1.14 Experimental Design: 1-hour Pack

EDEXCEL 1ST0 · Calculator allowed · about 60 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 A matched pairs experiment tests a revision method. Pairs of students with similar past marks were chosen; one in each pair used the method (after) and the other did not (before).

Pair	Without method	With method
Pair 1	82	85
Pair 2	88	98
Pair 3	72	81
Pair 4	40	52
Pair 5	72	68
Pair 6	78	76

(a) Work out the difference (with minus without) for each pair.
(b) Work out the mean difference. Give your answer to 2 decimal places if needed.

(Total for Question 1 is 4 marks)

© Revision Library | revisionlibrary.co.uk

2 A teacher numbers 40 books on a library shelf from 1 to 40 and wants a simple random sample of 3. Using the list of two-digit random numbers below, reading from the left, select the sample. Ignore numbers that are not between 1 and 40 and ignore repeats.

80 51 47 66 92 82 93 29 65 76 38 16

(a) Write down the numbers selected.
(b) Why must repeats be ignored?

(Total for Question 2 is 3 marks)

---

3 A teacher numbers 90 students in a year group from 1 to 90 and wants a simple random sample of 4. Using the list of two-digit random numbers below, reading from the left, select the sample. Ignore numbers that are not between 1 and 90 and ignore repeats.

93 9 28 76 21 52 97 63 28 50 99 78

(a) Write down the numbers selected.
(b) Why must repeats be ignored?

(Total for Question 3 is 3 marks)

© Revision Library | revisionlibrary.co.uk

4 A matched pairs experiment tests a revision method. Pairs of students with similar past marks were chosen; one in each pair used the method (after) and the other did not (before).

Pair	Without method	With method
Pair 1	85	81
Pair 2	44	50
Pair 3	46	49
Pair 4	79	87
Pair 5	58	68

(a) Work out the difference (with minus without) for each pair.
(b) Work out the mean difference. Give your answer to 2 decimal places if needed.

(Total for Question 4 is 4 marks)

---

5 There are 120 students in a year group, numbered 1 to 120. A systematic sample of 10 is to be taken.
(a) Work out the interval between selected items.
(b) The first item is chosen at random from the first interval and is number 4. Write down the next two numbers selected.
(c) Write down the last number selected.

(Total for Question 5 is 4 marks)

© Revision Library | revisionlibrary.co.uk

6 A teacher numbers 80 members of a sports club from 1 to 80 and wants a simple random sample of 3. Using the list of two-digit random numbers below, reading from the left, select the sample. Ignore numbers that are not between 1 and 80 and ignore repeats.

41 65 17 46 50 53 63 37 10 75 77 66

(a) Write down the numbers selected.
(b) Why must repeats be ignored?

(Total for Question 6 is 3 marks)

---

7 Quinn repeats an experiment 6 times and records the time in seconds for a ball to roll down a ramp.

33, 33, 28, 30, 6, 33

(a) Write down the value that looks anomalous.
(b) Work out the mean of the remaining 5 values. Give your answer to 1 decimal place if needed.
(c) Give one reason for repeating an experiment.

(Total for Question 7 is 4 marks)

© Revision Library | revisionlibrary.co.uk

8 A teacher numbers 80 members of a sports club from 1 to 80 and wants a simple random sample of 3. Using the list of two-digit random numbers below, reading from the left, select the sample. Ignore numbers that are not between 1 and 80 and ignore repeats.

85 23 18 60 98 14 39 8 30 70 76 58

(a) Write down the numbers selected.
(b) Why must repeats be ignored?

(Total for Question 8 is 3 marks)

---

9 A teacher numbers 40 students in a year group from 1 to 40 and wants a simple random sample of 5. Using the list of two-digit random numbers below, reading from the left, select the sample. Ignore numbers that are not between 1 and 40 and ignore repeats.

66 99 51 64 93 32 85 8 21 37 55 15

(a) Write down the numbers selected.
(b) Why must repeats be ignored?

(Total for Question 9 is 3 marks)

© Revision Library | revisionlibrary.co.uk

10 Nadia repeats an experiment 5 times and records the time in seconds for a ball to roll down a ramp.

38, 32, 37, 57, 37

(a) Write down the value that looks anomalous.
(b) Work out the mean of the remaining 4 values. Give your answer to 1 decimal place if needed.
(c) Give one reason for repeating an experiment.

(Total for Question 10 is 4 marks)

---

11 A teacher numbers 50 houses on a long road from 1 to 50 and wants a simple random sample of 4. Using the list of two-digit random numbers below, reading from the left, select the sample. Ignore numbers that are not between 1 and 50 and ignore repeats.

62 25 83 5 81 66 89 20 1 31 26 24

(a) Write down the numbers selected.
(b) Why must repeats be ignored?

(Total for Question 11 is 3 marks)

© Revision Library | revisionlibrary.co.uk

12 There are 200 houses on a long road, numbered 1 to 200. A systematic sample of 25 is to be taken.

(a) Work out the interval between selected items.

(b) The first item is chosen at random from the first interval and is number 1. Write down the next two numbers selected.

(c) Write down the last number selected.

(Total for Question 12 is 4 marks)

---

13 A matched pairs experiment tests a revision method. Pairs of students with similar past marks were chosen; one in each pair used the method (after) and the other did not (before).

Pair	Without method	With method
Pair 1	48	56
Pair 2	65	66
Pair 3	80	85
Pair 4	73	69
Pair 5	54	62
Pair 6	50	58

(a) Work out the difference (with minus without) for each pair.

(b) Work out the mean difference. Give your answer to 2 decimal places if needed.

(Total for Question 13 is 4 marks)

© Revision Library | revisionlibrary.co.uk

14 A teacher numbers 60 books on a library shelf from 1 to 60 and wants a simple random sample of 5. Using the list of two-digit random numbers below, reading from the left, select the sample. Ignore numbers that are not between 1 and 60 and ignore repeats.

25 22 41 13 17 67 82 12 75 12 71 39

(a) Write down the numbers selected.
(b) Why must repeats be ignored?

(Total for Question 14 is 3 marks)

---

15 A teacher numbers 60 members of a sports club from 1 to 60 and wants a simple random sample of 5. Using the list of two-digit random numbers below, reading from the left, select the sample. Ignore numbers that are not between 1 and 60 and ignore repeats.

65 58 23 68 87 37 92 99 96 95 25 7

(a) Write down the numbers selected.
(b) Why must repeats be ignored?

(Total for Question 15 is 3 marks)

© Revision Library | revisionlibrary.co.uk

16 A teacher numbers 50 houses on a long road from 1 to 50 and wants a simple random sample of 3. Using the list of two-digit random numbers below, reading from the left, select the sample. Ignore numbers that are not between 1 and 50 and ignore repeats.

73 79 63 56 28 17 2 76 22 95 2 3

(a) Write down the numbers selected.
(b) Why must repeats be ignored?

(Total for Question 16 is 3 marks)

---

17 A matched pairs experiment tests a revision method. Pairs of students with similar past marks were chosen; one in each pair used the method (after) and the other did not (before).

Pair	Without method	With method
Pair 1	56	55
Pair 2	43	44
Pair 3	42	54
Pair 4	82	92
Pair 5	60	62
Pair 6	40	51
Pair 7	74	77
Pair 8	82	83

(a) Work out the difference (with minus without) for each pair.
(b) Work out the mean difference. Give your answer to 2 decimal places if needed.

(Total for Question 17 is 4 marks)

© Revision Library | revisionlibrary.co.uk

Mark scheme · 1.14 Experimental Design: 1-hour Pack

Question 1

with minus without for at least half the pairs	**M1**
differences 3, 10, 9, 12, -4, -2 cao	**A1**
sum of differences divided by 6	**M1**
4.67 cao	**A1**

Answer: (a) 3, 10, 9, 12, -4, -2; (b) 4.67

Question 2

ignores numbers over 40, 0 and repeats	**M1**
29, 38, 16 cao	**A1**
so each item can only be chosen once (no item is selected twice)	**B1**

Answer: (a) 29, 38, 16; (b) each item can only be selected once

Question 3

ignores numbers over 90, 0 and repeats	**M1**
9, 28, 76, 21 cao	**A1**
so each item can only be chosen once (no item is selected twice)	**B1**

Answer: (a) 9, 28, 76, 21; (b) each item can only be selected once

Question 4

with minus without for at least half the pairs	**M1**
differences -4, 6, 3, 8, 10 cao	**A1**
sum of differences divided by 5	**M1**
4.6 cao	**A1**

Answer: (a) -4, 6, 3, 8, 10; (b) 4.6

Question 5

120 / 10	**M1**
12 cao	**A1**
16 and 28	**B1**
112 cao	**B1**

Answer: (a) 12; (b) 16, 28; (c) 112

Question 6

ignores numbers over 80, 0 and repeats	**M1**
41, 65, 17 cao	**A1**
so each item can only be chosen once (no item is selected twice)	**B1**

Answer: (a) 41, 65, 17; (b) each item can only be selected once

Question 7

6	**B1**
sum of the 5 remaining values divided by 5	**M1**
31.4 cao	**A1**
to improve reliability / to spot anomalies / to reduce the effect of random error	**B1**

Answer: (a) 6; (b) 31.4; (c) to improve reliability

Question 8

ignores numbers over 80, 0 and repeats	**M1**
23, 18, 60 cao	**A1**
so each item can only be chosen once (no item is selected twice)	**B1**

Answer: (a) 23, 18, 60; (b) each item can only be selected once

Question 9

ignores numbers over 40, 0 and repeats	**M1**
32, 8, 21, 37, 15 cao	**A1**
so each item can only be chosen once (no item is selected twice)	**B1**

Answer: (a) 32, 8, 21, 37, 15; (b) each item can only be selected once

Question 10

57	**B1**
sum of the 4 remaining values divided by 4	**M1**
36 cao	**A1**
to improve reliability / to spot anomalies / to reduce the effect of random error	**B1**

Answer: (a) 57; (b) 36; (c) to improve reliability

Question 11

ignores numbers over 50, 0 and repeats	**M1**
25, 5, 20, 1 cao	**A1**
so each item can only be chosen once (no item is selected twice)	**B1**

Answer: (a) 25, 5, 20, 1; (b) each item can only be selected once

Question 12

200 / 25	**M1**
8 cao	**A1**
9 and 17	**B1**
193 cao	**B1**

Answer: (a) 8; (b) 9, 17; (c) 193

Question 13

with minus without for at least half the pairs	**M1**
differences 8, 1, 5, -4, 8, 8 cao	**A1**
sum of differences divided by 6	**M1**
4.33 cao	**A1**

Answer: (a) 8, 1, 5, -4, 8, 8; (b) 4.33

Question 14

ignores numbers over 60, 0 and repeats	**M1**
25, 22, 41, 13, 17 cao	**A1**
so each item can only be chosen once (no item is selected twice)	**B1**

Answer: (a) 25, 22, 41, 13, 17; (b) each item can only be selected once

© Revision Library | revisionlibrary.co.uk

Question 15

ignores numbers over 60, 0 and repeats	**M1**
58, 23, 37, 25, 7 cao	**A1**
so each item can only be chosen once (no item is selected twice)	**B1**

Answer: (a) 58, 23, 37, 25, 7; (b) each item can only be selected once

Question 16

ignores numbers over 50, 0 and repeats	**M1**
28, 17, 2 cao	**A1**
so each item can only be chosen once (no item is selected twice)	**B1**

Answer: (a) 28, 17, 2; (b) each item can only be selected once

Question 17

with minus without for at least half the pairs	**M1**
differences -1, 1, 12, 10, 2, 11, 3, 1 cao	**A1**
sum of differences divided by 8	**M1**
4.88 cao	**A1**

Answer: (a) -1, 1, 12, 10, 2, 11, 3, 1; (b) 4.88

© Revision Library | revisionlibrary.co.uk