N5

National Qualifications

2022

Applications of Mathematics

Paper 2

Friday, 6 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.

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

Tactile diagrams are produced in a separately bound booklet.

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

An ow in the margin indicates a new question.

A separate formula sheet is provided.

Attempt ALL questions

ow 1. A soft drinks company currently have sales of 240 000 bottles per year. It is predicted that sales will

- Decrease by 4.2% in the next year.
- Increase by 5.3% in each of the following 2 years.

Calculate the predicted sales after 3 years. Give your answer to 3 significant figures. [4 marks]

ow 2. The prices of lambs sold in September was recorded. A sample of the prices, in pounds, is shown.

72; 75; 73; 68; 65; 70.

ow 2. (a) For these prices, calculate:

ow 2. (a) (i) the mean [1 mark]

ow 2. (a) (ii) the standard deviation. [3 marks]

The price of lambs sold in August was also recorded.
The mean price was £70.20 and the standard deviation was £3.85.

ow 2. (b) Make two valid comparisons about the prices of lambs in August and September. [2 marks]

ow 3. Laura earns £40,560 per annum.
National Insurance is calculated on a person's salary before deductions such as pension contributions.
National Insurance rates
Up to £9568   0%
From £9568 to £50,270   12%
Over £50,270   2%
Calculate her annual National Insurance payment. [2 marks]

ow * 4. Refer to the Diagram 1 and Diagram 2 for Question 4. A company produces sandwiches and packs them in crates for transporting to shops.

The dimensions of each sandwich box and the internal dimensions of a crate are shown in the diagrams.
Diagram 1 shows a front view of the sandwich box and the crate.
Diagram 2 shows the side view of the sandwich box and the crate.
The sandwiches need to be laid so the arrow on the box points up. They must all be aligned in the same direction.

ow 4. (a) Calculate the maximum number of sandwich boxes that can be fitted into each crate. [3 marks]

The company receives an order for 100 sandwiches.
It takes 7 employees 44 minutes to make 100 sandwiches.
All the employees work at the same rate.

ow 4. (b) Calculate the time it would take 11 employees to make 100 sandwiches. [3 marks]

Isaac sells sandwiches in his shop.
He spent a total of £92.65 on sandwiches, including delivery.
He then sold:

[Braille page 3]
- 10 chicken salad sandwiches at £2.50 each
- 15 prawn mayo sandwiches at £3.20 each
- 9 egg mayo sandwiches at £1.95 each.

ow 4. (c) Calculate the percentage loss Isaac made for this order. [3 marks]

The table shows the cost of one box of sandwiches, in pounds.
In the table below,
Filling is followed by: Number of boxes of sandwiches ordered − 0 to 9; 10 to 19; 20 to 29; 30 or more.

Tuna mayo: 1.80; 1.70; 1.60; 1.55.
Chicken salad: 1.95; 1.85; 1.75; 1.65.
Prawn mayo: 2.30; 2.20; 2.10; 2.05.
Egg mayo: 1.50; 1.45; 1.35; 1.30.
Ham and cheese: 2.35; 2.25; 2.15; 2.00.

For each order, the company charges £2.75 per mile for delivery.
Yolanda's Sandwich Shop places an order for:
- 20 chicken salad
- 30 prawn mayo
- 15 egg mayo.

The distance travelled for the delivery is 6 miles.

ow 4. (d) Calculate the total cost of this order. [3 marks]

ow * 5. An international athletics event was held in Doha, Qatar.

In athletics, competitors in the heptathlon must compete in seven different events.

The competitor is awarded points depending on how well they perform in some of the events.

The table shows the number of points awarded for different levels of performance in some of the events.

In the table below, Event is followed by: Performance, Points scored.

High Jump: 1.82m, 1000; 1.85m, 1040; 1.88m, 1080; 1.91m, 1120; 1.95m, 1160; 1.97m, 1200.

Shot put: 17.07m, 1000; 17.66m, 1040; 18.25m, 1080; 18.84m, 1120; 19.43m, 1160; 20.02m, 1200.

800 m run: 2 min 8 sec, 1000; 2 min 5 sec, 1040; 2 min 2 sec, 1080; 2 min 0 sec, 1120; 1 min 57 sec, 1160; 1 min 55 sec, 1200.

One of the competitors achieved a height of 1.95 metres in the high jump.

ow 5. (a) Use the table to state how many points they scored for the high jump. [1 mark]

The final event of the heptathlon is the 800 m run. In this event, another of the competitors scored 1000 points.

ow 5. (b) By referring to the table, calculate this competitor's average speed over the 800 m run.

Give your answer in metres per second. [3 marks]

[Braille page 4] Lucy is a sports journalist. She travelled to Doha to report on the international athletics event.

She flew from Manchester to Doha.

- Her flight landed in Doha at 19:18 local time.
- The flying time was 7 hours 23 minutes.
- Doha is 2 hours ahead of Manchester time.

ow 5. (c) Calculate the local time the flight left Manchester. [2 marks]

When she was in Qatar, Lucy stayed in a hotel.
She changed £1500 into Qatari riyals.

- She stayed for 8 nights.
- The room rate was 418 Qatari riyals per night.
- She spent 1836 Qatari riyals on other expenses.
- She then changed all her remaining Qatari riyals into euros.

The rates of exchange were:

Pounds Sterling (£)	Other currencies
1	4.67 Qatari riyals
1	1.16 euros

ow 5. (d) Calculate how many euros Lucy received. [4 marks]

ow * 6. Pepe inspects and sells fire extinguishers.

His monthly gross pay consists of a basic wage plus commission on the sale of any fire extinguishers.

The rate of commission he earns depends on the mean price he sells each fire extinguisher for, as shown.

In the table below, Mean price of fire extinguisher is followed by: Rate of commission.

[Braille page 5]

£40-£49.99: 14%.

£50-£59.99: 14.5%.

£60-£69.99: 15%.

£70-£79.99: 15.5%.

£80-£89.99: 16%.

£90-£99.99: 16.5%.

In January, Pepe's basic wage was £1200.
He sold 107 fire extinguishers for a total of £8185.50.

ow 6. (a) Calculate Pepe's gross pay for the month of January. [3 marks]

Pepe sells three different types of fire extinguishers.
In February he sold water, foam and powder fire extinguishers in the ratio 6:2:7 respectively.
He sold 56 powder fire extinguishers in February.

ow 6. (b) Calculate the total number of fire extinguishers he sold in February. [2 marks]

A customer wants to buy 12 powder fire extinguishers and 12 stands.

- The recommended price of one powder fire extinguishers is £78.
- The recommended price of one stand is £15.

The customer saw the following deals available.
- Company A   Buy 2 powder fire extinguishers, get one free. All stands reduced by £2.50.
- Company B   1/6 off the recommended price of all fire extinguishers. Each fire extinguisher comes with a free stand.
- Company C   12 powder fire extinguishers and 12 stands for £900.

To encourage the customer to buy from him instead, Pepe offers a 5% discount on the cheapest of these deals.

ow 6. (c) Calculate how much Pepe will charge the customer. [3 marks]

Pepe inspected the fire extinguishers of a local business.

The fire extinguishers were considered safe if they weighed 10.4 kg ± 10%.

The weights, in kilograms, of the seven fire extinguishers inspected are shown below.

9.80, 11.67, 9.12, 10.94, 11.10, 9.27, 10.55

ow 6. (d) Calculate the maximum and minimum safe weights and determine the fraction that were considered safe. [3 marks]

ow * 7. Jamel keeps fish.

To make tap water safe for fish, a conditioner is added.

The volume of conditioner required is directly proportional to the volume of tap water.

5 ml of conditioner must be used for every 20000 ml of tap water.

ow 7. (a) Calculate the volume of conditioner required for 14 litres of tap water. [2 marks]

Refer to the diagram for Question 7(b).

Jamel has a fish tank. The fish tank is a cuboid with dimensions 30 cm by 30 cm by 42 cm in the diagram in the diagram **[Braille page 6]** book.

The tank has a cylindrical light box at the bottom as shown.

The cylindrical light box has a diameter of 10 cm and a height of 8 cm.

There is a 2 cm gap between the top of the tank and the water level.

The light box does not hold any water.

ow 7. (b) Calculate the volume of water in the tank. [4 marks]

Jamel bought a stand for this fish tank.

The top of the stand is circular.

The corners of the square base of the tank touch the edge of the circle by diagram 7. (c)

The diameter of the circle is shown by the dotted line in the aerial view.

ow 7. (c) Calculate the area of the top of the stand. Give your answer in square metres. [4 marks]

[END OF QUESTION PAPER]