FOR OFFICIAL USE

G

	KU	RA
Total marks		

2500/403

NATIONAL QUALIFICATIONS 2000

THURSDAY, 18 MAY
10.30 AM – 12.00 NOON

MATHEMATICS STANDARD GRADE
General Level

Fill in these boxes and read what is printed below.

Full name of centre

Town

Forename(s)

Surname

Date of birth
Day Month Year

Scottish candidate number

Number of seat

1 Answer as many questions as you can.

2 Write your working and answers in the spaces provided. Additional space is provided at the end of this question-answer book for use if required. If you use this space, write clearly the number of the question involved.

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

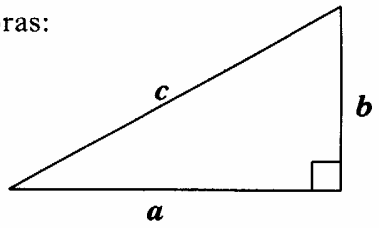
4 Before leaving the examination room you must give this book to the invigilator. If you do not you may lose all the marks for this paper.

SCOTTISH QUALIFICATIONS AUTHORITY

FORMULAE LIST

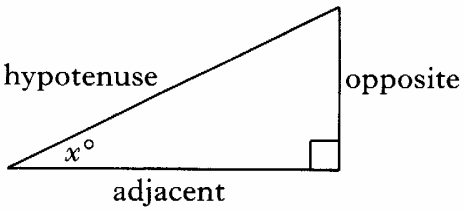
Circumference of a circle: $C = \pi d$
Area of a circle: $A = \pi r^2$
Curved surface area of a cylinder: $A = 2\pi rh$
Volume of a cylinder: $V = \pi r^2 h$
Volume of a triangular prism: $V = Ah$

Theorem of Pythagoras:



$a^2 + b^2 = c^2$

Trigonometric ratios in a right angled triangle:

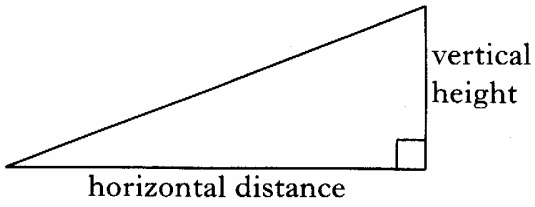


$$\tan x^\circ = \frac{\text{opposite}}{\text{adjacent}}$$

$$\sin x^\circ = \frac{\text{opposite}}{\text{hypotenuse}}$$

$$\cos x^\circ = \frac{\text{adjacent}}{\text{hypotenuse}}$$

Gradient:

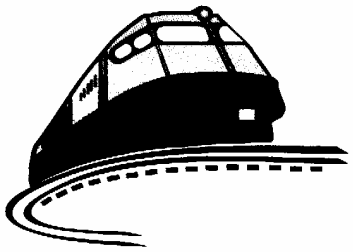


$$\text{Gradient} = \frac{\text{vertical height}}{\text{horizontal distance}}$$

DO NOT WRITE IN THIS MARGIN

Marks	KU	RA

1.



Here is part of a French Railway timetable for a high-speed train.

Distance from Paris (km)		
0	Paris	Depart 1649
512	Lyon	Depart 1900
617	Valence	Depart 1955
742	Avignon	Depart 2051
863	Marseille	Arrive 2144

(*a*) How many kilometres is it from Valence to Marseille?

1

(*b*) Calculate the journey time from Valence to Marseille.

2

(*c*) Find the speed of the train from Valence to Marseille.
Round your answer to the nearest kilometre per hour.

2

DO NOT WRITE IN THIS MARGIN

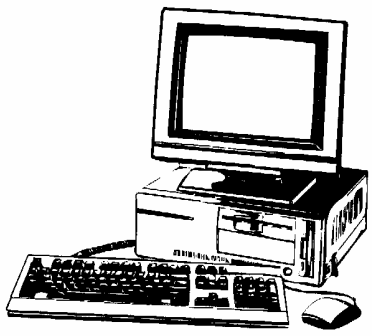
Marks	KU	RA

2. The distance from the earth to the sun is $1{\cdot}58 \times 10^{-5}$ light years.

Write this number in full.

2

3. The Computer Store buys this computer for £250 and sells it to make a profit of 40%.



(*a*) What is the selling price of this computer?

2

(*b*) The Computer Store adds 20% to the **selling price** when a customer buys the computer on hire purchase.

Hire purchase terms are a £30 deposit followed by 24 equal monthly payments.

Calculate the customer's monthly payment.

4

DO NOT WRITE IN THIS MARGIN

Marks | KU | RA

4. To get money from a cash machine you need an appropriate card and a four digit Personal Identity Number (PIN).

David knows:

- his PIN contains the digits 2, 5, 6 and 9;
- 2 is the first digit.

One possible PIN is shown in the table below.

Complete the table to show all the possible PINs.

2	5	6	9

3

[Turn over

DO NOT WRITE IN THIS MARGIN

Marks | KU | RA

5. This table shows insurance premiums for holidays abroad.

INSURANCE PREMIUM per person				
	Europe		*Rest of the World*	
Duration of Holiday	Adult * (16–64)	Child (0–15)	Adult * (16–64)	Child (0–15)
Up to 8 days	£27·50	£19·50	£42·50	£37·50
9–16 days	£35·00	£30·00	£51·20	£47·00
17–24 days	£39·50	£35·00	£60·20	£56·00
* Premiums double for persons 65 years and over				

Mr and Mrs Jones, both 35 years old, take their two children, aged 3 and 8, and Mr Jones's father, aged 70, on a one week holiday to Europe.

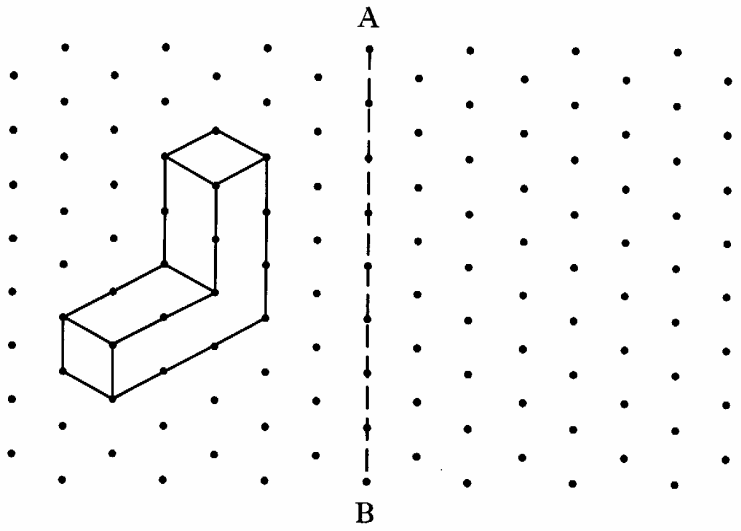
Find the total cost of the insurance premium.

3

DO NOT WRITE IN THIS MARGIN

Marks	KU	RA

6. Draw the image of the shape reflected in the line AB.



4

[Turn over

DO NOT WRITE IN THIS MARGIN

Marks	KU	RA

7. The operation ✦ means "square the first number and multiply by the second".

For example, $5 ✦ 3 = 5^2 \times 3 = 25 \times 3 = 75$

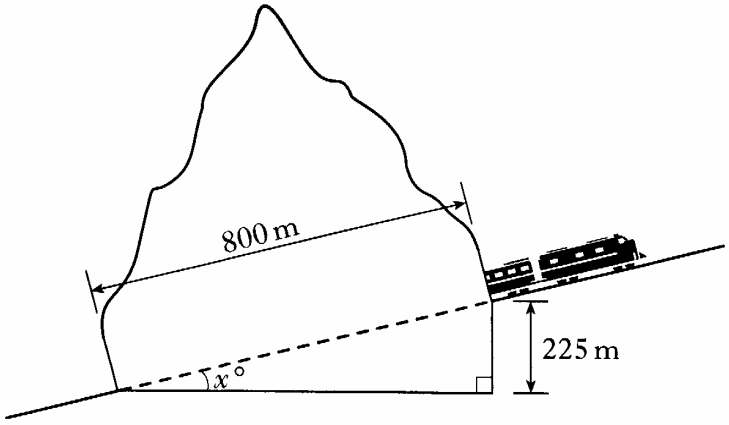
(*a*) Evaluate $6 ✦ 4$. **1**

(*b*) If $a ✦ 5 = 245$, find a. **2**

DO NOT WRITE IN THIS MARGIN

Marks	KU	RA

8. A mountain railway tunnel is 800 metres long.
It rises 225 metres vertically.
Calculate the size of the angle marked $x°$.



3

[Turn over

DO NOT WRITE IN THIS MARGIN

Marks	KU	RA

9. The faces of a cube have the numbers 0, 1, 2, 3, 4 and 5 written on them.

Different views of this cube are shown in Diagrams 1 and 2.

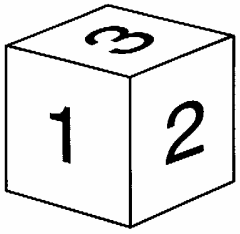


Diagram 1

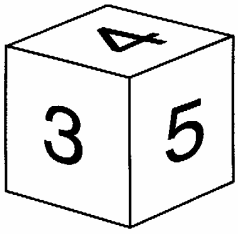
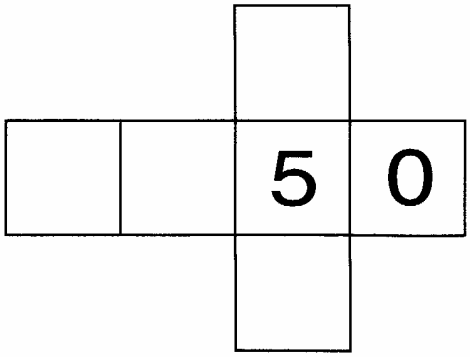


Diagram 2



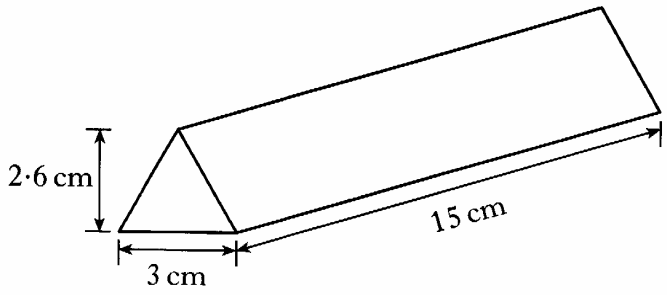
The net of this cube is shown above.

Fill in the remaining numbers on the correct faces. **3**

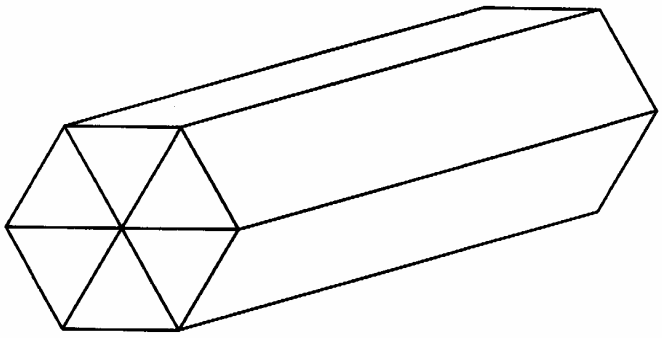
DO NOT WRITE IN THIS MARGIN

Marks	KU	RA

10. The box for a chocolate bar is shown below.



Six chocolate bars are packaged together.



Find the volume of the package of six bars.

4

[Turn over

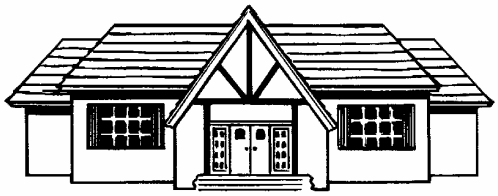
DO NOT WRITE IN THIS MARGIN

Marks	KU	RA

11. A house loses heat through its roof, walls, windows and doors.

In the Grant family's bungalow 23% of its heat loss is through the roof.

The **total** heat loss from the house costs the Grant family £650 each year.



(*a*) Calculate the annual cost of the heat loss through the roof.

2

(*b*) If the Grant family insulate their loft, the heat lost through the roof will be reduced by two thirds.

How much money will they save each year if they insulate their loft?

2

(*c*) It will cost the Grants £750 to insulate their loft.

How long will it take them to recover their expenditure on the insulation?

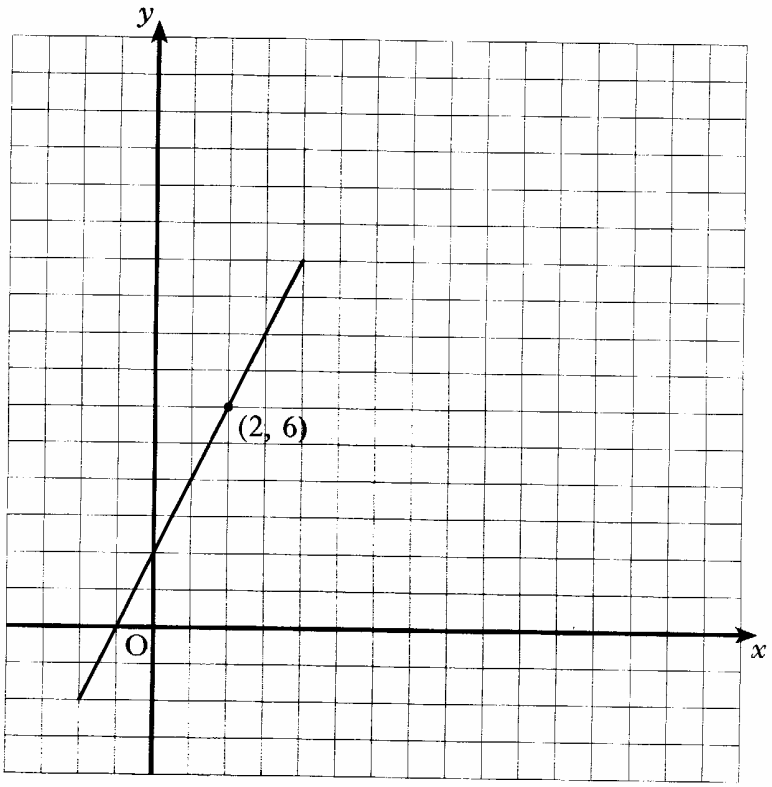
2

DO NOT WRITE IN THIS MARGIN

Marks | KU | RA

12. Part of a straight line graph is shown below.

The line can be extended in either direction.



(*a*) Complete the table below to show the coordinates of some of the points on the straight line.

x	1	2	3	4	5	6
y		6				

2

(*b*) Write down a formula for finding y when you know x.

$y =$

2

(*c*) The point $(a, 22)$ lies on the straight line.

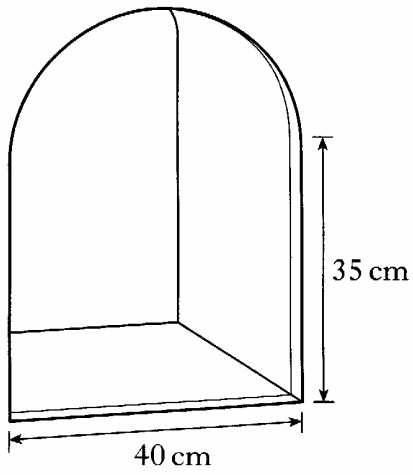
Find a.

2

DO NOT WRITE IN THIS MARGIN

Marks	KU	RA

13. The opening of the fireplace, shown in the diagram below, consists of a rectangle and a semi-circle.



A metal strip is to be placed around the fireplace opening.

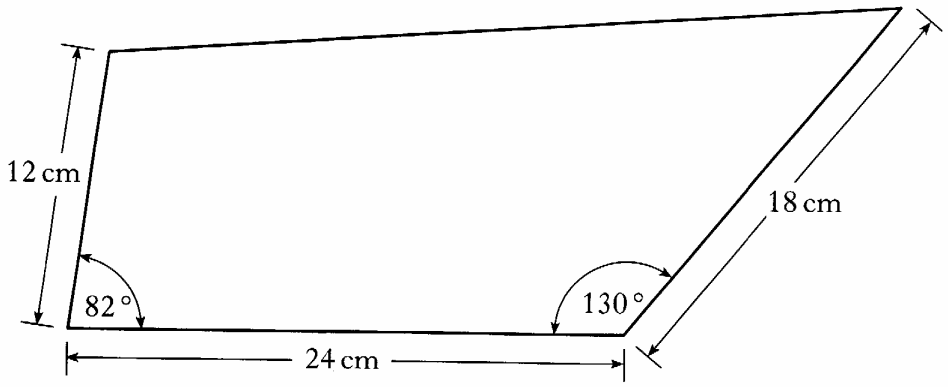
Calculate the length of the metal strip.

4

DO NOT WRITE IN THIS MARGIN

Marks	KU	RA

14. A sketch of a steel panel for a piece of machinery is shown below.



(*a*) Using a scale of 1:3, make a scale drawing of the steel panel.

3

(*b*) Use your scale drawing to find the **actual** length of the fourth side of the steel panel.

2

[Turn over

DO NOT WRITE IN THIS MARGIN

Marks	KU	RA

15. (*a*) Solve **algebraically** the equation

$$4x - 5 = x + 22.$$

2

(*b*) Factorise

$$8a - 12b.$$

2

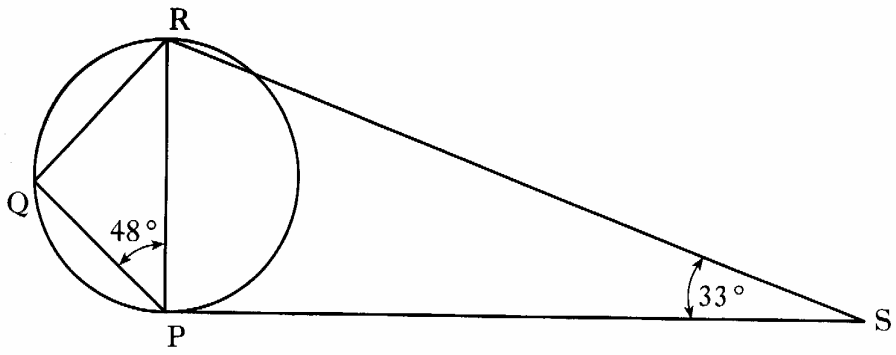
DO NOT WRITE IN THIS MARGIN

Marks	KU	RA

16. In the diagram below PR is a diameter of the circle.

PS is a tangent to the circle at P.

Angle QPR = 48° and angle PSR = 33°.



(*a*) Write down the size of angle PQR. Give a reason for your answer.

1

(*b*) **Calculate** the size of angle QRS.

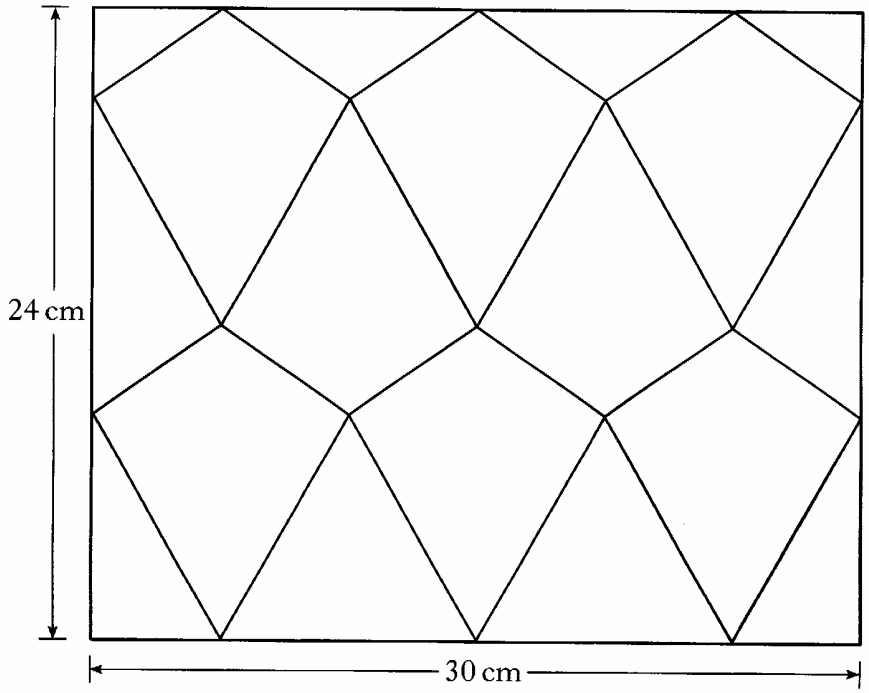
3

[Turn over

DO NOT WRITE IN THIS MARGIN

Marks	KU	RA

17. This is part of a tiling of **congruent** kites.



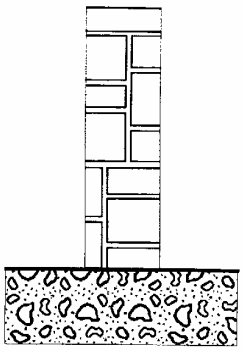
Calculate the area of one kite.

4

DO NOT WRITE IN THIS MARGIN

Marks | KU | RA

18. John is starting to lay concrete foundations for a garden wall.



Concrete is made from stones, sand and cement, to which water is added.

He will mix stones and sand in the ratio 3 to 1.

(*a*) John needs 1·8 cubic metres of stones for the job.
How much sand will he need?

1

(*b*) One bag of sand has a volume of 0·075 cubic metres.
How many bags of sand should he buy for the job?

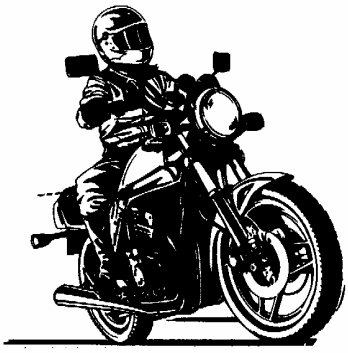
2

[Turn over

DO NOT WRITE IN THIS MARGIN

Marks | KU | RA

19. The braking distance, D metres, of a motorbike varies directly as the square of its speed, V kilometres per hour.



The braking distance is 16 m when the speed is 40 km/h.

Calculate the braking distance when the speed is 60 km/h.

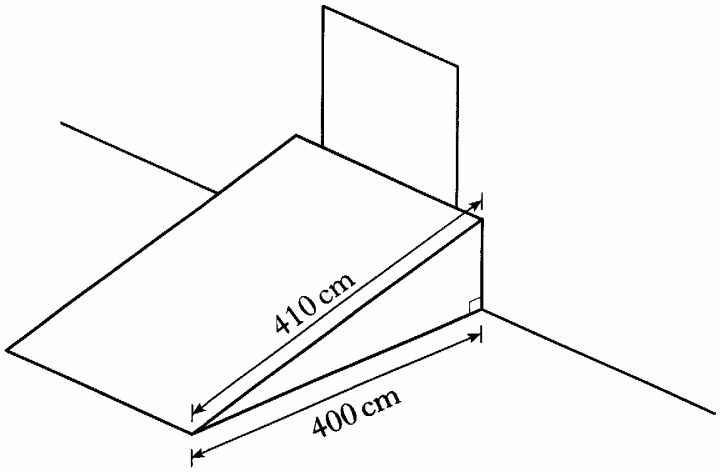
4

DO NOT WRITE IN THIS MARGIN

Marks | KU | RA

20. A new regulation states that the gradient of all ramps into a building must be less than 0·26.

An existing ramp is 410 cm long and has a horizontal distance of 400 cm.



Does this ramp satisfy the new regulation?

Show all your working and give a reason for your answer.

5

[END OF QUESTION PAPER]