Statistics 1 - Sampling Methods

<u>Section 1</u>

Q1. $a = \dfrac{x+4}{x+2}$

$a(x+2) = x+4$

$ax + 2a = x + 4$

$ax - x = 4 - 2a$

$x(a-1) = 4 - 2a$

$$\boxed{x = \dfrac{4-2a}{a-1}}$$

Q2 a, $64^{-2/3} = \left(\dfrac{1}{\sqrt[3]{64}}\right)^2 = \left(\dfrac{1}{4}\right)^2 = \boxed{\dfrac{1}{16}}$

b, $\left(3\tfrac{1}{16}\right)^{-3/2} = \left(\dfrac{49}{16}\right)^{-3/2} = \left(\dfrac{16}{49}\right)^{3/2} = \left(\dfrac{\sqrt{16}}{\sqrt{49}}\right)^3 = \left(\dfrac{4}{7}\right)^3 = \boxed{\dfrac{64}{343}}$

Q3. $\sqrt{192} - \sqrt{108} = \sqrt{64 \times 3} - \sqrt{36 \times 3} = 8\sqrt{3} - 6\sqrt{3} = \boxed{2\sqrt{3}}$

Q4. $\dfrac{1}{a} = \dfrac{1}{b} + \dfrac{1}{c}$ $\longrightarrow$ $\times b$ $\dfrac{b}{a} = 1 + \dfrac{b}{c}$

$\times a$ $b = a + \dfrac{ab}{c}$

$\times c$ $bc = ac + ab$

$bc - ab = ac$

$b(c-a) = ac$

$$\boxed{b = \dfrac{ac}{c-a}}$$

Q5 a, 2°C

b, Negative correlation. The further above sea
level you go, the lower the air temperature.

c, 2.7 km

Section 2

1a, $\frac{24}{564} \times 60$ = 2.55 = 3 Boys in Chess (3)

b, $\frac{82}{564} \times 60$ = 8.72 = 9 Girls in drama. (3)

2,a, Simple random sampling ✓

b, It is easier / quicker / requires no calculations
✓ any 1 comment.

c, 4 ✓ (138, 004, 103, 075)
others are larger than 184 / or repeated.

d, The large data set ~~only~~ does not contain
information on cloud cover for Beijing. ✓ (4)

Q3, a, <u>Cloud cover</u> ✓ (accept 'Daily mean windspeed on the Beaufort scale)

b, ① Give each piece of data a number
② Generate random numbers (include numbers that are 3 digits)
③ If a random number does not correspond to a data point (due to gaps / repeats / being out of range) ignore it and choose another.

④ Continue this way until 15 points are chosen.

c, <u>Not reliable</u> since he <u>only</u> used <u>15</u> data points, which is unlikely to be a 'good representation of the weather in Leeming in 2015'.

d, The <u>Large</u> data set <u>only</u> contains data for months of <u>May - October</u> and <u>not the whole year</u>.

Q4, a, Statified sampling ✓ (1)

b, 10% of 4 = 0.4 → <u>1 large load</u> ✓
10% of 136 = 13.6 → <u>13 light vans</u> ✓
10% of 21 = 2.1 → <u>2 cars</u> ✓ (3)

Must add up to 16.

Q5a, <u>Systematic sampling</u> ✓ (2)

b, Some of the <u>data is missing</u> in the LDS, so this may generate a day in a month that has not data.

Q6, - The cost of train journeys changes depending on the time of the day.
At midday she may not get an unbiased result of the various different prices available at other times. ✓

- 10 is a rather small amount of people to ask in a survey. ✓ (2)

- Other relevant answers!

Q7, a. Quota sampling ✓ (1)

b. quick and easy to complete ✓ (1)

c. - He could randomly sample within each 'Strata'
- He could also consider the age of the students within his sample
- He could ask more students (create a larger sample)
✓✓ (2)