

1.6 Answers

A-level Statistics : Year 1 Partitioning Data

1.6.1 Solutions (1.3 Example)

(i)

$$\frac{1}{4} \times 8 = 2, \text{ which is an integer so } Q_1 = \frac{15 + 16}{2} = 15.5$$

$$\frac{2}{4} \times 8 = 4, \text{ which is an integer so } Q_2 = \frac{17 + 19}{2} = 18$$

$$\frac{3}{4} \times 8 = 6, \text{ which is an integer so } Q_3 = \frac{19 + 20}{2} = 19.5$$

(ii) $IQR = Q_3 - Q_1$
 $= 19.5 - 15.5$
 $= 4 \text{ marks}$

(iii)

Boys	15	15	16	17	19	19	20	21
			^		^		^	

(iv) ARU means “Always Round Up”

$$\frac{1}{4} \times 9 = 2.25, \text{ which is NOT an integer (ARU) } Q_1 = 18$$

$$\frac{2}{4} \times 9 = 4.5, \text{ which is NOT an integer (ARU) } Q_2 = 22$$

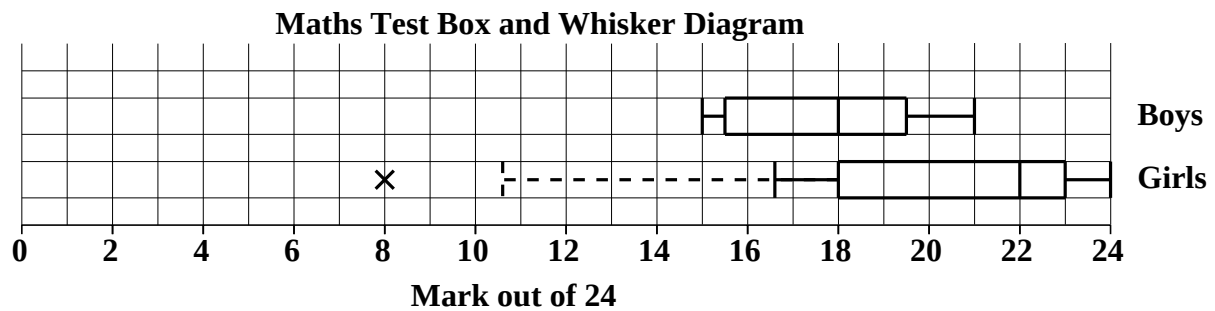
$$\frac{3}{4} \times 9 = 6.75, \text{ which is NOT an integer (ARU) } Q_3 = 23$$

(v) $IQR = Q_3 - Q_1$
 $= 23 - 18$
 $= 5 \text{ marks}$

(vi)

Girls	8	17	18	21	22	22	23	24	24
			^		^		^		

(vii)



(viii) On average (median) the girls have scored higher than the boys.
The girls' results are more spread out than the boys' results.

1.6.2 Solutions (1.4 Example)

N° of bad apples	0	1	2	3	4	5	6	7	8	9	10
Frequency	55	14	21	12	9	15	3	5	0	3	1
Cumulative	55	69	90	102	111	126	129	134	134	137	138

(i) 80th percentile, P₈₀

$$\frac{80}{100} \times 138 = 110.4 \quad (\text{ARU}) \quad \text{Item 111 is 4 bad apples}$$

(ii) 97th percentile, P₉₇

$$\frac{97}{100} \times 138 = 133.86 \quad (\text{ARU}) \quad \text{Item 134 is 7 bad apples}$$

(iii) 50th percentile, P₅₀

$$\frac{50}{100} \times 138 = 69$$

The average (mean) of item 69 and item 70 is 1.5 bad apples

1.6.3 Solutions (1.5 Exercise)

Answer 1

- (i) (a) 27 minutes 30 seconds
 (b) 2 minutes
- (ii) (a) 34 minutes 30 seconds
 (b) 75%
- (iii) The cross is a woman who is an outlier
 She ran the race in a remarkably short time of 26 minutes 30 seconds
- (iv) On average the men ran faster and so took less time
 Median for Men is 29 minutes 45 seconds, for women 34 minutes 30 seconds

The men were less spread out than the women

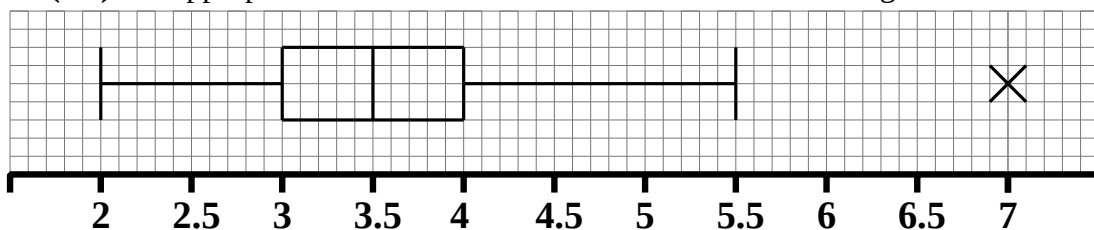
The IQR for the men was 2 minutes, but for the women it was 3 minutes

Answer 2

- (i) 64
- (ii) (a) position is 26th (25.6 rounded up)
 (b) $D_4 = 49$ (The first of the two 49s)
- (iii) position is 45th (44.8 rounded up) so $D_7 = 62$
- (iv) median is 53.5, which is also D_5

Answer 3

- (i) Q_1 position is 8th (7.5 rounded up) so $Q_1 = 3$
 $Q_2 = 3\frac{1}{2}$
 Q_3 position is 23rd (22.5 rounded up) so $Q_3 = 4$
- (ii) IQR = 1
- (iii) $Q_3 + 1.5 \times \text{IQR} = 4 + 1.5 \times 1 = 5.5 \therefore 7$ is an outlier $\square$
- (iv) Appropriate title and labelled axis added to the following...



Answer 4

Put the data in order !

$Q_1 = 3$, $Q_2 = 7$, $Q_3 = 8$

Answer 5

$$D_3 = 2, D_9 = 6$$

Answer 6

$$P_{33} = 13, P_{66} = 14$$

Answer 7

$$Q_1 = 35, Q_2 = 44, Q_3 = 55$$

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Teachers may obtain detailed worked solutions to the exercises by email from mhh@shrewsbury.org.uk