3.18-2 Science: Working Scientifically and Practical Skills Set 2: 1-hour Pack

Total Marks

ISEB Common Entrance 13+ Science · Calculator allowed · about 60 minutes

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 A weighing scale with graduations every 0.1 kg shows the pointer midway between 2.3 kg and 2.4 kg. State the reading.

(1)

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2 A pupil repeats an experiment and records the temperature rise (°C): 19, 24.1, 24, 23.9. The result 19 is an anomaly. Calculate the mean of the remaining results.

- ☐ A) 23.95°C
- ☐ B) 24°C
- ☐ C) 18°C
- ☐ D) 0.2°C
- ☐ E) 22.75°C

---

3 A pupil measures the length of a spring (cm) 4 times and records: 31.1, 32, 31.9, 31. Calculate the range of the results.

- ☐ A) 1 cm
- ☐ B) 31.5 cm
- ☐ C) 63 cm
- ☐ D) 31 cm
- ☐ E) 32 cm

---

4 A mass of 250 g is hung from a spring. Calculate the force applied, in newtons. (Use g = 10 N/kg.)

(1)

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5 A pupil measures the temperature rise (°C) 3 times and records: 31.2, 31.8, 31.5. Calculate the mean.

- ☐ A) 23.625°C
- ☐ B) 31.5°C
- ☐ C) 94.5°C
- ☐ D) 0.6°C
- ☐ E) 47.25°C

---

6 Calculate the force, in newtons, applied to a wire when a mass of 200 g is suspended from it. (Use g = 10 N/kg.)

(1)

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7 A pupil measures the mass of a sample (g) 4 times and records: 23.7, 23.3, 24.3, 24.7. Calculate the mean.

- ☐ A) 19.2 g
- ☐ B) 1.4 g
- ☐ C) 96 g
- ☐ D) 24 g
- ☐ E) 32 g

---

8 A student uses a Newton meter with divisions every 0.1 N. The pointer lines up exactly halfway between 2.3 N and 2.5 N. State the reading shown.

(1)

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9 A pupil measures the time for a ball to fall (s) 4 times and records: 10.9, 10.8, 11.2, 11.1. Calculate the mean.

- ☐ A) 11 s
- ☐ B) 110 s
- ☐ C) 44 s
- ☐ D) 0.4 s
- ☐ E) 8.8 s

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10 A stopwatch always reads 0.5 seconds slower than the actual time. State the type of error this represents.

(1)

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11 A pupil repeats an experiment and records the time for a ball to fall (s): 39.9, 49.5, 39.5, 39.1. The result 49.5 is an anomaly. Calculate the mean of the remaining results.

- ☐ A) 0.8 s
- ☐ B) 39.5 s
- ☐ C) 42 s
- ☐ D) 29.625 s
- ☐ E) 39.7 s

---

12 In an investigation into how light intensity affects plant growth, plant growth is which type of variable?

- ☐ A) Independent variable
- ☐ B) Categoric variable
- ☐ C) Dependent variable
- ☐ D) Control variable

---

13 A pupil measures the temperature rise (°C) 5 times and records: 15.3, 15.6, 14.7, 15, 14.4. Calculate the range of the results.

- ☐ A) 15.6°C
- ☐ B) 14.4°C
- ☐ C) 30°C
- ☐ D) 15°C
- ☐ E) 1.2°C

---

14 A forcemeter shows graduation marks every 0.5 N. The pointer is halfway between 3.5 N and 4.0 N. State the reading.

(1)

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15 A pupil measures the mass of a sample (g) 4 times and records: 10.7, 10.5, 11.5, 11.3. Calculate the mean.

- ☐ A) 44 g
- ☐ B) 1 g
- ☐ C) 110 g
- ☐ D) 8.8 g
- ☐ E) 11 g

---

16 A thermometer with 0.5°C divisions shows the mercury level halfway between 36.5°C and 37.0°C. State the temperature.

(1)

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17 A pupil repeats an experiment and records the volume of gas collected (cm3): 17.7, 17.5, 17.3, 27.5. The result 27.5 is an anomaly. Calculate the mean of the remaining results.

- ☐ A) 17.5 cm^3
- ☐ B) 17.6 cm^3
- ☐ C) 13.125 cm^3
- ☐ D) 20 cm^3
- ☐ E) 0.4 cm^3

---

18 A pupil measures the volume of gas collected (cm3) 3 times and records: 18.8, 19.2, 19. Calculate the mean.

- ☐ A) 0.4 cm^3
- ☐ B) 57 cm^3
- ☐ C) 14.25 cm^3
- ☐ D) 19 cm^3
- ☐ E) 28.5 cm^3

---

19 Three mass readings were: 25 g, 26 g and 35 g. Calculate the mean using only the two non-anomalous readings.

(1)

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20 A pupil repeats an experiment and records the temperature rise (°C): 18.1, 17.9, 28, 18. The result 28 is an anomaly. Calculate the mean of the remaining results.

- ☐ A) 20.5°C
- ☐ B) 18.05°C
- ☐ C) 0.2°C
- ☐ D) 13.5°C
- ☐ E) 18°C

---

21 As the length of a spring increases, its original mass decreases. State the type of correlation.

(1)

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22 A pupil measures the length of a spring (cm) 5 times and records: 14.5, 14, 15, 14.4, 14.6. Calculate the mean.

- ☐ A) 145 cm
- ☐ B) 1 cm
- ☐ C) 72.5 cm
- ☐ D) 18.125 cm
- ☐ E) 14.5 cm

---

23 Calculate the force, in newtons, when a mass of 200 g is hung from a spring. (Use g = 10 N/kg.)

(1)

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24 A pupil repeats an experiment and records the time for a ball to fall (s): 24.2, 29.5, 24.8, 24.5. The result 29.5 is an anomaly. Calculate the mean of the remaining results.

- ☐ A) 25.75 s
- ☐ B) 24.5 s
- ☐ C) 24.65 s
- ☐ D) 0.6 s
- ☐ E) 18.375 s

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25 A pupil measures the time for a ball to fall (s) 3 times and records: 14.5, 14.4, 14.6. Calculate the mean.

- [ ] A) 14.5 s
- [ ] B) 0.2 s
- [ ] C) 21.75 s
- [ ] D) 10.875 s
- [ ] E) 43.5 s

---

26 In an experiment investigating enzyme rate, which variable must be kept the same to ensure a fair test?

- [ ] A) Dependent variable
- [ ] B) Categoric variable
- [ ] C) Independent variable
- [ ] D) Control variable

---

27 A pupil measures the volume of gas collected (cm3) 4 times and records: 12.3, 11.7, 12.7, 11.3. Calculate the range of the results.

- [ ] A) 24 cm^3
- [ ] B) 1.4 cm^3
- [ ] C) 12 cm^3
- [ ] D) 11.3 cm^3
- [ ] E) 12.7 cm^3

---

28 A scale was not zeroed before taking measurements. Every reading was 2 g higher than it should be. What type of error is this?

(1)

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29 A pupil measures the length of a spring (cm) 4 times and records: 20.4, 20.7, 21.3, 21.6. Calculate the mean.

- [ ] A) 16.8 cm
- [ ] B) 1.2 cm
- [ ] C) 21 cm
- [ ] D) 84 cm
- [ ] E) 28 cm

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30 Match each term to its definition.

Terms: 1. Resolution 2. Repeatability

Definitions:

A. The smallest change an apparatus can measure.

B. How closely repeated measurements agree when the same person repeats them.

(1)

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31 A pupil measures the time for a ball to fall (s) 4 times and records: 19.4, 18.5, 18.6, 19.5. Calculate the range of the results.

- ☐ A) 38 s
- ☐ B) 19 s
- ☐ C) 19.5 s
- ☐ D) 18.5 s
- ☐ E) 1 s

---

32 A pupil measures the mass of a sample (g) 3 times and records: 25, 24.8, 25.2. Calculate the mean.

- ☐ A) 37.5 g
- ☐ B) 25 g
- ☐ C) 0.4 g
- ☐ D) 75 g
- ☐ E) 18.75 g

---

33 As the pH of a solution increases, the speed of reaction decreases. State the type of correlation shown.

(1)

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34 A pupil measures the temperature rise (°C) 5 times and records: 15.3, 16, 16.7, 16.2, 15.8. Calculate the mean.

- ☐ A) 1.4°C
- ☐ B) 20°C
- ☐ C) 80°C
- ☐ D) 160°C
- ☐ E) 16°C

---

35 As exercise duration increases, fatigue level decreases. What correlation is this?

(1)

---

36 A pupil repeats an experiment and records the volume of gas collected (cm3): 17, 11.9, 12, 12.1. The result 17 is an anomaly. Calculate the mean of the remaining results.

- ☐ A) 12.05 cm^3
- ☐ B) 0.2 cm^3
- ☐ C) 12 cm^3
- ☐ D) 13.25 cm^3
- ☐ E) 9 cm^3

---

37 State the type of error if a ruler always measures lengths 2 mm shorter than they actually are.

(1)

---

38 A pupil measures the temperature rise (°C) 5 times and records: 38, 38.1, 37.9, 37.9, 38.1. Calculate the mean.

- ☐ A) 190°C
- ☐ B) 47.5°C
- ☐ C) 380°C
- ☐ D) 38°C
- ☐ E) 0.2°C

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39 Match each term to its definition.

Terms: 1. Sensitivity 2. Validity

Definitions:

A. The ability of an apparatus to detect small changes in a quantity.

B. Whether the investigation measures what it claims to measure.

(1)

---

40 A pupil repeats an experiment and records the temperature rise (°C): 44.5, 39.3, 39.7, 39.5. The result 44.5 is an anomaly. Calculate the mean of the remaining results.

- ☐ A) 39.5°C
- ☐ B) 39.6°C
- ☐ C) 29.625°C
- ☐ D) 40.75°C
- ☐ E) 0.4°C

---

41 A mass of 300 g is hung from a spring. Calculate the force, in newtons. (Use g = 10 N/kg.)

(1)

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42 A pupil measures the mass of a sample (g) 5 times and records: 21.4, 20.3, 20.6, 21, 21.7. Calculate the mean.

- ☐ A) 21 g
- ☐ B) 1.4 g
- ☐ C) 105 g
- ☐ D) 26.25 g
- ☐ E) 17.5 g

---

43 A measuring cylinder's scale was printed incorrectly, always reading 3 cm^3 higher than the true volume. State the type of error this represents.

(1)

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44 A pupil measures the time for a ball to fall (s) 4 times and records: 29.9, 29.4, 29.1, 29.6. Calculate the mean.

- ☐ A) 295 s
- ☐ B) 118 s
- ☐ C) 23.6 s
- ☐ D) 0.8 s
- ☐ E) 29.5 s

---

45 A mass of 150 g is suspended from a spring. Calculate the force applied. (g = 10 N/kg.)

(1)

---

46 A pupil measures the temperature rise (°C) 3 times and records: 31.7, 32.3, 32. Calculate the mean.

- ☐ A) 48°C
- ☐ B) 0.6°C
- ☐ C) 32°C
- ☐ D) 96°C
- ☐ E) 24°C

---

47 A pupil measures the temperature rise (°C) 3 times and records: 24.8, 25.2, 25. Calculate the mean.

- ☐ A) 37.5°C
- ☐ B) 0.4°C
- ☐ C) 18.75°C
- ☐ D) 75°C
- ☐ E) 25°C

---

48 As the brightness of light increases from 0% to 100%, the rate of photosynthesis increases. State the type of correlation shown.

(1)

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49 A pupil measures the time for a ball to fall (s) 4 times and records: 35.8, 36.1, 36.2, 35.9. Calculate the mean.

- [ ] A) 0.4 s
- [ ] B) 28.8 s
- [ ] C) 48 s
- [ ] D) 36 s
- [ ] E) 144 s

---

50 In an investigation into photosynthesis, which variable is the factor that the student deliberately changes?

- [ ] A) Control variable
- [ ] B) Categoric variable
- [ ] C) Independent variable
- [ ] D) Dependent variable

---

51 A pupil measures the length of a spring (cm) 3 times and records: 30.5, 30.7, 30.3. Calculate the mean.

- [ ] A) 30.5 cm
- [ ] B) 0.4 cm
- [ ] C) 45.75 cm
- [ ] D) 22.875 cm
- [ ] E) 91.5 cm

---

52 An ammeter has graduations every 0.1 A. The needle sits exactly halfway between 2.3 A and 2.4 A. State the current.

(1)

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53 A pupil measures the time for a ball to fall (s) 5 times and records: 19.9, 19.6, 20.1, 20, 20.4. Calculate the mean.

- [ ] A) 200 s
- [ ] B) 0.8 s
- [ ] C) 25 s
- [ ] D) 20 s
- [ ] E) 100 s

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54 A pupil measures the mass of a sample (g) 4 times and records: 30, 30.8, 31, 30.2. Calculate the mean.

- ☐ A) 122 g
- ☐ B) 24.4 g
- ☐ C) 1 g
- ☐ D) 305 g
- ☐ E) 30.5 g

---

55 Match each term to its definition.
Terms: 1. Reproducibility 2. Precision
Definitions:
A. How close together repeated measurements are to each other.
B. How well results agree when obtained by different experimenters.

(1)

---

56 A pupil measures the temperature rise (°C) 5 times and records: 26, 26.3, 26.5, 27, 26.7. Calculate the mean.

- ☐ A) 132.5°C
- ☐ B) 1°C
- ☐ C) 265°C
- ☐ D) 26.5°C
- ☐ E) 33.125°C

---

57 In an experiment, which variable is the outcome that the scientist measures?

- ☐ A) Control variable
- ☐ B) Dependent variable
- ☐ C) Independent variable
- ☐ D) Continuous variable

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58 A pupil measures the temperature rise (°C) 5 times and records: 13.3, 13.4, 13.6, 13.7, 13.5. Calculate the mean.

- [ ] A) 13.5°C
- [ ] B) 16.875°C
- [ ] C) 67.5°C
- [ ] D) 11.25°C
- [ ] E) 0.4°C

---

59 In an investigation into how temperature affects enzyme activity, which is the measured variable?

- [ ] A) Control variable
- [ ] B) Independent variable
- [ ] C) Dependent variable
- [ ] D) Categoric variable

---

60 A pupil measures the volume of gas collected (cm3) 3 times and records: 33.5, 33.2, 33.8. Calculate the mean.

- [ ] A) 33.5 cm^3
- [ ] B) 25.125 cm^3
- [ ] C) 50.25 cm^3
- [ ] D) 0.6 cm^3
- [ ] E) 100.5 cm^3

---

61 A pupil measures the time for a ball to fall (s) 4 times and records: 11.4, 12.6, 12.4, 11.6. Calculate the mean.

- [ ] A) 48 s
- [ ] B) 12 s
- [ ] C) 9.6 s
- [ ] D) 16 s
- [ ] E) 1.2 s

---

62 As the enzyme concentration decreases, the reaction rate also decreases. State the type of correlation shown by this data.

(1)

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63 A pupil repeats an experiment and records the length of a spring (cm): 10.5, 16.1, 15.2, 15.8, 14.9. The result 10.5 is an anomaly. Calculate the mean of the remaining results.

- [ ] A) 1.2 cm
- [ ] B) 14.5 cm
- [ ] C) 12.4 cm
- [ ] D) 15.5 cm
- [ ] E) 15.2 cm

---

64 In an experiment investigating how light intensity affects photosynthesis, what is the rate of gas production called?

- [ ] A) Independent variable
- [ ] B) Continuous variable
- [ ] C) Control variable
- [ ] D) Dependent variable

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Mark scheme · 3.18-2 Science: Working Scientifically and Practical Skills Set 2: 1-hour Pack

Question 1

2.35 kg (oe) **B1**

Answer: 2.35 kg

Question 2

B (24°C) **B1**

Answer: B) 24°C

Question 3

A (1 cm) **B1**

Answer: A) 1 cm

Question 4

2.5 N (oe) **B1**

Answer: 2.5 N

Question 5

B (31.5°C) **B1**

Answer: B) 31.5°C

Question 6

2 N (oe) **B1**

Answer: 2 N

Question 7

D (24 g) **B1**

Answer: D) 24 g

Question 8

2.4 N (oe) **B1**

Answer: 2.4 N

Question 9

A (11 s) **B1**

Answer: A) 11 s

Question 10

A systematic error (oe) **B1**

Answer: A systematic error

Question 11

B (39.5 s) **B1**

Answer: B) 39.5 s

Question 12

C (Dependent variable) cao **B1**

Answer: C) Dependent variable

Question 13

E (1.2°C) **B1**

Answer: E) 1.2°C

Question 14

3.75 N (oe) **B1**

Answer: 3.75 N

Question 15

E (11 g) **B1**

Answer: E) 11 g

Question 16

36.75°C (oe) **B1**

Answer: 36.75°C

Question 17

A (17.5 cm^3) **B1**

Answer: A) 17.5 cm^3

Question 18

D (19 cm^3) **B1**

Answer: D) 19 cm^3

Question 19

25.5 g (oe) **B1**

Answer: 25.5 g

Question 20

E (18°C) **B1**

Answer: E) 18°C

Question 21

A negative correlation (oe) **B1**

Answer: A negative correlation

Question 22

E (14.5 cm) **B1**

Answer: E) 14.5 cm

Question 23

2 N (oe) **B1**

Answer: 2 N

Question 24

B (24.5 s) **B1**

Answer: B) 24.5 s

Question 25

A (14.5 s) **B1**

Answer: A) 14.5 s

Question 26

D (Control variable) cao **B1**

Answer: D) Control variable

Question 27

B (1.4 cm^3) **B1**

Answer: B) 1.4 cm^3

Question 28

A systematic error (oe) **B1**

Answer: A systematic error

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Question 29

C (21 cm) **B1**

Answer: C) 21 cm

Question 30

1-A, 2-B (oe) **B1**

Answer: 1-A, 2-B

Question 31

E (1 s) **B1**

Answer: E) 1 s

Question 32

B (25 g) **B1**

Answer: B) 25 g

Question 33

A negative correlation (oe) **B1**

Answer: A negative correlation

Question 34

E (16°C) **B1**

Answer: E) 16°C

Question 35

A negative correlation (oe) **B1**

Answer: A negative correlation

Question 36

C (12 cm^3) **B1**

Answer: C) 12 cm^3

Question 37

A systematic error (oe) **B1**

Answer: A systematic error

Question 38

D (38°C) **B1**

Answer: D) 38°C

Question 39

1-A, 2-B (oe) **B1**

Answer: 1-A, 2-B

Question 40

A (39.5°C) **B1**

Answer: A) 39.5°C

Question 41

3 N (oe) **B1**

Answer: 3 N

Question 42

A (21 g) **B1**

Answer: A) 21 g

Question 43

A systematic error (oe) **B1**

Answer: A systematic error

Question 44

E (29.5 s) **B1**

Answer: E) 29.5 s

Question 45

1.5 N (oe) **B1**

Answer: 1.5 N

Question 46

C (32°C) **B1**

Answer: C) 32°C

Question 47

E (25°C) **B1**

Answer: E) 25°C

Question 48

A positive correlation (oe) **B1**

Answer: A positive correlation

Question 49

D (36 s) **B1**

Answer: D) 36 s

Question 50

C (Independent variable) cao **B1**

Answer: C) Independent variable

Question 51

A (30.5 cm) **B1**

Answer: A) 30.5 cm

Question 52

2.35 A (oe) **B1**

Answer: 2.35 A

Question 53

D (20 s) **B1**

Answer: D) 20 s

Question 54

E (30.5 g) **B1**

Answer: E) 30.5 g

Question 55

1-B, 2-A (oe) **B1**

Answer: 1-B, 2-A

Question 56

D (26.5°C) **B1**

Answer: D) 26.5°C

Question 57

B (Dependent variable) cao **B1**

Answer: B) Dependent variable

Question 58

A (13.5°C) **B1**

Answer: A) 13.5°C

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Question 59

C (Dependent variable) cao **B1**

Answer: C) Dependent variable

Question 60

A (33.5 cm^3) **B1**

Answer: A) 33.5 cm^3

Question 61

B (12 s) **B1**

Answer: B) 12 s

Question 62

A positive correlation (oe) **B1**

Answer: A positive correlation

Question 63

D (15.5 cm) **B1**

Answer: D) 15.5 cm

Question 64

D (Dependent variable) cao **B1**

Answer: D) Dependent variable

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