

- 3

3.9

3.1

2.9

3.1

3.6

It is assumed that the standard deviation, σ kg.

By pooling the two samples, calculate an estimate of σ .

[4]

This image shows a full page of white paper with horizontal dotted lines. The lines are evenly spaced and run across the width of the page, providing a guide for handwriting or typing. There are no margins, text, or other markings on the page.

- 6

Athlete	<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>	<i>E</i>	<i>F</i>	<i>G</i>	<i>H</i>	<i>I</i>
Time before training (s)	250	251	252	267	276	291	310	320	335
Time after training (s)	245	251	253	261	275	293	302	313	320

- (a)**

[7]

3.

This image shows a full page of white paper with horizontal ruling lines. The lines are evenly spaced and extend across the width of the page. There are no margins, text, or other markings on the paper.

Further research suggests that the effects of the training programme tend to reduce the times of the slower athletes by more than those of the faster athletes.

- (b)** Suggest a reason why the paired t -test used in part **(a)** may not have been an appropriate test in this case. [1]

.....

.....

.....

- (c) Suggest a suitable alternative test that could have been used instead of a paired t -test. [1]

.....

.....

.....

- 2

$$\Sigma x = 2390$$

$$\sum x^2 = 476117$$

- (a)

This image shows a blank sheet of white paper with ten horizontal dotted lines spaced evenly apart, resembling notebook paper. The lines are thin and black, extending across the full width of the page. There is no handwriting or other markings on the paper.

A test of the null hypothesis $\mu = k$ is carried out on this sample using a 5% significance level. The test does not support the alternative hypothesis $\mu < k$.

- (b)**

[illegible]

- 5

Machine A	402	403	415	412	409	407	406	410
Machine B	401	398	395	397	410	405		

You should assume that the two distributions are normal and have the same population variance.

Use a t -test at the 5% significance level to test whether there is any difference in the mean tensile strengths of steel rods from the two machines. [9]

[illegible]

[illegible]

1

40

53

59

42

43

48

62

67

46

82

66

45

70

(a)

[5]

.....

.....

.....

(b)

[1]

.....

.....

- 3

A random sample of 20 oranges is selected and each carefully measured. Oranges of a similar size and mass are then paired and numbered from 1 to 10. One orange from each pair is randomly allocated to machine X with the other allocated to machine Y . The amount of juice, in ml, extracted from each orange is recorded in the following table.

	pair									
	1	2	3	4	5	6	7	8	9	10
machine X	65	73	58	61	72	79	64	65	69	71
machine Y	68	72	64	63	75	82	63	63	72	74

- (a)

[7]

This image shows a full page of white paper with horizontal dashed lines, typical of primary-ruled notebook paper. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

- 1**

$$\Sigma(y-\overline{y})^2 = 13\,520$$

[7]

- 4

$$\Sigma x^2 = 40\,104$$

$$\Sigma v^2 = 27\,460$$

You should assume that the two distributions are normal and have the same population variance.

- (a)

12

[illegible]

- [1]

.....

.....

- 2

$$\Sigma x = 168$$

$$\Sigma x^2 = 720$$

$$\Sigma y = 228$$

$$\sum y^2 = 900$$

Find a 9
fertiliser.

[7]

- 5

Patient	<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>	<i>E</i>	<i>F</i>	<i>G</i>	<i>H</i>
Before	183	165	172	165	143	176	161	153
After	164	148	164	149	134	153	155	148

- (a)

15

[illegible]

(b) State an assumption necessary for the test in part **(a)** to be valid.

[1]
