Pearson Edexcel International Advanced Level

考前模拟卷 – **A Level Clouds**出品

Morning (Time: 1 hour 30 minutes)

Paper reference **WST01/01**

Mathematics
International Advanced Subsidiary/Advanced Level
Statistics S1

You must have:
Mathematical Formulae and Statistical Tables (Yellow), calculator

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- If pencil is used for diagrams/sketches/graphs it must be dark (HB or B).
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions and ensure that your answers to parts of questions are clearly labelled.
- Answer the questions in the spaces provided
  – *there may be more space than you need.*
- You should show sufficient working to make your methods clear. Answers without working may not gain full credit.
- Values from the statistical tables should be quoted in full. If a calculator is used instead of the tables, the value should be given to an equivalent degree of accuracy.
- Inexact answers should be given to three significant figures unless otherwise stated.

Information

- A booklet 'Mathematical Formulae and Statistical Tables' is provided.
- There are 6 questions in this question paper. The total mark for this paper is 75.
- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question.*

Advice

- Read each question carefully before you start to answer it.
- Try to answer every question.
- Check your answers if you have time at the end.
- If you change your mind about an answer, cross it out and put your new answer and any working underneath.

Turn over ▶

Pearson

1. The table below shows the distances (to the nearest km) travelled to work by the 50 employees in an office.

Distance (km)	Frequency (f)	Distance midpoint (x)
0 – 2	16	1.25
3 – 5	12	4
6 – 10	10	8
11 – 20	8	15.5
21 – 40	4	30.5

[You may use $\sum fx = 394, \quad \sum fx^2 = 6500$]

A histogram has been drawn to represent these data.

The bar representing the distance of $3 - 5$ has a width of 1.5 cm and a height of 6 cm.

(a) Calculate the width and height of the bar representing the distance of $6 - 10$

(3)

(b) Use linear interpolation to estimate the median distance travelled to work.

(2)

(c) (i) Show that an estimate of the mean distance travelled to work is 7.88 km.

(ii) Estimate the standard deviation of the distances travelled to work.

(4)

(d) Describe, giving a reason, the skewness of these data.

(2)

Peng starts to work in this office as the 51st employee.
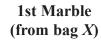
She travels a distance of 7.88 km to work.

(e) Without carrying out any further calculations, state, giving a reason, what effect Peng's addition to the workforce would have on your estimates of the

(i) mean,

(ii) median,

(iii) standard deviation

of the distances travelled to work.

(3)

Question 1 continued

Question 1 continued

Question 1 continued

(Total for Question 1 is 14 marks)

2. Two bags, *X* and *Y*, each contain green marbles (G) and blue marbles (B) only.

- Bag *X* contains 5 green marbles and 4 blue marbles

- Bag *Y* contains 6 green marbles and 5 blue marbles

A marble is selected at random from bag *X* and placed in bag *Y*
A second marble is selected at random from bag *X* and placed in bag *Y*
A third marble is then selected, this time from bag *Y*

(a) Use this information to complete the tree diagram shown on page 7

(3)

(b) Find the probability that the 2 marbles selected from bag *X* are of different colours.

(2)

(c) Find the probability that all 3 marbles selected are the same colour.

(2)

Given that all three marbles selected are the same colour,
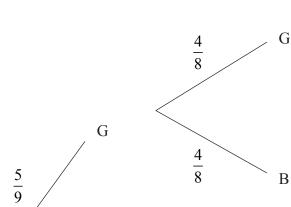
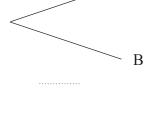(d) find the probability that they are all green.

(3)

Question 2 continued

1st Marble (from bag X)	2nd Marble (from bag X)	3rd Marble (from bag Y)

$\dfrac{5}{9}$ G

$\dfrac{4}{9}$ B

$\dfrac{4}{8}$ G

$\dfrac{4}{8}$ B

.... G

.... B

.... G

.... G

.... B

.... B

.... G

.... B

.... G

.... B

$\dfrac{6}{13}$ G

$\dfrac{7}{13}$ B

Question 2 continued

Question 2 continued

(Total for Question 2 is 10 marks)
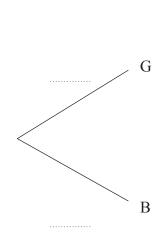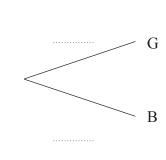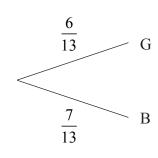
3. A bag contains n marbles of which 7 are green.

From the bag, 3 marbles are selected at random.

The random variable X represents the number of green marbles selected.

The cumulative distribution function of X is given by

x	0	1	2	3
F(x)	a	b	$\dfrac{37}{38}$	1

(a) Show that $n(n-1)(n-2) = 7980$

(4)

(b) Verify that $n = 21$ satisfies the equation in part (a).

(1)

Given that $n = 21$

(c) find the exact value of a and the exact value of b

(6)

Question 3 continued

(Total for Question 3 is 11 marks)

4. Two students, Olive and Shan, collect data on the weight, w grams, and the tail length, t cm, of 15 mice.

Olive summarised the data as follows

$$S_{tt} = 5.3173 \qquad \sum w^2 = 6089.12 \qquad \sum tw = 2304.53 \qquad \sum w = 297.8 \qquad \sum t = 114.8$$

(a) Calculate the value of S_{tw} and the value of S_{ww}

(3)

(b) Calculate the value of the product moment correlation coefficient between w and t

(2)

(c) Show that the equation of the regression line of w on t can be written as

$$w = -16.7 + 4.77t$$

(3)

(d) Give an interpretation of the gradient of the regression line.

(1)

(e) Explain why it would not be appropriate to use the regression line in part (c) to estimate the weight of a mouse with a tail length of $2\,$cm.

(2)

Shan decided to code the data using $x = t - 6$ and $y = \dfrac{w}{2} - 5$

(f) Write down the value of the product moment correlation coefficient between x and y

(1)

(g) Write down an equation of the regression line of y on x
You do not need to simplify your equation.

(1)

Question 4 continued

Question 4 continued

Question 4 continued

(Total for Question 4 is 13 marks)

5. The distance achieved in a long jump competition by students at a school is normally distributed with mean 3.8 metres and standard deviation 0.9 metres.

Students who achieve a distance greater than 4.3 metres receive a medal.

(a) Find the proportion of students who receive medals.

(3)

The school wishes to give a certificate of achievement or a medal to the 80% of students who achieve a distance of at least d metres.

(b) Find the value of d.

(3)

Of those who received medals, the $\frac{1}{3}$ who jump the furthest will receive gold medals.

(c) Find the shortest distance, g metres, that must be achieved to receive a gold medal.

(4)

A journalist from the local newspaper interviews a randomly selected group of 3 medal winners.

(d) Find the exact probability that there is at least one gold medal winner in the group.

(3)

Question 5 continued

Question 5 continued

Question 5 continued

(Total for Question 5 is 13 marks)

6. A red spinner is designed so that the score R is given by the following probability distribution.

r	2	3	4	5	6
P($R = r$)	0.25	0.3	0.15	0.1	0.2

(a) Show that $E(R^2) = 15.8$

(1)

Given also that $E(R) = 3.7$

(b) find the standard deviation of R, giving your answer to 2 decimal places.

(2)

A yellow spinner is designed so that the score Y is given by the probability distribution in the table below. The cumulative distribution function F(y) is also given.

y	2	3	4	5	6
P($Y = y$)	0.1	0.2	0.1	a	b
F(y)	0.1	0.3	0.4	c	d

(c) Write down the value of d

(1)

Given that $E(Y) = 4.55$

(d) find the value of c

(5)

Pabel and Jessie play a game with these two spinners.
Pabel uses the red spinner.
Jessie uses the yellow spinner.
They take turns to spin their spinner.
The winner is the first person whose spinner lands on the number 2 and the game ends.
Jessie spins her spinner first.

(e) Find the probability that Jessie wins on her second spin.

(2)

(f) Calculate the probability that, in a game, the score on Pabel's first spin is the same as the score on Jessie's first spin.

(3)

Question 6 continued

Question 6 continued

(Total for Question 6 is 14 marks)

TOTAL FOR PAPER IS 75 MARKS