N5

National Qualifications

2023

Applications of Mathematics

Paper 2

Thursday, 4 May

Instructions to Candidates

Candidates should enter their surname, forename(s), date of birth, Scottish candidate number and the name and level of the subject at the top of their first answer sheet.

Total marks – 55

Attempt ALL questions.

You may use a calculator.

To earn full marks you must show your working in your answers.

State the units for your answer where appropriate.

You must clearly identify the question number you are attempting on your answer sheet.

An ow in the margin indicates a new question.

Questions marked with an asterisk differ in some respects from those in the printed paper.

Marks are shown in square brackets at the end of each question or part question.

Tactile diagrams are produced in a separately bound booklet.

[Braille page 2] A separate formula sheet is provided.

Attempt ALL questions

ow 1. A lake had a volume of 14 730 000 litres.

Due to decreasing rainfall the volume of the lake is expected to decrease by 2.8% annually.

Calculate the expected volume of the lake after 3 years.

Give your answer to 3 significant figures. [4 marks]

ow * 2. Refer to the diagram for Question 2. A glazier is edging the perimeter of a window.

The window is in the shape of two rectangles and two identical quarter circles.

Calculate the length of edging required for the perimeter of the window. [3 marks]

ow * 3. Refer to the diagram for Question 3. Fiona is having her back garden redesigned.

In the diagram

AB = 21 m

AD = 5 m

DC = 7 m

Angle ADC is a right angle.

Angle ACB is a right angle.

A new fence is to be put from A to B and from B to C.

[Braille page 4] Rolls of fencing are 3 m long and cost £22 per roll.

Calculate the cost of the fencing. [6 marks]

ow * 4. Refer to the diagram for Question 4. The reception area in a hotel features a large mirror.

The mirror is in the shape of a square with identical semi-circles on each side.

• The square has sides of length 1.2 metres.

• The semi-circles have a diameter of 0.7 metres.

ow 4. (a) Calculate the area of the mirror. [2 marks]

The hotel bought a different mirror for the ballroom.

The options for mirrors are shown in tables 1 and 2 below;

[In table 1 below, feature is followed by: option and cost.]

Glass coating: standard £12 per m^2; anti-glare £16 per m^2.

Fixings: basic £19 per mirror; standard £32 per mirror; premium £42 per mirror.

Backing: no backing £0 per mirror; foil backing £20 per mirror.

[Braille page 5]

[In table 2 below, for glass colour and thickness, colour is followed by: thickness and cost per m^2.]

Bronze: 4mm £18; 6mm £36.

Silver: 4mm £38; 6mm £58.

Gold: 4mm £66; 6mm £86.50.

The hotel bought a mirror with an area of 3 m^2.

The hotel chose the following options for the mirror:

• 4 mm thick silver glass

• anti-glare glass coating

• standard fixings

• foil backing.

ow 4. (b) Calculate the total cost of this mirror. [2 marks]

ow * 5. Stuart records the chlorine levels in his hot tub.

A sample of the levels is shown below.

[The table below shows day of the week followed by: chlorine level.]

Mon: 0.8.

Tue: 1.9.

Wed: 1.1.

Thu: 2.6.

Fri: 3.1.

Sat: 2.4.

Sun: 2.1.

[Braille page 6]

ow 5. (a) For these levels, calculate:

(i) the mean [1 mark]

(ii) the standard deviation. [3 marks]

His friend Colin's hot tub had a mean chlorine level of 2.2 and a standard deviation of 1.4.

ow 5. (b) Make two valid comparisons about the chlorine levels in Stuart's and Colin's hot tubs. [2 marks]

Colin had a new hot tub installed in his garden.

It normally takes a team of 4 workers 12 hours to complete the task.

[Braille page 7] The company sent an additional worker to help complete the task.

All workers work at the same rate.

The workers started at 08:00 and they took a 30 minute break for lunch.

ow 5. (c) Determine the time they finished installing the hot tub. [3 marks]

ow * 6. Lorna is travelling around Europe.

The table shows the rate of exchange between Pounds sterling and other currencies.

[The table shows Pounds sterling (£) followed by: Other currencies.]

1: 1.15 euros.

1: 4.94 Polish zlotys.

• Lorna converted £640 into Polish zlotys.

• She was in Poland for 4 days.

• She spent 340 Polish zlotys each day she was in Poland.

• She converted her remaining Polish zlotys into euros.

ow 6. (a) Calculate how many euros she received. [3 marks]

Lorna visited Switzerland and decided to buy some cheese. The cost of five types of cheese is shown in the table.

[Braille page 8]

[In the table below, Type of cheese is followed by: Cost per 250 grams in Swiss francs.]

Emmental: 2.50.

Gruyere: 7.50.

Raclette: 7.00.

Edam: 3.00.

Mozzarella: 2.00.

Lorna saw 3 different deals for buying cheese.

Deal A: Buy all 5 for 18.50 Swiss francs

Deal B: Buy all 5, get the cheapest free

Deal C; Buy all 5, save 15%

Lorna is going to buy 250 grams of each cheese.

ow * 6. (b) Determine the best deal for buying all 5 cheeses.

Use your working to justify your answer. [2 marks]

Refer to Diagram 1 and Diagram 2 for Question 6(c).

Lorna also purchased a paperweight as a gift.

The paperweight is made in the shape of a cube with a hemisphere on top.

[Braille page 9]

The hemisphere is half of a sphere with a diameter of 6 cm.

Diagram 1 shows a top view of the paperweight.

Diagram 2 shows a side view of the paperweight.

ow * 6. (c) Calculate the volume of the paperweight [3 marks]

ow 7. Dave has a job in an office typing documents.

He is contracted to work 35 hours per week.

He earns £11.20 per hour.

He is paid time and a half for any overtime he works.

Last week Dave worked 37.5 hours.

ow 7. (a) Calculate his gross wage last week. [2 marks]

Dave records the number of words per minute that he typed during a 14-minute period.

47 39 51 49 42 44 47

54 48 37 41 46 37 44

ow * 7. (b) Describe all the elements of a box plot and for this data, calculate:

(i) the highest number of words per minute

(ii) the lowest number of words per **[Braille page 10]** minute

(iii) the median

(iv) the lower quartile

(v) the upper quartile [4 marks]

ow 7. (c) (i) Calculate the interquartile range for the number of words Dave can type per minute. [1 mark]

Lynn works in the same office as Dave.

Lynn also records the number of words per minute that she can type.

The interquartile range for the number of words that Lynn can type per minute is 5.

ow 7. (c) (ii) Make one valid comment comparing the number of words Dave and Lynn can type per minute. [1 mark]

Lynn earns £1052 a week.

National Insurance is calculated on a person's wage before deductions such as pension contributions.

The table below shows weekly National Insurance rates.

[In the table, weekly earnings is followed by: National Insurance rate.]

Up to £242: 0%.

From £242 to £967: 13.25%.

Over £967: 3.25%.

[Braille page 11]

ow * 7. (d) (i) Calculate Lynn's weekly National Insurance payment. [3 marks]

Lynn pays 4.5% of her weekly wage into her pension.

Her weekly income tax is £52.08.

ow * 7. (d) (ii) Calculate Lynn's weekly net pay. [2 marks]

ow 8. Jacqueline buys items online and sells them in her shop.

Jacqueline bought a painting for £320 and sold it for £415.

ow 8. (a) Calculate the percentage profit that she made. [2 marks]

Eileen wants to buy a new dining table from the shop.

It is advertised at a price of £800.

Eileen wishes to use a payment plan to buy the dining table.

The total price of the payment plan is 14% more than the advertised price.

The payments are calculated as follows:

• the deposit is $\frac{1}{4}$ of the total price

• 10 equal monthly instalments

• followed by a final payment of **[Braille page 12]** £100.

ow 8. (b) Calculate the cost of each monthly instalment. [3 marks]

Jacqueline owns shops in Edinburgh, New York and Dubai.

Jacqueline wants an item sent from her Dubai shop to her New York shop.

It will be sent from her Dubai shop at 8:45 am local time on 24 November.

The expected delivery time is 90 hours.

New York is 5 hours behind Edinburgh.

Dubai is 4 hours ahead of Edinburgh.

ow 8. (c) Determine the local time and date the item is expected to arrive at her New York shop. [3 marks]

[END OF QUESTION PAPER]