

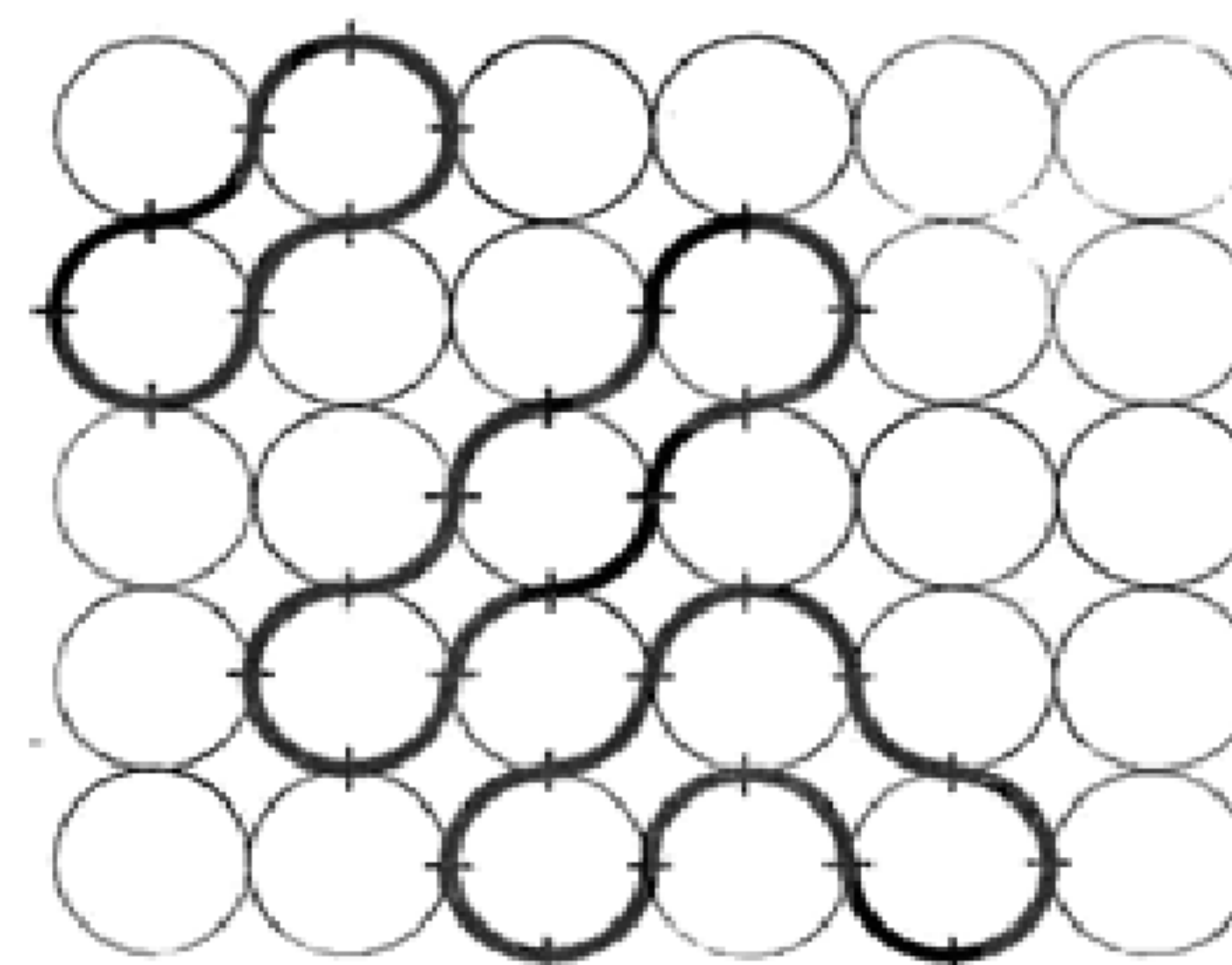
### THURBER DOG

- ① Take a square piece of paper and fold it diagonally and then open it out again.
- ② Place the paper in front of you as in the picture and fold the two lower edges in towards the centre.
- ③ Then fold the two upper edges into the centre line.
- ④ Fold tip 'A' to tip 'B' with the previous folds on the outside of the model. Then fold it back again, but in so doing forming a pleat.
- ⑤ Fold the tip of 'A' to the right & fold the model in half along the centre line.
- ⑥ Crimp the head 'A' and fold 'B' downwards inside the model.
- ⑦ Reverse fold flap 'B' again upwards so forming the hindlegs and tail.

One Thurber Dog

**Editorial Address:** 31 Oldway Drive,  
Solihull, Warwickshire B91 3HP

## RING A RING A RAILWAYS



Bob Richards has a model train and a set of rails, all made from quarter-circle arcs. Of course, he can make a simple circuit of track with four arcs, but he has got bored with this and is looking for other closed curves that he can make. To help him, he has drawn a set of circles on a hardboard base.

The diagram illustrates how he has used this to find one new circuit using 8 arcs and two new circuits using 12. How many arcs do you think he needs for the next size

layout? (Remember that he has only one train and no "level crossing" units.)

Try to find all the circuits B.R. can make if his set contains 20 pieces of track.

E.G.

## AN OPEN AND SHUT CASE

Lord Charles absentmindedly left a £5 note on his desk before he went out. When he returned he remembered the money but when he looked for it, it was no longer there. The only people who had access to his desk were the maid and the butler. The maid said that she had seen the money, folded it and placed it under the red book. The butler said he had seen the money under the red book and thinking it might be lost, had put it inside the book between pages 133 and 134. Needless to say when Lord Charles looked in the book, the money was not there. Who stole it? What was the evidence of guilt?

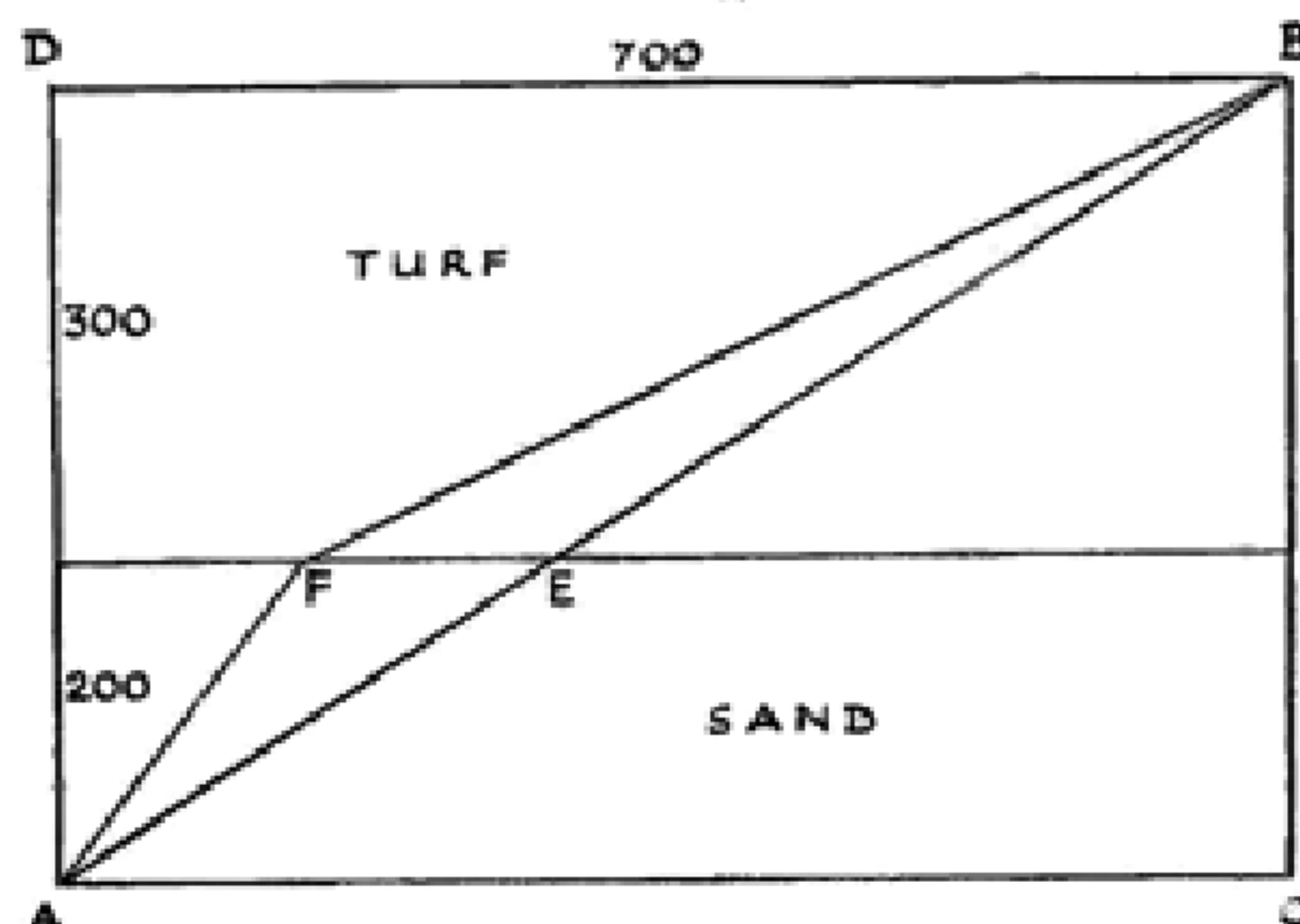
P.I.G.

## SNOOKERED

Where must the ball be placed on the long side of a billiard table six feet by five feet so that when shot at  $45^\circ$  to the edge, it falls into a corner pocket after four rebounds? Assume that the coefficient of restitution is one.

R.H.C.

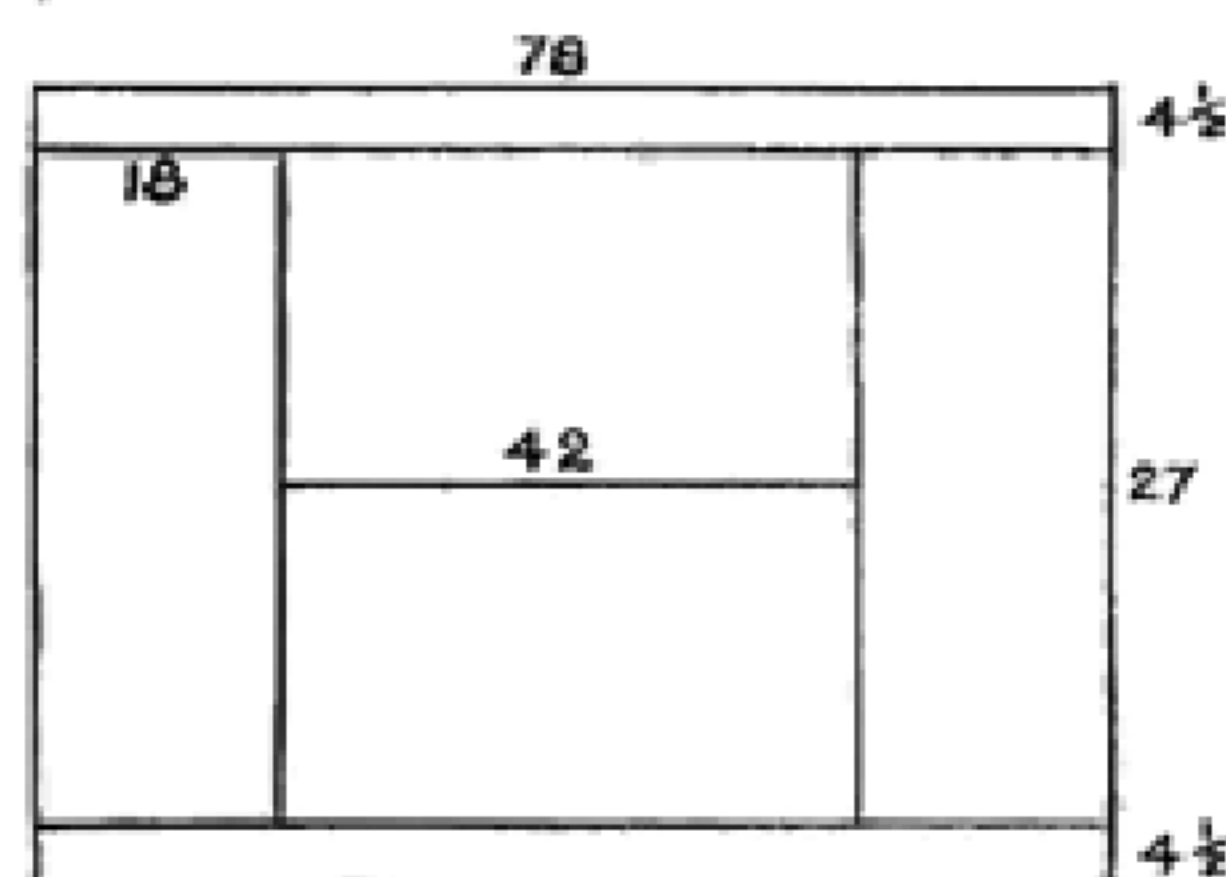
## COOL THOUGHT



Cutie Pie is at A with her boy friend and wants an ice-cream from the kiosk at B. He can walk twice as fast over the turf as the sand. What is the quickest route for him to take?

R.H.C.

## ANYONE FOR TENNIS



A tennis court is to be marked out as shown in the diagram. Where should I start and what route should I take without lifting the marker and to go over the minimum distance twice?

R.H.C.

## LIGHT HEADED SQUARE

1	3	6
2	5	7
4	8	9

The diagram shows one way in which the numbers 1 to 9 can be fitted into a three by three square so that the number below is bigger than the one above and the number on the right is always bigger than its neighbour. In how many ways can the numbers be arranged?

R.H.C.

## JUNIOR CROSS FIGURE No. 65

submitted by A. Jenkin, Hillstone School, Malvern

1		2	3		4	5
6			7	8		
9		10			11	
12	13			14		
			15			
16						17
	18		19			

### CLUES ACROSS

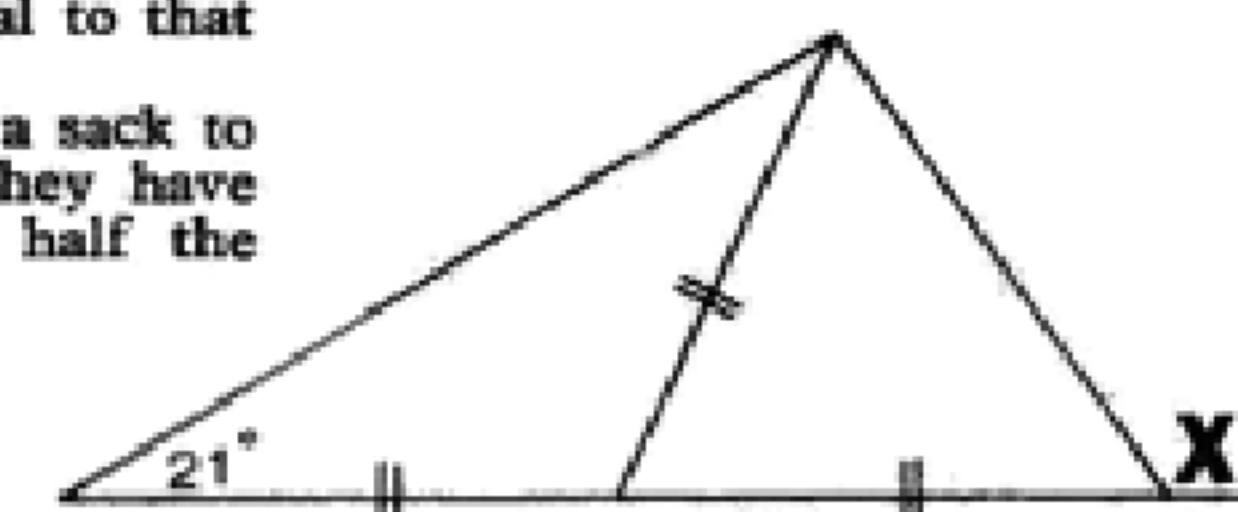
- All the boys in a school like rugby or cricket or both. If there are 113 boys altogether, 88 of whom like rugby and 18 like both. How many like cricket?
- The cube root of 1331.
- A train travels 200 km. at 60 km. per hour and the next 125 km. at 75 km. per hour. Find the average speed of the train.
- If  $C = \frac{5(F-32)}{9}$ , find C when F is 77.
- A bottle and a cork cost 60p. The bottle costs as much as 19 corks. Find the cost of the cork.
- A rectangle is 128 cm. by 8 cm. Find the length of one side of a square whose area is equal to that of the rectangle.
- There is enough corn in a sack to last 2 mice 100 days. They have 6 baby mice, each eats half the

amount of an adult mouse. How long will the food now last?

- Concrete is made 1 part cement : 3 parts sand : 4 parts gravel. If the cement weighs 41 kg., what is the weight of the concrete?
- What is five to the power of nought?
- Find x in the diagram.
- $275^2 - 275 \times 274$ .
- 2 towels take 2 minutes to dry in the sun. How long will 10 towels take to dry?
- $$\left\{ \begin{array}{l} \text{Even numbers} \\ \text{Prime numbers} \end{array} \right\} \cap = ?$$
- Fifth prime number (1 is not prime).

### CLUES DOWN

- $315 \times 7$  in octopus language.
- 1st prime  $\times$  4th prime  $\times$  9th prime.
- The next prime after 1000.
- Each angle of a regular polygon is  $108^\circ$ . How many sides has it?
- Two solid spheres are made of the same material. One has a diameter of 10 cm. and weighs 304 grams. If the other has a diameter of 5 cm. find its weight.
- The average of 2460, 2470, 2472, 2478, 2480.
- $1000001 \div 101$  in binary, answer in binary.
- A water lily in a pond doubles its size every day and in 28 days it fills the whole pond. How long does it take to fill half the pond?



## SOLUTIONS TO PROBLEMS IN ISSUE No. 72

### A RATIONAL PROBLEM

The length divided by the breadth must be less than  $(\sqrt{2} + 1)$ .

### CHARLIE COOK AGAIN

$P = S^2 - S$  for the method to give the correct value.

### SENIOR CROSS FIGURE No. 68

There were a number of incorrect clues. 11 Across should have read—Gradient of  $y = 4x^2 + x^2 - x + 4$  at (1,7) and 7 Down should have been First palindromic number greater than 310.

Clues Across : 1. 975 ; 2. 425 ; 5. 56 ; 6. 433 ; 8. 42 ; 9. 169 ; 11. 13 ; 12. 564 ; 13. 21 ; 14. 999 ; 15. 128.

Clues Down : 1. 9140 ; 3. 252 ; 4. 56 ; 7. 313 ; 8. 495 ; 10. 6428 ; 11. 119 ; 13. 29.

### JUNIOR CROSS FIGURE No. 64

Clues Across : 1. 254 ; 3. 52 ; 5. 2536 ; 7. 39 ; 9. 96 ; 13. 2857 ; 15. 168 ; 16. 22.

Clues Down : 1. 253 ; 2. 42 ; 3. 53 ; 4. 268 ; 6. 50 ; 8. 99 ; 10. 628 ; 11. 152 ; 12. 81 ; 14. 72.

B.A.



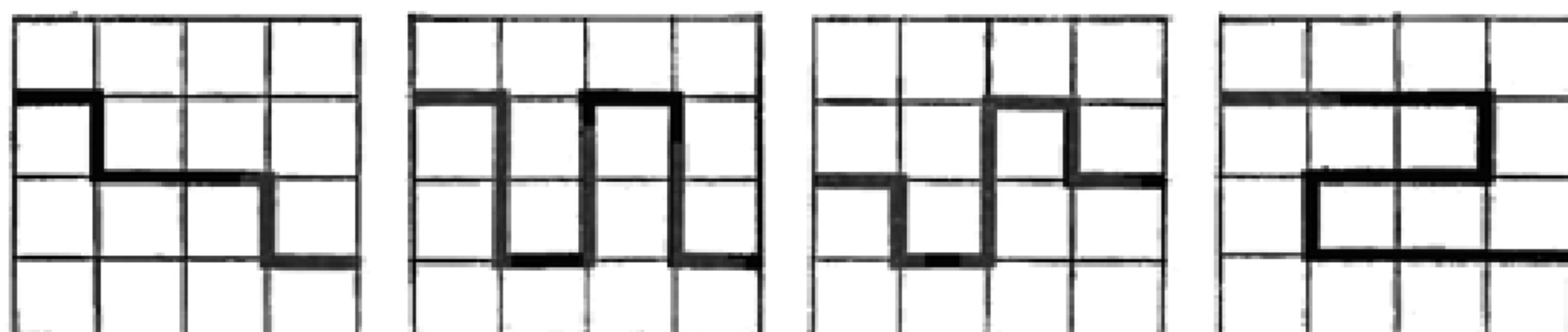
## LETTERS TO THE EDITOR

We acknowledge with thanks a copy of "Junior Pie" from the Fifth Form of Bournemouth School for Girls; we have looked through to see what might suit Maths Pie and include the Thurber Dog on the back page. John Barber of Ravenstone, Leicestershire, took us to task about our arithmetic. In Issue No. 71 "Solutions to problems in issue No. 70" we gave the answer to "Behind the Iron Curtain"  $425 \times 382$  as 163,350 instead of 162,350. He was right. Ken Warland, Melbourne High School, Australia, complained that we spelt Sydney with an "i" in issue No. 69.

A number of you, Janet Caiger, Prendergast Grammar School, London, Mrs. J. Bean, Collegiate Girls' School, Leicester, and Adrian Webb, Warwick, told us of the error in Junior Cross Figure No. 63 (Issue No. 71) Clue 4 Down which should have been  $ab^2 + 3a^2b$  not  $ab^2 - 3a^2b$ .

Mr. J. Seaton, Grimsby and Timothy Lee, Loughborough (aged 12) noted that Senior Cross Figure No. 66 (issue No. 70) 18 Across should have been  $a^2b - 2c - 1$   $a^4b - 3c - 2$ . Mr. C. Pyle, Southampton, found the mistakes in Senior Cross Figure No. 64 (issue No. 68). Comments and problems reached us from R. A. Briggs (Torrington), R. Loewenstein (Eton College) and Y. Lipman, London. We had a large number of examples of Curve stitching from the boys of Form 2R, Harrogate Grammar School, and one from Aidrian Chinery, London. T. Noble sent us some ideas on "Squares from Cubes". Finally, we are going to use A. Jackson's, Heathfield High School, Leicester, Cross Figure.

## HALVE IT DISSECTIONS



Four solutions from "Halve It" in issue No. 72

B.A.

## NUMBER PLEASE

submitted by Y. Lipman, Stoke Newington, London

I do wish that the Post Office would stop chopping and changing my telephone number. Not only has one got to learn a new number, but also inform everyone of the change.

Mind you, things could have been worse! There are three things about my number which makes it easy to remember. Firstly, both the old and new numbers consist of four digits, secondly the new number is exactly four times the old number and thirdly the new number happens to be my old number written backwards. What is my new number?

## A TRIDDLE!

I'm aloof as a matter of degree.  
The area enclosed by my sides three  
And their sum indisputably agree.  
Now to double the shortest add a two  
And the size of the second will ensue :  
Half of this, then a seven included  
Means that the third has not me eluded.  
With what length sides have I been constructed?

D.I.B.

## MAP READING

On a map-reading exercise, Cutie Pie had to travel on a triangular course given by the following Ordnance Survey references : from 120040 to 138070 to 146050 and back to the start. The navigation presented her with no serious difficulties but, on completing the course, she was asked to calculate the area enclosed by her route. What solution should she have obtained?

D.I.B.

## SENIOR CROSS FIGURE No. 69

1	2			3	4
5			6	7	
	8	9			
	10			11	12
13		14	15		
16	17				18
20				21	

x, y and z are positive integers. Ignore decimal points and work to the required degree of accuracy.

### CLUES ACROSS

- $10xyz^\circ$
- $x^2$
- (a, b) if  $ax - by = 33$  and  $ay + bx = 39$
- Surface area of a solid of length z cm. if a similar solid of length y cm. has a surface area of 81 cm<sup>2</sup>.
- $(x_1, y_1)$  if  $\begin{pmatrix} 8 & -5 \\ -1 & 6 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} x_1 \\ y_1 \end{pmatrix}$
- $\log_2(z^{12})$ .

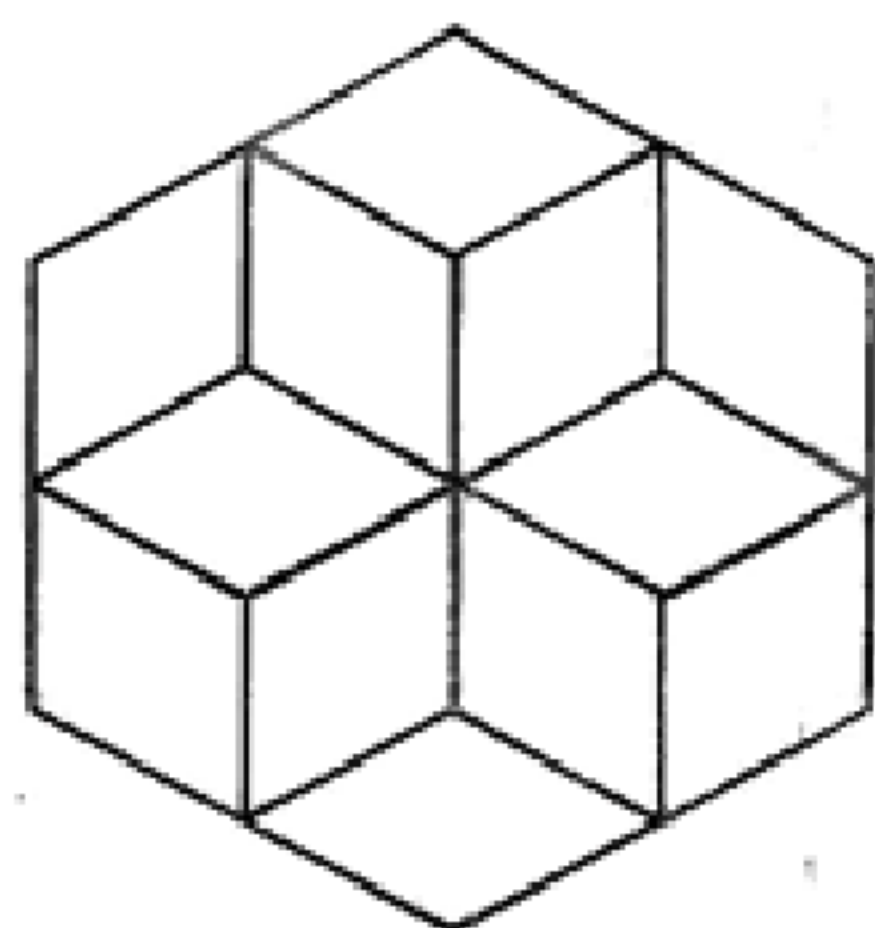
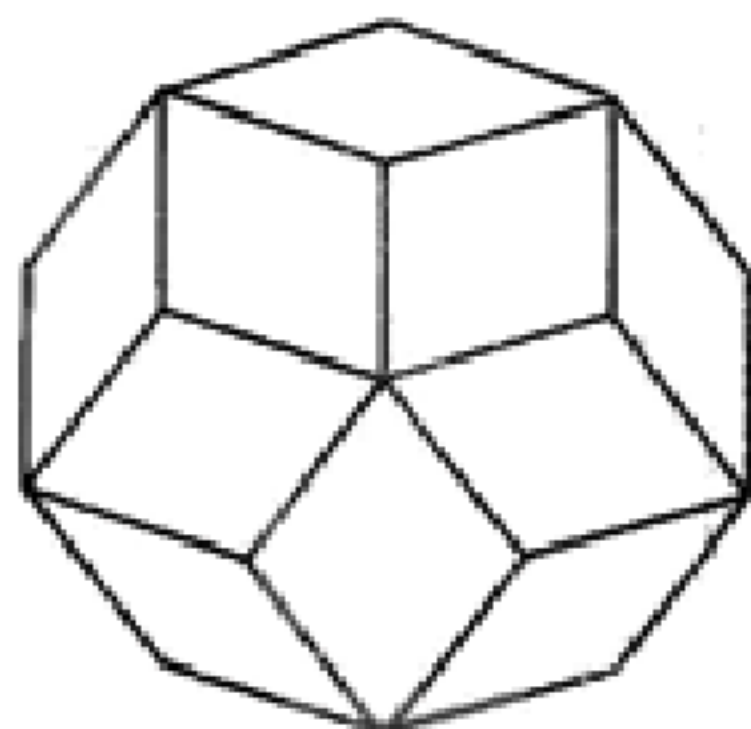
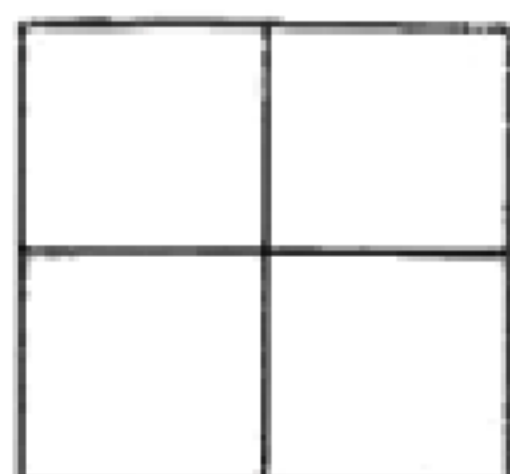
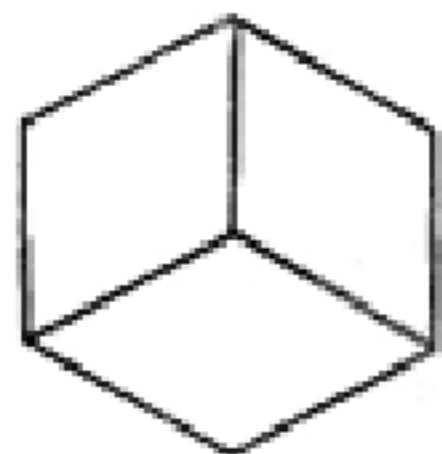
- Sum of A.P. in which the first term is x, common difference is y and the last term is z.
- Sum of the interior angles of a polygon of z sides.
- Fourth term of G.P. in which first is z and the common ratio is x.
- Gradient of a straight line joining the points (x, x) and (y, -y).
- $y(z+1)$  in base seven.
- Area of the square on a strut joining opposite vertices of cuboid with dimensions x, y and z units.

### CLUES DOWN

- $x + y + z$ .
- $4xyz$ .
- $\sqrt{100z}$ .
- Greatest area that can be enclosed by a fence of total length  $(7z - y)$  metres.
- $y + z$  in base eight.
- $\frac{\pi(x^2 + y^2)}{(z - y^2)^2 + y^2}$
- Sine  $(x + y)$  degrees 2z minutes.
- $\log \sqrt{z}$ .
- Total amount after 3x months when £200 is invested at a rate of z% per annum simple interest.
- Roots of  $p^2 - (2x - 1)p + 40 = 0$ , smaller root first.
- $\frac{1}{(4z)^y(x + y)}$ .
- $3z + 2y$ .

D.I.B.





### FITTED RHOMBI

Draw a circle with radius 2 cm. and put in seven equally-spaced radii; the angle at the centre of the circle between two adjacent radii will be  $51\frac{3}{4}^\circ$ . With centres at the points where the radii meet the circumference and radius 2 cm. draw arcs outside the circle. Join the points of intersection of the arcs to the centres of the circles that produced them. The diagram now consists of seven rhombi. Complete seven more using the "free" sides of the seven completed as adjacent sides of the new ones. Continue the process until the outline of the figure is a convex polygon. How many "rings" of rhombi did you draw? How many sides has the final polygon? What are the sizes of the angles of the various shapes of rhombi?

Repeat the process starting with eight equally-spaced radii. Answer the three questions with the new diagram.

The diagrams around the page show the result of using three to nine radii. Did your diagrams for seven and eight radii agree with those shown? Great care and accuracy is needed to produce the diagrams—particularly as the number of radii increases. Can you generalise the answers to the questions using  $n$  radii? Is it easier to consider  $n$  as odd and as even separately, i.e., use  $2n$  and  $(2n+1)$  radii?

B.A.

### THREE DIMENSIONAL CURVE STITCHING

In the article entitled "Three dimensional curve stitching" on pages 568 and 569 of issue No. 72, use was made of the leaflet on the same subject by H. Shaw, Esq., published by Taskmaster Ltd. of Leicester, from whom the type of equipment illustrated can also be obtained.

Ed.

