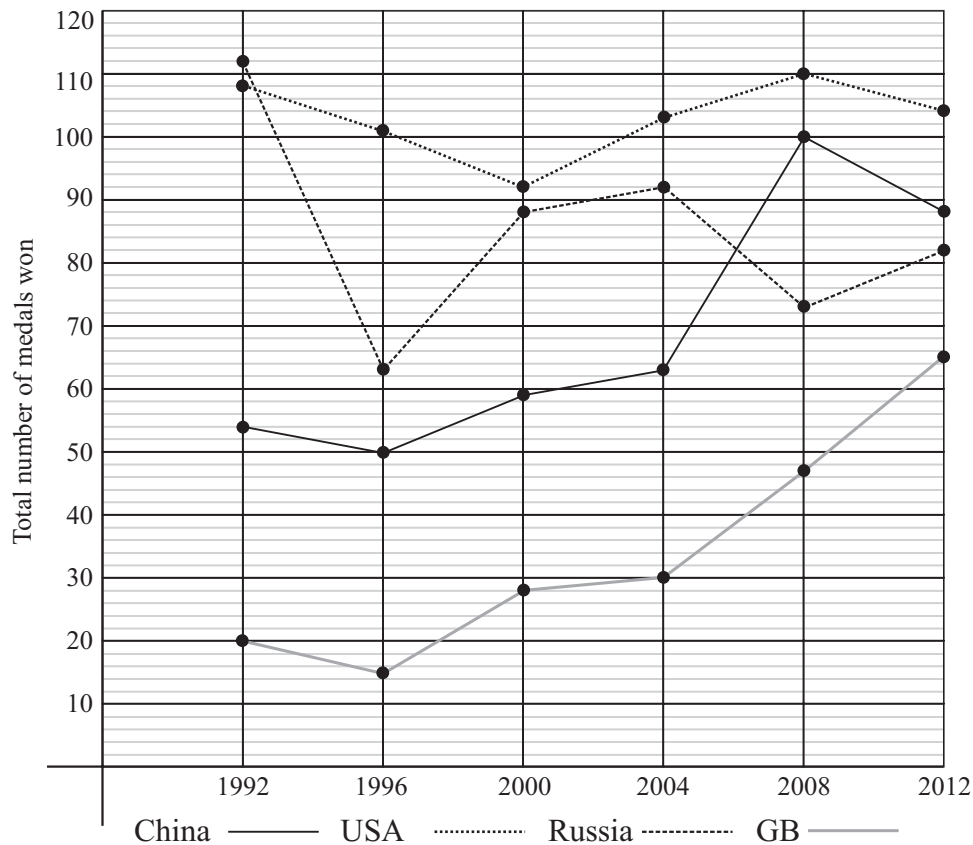


## SAMPLE PAPER 7: PAPER 2

### QUESTION 7 (75 MARKS)

#### Question 7 (a)

	China	USA	Russia	GB
London (2012)	88	104	82	65
Beijing (2008)	100	110	73	47
Athens (2004)	63	103	92	30
Sydney (2000)	59	92	88	28
Atlanta (1996)	50	101	63	15
Barcelona (1992)	54	108	112	20



**CHINA:** There is a steady rise in the number of medals won as the economy grows.

**USA:** Relatively steady over the years.

**RUSSIA:** Rapid fall in medals from 1992–1996 as the Soviet Union breaks up into individual states.

**GB:** Big improvement from Atlanta to the last Olympics in London can be attributed to hosting the Olympics in 2012, and a strategic investment in areas likely to bring success such as cycling.

**Question 7 (b)**

	China	USA	Russia	GB
London (2012)	88	104	82	65
Beijing (2008)	100	110	73	47
Athens (2004)	63	103	92	30
Sydney (2000)	59	92	88	28
Atlanta (1996)	50	101	63	15
Barcelona (1992)	54	108	112	20
				205

(i) Number of medals =  $20 + 15 + 28 + 30 + 47 + 65 = 205$

(ii) % increase =  $\left(\frac{65 - 20}{20}\right) \times 100\% = 225\%$

(iii) Mean =  $\frac{205}{6} \approx 34$

(iv) 1. Russia (112), 2. USA (108), 3. China (54)

(v) USA:  $36 \times 3 + 38 \times 2 + 36 \times 1 = 220$  points

China:  $51 \times 3 + 21 \times 2 + 28 \times 1 = 223$  points

No, China would be ahead by 223 points to 220 points.

**Question 7 (c)**

(i)  $P(\text{Gold}) = \frac{\text{Number of Gold medals}}{\text{Number of medals}} = \frac{18}{22} = \frac{9}{11}$

(ii)  $P(\text{Silver or Bronze}) = \frac{\text{Number of Silver or Bronze medals}}{\text{Number of medals}} = \frac{4}{22} = \frac{2}{11}$

(iii)  $P(\text{Gold})$  and then  $P(\text{Silver})$  and then  $P(\text{Bronze}) = \frac{9}{11} \times \frac{1}{11} \times \frac{1}{11} = \frac{9}{1331}$

18 Gold
2 Silver
2 Bronze
22 Medals

(iv) GGG, GGS, GGB, GSS, GBB, GSB, SSB, SBB



The probabilities add to 1.

$$0.38 + 0.4 + 0.12 + 0.08 + y + 0.004 + 0.003 + 0.002 + 0.0006 + 0.0004 = 1$$

$$y = 0.01$$

**Question 7 (e) (iii)**

Score $x$	10	9	8	7	6	5	4	3	2	1
Probability $P(x)$	0.38	0.4	0.12	0.08	0.01	0.004	0.003	0.002	.0006	.0004
$xP(x)$	3.8	3.6	0.96	0.56	0.06	0.02	0.012	0.006	.0012	.0004

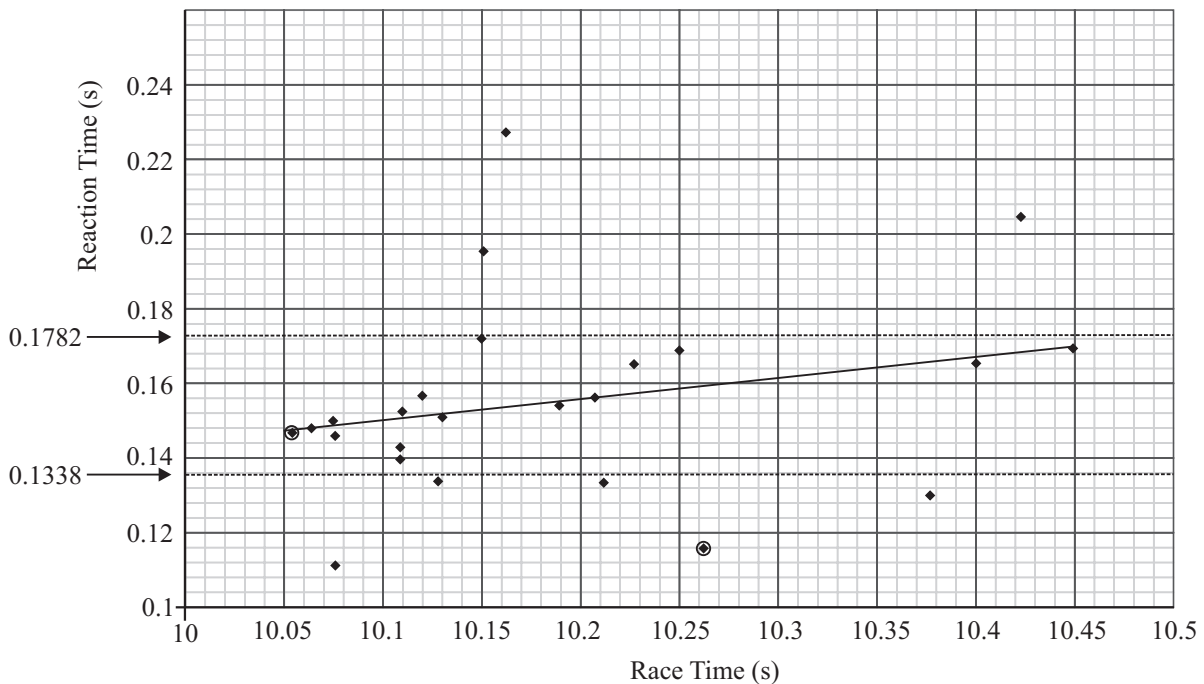
**Question 7 (e) (iv)**

Average score per arrow  $\mu = \text{Sum of } xP(x) = 9.0196$

**Question 7 (e) (v)**

Expected score (15 arrows) =  $15 \times 9.0196 = 135.294$

**Question 7 (f)**



(i) Number of reaction times = 24

(ii) Athlete with fastest race time is circled (left).  
Race time: 10.055 s, reaction time: 0.148 s

(iii) There are 16 athletes within one standard deviation of the mean, as shown by the two broken lines.

$$\mu = 0.156 \text{ s}, \sigma = 0.0222 \text{ s}$$

$$\mu + \sigma = 0.156 + 0.0222 = 0.1782 \text{ s}$$

$$\mu - \sigma = 0.156 - 0.0222 = 0.1338 \text{ s}$$

% of athletes within 1 SD

$$= \frac{16}{24} \times 100\% = 67\%$$

A normal distribution predicts that **68%** of the data lies within one standard deviation of the mean.

(iv) The athlete circled (to the right) had a quick starting reaction time but a slow race.

Race time: 10.26 s,

Reaction time: 0.116 s