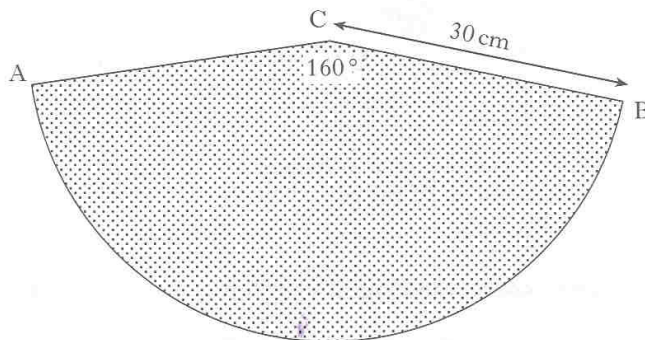


1.



The diagram shows a sector of a circle, centre C.
Angle ACB is 160° and the radius of the circle is 30 cm.
Calculate the length of the arc AB.

KU	RA
3	

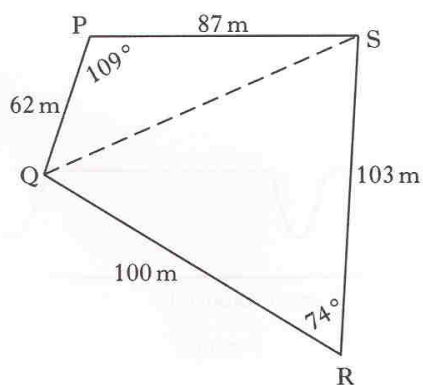
3. While on holiday, John's family decide to hire a car.

There are two different schemes for hiring the same type of car, Eurocar and Apex.

EUROCAR HIRE	APEX HIRE
No deposit required £15 per day	£50 deposit required plus £10 per day

- (a) Write down a formula to find the cost, £ C , of hiring the car from Eurocar for d days.
- (b) Write down a formula to find the cost, £ C , of hiring the car from Apex for d days.
- (c) John's family have £170 to spend on car hire.
Which scheme should they use to have the car for as long as possible?
Show clearly all your working.

4. The sketch below shows a plot of ground, PQRS, split into two triangles.



Calculate the area of the plot of ground.

KU	RA
1	
2	
	4
4	

7. Figure 1 shows part of the street plan of a town.

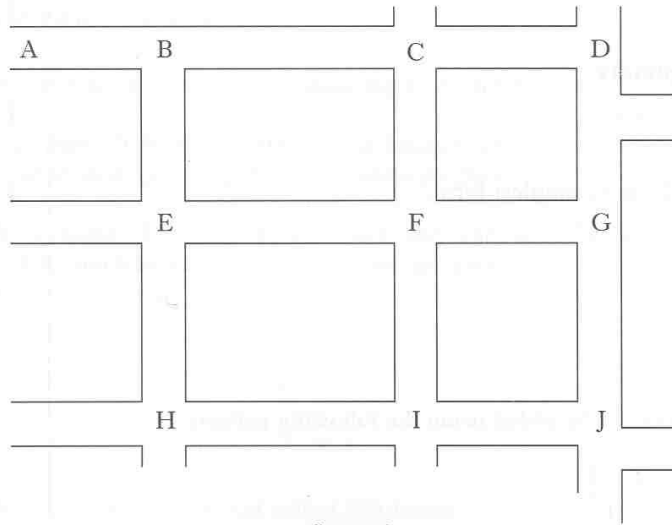


figure 1

Vehicles can travel in both directions along each street.

As a vehicle travels on the straight parts of any street it can reach the maximum speed.

The speed is always reduced on the bends.

The graph in figure 2 shows how the speed of a vehicle changes as it travels from **A to J**.

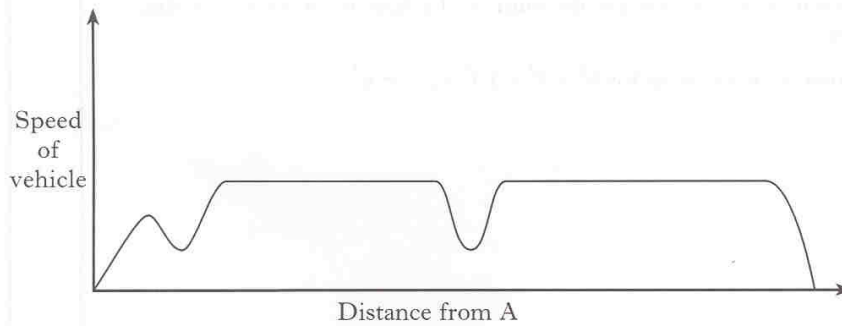


figure 2

(a) What route did the vehicle travel? Use the letters from figure 1 to indicate this route.

2

(b) Another vehicle took the route A, B, C, F, G and J.

Sketch a graph to show how the speed of this vehicle changes during the journey.

3

KU	RA

8. (a) $h(t) = 15t - 3t^2$

Find $h(-2)$.

(b) (i) Factorise **completely**

$$2x^2 - 6x.$$

(ii) Express $\frac{2x^2 - 6x}{x^2 - 9}$ in its simplest form.

9. Consecutive cubic numbers can be added using the following pattern.

$$1^3 + 2^3 = \frac{2^2 \times 3^2}{4}$$

$$1^3 + 2^3 + 3^3 = \frac{3^2 \times 4^2}{4}$$

$$1^3 + 2^3 + 3^3 + 4^3 = \frac{4^2 \times 5^2}{4}$$

(a) Express $1^3 + 2^3 + 3^3 + 4^3 + 5^3 + 6^3 + 7^3$ in the same way.

(b) Write down an expression for the sum of the first n consecutive cubic numbers.

(c) Write down an expression for $8^3 + 9^3 + 10^3 + \dots + n^3$.

KU	RA
2	
1	
2	
	2
	3
	2

10. The number of litres of petrol, L , used by a car on a journey varies directly as the distance travelled, D kilometres, and as the square root of the average speed, S kilometres per hour.

(a) Write down a relationship connecting L , D and S .

The car uses 30 litres of petrol for a journey of 550 kilometres when it travels at an average speed of 81 kilometres per hour.

(b) How many litres of petrol does the car use for a journey of 693 kilometres travelling at an average speed of 100 kilometres per hour?

11. (a) Remove the brackets and collect like terms

$$(3a - b)(2a - 5b).$$

(b) Solve **algebraically** the equation

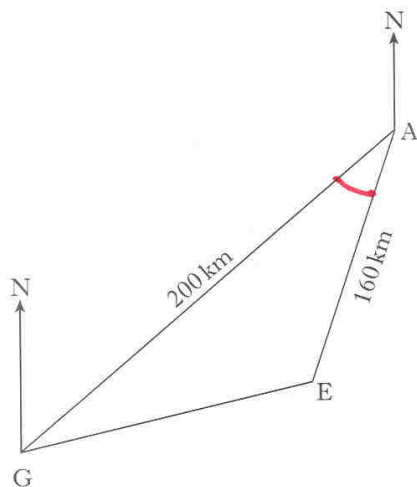
$$2x^2 - 9x - 5 = 0.$$

(c) Solve **algebraically** the equation

$$\frac{x}{2} - \frac{(x+1)}{3} = 4.$$

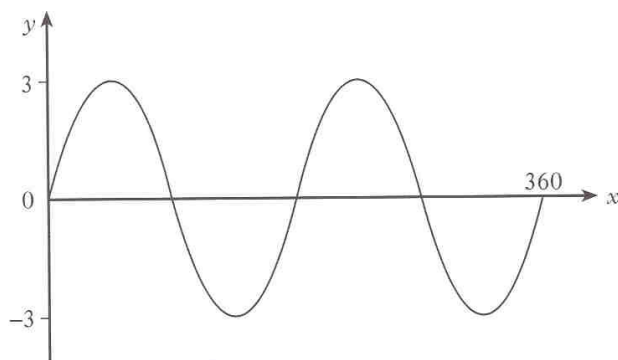
KU	RA
1	
3	
2	
3	
3	

12. The diagram shows the positions of three airports, A, E and G.



- G is 200 kilometres from A.
 E is 160 kilometres from A.
 From G the bearing of A is 052° .
 From A the bearing of E is 216° .
 How far apart are airports G and E?

- 13.



- The diagram shows the graph of $y = k \sin ax^\circ$, $0 \leq x < 360$.
 Find the values of a and k .

KU	RA
	6
	2

14. A number tower is built from bricks as shown in figure 1.

The number on the brick above is always equal to the sum of the two numbers below.

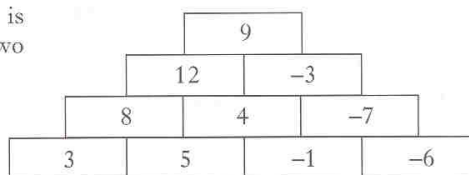


figure 1

- (a) Find the number on the shaded brick in figure 2.

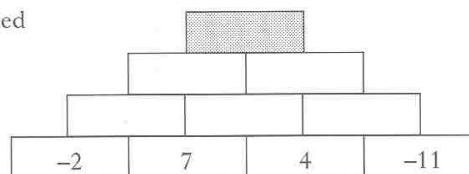


figure 2

- (b) In figure 3, two of the numbers on the base bricks are represented by p and q .

Show that $p + 3q = 10$.

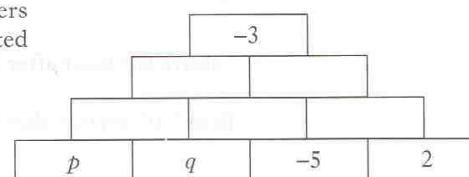


figure 3

- (c) Use figure 4 to write down a second equation in p and q .

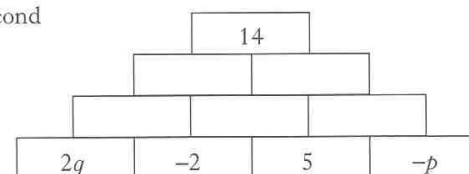


figure 4

- (d) Find the values of p and q .

KU	RA
1	
	2
	2
	3

15. (a) Express $\sqrt{72} - \sqrt{2} + \sqrt{50}$ as a surd in its simplest form.

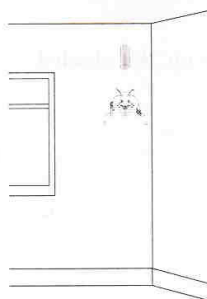
(b) Express $\frac{3y^5 \times 4y^{-1}}{6y}$ in its simplest form.

16. A toy is hanging by a spring from the ceiling.

Once the toy is set moving, the height, H metres, of the toy above the floor is given by the formula

$$H = 1.9 + 0.3\cos(30t)^\circ$$

t seconds after starting to move.



(a) State the maximum value of H .

(b) Calculate the height of the toy above the floor after 8 seconds.

(c) When is the height of the toy **first** 2.05 metres above the floor?

[END OF QUESTION PAPER]

KU	RA
3	
3	
1	
	3
	3