N5

National Qualifications

2023

Mathematics

Paper 2

Wednesday, 3 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 – 50

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.

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

Write your answers clearly on your answer sheet.

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

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

[Braille page 2] An ow in the margin indicates a new question.

A separate formula sheet is provided.

Total marks — 50

Attempt ALL questions

ow 1. A caravan was bought for £20,000.

It depreciated by 11% in the first year.

It then depreciated by a further 6% each year over the next two years.

Calculate the value of the caravan three years after it was bought. [3 marks]

ow 2. The mass of a helium atom is 6.64×10^{-24} grams.

A flask contains 300 grams of helium.

Calculate the number of helium atoms in this flask.

Give your answer in scientific notation, correct to 3 significant figures. [3 marks]

ow * 3. Refer to the diagram for Question 3. The diagram shows part of a football pitch.

The penalty spot is marked at point C.

AB is an arc of a circle, centre C, radius 9.15 metres.

Calculate the length of the arc AB. [3 marks]

ow * 4. Refer to the diagram for Question 4. The diagram shows triangle JKL.

• Angle KJL = 25°

• JL = 10 metres

• KL = 7 metres

Calculate the size of angle JKL. [3 marks]

ow * 5. Refer to the diagram for Question 5. A logo consists of an H shape and a regular decagon.

The diagram represents the logo.

Calculate the size of the angle labelled P. [2 marks]

ow 6. Nadim bought a flat last year.

The value of the flat has increased by 8% and it is now worth £94,500.

Calculate how much Nadim paid for the flat. [3 marks]

ow 7. Change the subject of the formula

$$P = \frac{1}{3} mn - r \text{ to } m. \quad \text{[3 marks]}$$

ow * 8. Refer to the diagram for Question 8. A wooden beam is used to support a wall built on horizontal ground as shown in the diagram.

The edge of the beam, AB, is 8 metres long.

C is at the foot of the wall.

A is 7 metres from C.

[Braille page 5] B is 4 metres from C.

Determine whether the wall is perpendicular to the ground.

Justify your answer. [4 marks]

ow * 9. Refer to the diagram for Question 9. A concrete block is in the shape of a large pyramid with a small pyramid removed.

The large pyramid has a square base of length 90 centimetres.

The small pyramid has a square base of length 40 centimetres and a height of 48 centimetres.

The block has height 60 centimetres.

Calculate the volume of the block. [4 marks]

ow 10. Express

$$\frac{7}{x-3} - \frac{2}{x}, \quad x \neq 3, x \neq 0$$

as a single fraction in its simplest form. [3 marks]

ow * 11. Anna has a grandfather clock in her house.

It stands on the floor.

The height of the tip of the hour hand above the floor, in centimetres, is given by

$$h = 20 \cos x° + 147$$

where $x°$ is the angle the hour hand **[Braille page 6]** has rotated through since 12 o'clock.

Calculate the first two values of x for which the tip of the hour hand is 150 centimetres above the floor. [4 marks]

ow 12. Simplify $\dfrac{x^2 - 16}{x^2 + x - 20}$.   [3 marks]

ow 13. Simplify $2\sin^2 x° + 2\cos^2 x°$.

Show your working. [2 marks]

ow * 14. Refer to the diagram for Question 14. A storage unit, built in the shape of a cuboid, is shown.

It has length $(x+7)$ metres, breadth x metres and height 2 metres.

The volume of this unit is 45 cubic metres.

(a) Show that $2x^2 + 14x - 45 = 0$.   [2 marks]

(b) Calculate x, the breadth of the storage unit.

Give your answer correct to 1 decimal place. [4 marks]

ow * 15. Refer to the diagram for Question 15. In the diagram:

• AC is perpendicular to BC

• AB = 18 centimetres

[Braille page 7] • BD = 6 centimetres

• BC = 8 centimetres.

The area of triangle ADE is 160 square centimetres.

Calculate the length of AE. [4 marks]

[END OF QUESTION PAPER]