

Week 42

A-Level Mathematics

Homework bundle for this week

本周作业合集

exercises.lol

Contents 目录

Topic 5 quiz	2
Exercise sheet 5.1	5
Past-paper questions 5.1	9
Exercise sheet 5.2	14
Past-paper questions 5.2	18
Exercise sheet 5.3	27
Past-paper questions 5.3	30
Exercise sheet 5.4	34
Past-paper questions 5.4	38
Exercise sheet 5.5	49
Past-paper questions 5.5	54

A-Level Mathematics

Name: _____ Score: _____

1. For 10 values with $\Sigma x = 50$, what is the mean?

2. How many ways are there to choose 2 from 5 (5C_2)?

3. $P(A) = 0.5$, $P(B) = 0.4$ and $P(A \cap B) = 0.2$. Are A and B independent?

☐ Yes, because $P(A) \times P(B) = 0.2 = P(A \cap B)$

☐ No, because the values differ

☐ Yes, because they are mutually exclusive

☐ No, because $P(A) > P(B)$

4. For $X \sim B(10, 0.3)$, what is $E(X) = np$?

5. $X \sim N(50, 4)$ means $\mu = 50$, $\sigma = 2$. Standardize $x = 56$: what is $Z = (x - \mu)/\sigma$?

6. For 10 values, $\Sigma x = 50$ and $\Sigma x^2 = 300$. What is the standard deviation? ($\sqrt{(\Sigma x^2/n - \bar{x}^2)}$)

7. The normal distribution curve is:

☐ a symmetric bell shape

☐ a straight line

☐ a rectangle

☐ always skewed right

8. In a histogram of grouped data, the frequency is shown by each bar's:

☐ area

☐ colour

☐ height only

☐ width only

9. In a combination, the order of the chosen items:

☐ does not matter

- ☐ always matters
- ☐ must be alphabetical
- ☐ must be reversed

10. In a probability distribution table, the probabilities must add up to 1.

- ☐ True ☐ False

A-Level Mathematics

1. **5**

$$\text{Mean} = \Sigma x / n = 50 / 10 = 5.$$

2. **10**

$${}^5C_2 = 5!/(2!3!) = 120/(2 \times 6) = 10.$$

3. **Yes, because $P(A) \times P(B) = 0.2 = P(A \cap B)$**

$$P(A) \times P(B) = 0.5 \times 0.4 = 0.2, \text{ which equals } P(A \cap B), \text{ so they are independent.}$$

4. **3**

$$E(X) = np = 10 \times 0.3 = 3.$$

5. **3**

$$Z = (56 - 50)/2 = 6/2 = 3.$$

6. **2.24**

$$\sigma = \sqrt{(300/10 - 5^2)} = \sqrt{(30 - 25)} = \sqrt{5} \approx 2.24.$$

7. **a symmetric bell shape**

It is the symmetric bell-shaped curve centred on the mean μ .

8. **area**

In a histogram, the area of each bar represents the frequency.

9. **does not matter**

Combinations ignore order; permutations count order.

10. **True**

A valid distribution has all probabilities summing to 1.

5.1 Representation of data

Name: _____ Class: _____ Date: _____

Total: 12 marks

KEY WORDS mean 平均数 • standard deviation 标准差 • cumulative frequency 累积频数 • box-and-whisker plot 箱
• median 中位数

Objective

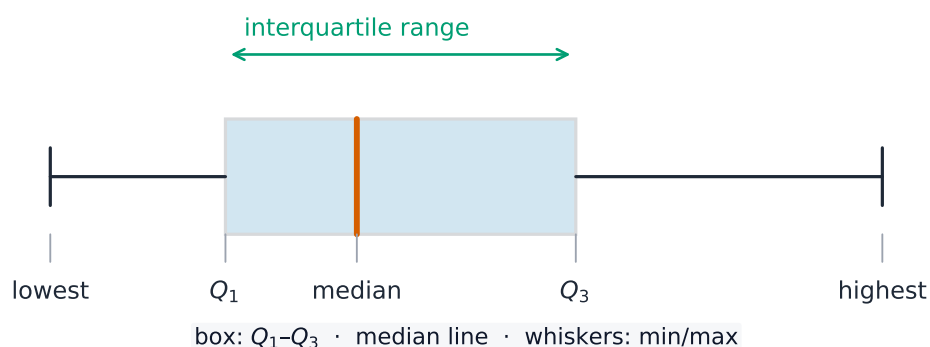
Build the skills to answer exam questions on **representation of data** 数据表示 — diagrams, averages, and **measures of spread** 离散程度 (range, IQR, standard deviation).

You must be able to:

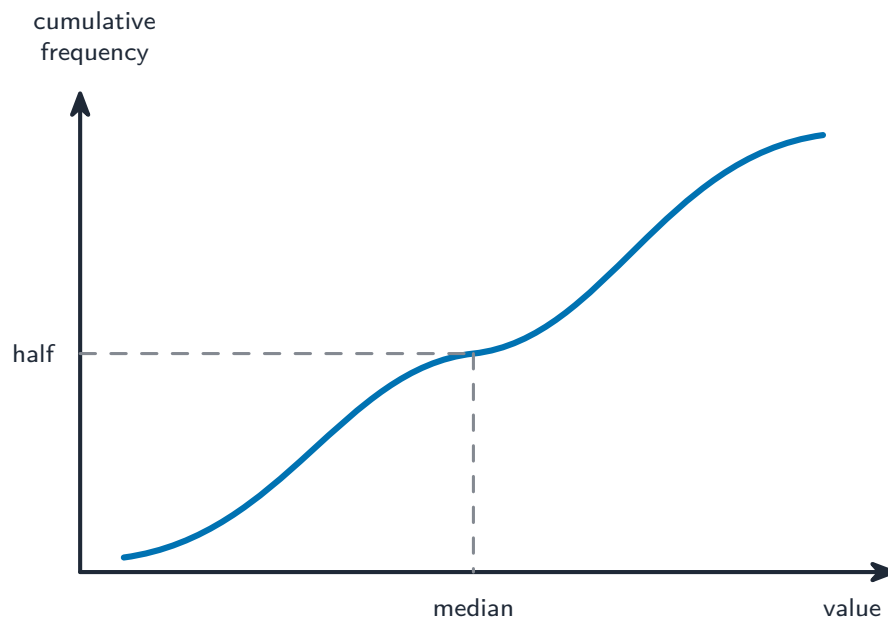
- read a box-and-whisker plot and a cumulative frequency graph
- find the mean, median and mode
- find the standard deviation from $\sum x$ and $\sum x^2$

1 Worked examples

■ Spread from totals



The box spans Q_1 to Q_3 ($IQR = Q_3 - Q_1$); the whiskers reach the extremes



Read the median across from half the total frequency; the quartiles from $\frac{1}{4}$ and $\frac{3}{4}$

$$n = 10, \sum x = 50, \sum x^2 = 300: \bar{x} = 5; \sigma = \sqrt{\frac{300}{10} - 5^2} = \sqrt{5} = 2.24.$$

2 Practice

2.1 Find the interquartile range when $Q_1 = 14$ and $Q_3 = 23$. [1]

2.2 For 8 values, $\sum x = 96$. Find the mean. [1]

3 Exam-style questions

3.1 For data with $\sum x = 200$, $\sum x^2 = 4500$ and $n = 10$, the variance is: [1]

- A 25
 - B 50
 - C 450
 - D 5
-

3.2 The masses (kg) of 7 parcels are 3, 5, 5, 8, 9, 12, 16.

(a) Find the median and the interquartile range. [3]

(b) Find the mean and the standard deviation. [4]

3.3 A cumulative frequency graph for 200 students rises smoothly. The median is read as 52, $Q_1 = 40$ and $Q_3 = 63$. Estimate how many students scored more than 63. [2]

Solutions

2.1 $\text{IQR} = 23 - 14 = 9.$

2.2 $\bar{x} = \frac{96}{8} = 12.$

3.1 B. $\text{Variance} = \frac{4500}{10} - \left(\frac{200}{10}\right)^2 = 450 - 400 = 50.$

3.2 (a) ordered already; median (4th) = 8; $Q_1 = 5$, $Q_3 = 12$, $\text{IQR} = 7.$

(b) $\sum x = 58$, $\bar{x} = \frac{58}{7} = 8.29$; $\sum x^2 = 9 + 25 + 25 + 64 + 81 + 144 + 256 = 604$;
 $\sigma = \sqrt{\frac{604}{7} - 8.29^2} = \sqrt{86.29 - 68.7} = \sqrt{17.6} = 4.20.$

3.3 above Q_3 is the top quarter = $\frac{1}{4} \times 200 = 50$ students.

3 The back-to-back stem-and-leaf diagram shows the annual salaries, in dollars, of 27 employees at each of two companies, Browns and Greens.

Browns									Greens								
(3)	9 8 4							30	6	8	(2)						
(7)	8	8	5	3	3	1	0	31	2	4	5	8	(4)				
(7)	9	7	6	4	2	2	0	32	3	6	6	7	9	(5)			
(6)	8 7 5				5	3	1	33	1	1	3	7	8	8	9	9	(8)
(3)	4 2 2						34	0	2	3	5	6	9	(6)			
(1)	7							35	3	7	(2)						

Key: 6|32|7 means \$32 600 for Browns and \$32 700 for Greens.

(a) Find the median and interquartile range for the annual salaries of employees at Browns. [3]

The annual salary of an employee at Browns is denoted by x thousand dollars and the annual salary of an employee at Greens is denoted by y thousand dollars. It is given that, for the 27 employees at each of the companies,

$\sum x = 878.3, \sum x^2 = 28\,616.09, \sum y = 896.5, \sum y^2 = 29\,815.63.$

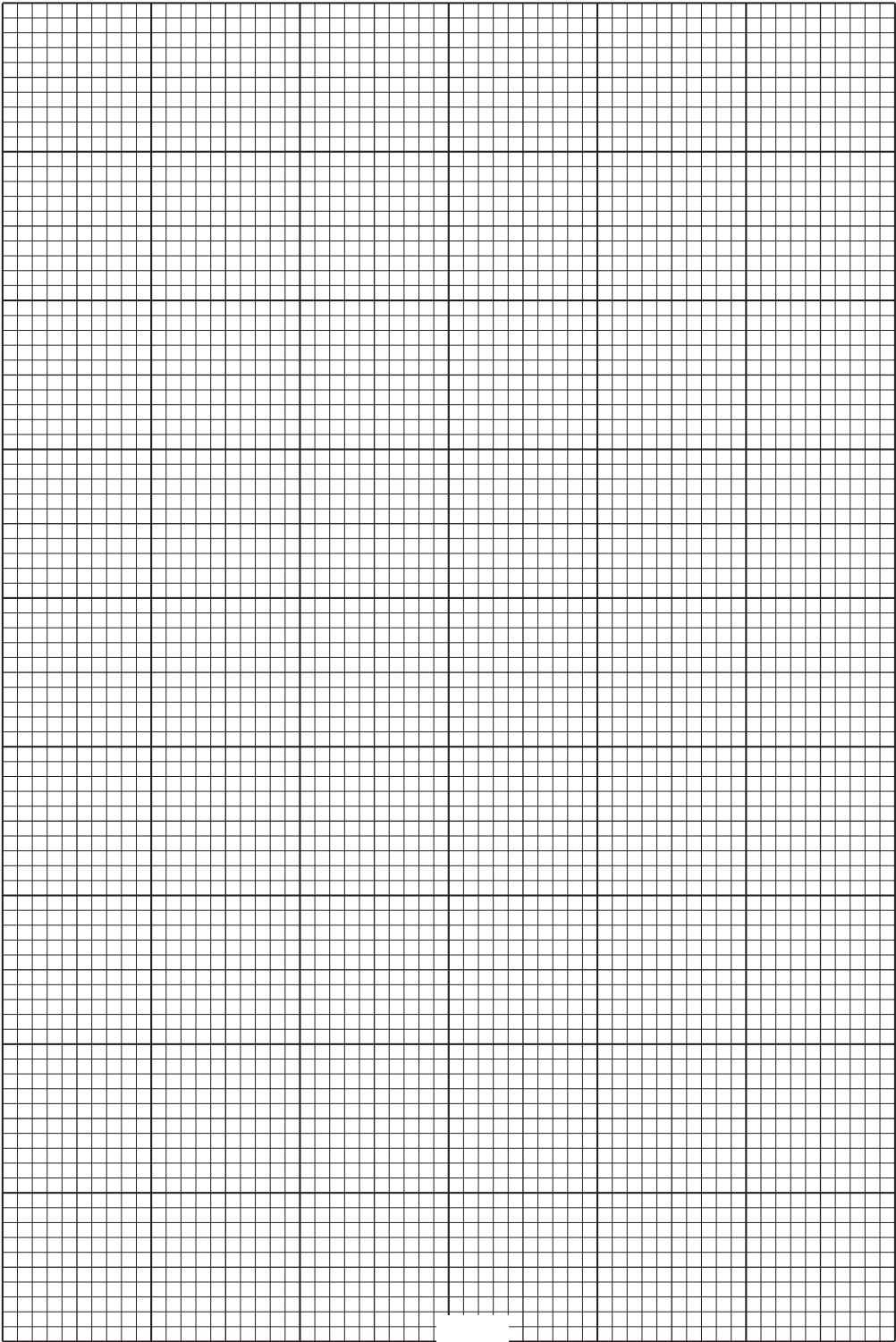
(b) Find the mean and standard deviation of the annual salaries of these 54 employees. [5]

5 The times of 240 competitors taking part in an event are recorded correct to the nearest minute. The results are summarised in the table.

Time (minutes)	1 – 10	11 – 20	21 – 25	26 – 30	31 – 50
Frequency	12	38	68	76	46

(a) Draw a histogram to represent this information.

[4]



(b) Calculate an estimate of the mean time taken by the 240 competitors. [3]

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3 Last Sunday, teams of runners took part in a charity event. The time taken, in seconds, to run 50m was recorded, correct to 1 decimal place, for each runner. The times recorded for 11 runners from each of the Gulls and the Herons are shown in the table.

Gulls	7.9	8.2	8.3	8.6	8.6	8.8	9.2	9.7	9.8	10.0	10.4
Herons	9.5	9.9	8.5	8.1	9.2	10.8	8.3	9.7	9.3	9.9	8.7

(a) Draw a back-to-back stem-and-leaf diagram to represent this information, with Gulls on the left-hand side. [4]

(b) Find the median and the interquartile range of the times of the runners from the Gulls. [3]

Two other teams of runners, the Eagles and the Swifts, also took part in the event. The recorded times in seconds for 20 runners from the Eagles and 30 runners from the Swifts are denoted by x and y respectively.

It is given that $\sum x = 175.0$ and that the mean of y is 8.4.

(c) Find the mean of the times taken by all 50 runners. [2]

It is given that $\sum x^2 = 1823.0$.

It is also known that the standard deviation of the times taken by all 50 runners is 1.38 seconds.

(d) Find the value of $\sum y^2$, correct to 1 decimal place. [3]

5.2 Permutations and combinations

Name: _____ Class: _____ Date: _____

Total: 11 marks

KEY WORDS permutations and combinations 排列与组合 • combination 组合 • permutation 排列

Objective

Build the skills to answer exam questions on **permutations and combinations** 排列与组合 — counting arrangements (order matters) and selections (order does not), including repeated objects and restrictions.

You must be able to:

- use nP_r for arrangements and nC_r for selections
- arrange objects with repeats (divide by each repeat factorial)
- count with restrictions (e.g. items together / not together)

1 Worked examples

■ Arrangements & selections



Counting outcomes underlies both combinatorics and probability

Arranging 3 of 4 objects (4P_3)

$$\boxed{4} \times \boxed{3} \times \boxed{2} = 24$$

1st pick 2nd pick 3rd pick

Choosing 3 of 4 (order ignored): ${}^4C_3 = \frac{{}^4P_3}{3!} = 4$

$${}^nP_r = n! / (n-r)! \quad \cdot \quad {}^nC_r = {}^nP_r / r!$$

Arrange (order matters, nP_r) versus choose (order ignored, nC_r)

Arrangements of NEEDLESS (8 letters, E $\times$ 3, S $\times$ 2): $\frac{8!}{3!2!} = 3360$.

Choosing 3 from 10 (order doesn't matter): ${}^{10}C_3 = \frac{10!}{3!7!} = 120$.

2 Practice

2.1 Evaluate 7P_3 . [1]

2.2 Evaluate 8C_2 . [1]

3 Exam-style questions

3.1 The number of ways to arrange the letters of BANANA is: [1]

- A 720
 - B 120
 - C 60
 - D 360
-

3.2 A committee of 4 is chosen from 7 women and 5 men.

(a) Find the number of possible committees. [2]

(b) Find the number that contain exactly 2 women and 2 men. [3]

3.3 Find the number of arrangements of the 7 letters of PICTURE in which the three vowels (I, U, E) are all together. [3]

Solutions

2.1 ${}^7P_3 = 7 \times 6 \times 5 = 210.$

2.2 ${}^8C_2 = \frac{8 \times 7}{2} = 28.$

3.1 C. BANANA has 6 letters with A $\times$ 3, N $\times$ 2: $\frac{6!}{3!2!} = \frac{720}{12} = 60.$

3.2 (a) ${}^{12}C_4 = \frac{12 \cdot 11 \cdot 10 \cdot 9}{24} = 495.$

(b) ${}^7C_2 \times {}^5C_2 = 21 \times 10 = 210.$

3.3 treat (IUE) as one block $\rightarrow$ 5 items arrange in $5! = 120$ ways; the vowels arrange among themselves in $3! = 6$ ways; total = $120 \times 6 = 720.$

7 (a) How many different arrangements are there of the 10 letters in the word SEYCHELLES? [1]

(b) How many different arrangements are there of the 10 letters in the word SEYCHELLES in which there are exactly two letters between the Ss and one of these two letters is C? [3]

(c) How many different arrangements are there of the 10 letters in the word SEYCHELLES in which there is an S at the beginning, an S at the end and the three Es are **not** all next to each other? [3]

5 letters are selected at random from the 10 letters in the word SEYCHELLES.

(d) Find the probability that these 5 letters include the three Es. [3]

Additional page

If you use the following page to complete the answer to any question, the question number must be clearly shown.

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7 **(a)** Find the number of different arrangements of the 10 letters in the word ZOOLOGICAL in which the three Os are together and the two Ls are **not** next to each other. [4]

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(b) Find the number of different arrangements of the 10 letters in the word ZOOLOGICAL in which there are exactly 5 letters between the two Ls. [3]

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Two letters are chosen at random from the 10 letters in the word ZOOLOGICAL.

(c) Find the probability that these two letters are different.

[3]

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Additional page

If you use the following page to complete the answer to any question, the question number must be clearly shown.



2 (a) Find the number of different arrangements of the 8 letters in the word KANGAROO in which the two As are together and the two Os are **not** together. [3]

A fair 8-sided dice has faces labelled K, A, N, G, A, R, O, O. The dice is rolled repeatedly.

(b) Find the probability that fewer than 6 rolls of this dice are required to obtain an A. [2]

(c) Find the probability that the second A is obtained on the 6th roll of the dice. [2]

A-Level Mathematics: 9709 Mathematics June 2025 Question Paper 51

5

6 musicians are selected from these 20 to perform at a concert.

- (a) Find the number of different ways in which the 6 musicians can be selected if there must be at least 3 guitarists, at most 2 pianists and exactly 1 drummer. [4]

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(b) Find the number of different ways in which these three bands can be selected.

[3]

[illegible]

5.3 Probability

Name: _____ Class: _____ Date: _____

Total: 13 marks

KEY WORDS probability 概率 • independent 独立 • mutually exclusive 互斥 • conditional probability 条件概率
• independent events 独立事件

Objective

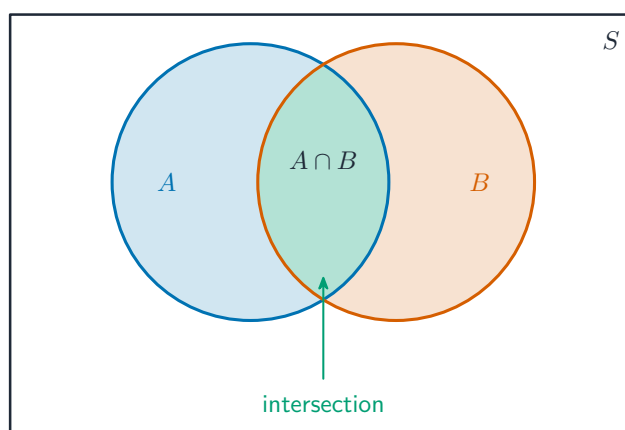
Build the skills to answer exam questions on **probability** 概率 — the addition and multiplication rules, **mutually exclusive** 互斥 and **independent** 独立 events, and **conditional probability** 条件概率.

You must be able to:

- use $P(A \cup B) = P(A) + P(B) - P(A \cap B)$
- test independence with $P(A \cap B) = P(A)P(B)$
- use $P(A | B) = \frac{P(A \cap B)}{P(B)}$

1 Worked examples

■ Rules & independence



The overlap is $A \cap B$; the addition rule subtracts it once so it is not double-counted

$P(A) = 0.5$, $P(B) = 0.4$, $P(A \cap B) = 0.2$. **Independent?** $P(A)P(B) = 0.2 = P(A \cap B)$ — yes.

Conditional: $P(A | B) = \frac{0.2}{0.4} = 0.5$.

2 Practice

2.1 Events are mutually exclusive with $P(A) = 0.3$, $P(B) = 0.45$. Find $P(A \cup B)$. [2]

2.2 State the test for two events A and B to be independent. [1]

3 Exam-style questions

3.1 For independent events with $P(A) = 0.6$ and $P(B) = 0.5$, $P(A \cap B)$ is: [1]

- **A** 1.1
- **B** 0.3
- **C** 0.1
- **D** 0

3.2 A and B are events with $P(A) = 0.6$, $P(B) = 0.5$ and $P(A \cup B) = 0.8$.

(a) Find $P(A \cap B)$. [2]

(b) Determine whether A and B are independent. [2]

(c) Find $P(A \mid B)$. [2]

3.3 A bag has 5 red and 3 blue balls. Two are drawn without replacement. Find the probability that both are red. [3]

Solutions

2.1 mutually exclusive $\rightarrow P(A \cup B) = 0.3 + 0.45 = 0.75$.

2.2 $P(A \cap B) = P(A) \times P(B)$.

3.1 B. $0.6 \times 0.5 = 0.3$.

3.2 (a) $0.8 = 0.6 + 0.5 - P(A \cap B) \Rightarrow P(A \cap B) = 0.3$.

(b) $P(A)P(B) = 0.6 \times 0.5 = 0.3 = P(A \cap B)$, so they **are** independent.

(c) $P(A | B) = \frac{0.3}{0.5} = 0.6$.

3.3 $P(\text{both red}) = \frac{5}{8} \times \frac{4}{7} = \frac{20}{56} = \frac{5}{14}$.

A-Level Mathematics: 9709 Mathematics November 2025 Question Paper 51

2

(a)

[1]

[illegible]

(b)

[3]

[illegible]

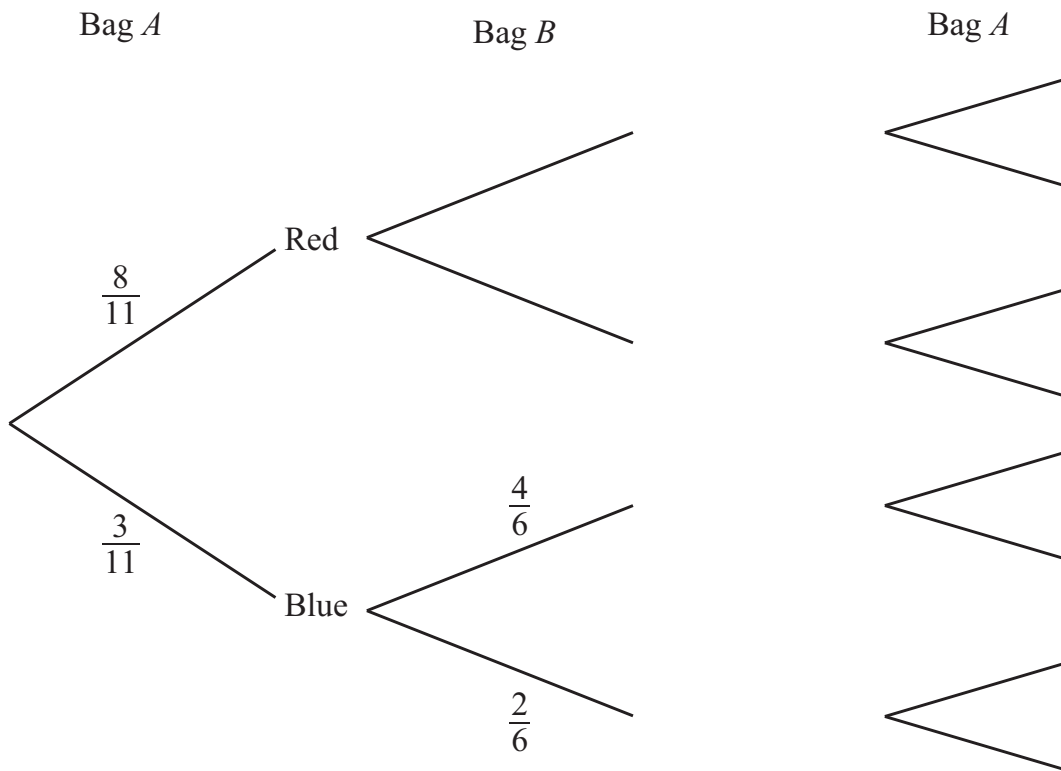
- 4

A marble is chosen at random from bag A . If the marble chosen is red, it is discarded. If the marble chosen is blue, it is placed in bag B .

A marble is then chosen at random from bag B . If the marble chosen is red, it is discarded. If the marble chosen is blue, it is placed in bag A .

A marble is now chosen at random from bag A .

- (a)** Complete the tree diagram below by entering all the remaining outcomes and probabilities. [3]



- (b) Find the probability that all three marbles chosen are the same colour. [2]

[illegible]

52 _____

- 4

Each card has a picture of a bus or a car or a train. The number of cards with each picture in the two packs is shown in the table.

	Bus	Car	Train
Gio's pack	6	10	2
Ivy's pack	$x - 12$	9	3

One card is chosen at random from each pack. The probability that the two cards have pictures of buses on them is equal to twice the probability that the two cards have pictures of cars on them.

- (a) Write down an equation in terms of x and hence find the value of x . [4]

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(b) Find the probability that the two cards have pictures of the same type of vehicle on them. [3]

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5.4 Discrete random variables

Name: _____ Class: _____ Date: _____

Total: 12 marks

KEY WORDS geometric 几何分布 • discrete random variable 离散型随机变量 • binomial 二项分布
• variance 方差 • expectation 期望

Objective

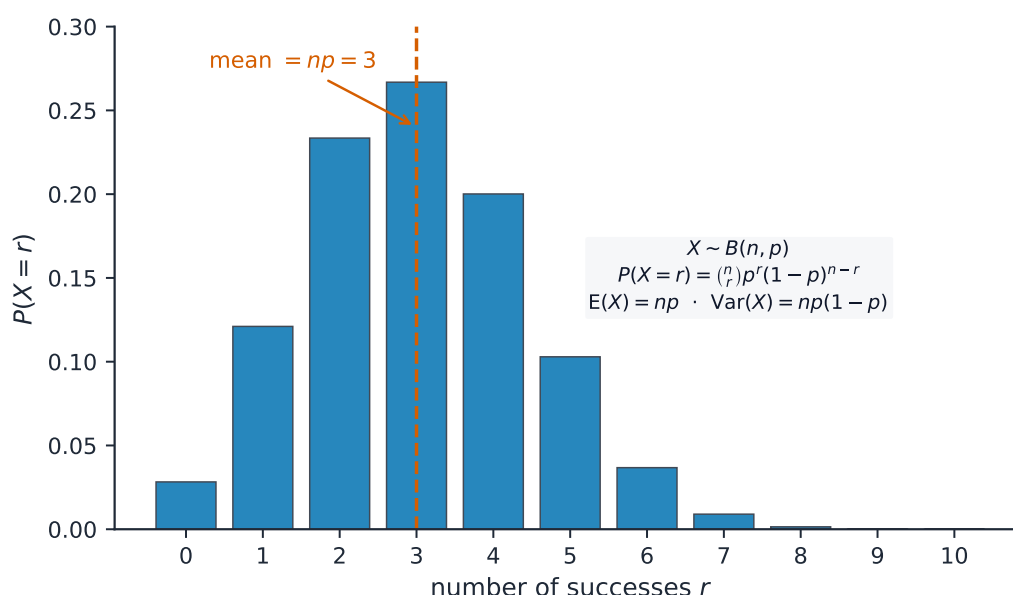
Build the skills to answer exam questions on **discrete random variables** 离散型随机变量 — probability distributions, **expectation** 期望 and **variance** 方差, the **binomial** 二项分布 and **geometric** 几何分布 distributions.

You must be able to:

- use a distribution table (probabilities sum to 1); find $E(X)$ and $\text{Var}(X)$
- use $B(n, p)$: $P(X = r) = \binom{n}{r} p^r (1 - p)^{n-r}$, $E(X) = np$
- use the geometric model $P(X = r) = (1 - p)^{r-1} p$, $E(X) = \frac{1}{p}$

1 Worked examples

■ Binomial distribution



$B(10, 0.3)$: each bar is $P(X = r)$, clustered around the mean $np = 3$

$X \sim B(10, 0.3)$: $P(X = 2) = \binom{10}{2} (0.3)^2 (0.7)^8 = 0.233$; $E(X) = np = 3$.

Distribution: $E(X) = \sum xP(X=x)$, $\text{Var}(X) = \sum x^2P(X=x) - [E(X)]^2$.

2 Practice

2.1 $X \sim B(8, 0.25)$. Find $E(X)$. [1]

2.2 A geometric variable has $p = 0.2$. Find $E(X)$. [1]

3 Exam-style questions

3.1 For $X \sim B(12, 0.5)$, the variance $\text{Var}(X)$ is: [1]

- A 6
- B 3
- C 12
- D 1.5

3.2 A discrete random variable X has the distribution:

x	1	2	3	4
$P(X = x)$	0.1	0.3	k	0.2

(a) Find k . [1]

(b) Find $E(X)$ and $\text{Var}(X)$. [5]

3.3 A fair coin is tossed 6 times. Find the probability of obtaining exactly 4 heads. [3]

Solutions

2.1 $E(X) = np = 8 \times 0.25 = 2.$

2.2 $E(X) = \frac{1}{p} = \frac{1}{0.2} = 5.$

3.1 B. $\text{Var}(X) = np(1 - p) = 12(0.5)(0.5) = 3.$

3.2 (a) probabilities sum to 1: $0.1 + 0.3 + k + 0.2 = 1 \Rightarrow k = 0.4.$

(b) $E(X) = 1(0.1) + 2(0.3) + 3(0.4) + 4(0.2) = 0.1 + 0.6 + 1.2 + 0.8 = 2.7$; $E(X^2) = 1(0.1) + 4(0.3) + 9(0.4) + 16(0.2) = 0.1 + 1.2 + 3.6 + 3.2 = 8.1$; $\text{Var}(X) = 8.1 - 2.7^2 = 8.1 - 7.29 = 0.81.$

3.3 $X \sim B(6, 0.5)$; $P(X = 4) = \binom{6}{4}(0.5)^6 = 15 \times \frac{1}{64} = \frac{15}{64} = 0.234.$

1

(a)

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(b)

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(c)

[illegible]

5 On any given day, Cooper either wears a blue jumper or he wears a green jumper or he does not wear a jumper. The probability that he wears a blue jumper is 0.6 and the probability that he wears a green jumper is 0.3. Whether Cooper wears a jumper of either colour, or does not wear a jumper, on any day is independent of his choice on any other day.

(a) Find the probability, that in a week (7 days), Cooper wears a blue jumper on at least 5 days. [3]

(b) Use a suitable approximation to find the probability that, in any 150-day period, Cooper does not wear a jumper on fewer than 22 days. [5]

1 A coin is biased so that the probability of obtaining a head when it is thrown is 0.4. The coin is thrown repeatedly until the first head is obtained.

(a) Find the probability that the first head is obtained on the 5th throw. [1]

(b) Find the probability that the first head is obtained after the 6th throw. [2]

A-Level Mathematics: 9709 Mathematics November 2025 Question Paper 52

- 2

- (a)

[4]

[illegible]

- (b)

[3]

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- 6 For a randomly chosen person, their next birthday is equally likely to occur on any day of the week, independently of any other person’s birthday.
- (a) Find the probability that, out of 10 randomly chosen people, none of them will have their next birthday on a Saturday or Sunday. [1]

- (b) Find the probability that, out of 10 randomly chosen people, fewer than 3 will have their next birthday on a Wednesday. [3]

- (c) Use a suitable approximation to find the probability that, out of 392 randomly chosen people, more than 65 will have their next birthday on a Friday. [5]

[illegible]

- 4

Last Saturday, 600 competitors took part. The times taken to complete the puzzle were normally distributed with mean 32.4 minutes and standard deviation 2.5 minutes.

- (a)** How many competitors would you expect to have times within 1.2 minutes of the mean time? [4]

[illegible]

In this Saturday's event, 60% of the competitors had times less than 36.0 minutes.

- (b)** 9 competitors who took part in this Saturday's event are selected at random.

Find the probability that at least 2 and fewer than 8 of these competitors had times less than 36.0 minutes. [3]

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- Use a suitable approximation to find the probability that more than 50 of these competitors had times less than 36.0 minutes. [5]

- 6

- (a)**

[illegible]

- (b)**

This image shows a full page of a worksheet designed for handwriting practice. It features ten sets of horizontal dashed lines spaced evenly down the page. Each set consists of three parallel dashed lines, providing a guide for letter height and placement. The background is plain white, and there are no other markings or text present.

A-Level Mathematics: **9709 Mathematics June 2025 Question Paper** 51

- [3]

Additional page

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5.5 The normal distribution

Name: _____ Class: _____ Date: _____

Total: 15 marks

KEY WORDS approximation 近似 • continuity correction 连续性校正 • normal distribution 正态分布
 • standardisation 标准化 • standard deviation 标准差

Objective

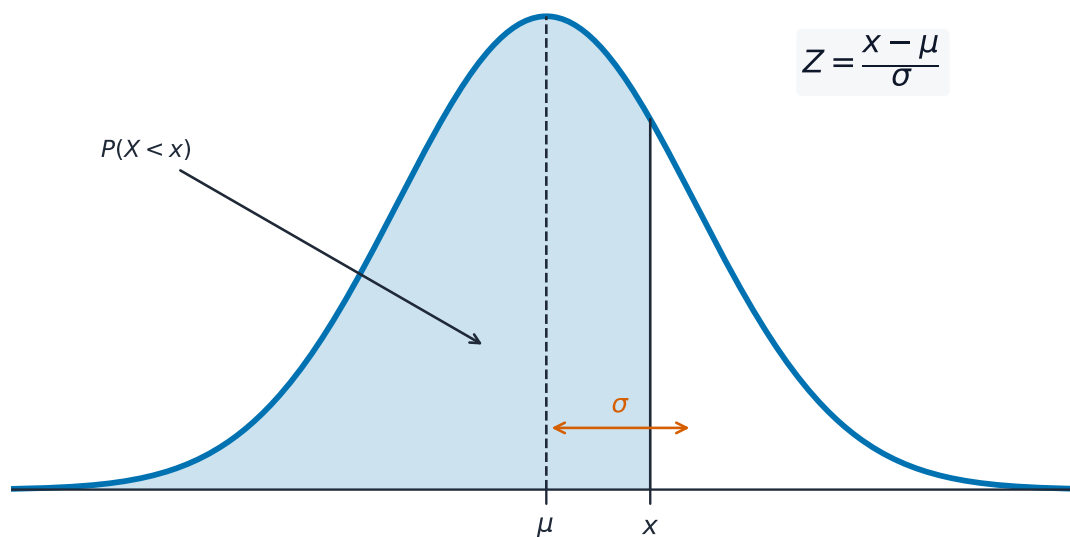
Build the skills to answer exam questions on the **normal distribution** 正态分布 — **standardisation** 标准化, reading the Φ table, finding an unknown μ or σ , and the **normal approximation to the binomial** 二项分布的正态近似.

You must be able to:

- standardise with $Z = \frac{X - \mu}{\sigma}$ and read Φ
- find an unknown mean or standard deviation from a given probability
- use the normal approximation with a **continuity correction** 连续性校正

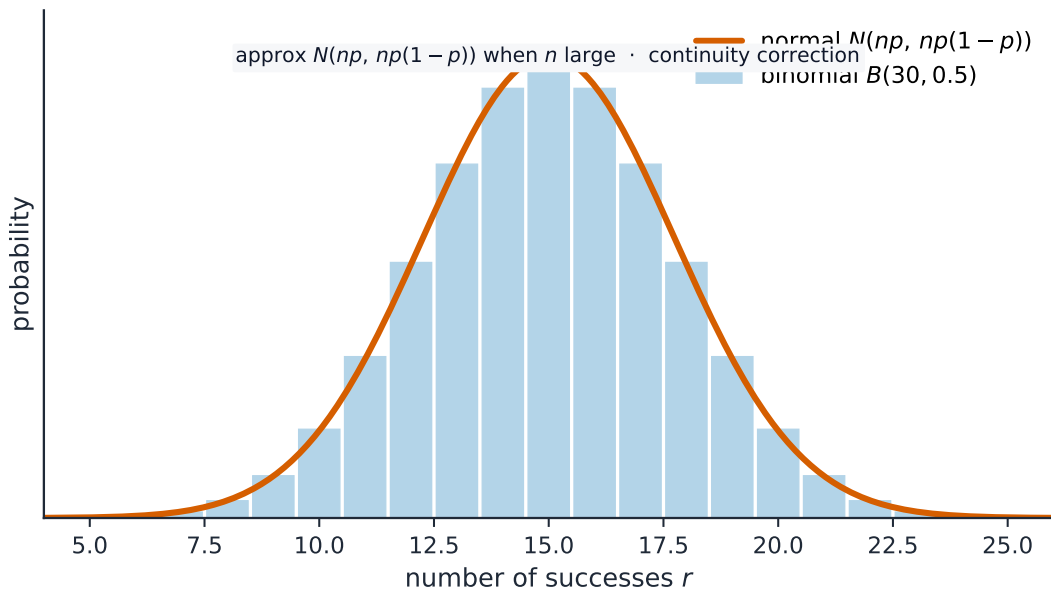
1 Worked examples

- Standardise & find μ



A normal probability is an area under the bell curve; standardising rescales it to $Z \sim N(0, 1)$

$X \sim N(\mu, 0.14^2)$, $P(X < 1.48) = 0.22$. $\Phi^{-1}(0.22) = -0.772$, so $\frac{1.48 - \mu}{0.14} = -0.772 \Rightarrow \mu = 1.59$.



For large n the binomial $\approx N(np, np(1-p))$ — add a ± 0.5 continuity correction

2 Practice

2.1 $X \sim N(50, 4^2)$. Find the Z value for $X = 56$. [2]

2.2 State the continuity correction used for $P(X \geq 20)$ in a normal approximation. [1]

3 Exam-style questions

3.1 $X \sim N(0, 1)$. Using $\Phi(1) = 0.8413$, $P(Z > 1)$ is: [1]

- A 0.8413
- B 0.1587
- C 0.3413
- D 0.5

3.2 The heights of plants are $X \sim N(82, 5^2)$ cm.

(a) Find $P(X > 90)$. [3]

(b) Find the height exceeded by the tallest 10% of plants. [3]

3.3 A fair coin is tossed 100 times. Using a normal approximation, find the probability of obtaining at least 60 heads. [5]

Solutions

2.1 $Z = \frac{56 - 50}{4} = 1.5.$

2.2 use $P(X \geq 19.5).$

3.1 B. $P(Z > 1) = 1 - 0.8413 = 0.1587.$

3.2 (a) $Z = \frac{90 - 82}{5} = 1.6; P(X > 90) = 1 - \Phi(1.6) = 1 - 0.9452 = 0.0548.$

(b) top 10%: $\Phi(z) = 0.90 \Rightarrow z = 1.282; x = 82 + 1.282(5) = 88.4 \text{ cm}.$

3.3 $X \sim B(100, 0.5) \approx N(50, 25);$ continuity correction $P(X \geq 60) \rightarrow P(Y > 59.5);$
 $Z = \frac{59.5 - 50}{5} = 1.9; P = 1 - \Phi(1.9) = 1 - 0.9713 = 0.0287.$

- 6** A factory produces chocolate bars. The weights of the bars are normally distributed with mean 155 g and standard deviation 6 g. A random sample of 350 of these bars is chosen.
- (a)** How many of these 350 bars would you expect to weigh between 148 g and 160 g? [4]

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A-Level Mathematics: 9709 Mathematics November 2025 Question Paper 51

A second factory also produces chocolate bars. The weights of these bars are normally distributed with mean μ g and standard deviation σ g. Tests show that 8% of the bars weigh more than 114.0 g and 20% weigh less than 99.5 g.

(b) Find the value of μ and the value of σ .

[5]

[illegible]

A-Level Mathematics: 9709 Mathematics November 2025 Question Paper 52

- 3

(56)

The heights of the Junior members of the Giraffes club are normally distributed with mean 172.7 cm and standard deviation σ cm. 23% of these members have height less than 170.3 cm.

(b) Find the value of σ . [3]

[illegible]

- 6 For a randomly chosen person, their next birthday is equally likely to occur on any day of the week, independently of any other person’s birthday.
- (a) Find the probability that, out of 10 randomly chosen people, none of them will have their next birthday on a Saturday or Sunday. [1]

- (b) Find the probability that, out of 10 randomly chosen people, fewer than 3 will have their next birthday on a Wednesday. [3]

- (c)** Use a suitable approximation to find the probability that, out of 392 randomly chosen people, more than 65 will have their next birthday on a Friday. [5]

[illegible]

- 1 The masses of the bags of rice made by a company are normally distributed with mean μ kg and standard deviation 0.14 kg. The probability that the mass of a randomly chosen bag of this rice is less than 1.48 kg is 0.22.

Find the value of μ .

[3]

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