

1. Barry recorded the times, in seconds, taken by some students to run a race.

The times taken by the students are normally distributed with mean 52.6 seconds and standard deviation 2.7 seconds.

Jenny's time for the race is 49.2 seconds.

- (a) Calculate Jenny's standardised time.
Give your answer to 2 decimal places.

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

$$= \frac{49.2 - 52.6}{2.7}$$

$$\underline{\underline{-1.26}} \quad (2dp)$$

(2)

Toby's standardised time is -1.20.

- (b) Who did better in the race, Jenny or Toby?
You must explain your answer.

Jenny → lower standardised score means
a faster time.

(1)

(Total for Question 1 is 3 marks)

2. Andrew entered a swimming race.
The times in this race are normally distributed with a mean time of 57 seconds and a standard deviation of 8 seconds.

Andrew swam the race in a time of 70 seconds.

- (a) Calculate the standardised score for Andrew.

$$z = \frac{x - \mu}{\sigma}$$
$$= \frac{70 - 57}{8}$$

$$\underline{\underline{1.625}}$$

(2)

Ravina swam in the same race.
Her standardised score is 1.8.

- (b) Which of Andrew or Ravina did better in the race?
Give a reason for your answer.

Andrew - a lower standardised score
Means a faster time

(1)

(Total for Question 2 is 3 marks)

3. The table gives the mean and the standard deviation of the marks in three examinations. The marks in each of these examinations are normally distributed.

	Mean	Standard deviation
Art	70	5
Music	65	2.5
Drama	58	4

Lisa got a mark of 77 in the Art examination and a mark of 70 in the Music examination.

- (a) Calculate Lisa's standardised score in each of these two examinations.

$$\text{ART} = \frac{77 - 70}{5} = 1.4$$

$$\text{Music} \quad \frac{70 - 65}{2.5} = 2$$

Standardised Art score 1.4

Standardised Music score 2

(3)

- (b) Did Lisa do better in the Art examination or in the Music examination?

Give a reason for your answer.

..... Music → higher standardised score

..... More standard deviations above the mean

(1)

For the Drama examination, Lisa's standardised score is -1.5 .

- (c) Calculate Lisa's mark in the Drama examination.

$$-1.5 = \frac{X - 58}{4}$$

$$-6 = X - 58$$

$$X = 52$$

..... 52

(2)

(Total for Question 3 is 6 marks)

4. The weights of the fish in a lake are normally distributed with mean 480 g and standard deviation 50 g.

Mary caught a fish from the lake.
The weight of the fish was 450 g.

- (a) Calculate the standardised weight of Mary's fish.

$$z = \frac{450 - 480}{50}$$
$$= -0.6$$

.....-0.6.....g
(2)

Julie and Pam each caught a fish from the lake.

The standardised weight of Julie's fish is -1.5.
The standardised weight of Pam's fish is 0.65.

- (b) Compare the weights of these two fish.

.....~~from~~ Pam's fish weighs more ~~above~~
.....~~the mean~~) than Julie's fish.....
(1)

(Total for Question 4 is 3 marks)

5. Ian wants to train as a translator.

He sits language tests to help him decide in which language he should specialise.

He sits a Spanish test, a Mandarin test and a Russian test.

The table gives the mean mark and the standard deviation of the marks for all the candidates in each of the three tests.

Test	Mean mark	Standard deviation
Spanish	65	2
Mandarin	72	5
Russian	79	4

Ian scored 68 marks in the Spanish test and 78 marks in the Mandarin test.

- (a) Calculate the standardised score for the Spanish test and for the Mandarin test.

$$\text{SPANISH} \quad \frac{68 - 65}{2} = 1.5$$

$$\text{MANDARIN} \quad \frac{78 - 72}{5} = 1.2$$

Standardised Spanish score..... 1.5

Standardised Mandarin score..... 1.2

(3)

In the Russian test, Ian had a standardised score of -1.5 .

- (b) Calculate Ian's mark in the Russian test.

$$-1.5 = \frac{x - 79}{4}$$

$$-6 = x - 79$$

$$x = 73$$

..... 73
(2)

(Total for Question 5 is 5 marks)

6 The distances, in metres, some athletes threw a javelin were recorded.

The mean distance was 45.4 metres and the standard deviation was 3.6 metres.

Taylor threw the javelin 52 metres.

- (a) Calculate Taylor's standardised score.
Give your answer correct to 2 decimal places.

$$z = \frac{52 - 45.4}{3.6}$$
$$= \frac{11}{6}$$

$$\frac{11}{6} = 1.83\overline{3}$$

.....
(2)

For the javelin, Daisy's standardised score was 1.7.

- (b) Who threw the javelin the further, Taylor or Daisy?
Give a reason for your answer.

..... Taylor → higher standardised
..... score means a greater distance
(1)

(Total for Question 6 is 3 marks)
