Data Collection 1E

1 a Leuchars

b Perth

c Any one from: Leeming, Heathrow, Beijing

d Any one from: Leuchars, Hurn, Camborne, Jacksonville, Perth

e Any one from: Beijing, Jacksonville, Perth

2 Daily maximum relative humidity is a continuous variable as it can take any percentage value between 0 and 100.

3 a i Mean daily total sunshine for Leeming = $\frac{101.4}{10}$ = 10.1 hrs (to 1 d.p.)

ii Mean daily total sunshine for Heathrow = $\frac{76}{10}$ = 7.6 hrs

b i Leeming range = 14.6 − 5.1 = 9.5 hrs

ii Heathrow range = 14.4 − 1.6 = 12.8 hrs

c Part (**a**) shows that Leeming has a higher average number of hours of sunshine. Leeming is further north than Heathrow, so the data does not support Supraj's conclusion. (The range calculated in part (**b**) does not affect this.)

4 The rainfall on 2/6/2015, 5/6/2015 and 8/6/2015 was recorded as 'tr', meaning trace, which is between 0 and 0.05 mm of rain. However, we treat the trace amounts as 0 in numerical calculations as anything less than 0.05 mm would be 0.0 to 1 decimal place.

$$\text{Mean daily total rainfall in Heathrow} = \frac{0.6 + 0 \times 3 + 0 \times 5 + 0.8}{10}$$
$$= \frac{1.4}{10}$$
$$= 0.14 \text{ mm}$$

5 a i Using multiple months provides more data.

ii Two days out of each month of 30 or 31 days is a small sample size.

b He is choosing the last day of one month followed by the first day of the next month, which is not random. These consecutive days are likely to be affected by the same weather pattern.

c He could number the days and choose a simple random sample.

6 a Perth is in the Southern hemisphere, where it will be winter in August, and Jacksonville is in the Northern hemisphere, where it will be summer. So it is likely to be hotter in Jacksonville.

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6 b The lowest temperatures in the UK are at coastal locations – Leuchars and Camborne (14.7 °C and 15.4 °C). The highest temperature is at an inland location – Beijing (26.6 °C). There is some evidence to support this conclusion.

7 1 okta corresponds to 1 eighth of the sky covered by cloud, and so the maximum figure for cloud cover is 8. Brian's answer is more than that and so is incorrect.

8 a Marie should select days at regular intervals from an ordered list. She should put the days into date order. Then she should begin at a random day between 1 and 6 and select every 6th day thereafter since $184 \div 30 \approx 6$.

b There may be missing values because the data is not available.

Large data set

1 a Mean pressure = $\frac{31628}{31}$ = 1020 hPa (to the nearest whole number)

b When the rainfall for July 2015 is in numerical order, the first seventeen days had zero rainfall, so the median daily rainfall is 0.0 mm.

c i The grouped frequency table shows the daily mean temperature in Heathrow in July and August 2015.

Temperature (°C)	Frequency
$10 \leq t < 15$	1
$15 \leq t < 20$	50
$20 \leq t < 25$	10
$25 \leq t < 30$	1

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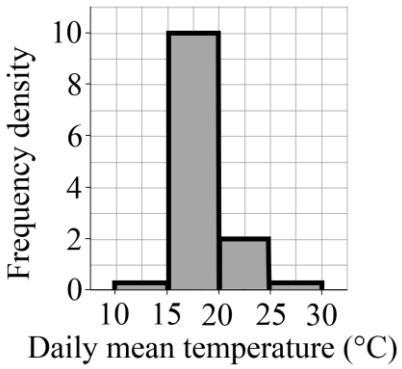
1 c ii Frequency densities are:

$10 \leq t < 15$: $\frac{1}{5} = 0.2$

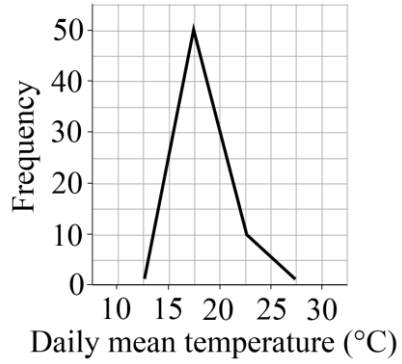
$15 \leq t < 20$: $\frac{50}{5} = 10$

$20 \leq t < 25$: $\frac{10}{5} = 2$

$25 \leq t < 30$: $\frac{1}{5} = 0.2$



iii



2 a i Give each day a number from 1 to 184. Use a calculator to generate 10 random numbers, for example:

43, 4, 102, 23, 139, 106, 164, 94, 163, 63

This gives the sample of wind speeds: 4, n/a, 4, 12, 3, 8, 4, 8, 5 and 3.

ii Mean daily wind speed excluding the value n/a is $\frac{51}{9} = 6$ kn (to the nearest whole number)

b i The first ten available values are 5, 8, 7, 11, 9, 7, 10, 7, 5 and 5.

ii Mean daily mean wind speed = $\frac{74}{10} = 7$ kn (to the nearest whole number)

c The simple random sample is likely to be more representative as the opportunity sample records consecutive days, which are likely to affect one another.

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2 d Any two of:

Take a bigger sample, as 10 sample units is likely to be insufficient.
Take a stratified sample, categorising by month.
Take a systematic sample.

Both of the final options guarantee that you will take data spread over a range of months.

e Example: A stratified sample of 30 days.

Month	May	Jun	Jul	Aug	Sep	Oct
Number of days	31	30	31	31	30	31

$\frac{31}{184} \times 30 = 5.05 \approx 5$ days
$\frac{30}{184} \times 30 = 4.89 \approx 5$ days

Therefore, take a simple random sample of 5 days from each month for both Leeming and Leuchars in 1987.

In the sample taken for this example, 4 of the values for Leeming and Leuchars were not available and so the calculations will be evaluated from the remaining 26 sample units.

Mean windspeed for Leeming = $\frac{166}{26}$ = 6 kn (to the nearest whole number)
Mean windspeed for Leuchars = $\frac{183}{26}$ = 7 kn (to the nearest whole number)

Leuchars is a coastal location and has a higher average wind speed than the inland location of Leeming so the calculation supports the statement 'Coastal locations are likely to have higher average windspeeds than inland locations.'

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