

A Level Maths Statistics Practice Exam: Mark Scheme

Pearson Edexcel A Level Mathematics (9MA0) · 27 questions · 60 marks

- M marks are for a correct method; A marks for an accurate answer that follows a correct method; B marks are independent of method.
- Accept any correct method that reaches a correct answer, unless the question says which method to use.
- Practise these topics online with instant feedback: alevelmathrevision.com/alevel-frontend/alevel-unit.html?course=uk&unit=4

Question 1

2 marks

B1 $P(A \cup B) = 0.5 + 0.4 - 0.15 = 0.75$

B1 $P(A' \cap B') = 1 - 0.75 = 0.25$

Final answer: 0.75; 0.25

Question 2

2 marks

B1 School: a census, since the population is small, so asking every pupil is quick and cheap

B1 Council: a sample, since the population is large, so a census would be too costly and time-consuming

Final answer: school: census (population small); council: sample (population large)

Question 3

2 marks

B1 Ignore the repeat and generate another number, so that 12 different tickets are chosen (sampling without replacement)

B1 e.g. it needs a full sampling frame, and numbering a very large population is time-consuming

Final answer: ignore the repeat and generate another number; e.g. needs a full sampling frame, which is time-consuming

Question 4

2 marks

B1 Not every possible sample has the same chance of being chosen (e.g. two neighbouring bottles can never both be chosen)

B1 e.g. it is simple and quick to use, especially for a large population or a production line

Final answer: not every sample is equally likely (neighbouring bottles cannot both be chosen); simple and quick

Question 5

2 marks

M1 $\frac{18 \times 64 + 12 \times 71}{30} = \frac{1152 + 852}{30}$

A1 66.8

Final answer: 66.8



Question 6**2 marks**

- B1** Q fills bags with a slightly higher mean mass
-
- B1** P has the smaller standard deviation, so P is more consistent
-

Final answer: Q has the higher mean; P has the smaller standard deviation, so P is more consistent

Question 7**2 marks**

- B1** Mean $1.8 \times 14.5 + 32 = 58.1$
-
- B1** Standard deviation $1.8 \times 3.5 = 6.3$ (the added 32 does not affect the spread)
-

Final answer: mean 58.1, standard deviation 6.3 (degrees Fahrenheit)

Question 8**2 marks**

- B1** Group B has the higher median, so on average group B took longer
-
- B1** Group B has the smaller IQR, so the times in group B were more consistent
-

Final answer: group B took longer on average (higher median) and its times were more consistent (smaller IQR)

Question 9**2 marks**

- M1** Cumulative frequency at 55: $60 + \frac{5}{10} \times 40 = 80$
-
- A1** $120 - 80 = 40$
-

Final answer: 40

Question 10**2 marks**

- B1** Correlation does not imply causation
-
- B1** A third variable, the population of the town, is likely to cause both to be larger
-

Final answer: correlation does not imply causation; both depend on the population of the town

Question 11**2 marks**

- B1** $-20 + 8.5 \times 22 = 167$ ice creams
-
- B1** The line is for estimating sales (the response) from temperature (the explanatory variable), not temperature from sales
-

Final answer: 167; the line should only be used to estimate sales from temperature

Question 12**2 marks**

- B1** Vowels A, I, I: $\frac{3}{10}$
-
- B1** Three S and one C: $\frac{4}{10} = \frac{2}{5}$
-

Final answer: $\frac{3}{10}$; $\frac{2}{5}$



Question 13**2 marks**

B1 Mutually exclusive means $P(A \cap B) = 0$

B1 But $P(A)P(B) > 0$, so $P(A \cap B) \neq P(A)P(B)$

Final answer: $P(A \cap B) = 0$ but $P(A)P(B) > 0$

Question 14**2 marks**

B1 $x = 1 - 0.58 = 0.42$

B1 $P(B | A') = \frac{0.18}{0.6} = 0.3$

Final answer: $x = 0.42$; 0.3

Question 15**2 marks**

B1 All probabilities are positive and $\frac{1+2+3+4+5}{15} = 1$

B1 $\frac{2+4}{15} = \frac{2}{5}$

Final answer: sum is 1; $\frac{2}{5}$

Question 16**2 marks**

B1 $X \sim B\left(30, \frac{1}{6}\right)$

B1 The number of trials is not fixed

Final answer: $B\left(30, \frac{1}{6}\right)$; the number of trials is not fixed

Question 17**2 marks**

B1 $P(X < \mu - a) = 0.2$ by symmetry

B1 $1 - 2(0.2) = 0.6$

Final answer: 0.6; 0.2

Question 18**2 marks**

B1 p is far from 0.5 and $np = 2$ is small

B1 So the distribution of X is strongly skewed, not symmetric

Final answer: $np = 2$ is small and p is far from 0.5, so the distribution is skewed

Question 19**2 marks**

B1 $0.073 > 0.05$: do not reject H_0 (insufficient evidence)

B1 The p-value is the probability, assuming H_0 is true, of a result at least as extreme as the one observed

Final answer: do not reject H_0 ; the p-value is the probability of a result at least as extreme, if H_0 is true



Question 20**2 marks**

B1 The population is normally distributed, and its standard deviation σ is known (or given)

B1 The sample is random (the observations are independent)

Final answer: normal population with known σ ; a random sample

Question 21**2 marks**

B1 Correlation does not imply causation: both are likely to be caused by hot, sunny weather

B1 It shows evidence that the population correlation coefficient is greater than 0 (a positive linear association)

Final answer: correlation does not imply causation (both depend on sunny weather); evidence that $\rho > 0$

Question 22**3 marks**

B1 A class width of 10 is shown as 4 cm

M1 12 cm^2 represents 24 students, so 2 students per cm^2 ; area $4 \times 4.5 = 18 \text{ cm}^2$

A1 36 students

Final answer: width 4 cm; 36 students

Question 23**3 marks**

M1 $P(B) = 0.45$ and $\frac{0.15}{0.45}$

A1 $P(A | B) = \frac{1}{3}$

A1 $P(B | A') = \frac{0.3}{0.6} = 0.5$

Final answer: $\frac{1}{3}$; 0.5

Question 24**3 marks**

M1 Second-stage probabilities out of 9

A1 $\frac{6}{10} \times \frac{5}{9} = \frac{1}{3}$

A1 $\frac{4}{10} \times \frac{6}{9} + \frac{6}{10} \times \frac{4}{9} = \frac{8}{15}$

Final answer: $\frac{1}{3}$; $\frac{8}{15}$

Question 25**3 marks**

M1 $P(X \leq 7) - P(X \leq 2)$

A1 $0.8909 - 0.0982$

A1 0.7927

Final answer: 0.7927



Question 26

3 marks

B1 $z = 1.6449$

M1 $\frac{115 - 100}{\sigma} = 1.6449$

A1 $\sigma = 9.12$

Final answer: $\sigma = 9.12$

Question 27

3 marks

M1 Each tail at most 0.025: $P(X \leq 5) = 0.0207$, $P(X \leq 6) = 0.0577$

A1 $X \leq 5$ or $X \geq 15$

A1 Actual significance level $0.0207 + 0.0207 = 0.0414$

Final answer: $X \leq 5$ or $X \geq 15$; 0.0414

End of mark scheme · More free exams: alevelmathrevision.com/alevel-frontend/free-practice-exams

