2 a 82.3 decibels  
b The mean is an estimate as we don't know the exact noise levels recorded.
- 3 a  $16 \leq t < 18$   
b  $16.5^{\circ}\text{C}$  (correct to 3 s.f.)
- 4 Shop B (mean 51 years) employs older workers than shop A (mean 50 years).

#### Exercise 4:

- 1 a 1020 hPa      b  $Q_1 = 1017$  hPa,  $Q_3 = 1024.5$  hPa
- 2  $Q_1 = 37$ ,  $Q_2 = 37$ ,  $Q_3 = 38$
- 3 1.08
- 4 a 432 kg      b 389 kg      c 480 kg  
d Three-quarters of the cows weigh 480 kg or less.
- 5 a 44.0 minutes    b 48.8 minutes  
c 90th percentile = 57.8 minutes so 10% of customers have to wait longer 57.8 minutes, not 56 minutes as stated by the firm.
- 6 a 2.84 m. 80% of condors have a wingspan of less than 2.84 m.  
b The 90th percentile is in the  $3.0 \leq w$  class. There is no upper boundary for this class, so it is not possible to estimate the 90th percentile.

#### Exercise 5:

- 1 a 71      b 24.6      c 193.1 mm      d 7
- 2 a \$81.87      b 22
- 3 a 6.2 minutes    b 54
- 4 a Median 11.5 °C,  $Q_1 = 10.3$  °C,  $Q_3 = 12.7$  °C, IQR = 2.4 °C  
b On average, the temperature was higher in June than in May (higher median). The temperature was more variable in May than June (higher IQR).  
c 24 days

#### Exercise 6:

- 1 a 3      b 0.75      c 0.866
- 2 3.11 kg
- 3 a 178 cm      b 59.9 cm<sup>2</sup>      c 7.74 cm
- 4 Mean 5.44, standard deviation 2.35
- 5 a Mean OMR10.22, standard deviation OMR1.35  
b 19
- 6 1.23 days

- 7 Mean 16.1 hours, standard deviation 4.69 hours  
 One standard deviation below mean 11.41 hours.  
 41 parts tested (82%) lasted longer than one  
 standard deviation below the mean. According to the  
 manufacturers, this should be 45 parts (90%), so the  
 claim is false.
- 8 **a** Mean 8.1 knots, standard deviation 3.41 knots  
**b** 12 days  
**c** The wind speeds are equally distributed throughout  
 the range.

### Challenge

Mean = 81.8 cents, standard deviation = \$1.03

### Exercise 7

- 1 **a** 11, 9, 5, 8, 3, 7, 6      **b** 7      **c** 70  
 2 **a** 7, 10, 4, 10, 5, 11, 2, 3      **b** 6.5      **c** 48.5  
 3 365  
 4 2.34

5 **a**

Battery life ( <i>b</i> years)	Frequency ( <i>f</i> )	Midpoint ( <i>x</i> )	$y = \frac{x - 14}{2}$
11-21	11	16	1
21-27	24	24	5
27-31	27	29	7.5
31-37	26	34	10
37-43	12	40	13

- b** Coded mean = 7.495  
 Actual mean – 28.99 or 29 hours to the nearest hour

- 6 **a** 1.2 hours      **b** 25.1 hours      **c** 1.76 hours  
 7 22.9
- 8 416 mm
- 9 Mean 1020 hPa, standard deviation 6.28 hPa