C

2500/405

NATIONAL QUALIFICATIONS

Time: 45 minutes

BASED on the 2000 Question Paper

Due to the changes in format and syllabus of the current paper, some amendments have been made to the original paper.

MATHEMATICS STANDARD GRADE

Credit Level

Paper 1

(Non-calculator)

1 **You may NOT use a calculator.**

2 Answer as many questions as you can.

3 Full credit will be given only where the solution contains appropriate working.

4 Square-ruled paper is provided.

SCOTTISH QUALIFICATIONS AUTHORITY

FORMULAE LIST

The roots of $ax^2 + bx + c = 0$ are $x = \dfrac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}$

Sine rule: $\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$

Cosine rule: $a^2 = b^2 + c^2 - 2bc \cos A$ or $\cos A = \dfrac{b^2 + c^2 - a^2}{2bc}$

Area of a triangle: Area $= \frac{1}{2}ab \sin C$

Standard deviation: $s = \sqrt{\dfrac{\sum(x - \bar{x})^2}{n-1}} = \sqrt{\dfrac{\sum x^2 - (\sum x)^2 / n}{n-1}}$, where n is the sample size.

	KU	RE

1. Evaluate

$$18 - 12{\cdot}5 \div 5.$$ **2**

2. Evaluate

$$\frac{2}{7} \text{ of } \left(\frac{1}{3} + \frac{1}{4}\right).$$ **2**

3. $f(x) = 2x - 5x^2$.

Find $f(-2)$. **2**

4. (*a*) Factorise $x^2 - 16$. **1**

(*b*) Express $\dfrac{5(2x-3)}{4x^2-9}$ in its simplest form. **2**

5. Fifty people took part in a Health Promotion Campaign. They were asked whether or not they smoked cigarettes. The following table summarises the responses.

	Smoker	**Non Smoker**
Male	3	21
Female	8	18

What is the probability that a person chosen at random from this group is

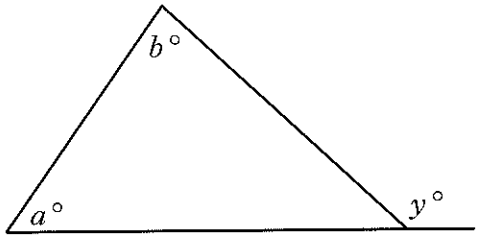
(*a*) male; **1**

(*b*) a smoker; **1**

(*c*) a female who smokes? **1**

KU	RE

6.



Use the information in the above diagram to find a relationship connecting a, b and y. **2**

7. Jamie conducted a survey.

He asked his classmates how they had travelled to school that day.

Here are their replies:

Walk	13
Bus	9
Car	6
Cycle	2

Draw an appropriate statistical diagram to illustrate this information. **4**

8. Solve **algebraically** the inequality

$$2y < 3 - (y + 6).$$ **3**

9. (*a*) Remove the brackets and simplify

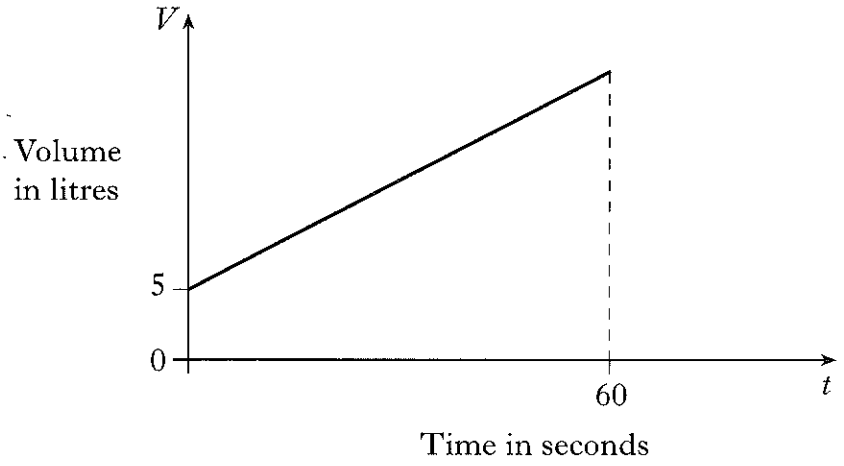
$$a^{\frac{1}{2}}\left(a + \frac{1}{a}\right).$$ **2**

(*b*) Express $\sqrt{18} - \sqrt{2}$ as a surd in its simplest form. **2**

KU	RE

10. The tank of a car contains 5 litres of petrol.

The graph below shows how the volume of petrol in this tank changes as a further 45 litres of petrol is pumped in at a steady rate for 60 seconds.



Find the equation of the straight line in terms of V and t. **4**

11. **1, 3, 5, 7, ...**

The **first** odd number can be expressed as $1 = 1^2 - 0^2$.

The **second** odd number can be expressed as $3 = 2^2 - 1^2$.

The **third** odd number can be expressed as $5 = 3^2 - 2^2$.

(*a*) Express the **fourth** odd number in this form. **1**

(*b*) Express the number 19 in this form. **1**

(*c*) Write down a formula for the $\boldsymbol{n^{th}}$ odd number and simplify this expression. **2**

[END OF QUESTION PAPER]

C

2500/406

NATIONAL QUALIFICATIONS

Time: 1 hour 20 minutes

BASED on the 2000 Question Paper

Due to the changes in format and syllabus of the current paper, some amendments have been made to the original paper.

MATHEMATICS STANDARD GRADE

Credit Level

Paper 2

1 **You may use a calculator.**

2 Answer as many questions as you can.

3 Full credit will be given only where the solution contains appropriate working.

4 Square-ruled paper is provided.

SCOTTISH QUALIFICATIONS AUTHORITY

	KU	RE

1. In January 1999, it was estimated that the number of monkeys in a colony was 5000.

The number of monkeys is decreasing at the rate of 12% per year.

How many monkeys are expected to be in this colony in January 2002?

Give your answer **to the nearest 10**. **4**

2. The mass of water on the earth's surface is $1{\cdot}41 \times 10^{18}$ tonnes.

The total mass of the earth is $5{\cdot}97 \times 10^{21}$ tonnes.

Express the mass of water on the earth's surface as a percentage of the total mass of the earth.

Give your answer in **scientific notation**. **3**

3. Solve the equation $x^2 + 3x - 5 = 0$.

Give your answer **correct to 2 significant figures**. **4**

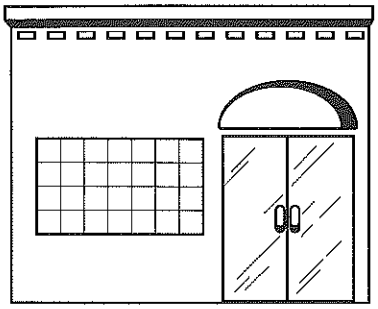
4. The figures below show the total length, in mm, of a sample of 5 sparrows, captured during a bird ringing exercise.

162 152 159 155 163

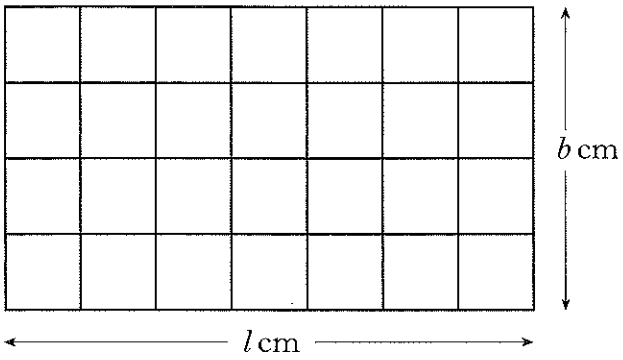
Calculate the sample mean and standard deviation for these measurements, giving your answers correct to 1 decimal place. **3**

KU	RE

5.



A rectangular window has length, l centimetres and breadth, b centimetres.



A security grid is made to fit this window. The grid has 5 horizontal wires and 8 vertical wires.

(*a*) The perimeter of the window is 260 centimetres.
Use this information to write down an equation involving l and b. **1**

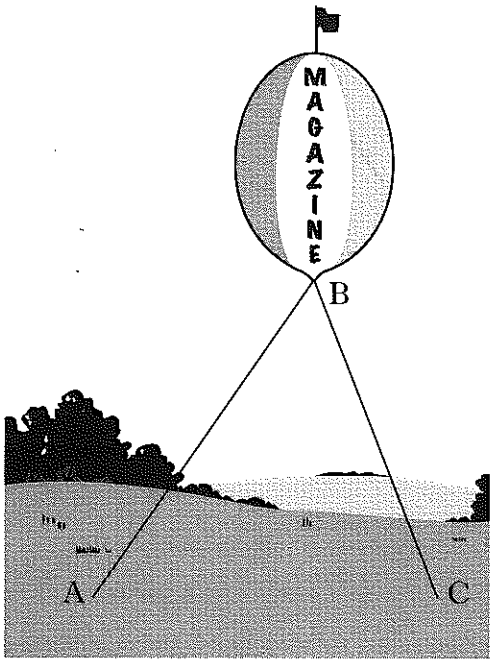
(*b*) In total, 770 centimetres of wire are used.
Write down another equation involving l and b. **2**

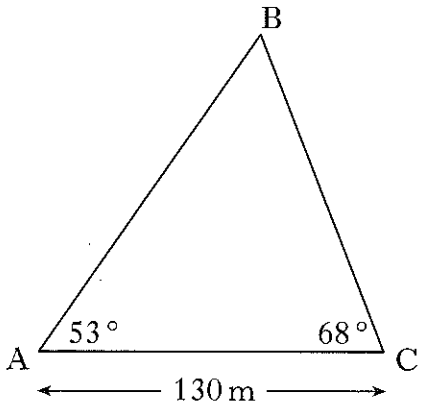
(*c*) Find the length and breadth of the window. **3**

6. Triangle ABC has an area of 14 square centimetres.
AB is 6 centimetres and AC is 7 centimetres.
Calculate the possible **sizes** of angle BAC. **4**

KU	RE

7. A newspaper group advertises a new magazine on a helium balloon.





From the base of the balloon, B, two holding wires are attached to the ground at A and C.

The distance from A to C is 130 metres.

From A, the angle of elevation of B is 53°.

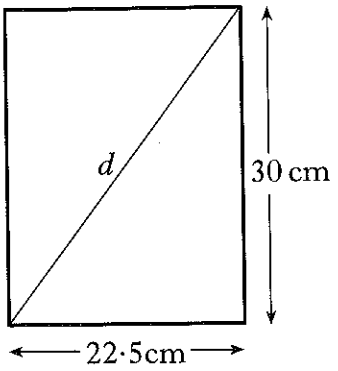
From C, the angle of elevation of B is 68°.

Calculate the height of point B above the ground.

Do not use a scale drawing. **5**

KU	RE

8. A **rectangular** picture frame is to be made.



It is 30 centimetres high and 22·5 centimetres wide, as shown.

To check that the frame is rectangular, the diagonal, d, is measured.

It is 37·3 centimetres long.

Is the frame rectangular? **4**

9. The height, H metres, of the tide-mark in a harbour is given by the formula

$$H = 14 + 3\cos(30n)^\circ$$

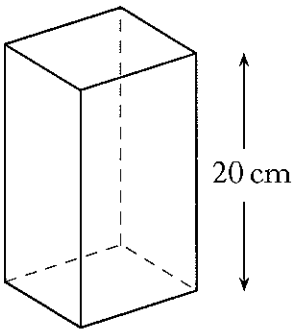
where n is the number of hours after midnight.

(*a*) Find the height of the tide-mark at 2 am. **2**

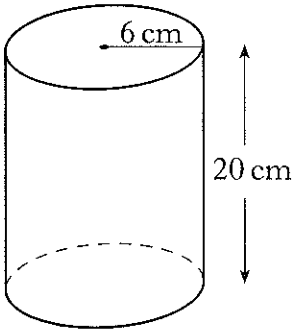
(*b*) When, after midnight, is the first time that the height of the tide-mark is 12·5 metres? **3**

KU	RE

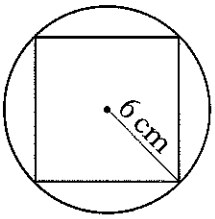
10. A glass vase, in the shape of a cuboid with a square base, is 20 centimetres high.



It is packed in a cardboard cylinder with radius 6 centimetres and height 20 centimetres.



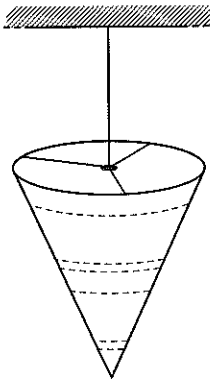
The corners of the vase touch the inside of the cylinder as shown.



Show that the volume of the space between the vase and the cylinder is $720(\pi - 2)$ cubic centimetres. **5**

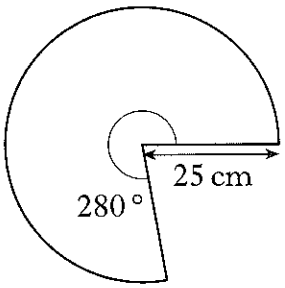
KU	RE

11. A lampshade is made in the shape of a cone, as shown.



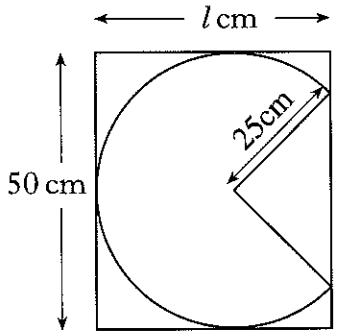
The shape of the material used for the lampshade is a sector of a circle.

The circle has radius 25 centimetres and the angle of the sector is 280°.



(*a*) Find the area of the sector of the circle. **3**

Each sector is cut from a rectangular piece of material, 50 centimetres wide.



(*b*) Find, to the nearest centimetre, the **minimum** length, *l*, required for the piece of material. **4**

[END OF QUESTION PAPER]