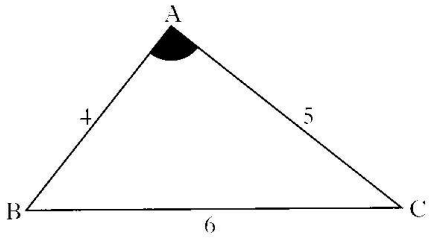
	KU	RE
1. Evaluate $7{\cdot}18 - 2{\cdot}1 \times 3$.	2	
2. Evaluate $1\frac{1}{8} \div \frac{3}{4}$.	2	
3. Solve the inequality $5 - x > 2(x + 1)$.	3	
4. Given that $f(x) = x^2 + 5x$, evaluate $f(-3)$.	2	
5. (*a*) Factorise $p^2 - 4q^2$.	1	
(*b*) Hence simplify $\frac{p^2 - 4q^2}{3p + 6q}$.	2	
6. $L = \frac{1}{2}(h - t)$. Change the subject of the formula to h.	2	

KU	RE

7. In triangle ABC,

AB = 4 units
AC = 5 units
BC = 6 units.



Show that $\cos A = \frac{1}{8}$. | 3 |

8. Fifteen medical centres each **handed out** a questionnaire to fifty patients.
The numbers who replied to each centre are shown below.

11	19	22	25	25
29	31	34	36	38
40	46	49	50	50

Also, they each **posted** the questionnaire to another fifty patients.
The numbers who replied to each centre are shown below.

15	15	21	22	23
25	26	31	33	34
37	39	41	46	46

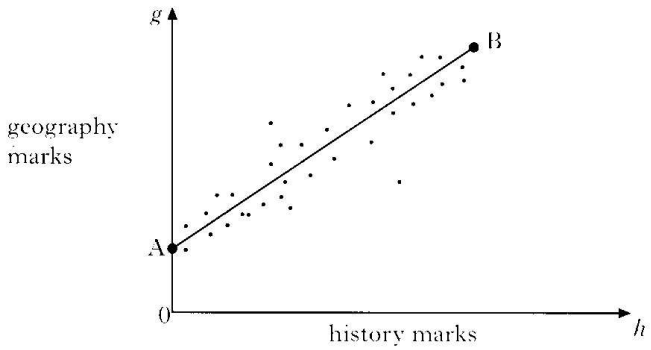
Draw an appropriate statistical diagram to compare these two sets of data. | | 3 |

9. Two functions are given below.

$f(x) = x^2 + 2x - 1$
$g(x) = 5x + 3$

Find the values of x for which $f(x) = g(x)$. | | 3 |

	KU	RE
10. Simplify $\sqrt{27} + 2\sqrt{3}$.	2	
11. Express in its simplest form $y^8 \times (y^3)^{-2}$.	2	
12. The graph below shows the relationship between the history and geography marks of a class of students.		



A best-fitting straight line, AB has been drawn.

Point A represents 0 marks for history and 12 marks for geography.
Point B represents 90 marks for history and 82 marks for geography.

Find the equation of the straight line AB in terms of h and g. | | 4

KU	RE

13. (*a*) 4 peaches and 3 grapefruit cost £1·30.
Write down an algebraic equation to illustrate this. | **1** | |

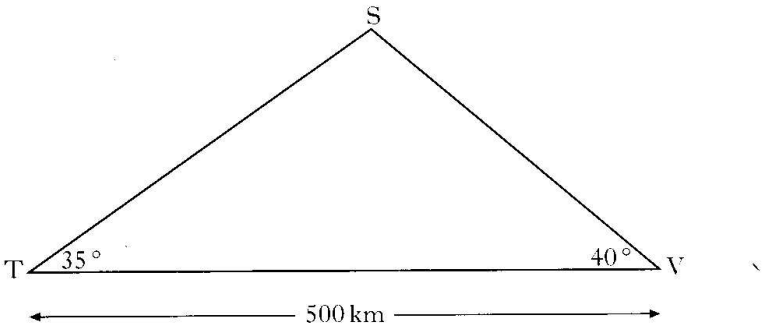
(*b*) 2 peaches and 4 grapefruit cost £1·20.
Write down an algebraic equation to illustrate this. | **1** | |

(*c*) Find the cost of 3 peaches and 2 grapefruit. | | **4**

	KU	RE
1. A spider weighs approximately $19{\cdot}06 \times 10^{-5}$ kilograms. A humming bird is 18 times heavier. Calculate the weight of the humming bird. Give your answer **in scientific notation**.	2	
2. A microwave oven is sold for £150. This price includes VAT at 17·5%. Calculate the price of the microwave oven **without** VAT.	3	
3. Solve the equation $2x^2 + 3x - 7 = 0.$ Give your answers **correct to 1 decimal place**.	4	

KU	RE

4. A TV signal is sent from a transmitter T, via a satellite S, to a village V, as shown in the diagram. The village is 500 kilometres from the transmitter.

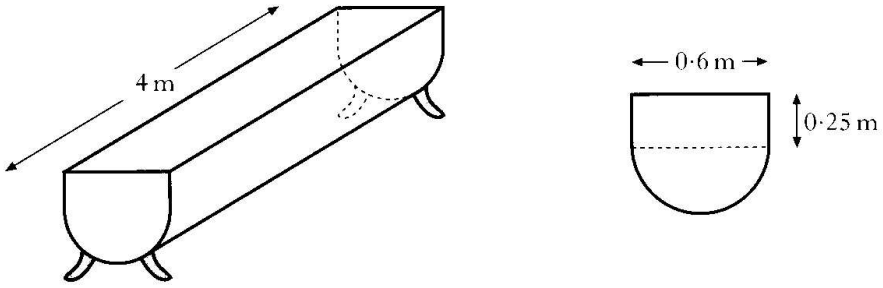


The signal is sent out at an angle of 35° and is received in the village at an angle of 40°.

Calculate the height of the satellite above the ground. **5**

5. A feeding trough, 4 metres long, is prism-shaped.

The uniform cross-section is made up of a rectangle and semi-circle as shown below.

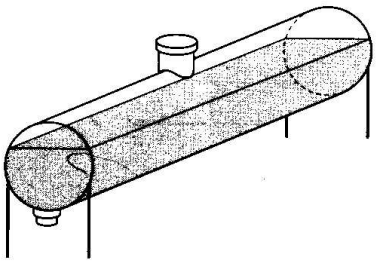


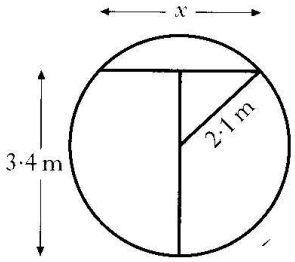
Find the volume of the trough, **correct to 2 significant figures**. **5**

KU	RE

6. An oil tank has a circular cross-section of radius 2·1 metres.

It is filled to a depth of 3·4 metres.





(*a*) Calculate x, the width in metres of the oil surface. **3**

(*b*) What other depth of oil would give the same surface width? **1**

7. A coffee shop blends its own coffee and sells it in one-kilogram tins.

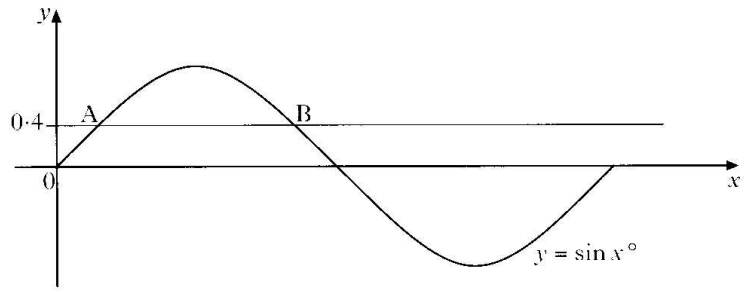
One blend consists of two kinds of coffee, Brazilian and Colombian, in the ratio 2 : 3.

The shop has 20 kilograms of Brazilian and 25 kilograms of Colombian in stock.

What is the **maximum** number of one-kilogram tins of this blend which can be made? **3**

KU	RE

8. The diagram shows part of the graph of $y = \sin x°$.



The line $y = 0{\cdot}4$ is drawn and cuts the graph of $y = \sin x°$ at A and B.

Find the x-coordinates of A and B. **3**

9. Esther has a new mobile phone and considers the following daily rates.

Easy Call	**Green Call**
25 pence per minute for the first 3 minutes 5 pence per minute **after** the first three minutes	40 pence per minute for the first 2 minutes 2 pence per minute **after** the first two minutes

(*a*) For Easy Call, find the cost of ten minutes in a day. **1**

(*b*) For Easy Call, find a formula for the cost of "m" minutes in a day, $m > 3$. **1**

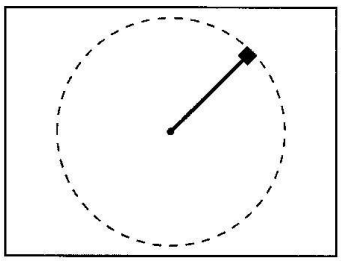
(*c*) For Green Call, find a formula for the cost of "m" minutes in a day, $m > 2$. **1**

(*d*) Green Call claims that its system is cheaper.

Find **algebraically** the least number of minutes (to the nearest minute) which must be used each day for this claim to be true. **3**

	KU	RE

10. A weight on the end of a string is spun in a circle on a smooth table.



The tension, T, in the string varies directly as the square of the speed, v, and inversely as the radius, r, of the circle.

(*a*) Write down a formula for T in terms of v and r. **1**

(*b*) The speed of the weight is multiplied by 3 and the radius of the string is halved.

What happens to the tension in the string? **2**

11. (*a*) Solve the equation

$$2^n = 32.$$ **1**

(*b*) A sequence of numbers can be grouped and added together as shown.

The sum of 2 numbers: $(1 + 2) = 4 - 1$
The sum of 3 numbers: $(1 + 2 + 4) = 8 - 1$
The sum of 4 numbers: $(1 + 2 + 4 + 8) = 16 - 1$

Find a **similar** expression for the sum of 5 numbers. **1**

(*c*) Find a formula for the sum of the first n numbers of this sequence. **2**

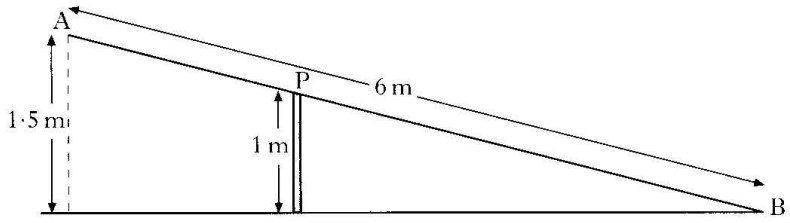
KU	RE

12. A metal beam, AB, is 6 metres long.

It is hinged at the top, P, of a vertical post 1 metre high.

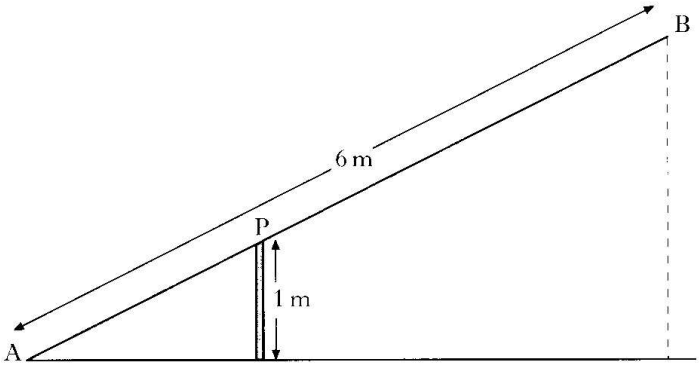
When B touches the ground, A is 1·5 metres above the ground, as shown in Figure 1.

Figure 1



When A comes down to the ground, B rises, as shown in Figure 2.

Figure 2



By calculating the length of AP, or otherwise, find the height of B above the ground.

Do not use a scale drawing. 5

[END OF QUESTION PAPER]