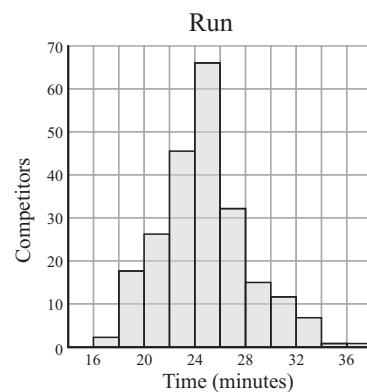
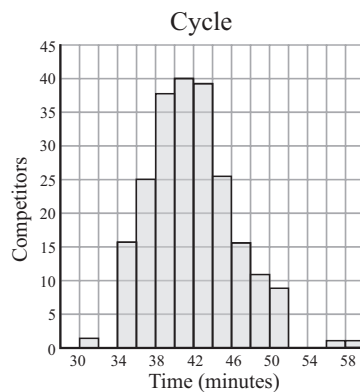
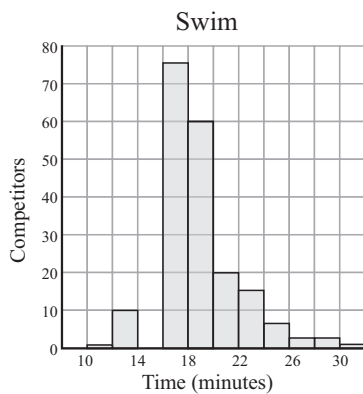


SAMPLE PAPER 2014 (SET F): PAPER 2

QUESTION 7 (75 MARKS)

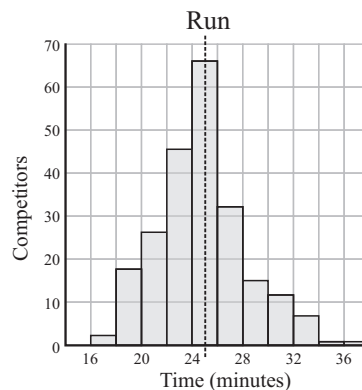
QUESTION 7 (a)

(i)	Swim	Cycle	Run
Mean	18.329	41.927	?
Median	17.900	41.306	?
Mode	#N/A	#N/A	#N/A
Standard Deviation	?	4.553	3.409
Sample Variance	10.017	20.729	11.622
Skewness	1.094	0.717	0.463
Range	19.226	27.282	20.870
Minimum	11.350	31.566	16.466
Maximum	30.576	58.847	37.336
Count	224	224	224



You can match the histograms to the events by looking at the maximum and minimum times to complete each event.

- (ii) The median is a line on the histogram that bisects its area. The area to the left of it is equal to the area to the right of it. Using your eye this appears to lie along the class interval of 24–26 minutes.
 mean \approx median \approx 25 minutes



- (iii) Swim: Sample Variance $s = 10.017$

$$s = \sigma^2$$

$$\sigma = \sqrt{s} = \sqrt{10.017} = 3.16 \text{ minutes}$$

- (iv) There was probably no discrete modal result as all times were different or there were lots of the same times. Therefore, there is no modal time. There is a modal class alright but no modal time.

QUESTION 7 (b)

Cycle vs. Swim: Moderate positive correlation
 Run vs. Swim: Moderately strong positive correlation
 Run vs. Cycle: Strong positive correlation

QUESTION 7 (c)

Run/Swim: $y = 0.53x + 15.2$	Run/Cycle: $y = 0.58x + 0.71$
Brian: $x = 17.6$ mins	Brian: $x = 35.7$ mins
$y = 0.53(17.6) + 15.2 = 24.528$ mins	$y = 0.58(35.7) + 0.71 = 21.416$ mins

Take the average of the 2 run times: $\frac{24.528 + 21.416}{2} = 22.972$ mins

The mean finishing time for the overall event was 88.1 minutes and the standard deviation was 10.3 minutes.

QUESTION 7 (d)

In any normal distribution with mean μ and standard deviation σ .

- 68.26% of the data falls within 1σ of the mean μ .
- 95.46% of the data falls within 2σ of the mean μ .
- 99.74% of the data falls within 3σ of the mean μ .

$\mu = 88.1$ mins, $\sigma = 10.3$ mins
 $\mu - 2\sigma = 88.1 - 2(10.3) = 67.5$ mins
 $\mu + 2\sigma = 88.1 + 2(10.3) = 108.7$ mins

“95% of the athletes took between **67.5** and **108.7** minutes to complete the race.”

QUESTION 7 (e)

$$z = \frac{100 - 88.1}{10.3} = 1.155$$

$P(x < 100) = P(z < 1.155) = 0.877$

Number of athletes = $224 \times 0.877 \approx 196$

FORMULAE AND TABLES BOOK
Statistics and Probability: Probability distribution (standardising formula) [page 34]

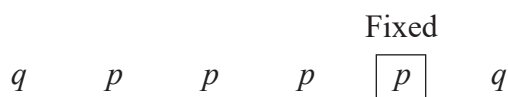
$$\bar{z} = \frac{\bar{x} - \mu}{\bar{\sigma}}$$

n = Number in the sample
 σ = standard deviation of the sample

QUESTION 7 (f)

Let p = Probability of completing the race in less than 100 minutes = $p(0.877)$
 Let q = Probability of completing the race in more than 100 minutes = $q(1 - 0.877) = q(0.123)$

This is the order in which she interviews the athletes:



No. of permutations = $\frac{5!}{4!} = 5$

$P = (0.123)^2 \times (0.877)^4 \times 5 = 0.0447$

BERNOULLI TRIALS
 $p = P(\text{Success}), q = P(\text{Failure})$
 $P(r \text{ successes}) = {}^n C_r p^r q^{n-r}$

The probability that the second person she interviews will be the sixth person she approaches is about 4.5%.