ALEVEL Statistics Induction Work:

Please complete these questions over the summer ready for your first lesson. Please look at the attached teacher answers and mark your work accordingly.

1. Eighty motorists were asked to estimate the distance they each drive in a year.
The results are summarised in the table.

Distance in miles (m thousands)	Frequency	Midpoint (x)	fx	c.f. Cumulative frequency
$0 < m \le 5$	16	2.5	40	16
$5 < m \le 10$	38	7.5	285	54
$10 < m \le 15$	18	12.5	225	72
$15 < m \le 20$	6	17.5	105	78
$20 < m \le 25$	2	22.5	45	80
	80		700	

(a) Calculate an estimate of the **mean** distance.

$$\text{Mean} = \frac{\Sigma fx}{\Sigma f} = \frac{700}{80}$$

$$= 8.75$$

......8.75..... thousand miles

[4]

(b) Explain how you can use the table to justify this statement.

The median distance is in the interval 5 < m ≤ 10.

The 40th position is in the 5<m<10 interval (see cumulative frequency).

[1]

2. These are the weekly wages, in pounds (£), paid to 11 workers.

275 160 842 275 420 359 315 275 740 280 195

Jermaine says the average wage is £280.
Jane says the average wage is £376.

Show how they can both be correct.

Mean = 4136 ÷ 376
     = 376

Median   160, 195, 275, 275, 275, (280), 315, 359, 420, 740, 842

     = 280

Both Mean and Median are averages.
See justifying above

[5]

3. Three friends keep a record of their scores at ten-pin bowling.

(a) These are Ben's scores for 8 games.

104   118   156   78   110   162   176   144

(i) Work out the mean of Ben's scores.

$1048 \div 8 =$

...........131..........

[3]

(ii) Work out the range of Ben's scores.

$176 - 78$

...........98..........

[1]

(b) This table shows the mean and range for Ben's two friends, Chris and Denzil.

	Chris	Denzil
Mean	135	160
Range	46	72

Which of the **three** players is the most consistent?
Give a reason for your decision.

.......Chris....... because

.....smaller range means more consistent............

....

[1]

4. The ages of people in a group are shown below.

39	16	36	21	43	24	28	38
8	20	40	34	27	38	18	26
19	49	15	12	9			

(a) Complete the stem and leaf diagram.

key 2|7

0	8 9
1	2 5 6 8 9
2	0 1 4 6 7 8
3	4 6 8 8 9
4	0 3 9

0	8 9
1	6 8 9 5 2
2	1 4 8 0 7 6
3	9 6 8 4 8
4	3 0 9
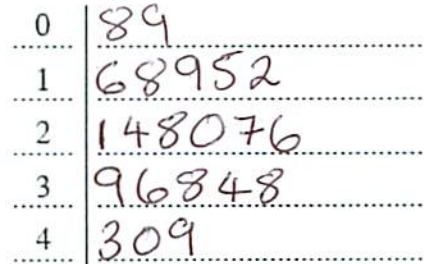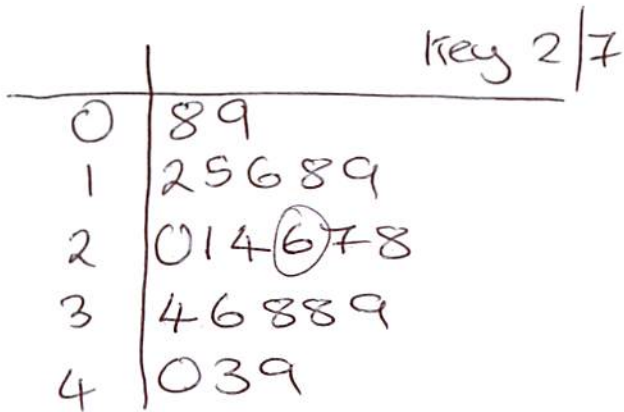
Key: 2 | 7 = 27

Key : 2|7 = 27

[3]

(Must be ordered).

(b) For these ages, find

(i) the median,

$$\frac{n+1}{2} = \frac{21+1}{2} = 11^{th}\text{ value}$$

26

[1]

(ii) the range.

$$49 - 8$$
$$= 41$$

41

[1]

5. The pulse rates, in beats per minute, of 20 people were recorded as they left work.

The results are shown in this stem and leaf diagram.

```
 6 | 2 3 3 5 7 9
 7 | 1 4 5 8 8
 8 | 1 1 2 4 6
 9 | 2 9
10 | 1 2
```

Key 8|1 represents 81 beats per minute

Median = 78

(a) Work out the range of the pulse rates.

$102 - 62$

$= 40.$

................40................

[1]

(b) The pulse rates of another 20 people were recorded as they left an aerobics class. These are the results:

97 130 136 136 115 121 137 129 128 124

129 102 132 135 135 110 124 129 128 108

Show these results in a stem and leaf diagram.

Must be ordered.
and have a key.

10|2 means
102.

```
 9 | 7
10 | 2 8
11 | 0 5
12 | 1 4 4 8 8 9 9 9
13 | 0 2 5 5 6 6 7.
```

```
 9 | 7
10 | 2 8
11 | 5 0
12 | 1 9 8 4 9 4 9 8
13 | 0 6 6 7 2 5 5
```

[2]

Median = 128·5

Range = 137 - 97
        = 40

(c) Make two comments comparing the pulse rates of the two groups.

1 Median pulse rate for leaving work is lower (78) compared with (128.5) suggesting on average pulse rates are lower.

2 The range for both pulse sittings are the same suggesting the same amount of consistency

[2]

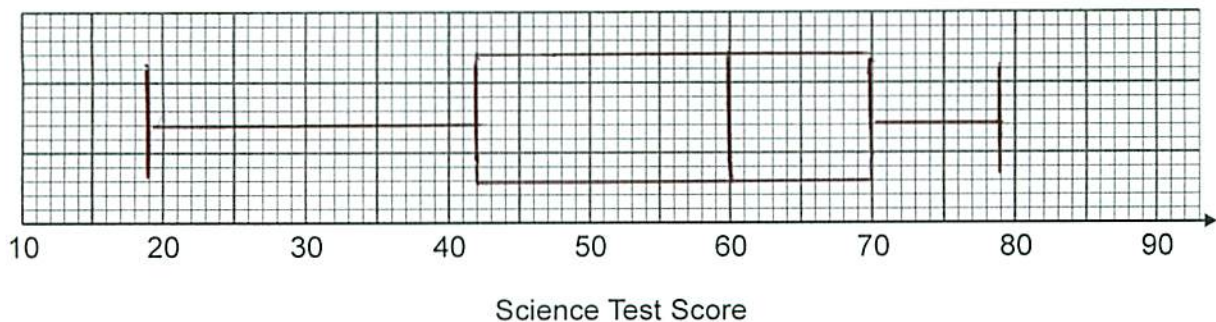6. The scores in a science test are summarised in the table below.

Minimum mark	19
Range	60
Median	60
Lower quartile	42
Interquartile range	28

19+60=79

42+28 =70 ← Upper quartile

Between Whiskers

Use this information to draw a box plot.
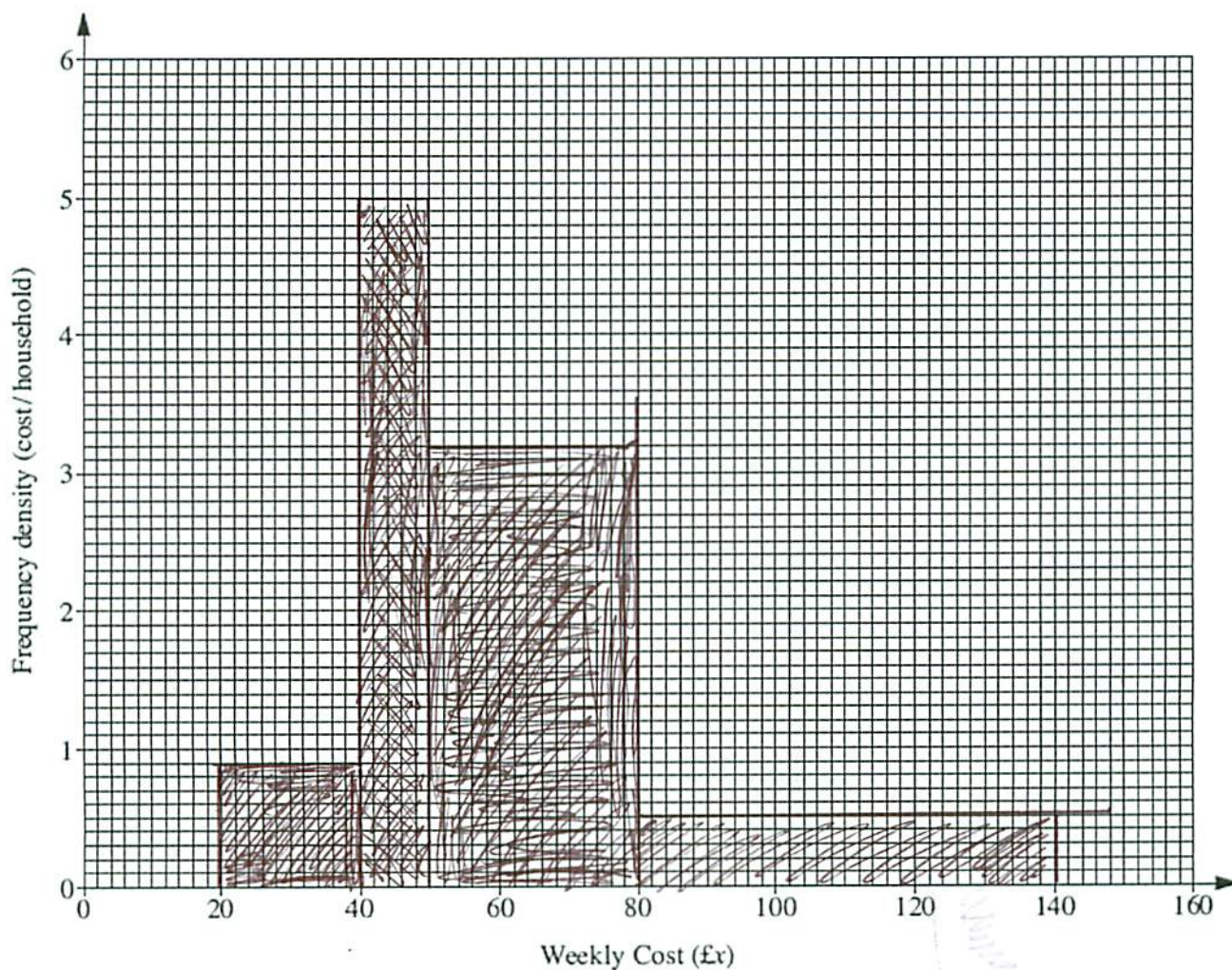

Science Test Score

[3]

7. This table shows the distribution of the weekly costs, £x, of groceries for a sample of 200 households in the UK.

Weekly Cost (£x)	Frequency	cw	fd
20 < x ≤ 40	18	20	0.9
40 < x ≤ 50	50	10	5
50 < x ≤ 80	96	30	3.2
80 < x ≤ 140	36	60	0.6

$$fd = \frac{f}{cw}.$$

Draw a histogram to illustrate the data in the table.

Frequency density (cost / household)

Weekly Cost (£r)

[3]

8. In a city 33% of the people have been vaccinated against influenza. A person who has been vaccinated has a 6% chance of catching influenza. A person who has not been vaccinated has a 41% chance of catching influenza.

What is the probability that a person in that city, selected at random, will catch influenza?

Vaccinated?   Disease?

$$0.33 \times 0.06 = 0.0198$$

$$0.33 \times 0.94 = 0.3102$$

$$0.67 \times 0.41 = 0.2747$$

$$0.67 \times 0.59 = 0.3953$$

$$0.0198 + 0.2747 \quad [3]$$
$$= 0.2945$$
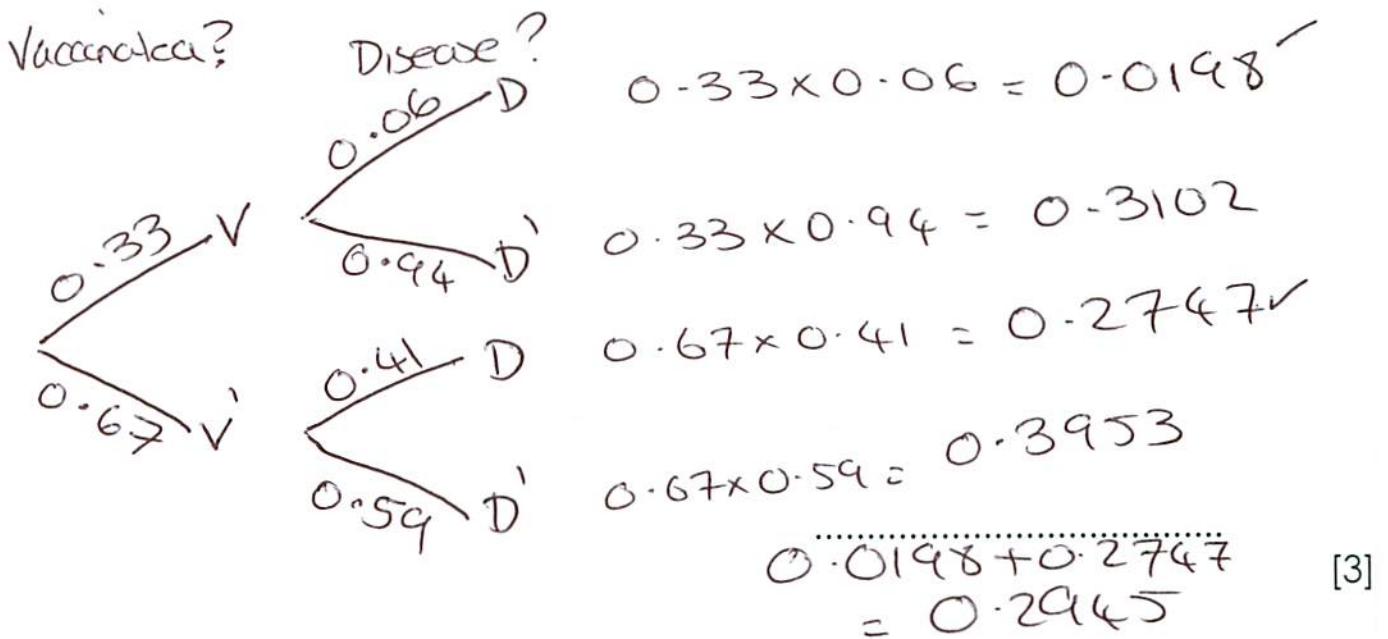
9. The probability that a train is late is 1/7. During the next three days, what is the probability:

a) It is late once

$$\left(\frac{1}{7} \times \frac{6}{7} \times \frac{6}{7} \right) \times 3$$ As there are 3 combinations   ✓ Answer to 3 sig figs

.......0.315....... [2]

b) On time for the next six days.

$$\frac{6^6}{7}$$

.......0.397....... [2]

10. 20 people, four are wearing spectacles. Three are selected at random, find the probability that:

a) They all wear spectacles

$P(spectacles) = 4/20$

$P(Not) = 16/20$

$$\frac{4}{20} \times \frac{3}{19} \times \frac{2}{18} =$$

0·00351 ....[2]

b) None wear spectacles.

$$\frac{16}{20} \times \frac{15}{19} \times \frac{14}{18}$$

0·4912 ....[2]