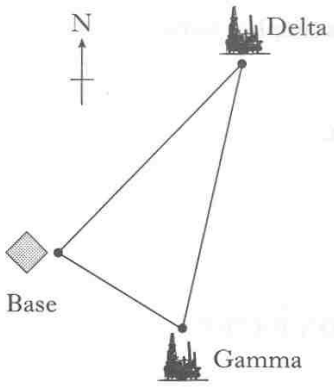
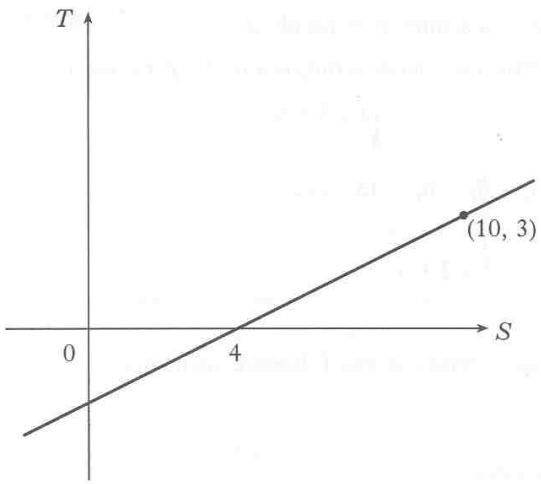
		KU	RA
1.	Paul bought a car last year. It has lost $12\frac{1}{2}\%$ of its value since then. It is now valued at £10 500. How much did Paul pay for his car?	2	
2.	A newspaper report stated: "Concorde has now flown $7{\cdot}1 \times 10^7$ miles. This is equivalent to 300 journeys from the earth to the moon." Calculate the distance from the earth to the moon. Give your answer in **scientific notation correct to 2 significant figures.**	3	
3.	Solve **algebraically** the inequality $5x - 4 < 2(1 - 2x)$.	3	
4.	The diagram shows the positions of a helicopter base and two oil rigs, Delta and Gamma.  From the helicopter base, the oil rig Delta is 35 kilometres away on a bearing of 050°. From the same base, the oil rig Gamma is 20 kilometres away on a bearing of 125°. Calculate the distance between Delta and Gamma. **Do not use a scale drawing.**		5

	KU	RA

5.



Find the equation of the given straight line in terms of T and S. **4**

6. Factorise $3x^2 - 5x - 2$. **2**

7. Anna hired a mobile phone at a fixed charge of £17·50 per month.

She is also charged for her total call time each month.

15 minutes of this total call time are **free**. The rest of her call time is charged at 35 pence per minute.

(*a*) What is the total cost for Anna's phone in a month when her **total call time** is 42 minutes? **2**

(*b*) Write down a formula for the total cost, £C, for Anna's phone in a month when her **total call time** is t minutes, where $t \geq 15$. **3**

KU	RA

8. A Fibonacci sequence is a sequence of numbers.

After the first two terms, each term is the sum of the previous two terms.

$13 = 5 + 8$

eg **2, 3, 5, 8, 13, ...**

$5 = 2 + 3$

(*a*) Write down the next three terms of this Fibonacci sequence.

5, –1, 4, ___, ___, ___, **1**

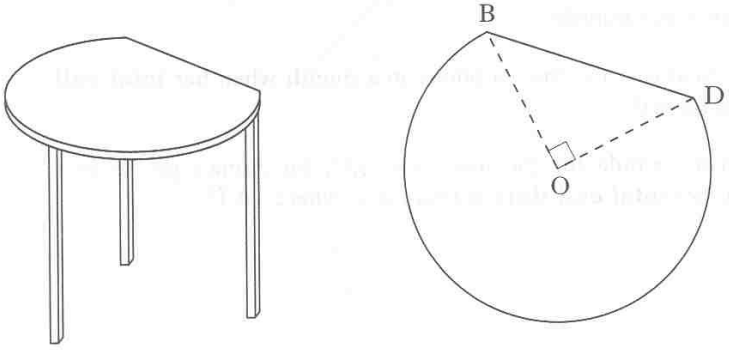
(*b*) For the Fibonacci sequence

4, –3, 1, –2, –1, –3, –4, ...

show that the sum of the first six terms is equal to four times the fifth term. **2**

(*c*) If p and q are the first two terms of a Fibonacci sequence, **prove** that the sum of the first six terms is equal to four times the fifth term. **3**

9. The diagram shows a table whose top is in the shape of part of a circle with centre, O, and radius 60 centimetres.



BD is a straight line.

Angle BOD is 90°.

Calculate the perimeter of the table top. **3**

KU	RA

10. A wooden toy box is prism-shaped as shown in figure 1.

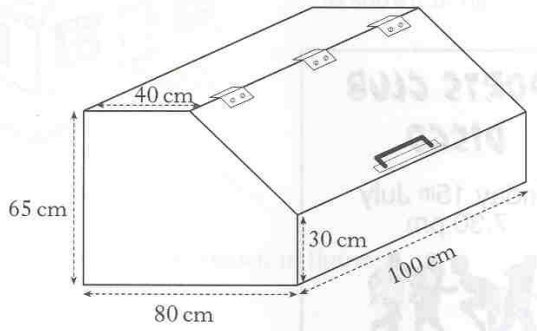


figure 1

The uniform cross-section of the box is shown in figure 2.

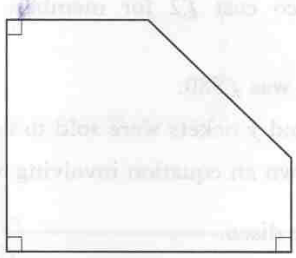
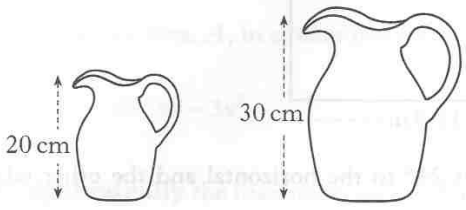


figure 2

Calculate the volume of the box in **cubic metres**. **4**

11. The diagram below shows two jugs which are mathematically similar.



The volume of the smaller jug is 0·8 litre.

Find the volume of the larger jug. **3**

	KU	RA

12. Solve **algebraically** the equation

$2 + 3\sin x° = 0$ for $0 \leq x < 360$. | 3 |

13.

The tickets for a Sports Club disco cost £2 for members and £3 for non-members.

(*a*) The total ticket money collected was £580.

x tickets were sold to members and y tickets were sold to non-members.

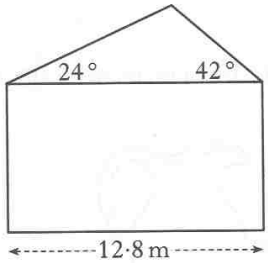
Use this information to write down an equation involving x and y. | | 2 |

(*b*) 250 people bought tickets for the disco.

Write down another equation involving x and y. | | 1 |

(*c*) How many tickets were sold to members? | | 3 |

14. The end wall of a bungalow is in the shape of a rectangle and a triangle as shown below.



The roof has one edge inclined at 24° to the horizontal and the other edge inclined at 42° to the horizontal.

The width of the house is 12·8 metres.

Calculate the length of the longer sloping edge of the roof.

Do not use a scale drawing. | 4 |

15.

figure 1

A gardener creates an L-shaped flower-bed. He uses the house walls and concrete edging for the boundary as shown in figure 1.

KU	RA

He plans his flower-bed as shown in figure 2.

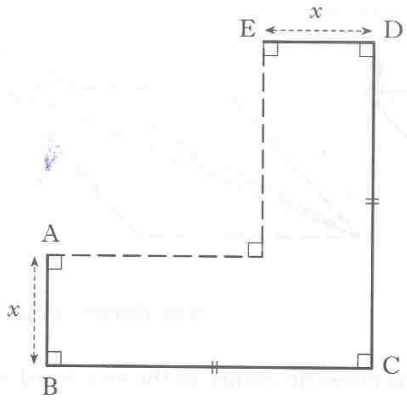


figure 2

(*a*) He uses a total of **6 metres of edging**.

AB = ED = x metres
BC = DC

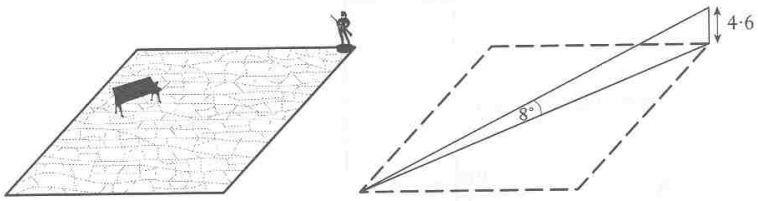
Show that the length, in metres, of BC can be expressed as BC = $3 - x$. **2**

(*b*) Hence show that the area, A, in square metres, of the flower-bed can be expressed as

$$A = 6x - 3x^2.$$ **3**

(*c*) Calculate **algebraically** the maximum area of the flower-bed. **3**

	KU	RA
16. (*a*) Express $\sqrt{32}$ as a surd in its simplest form.	1	
(*b*) Simplify $a^2(a^{-5}+4)$.	2	
(*c*) Multiply out the brackets and collect like terms $(x-2)(x^2+3x-4)$.	3	
17. A statue stands at the corner of a square courtyard.		



The statue is 4·6 metres high.

The angle of elevation from the opposite corner of the courtyard to the top of the statute is 8°.

(*a*) Find the distance from the base of the statue to the opposite corner of the courtyard.		2
(*b*) Show that the length of the side of the courtyard is approximately 23 metres.		3
18. $f(x)=3^x$		
(*a*) Find $f(4)$.	1	
(*b*) Given that $f(x)=\sqrt{27}$, find x.	3	

19.

The table below shows the distances, in metres (d), travelled by a snowboarder in seconds (t).

Time in seconds (t)	1	2	3	4
Distance in metres (d)	5	20	45	80

(a) Explain why d varies directly as t^2. **1**

(b) Write down the formula connecting d and t. **1**

(c) How does the distance change when the time is multiplied by six? **2**