ZIMBABWE SCHOOL EXAMINATIONS COUNCIL
General Certificate of Education Advanced Level

STATISTICS
PAPER 1

6046/1

NOVEMBER 2022 SESSION

3 hours

Additional materials:
Answer paper
Graph paper
List of Formulae MF7
Electronic calculator (Non-programmable)

TIME 3 hours

INSTRUCTIONS TO CANDIDATES

Write your name, centre number and candidate number in the spaces provided on the answer paper/ answer booklet.

Answer **all** questions.

If a numerical answer cannot be given exactly, and the accuracy required is not specified in the question, then in the case of an angle it should be given to the nearest degree, and in other cases it should be given correct to 2 significant figures.

INFORMATION FOR CANDIDATES

The number of marks is given in brackets [ ] at the end of each question or part question.

The total number of marks for this paper is 120.

The use of a non-programmable electronic calculator is expected, where appropriate.

You are reminded of the need for clear presentation in your answers.

This question paper consists of 7 printed pages and 1 blank pages.

[Turn over

1   A distribution is given by

$$P(X = i) = \frac{1}{5} \ (i = 1,2,3,4,5)$$

[1]

(a)   State the name of the distribution.

(b)   Find the

(i)   mean

(ii)   standard deviation.

[4]

2   The following table shows number of people and their favourite television shows in two different towns.

	News	Drama	Sport
Town A	55	20	25
Town B	25	15	60

Draw **two** comparable pie charts to display the information for town A and town B.

[5]

3   The results of a survey showed that 360 out of 1 000 families view a certain television show.

Calculate the 95% confidence interval for the proportion of families viewing the show.

[5]

4   The table below shows information about students at an Academy.

	Runs a small business	Does not run a small business
Male	28	22
Female	70	30

(a)   How many students are at the Academy?

[1]

(b)   A student is picked at random from the Academy.

    (i)   Find the probability that the student runs a small business.   [2]

    (ii)   Given that the student is female find the probability that she does not run a small business.   [2]

5   The masses of fifty Grade five learners at school A is given in the table below.

Mass (kg)	25 − 27	28 − 31	32 − 36	37 − 40	41 − 50
Frequency	5	17	15	10	3

Use the above information to construct a frequency polygon showing the distribution of learners' masses.   [6]

6   **(a)**   Define the term *trend*.   [1]

    (b)   State any **three** different components of time series.   [3]

    (c)   Distinguish between forecasting and planning.   [2]

7   Given that $X \sim Geo(p)$ and $Var(X) = 20$,

find the

    (i)   value of p,   [4]

    (ii) $P(X \geq 4)$.   [2]

8   A quiz team of five is to be chosen from seven men and six women. Find in how many ways the team can be chosen if there are

    (a)   no restrictions on the number of men and women,   [2]

    (b)   three women and two men in the team,   [2]

    (c)   more men than women in the team.   [3]

[Turn over

9   **(a)**   Distinguish between *a population* and *a sampling frame*.   [2]

(b)   Potato pockets are filled by a machine. A random sample of 10 pockets from the production line had the following quantities in kg.

20.12	20.50	20.91	20.23	20.46
20.64	21.01	20.19	20.37	20.73

Calculate unbiased estimates of the

(i)   mean,   [2]

(ii)   variance.   [3]

10   A lady withdrew money from her bank and was given it in the form of coins as follows:

fourty 50c coins, sixty 25c coins, and hundred 10c coins.

Along her way home she lost two coins.

Find the probability that both coins lost are

(i)   50c coins,   [2]

(ii)   of different face value,   [3]

(iii)   of the same face value.   [3]

11   A fuel manufacturing company is promoting the use of an environmental friendly diesel called diesel A. A researcher made the following observations for a random sample of 200 sales of diesel A at a particular fuel station:

Volume (litres) of diesel A	≤ 5	≤ 10	≤ 15	≤ 20	≤ 25	≤ 30
Cumulative No of sales	87	106	123	138	151	164

Volume (litres) of diesel A	≤ 35	≤ 40	≤ 45	≤ 50	≤ 55	≤ 60
Cumulativ e No of sales	175	184	191	196	199	200

(a)   Calculate the mean and the standard deviation for the sample.   [7]

(b)   State any **one** advantage and **one** disadvantage of using mean as a measure of central tendency.   [2]

12   The mass of sugar packed by a machine in a bag is normally distributed with mean 1 000 g and standard deviation 3 g.

(a)   A bag is picked at random at the end of the production line.

Find the probability that the mass of the bag is

(i)   greater than 1 007 g,   [3]

(ii)   between 995 g and 1 005 g.   [4]

(b)   Find the probability that exactly four in five bags selected at random have masses between 995 g and 1 005 g.   [3]

13   A company used to have a market proportion of 45% for their drink of type A. The company is no longer sure of their current market proportion for type A drink.

Out of a random sample of 50 retail outlets, 35 of them were selling type A drink.

(a)   Calculate an approximate 95% confidence interval for the market proportion of type A drink.   [3]

(b)   Using a suitable approximation carry out a 5% level of significance test to investigate whether the market proportion of drink type A has changed. [9]

[Turn over

14   A bag contains 10 red balls and x non-red balls. Two balls are drawn from the bag at random, one at a time and without replacement.

   (a)   Copy and complete the tree diagram below.
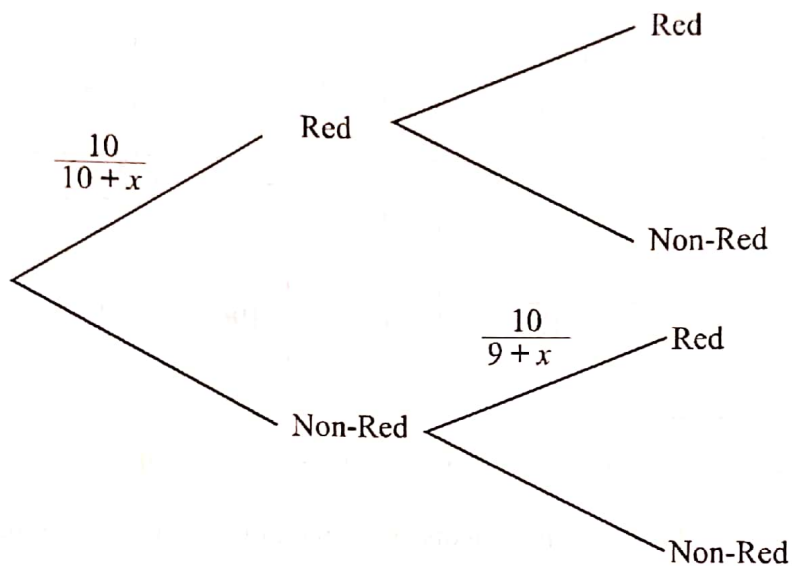
   [3]

   (b)   Find x if the probability of drawing two red balls is $\frac{3}{20}$.   [4]

   (c)   Using this value of x, find the probability that the second ball is

      (i)   non-red,   [3]

      (ii)   red given that the first ball drawn is non-red.   [3]

15 The heights of 12 teenage boys were measured correct to the nearest centimetre, on their 15th and 18th birthdays. The results, denoted by x cm and y cm respectively were recorded as follows:

Height at 15th (x cm)	135	137	138	141	143	144
Height at 18th (y cm)	145	146	149	150	150	149

Height at 15th (x cm)	145	147	148	149	156	158
Height at 18th (y cm)	155	156	159	160	166	169

$\sum X = 1\,741$ $\sum X^2 = 253143$ $\sum y = 1854$

$\sum y^2 = 287102$ $\sum Xy = 269572$

$\bar{x} = 145{,}1$ $\bar{y} = 154{,}5$

(a)   Plot the data on a scatter diagram.   [3]

(b)   (i)   Calculate the equation of the regression line y on x.   [5]

       (ii)   Draw the line of best fit.   [3]

(c)   Use the graph to estimate the height of a boy on the 18th birthday if he
       was 154 cm on his 15th birthday.   [2]

(d)   (i)   Find the value of the product moment correlation coefficient.   [2]

       (ii)   Comment on the result.   [1]