smile

0746

CONTENTS

PASCAL'S TRIANGLE

An activity for a small group

Share out the work between you.

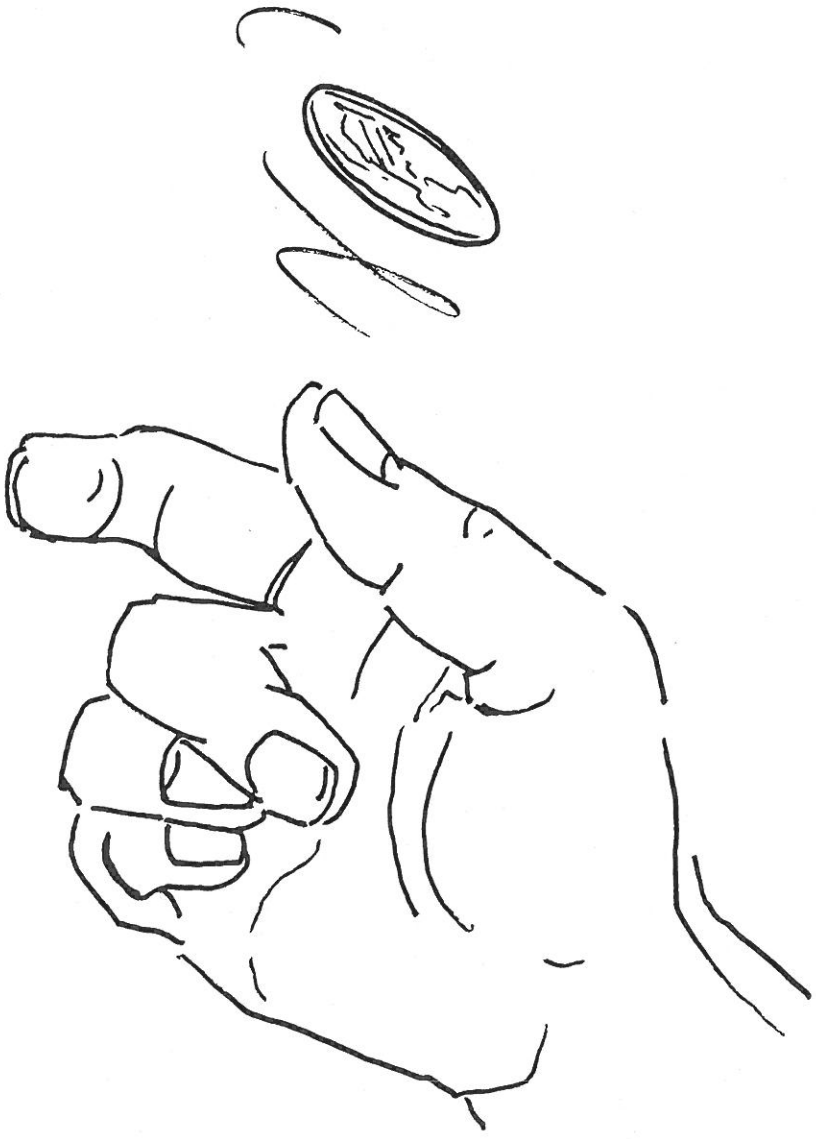
When you have finished, answer these questions:

(1) What similarities are there between the five pieces of work?

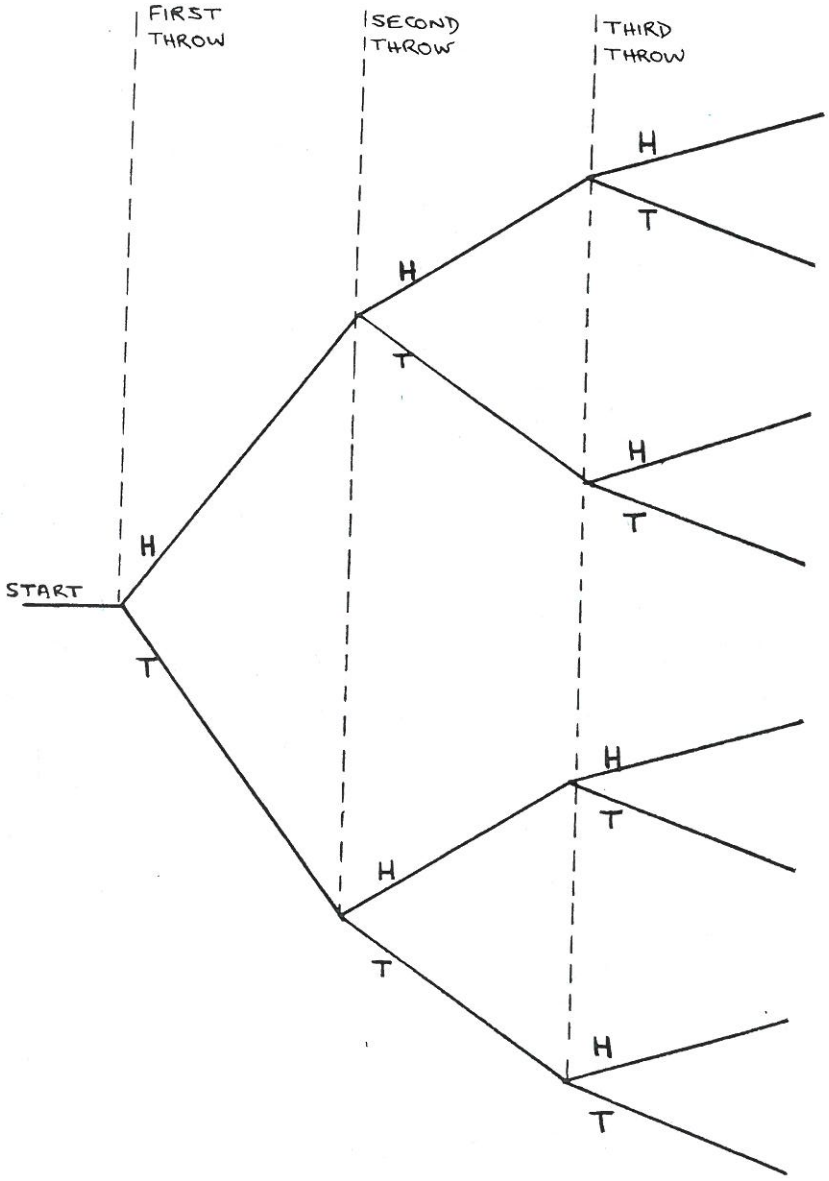
(2) How do they compare with Pascal's Triangle?

0746B

FLIPPING COINS

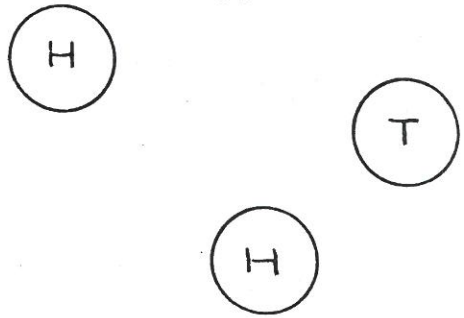


Flip a coin 3 times and trace your path through the tree diagram.



(1) How many different paths are there?

(2) 3 coins were flipped at once:



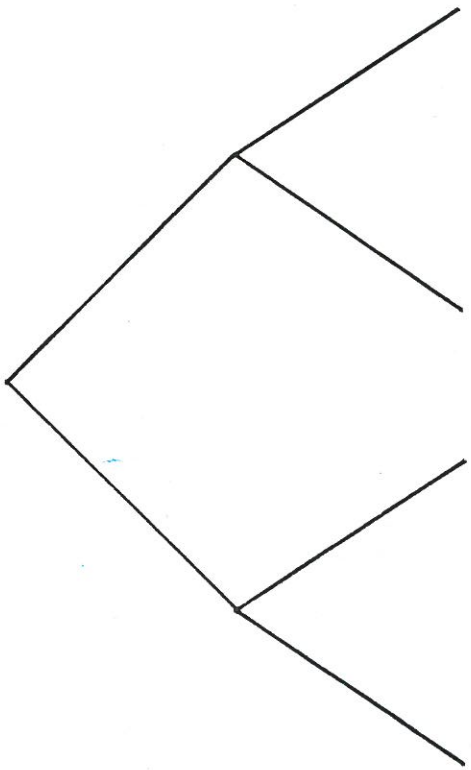
How many paths could you choose?

(3) Copy and complete:

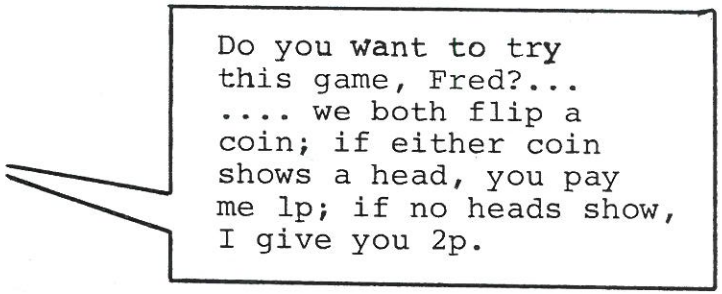
Combinations	Paths	Total Number of paths	Probability
3 Heads	HHH	1	1/8
2 Heads & 1 Tail	HHT, HTH, THH	3	3/8
2 Tails & 1 Head			
3 Tails			
		Total of Probabilities →	

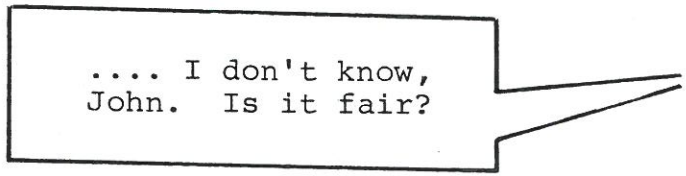
The PROBABILITY of getting HHH is $\frac{1}{8}$ because it is one path out of 8 possible paths.

(4) Investigate the probabilities if you flip 2 coins only.



(5)





Is it a fair game?

Explain your answer.

(6) If you flip 4 coins you can get five different combinations of heads and tails.

They are - 4 H's

3 H's and 1 T

2 H's and 2 T's

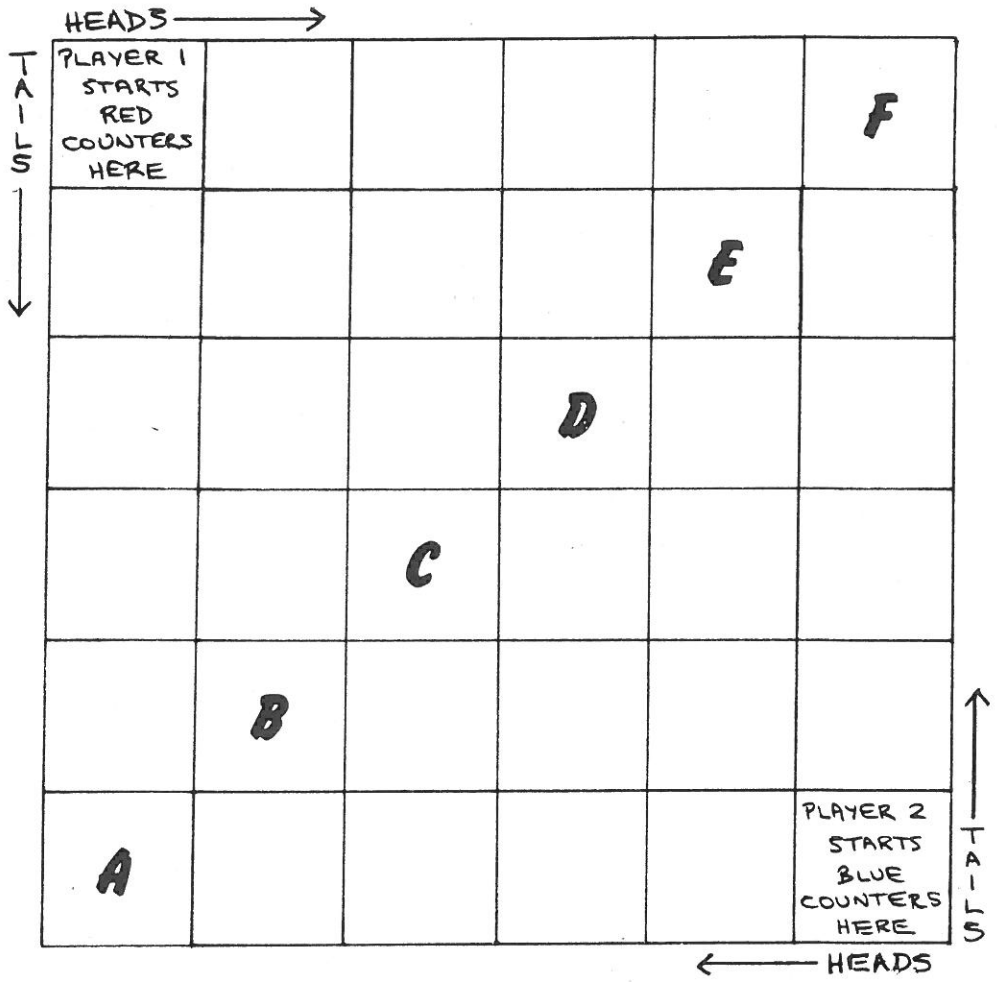
1 H and 3 T's

4 T's

Draw a tree diagram and use it to work out the probabilities for each of the five combinations.

0746C

You will need: 2 players, 16 counters each, 1 coin



COIN GAME

Player 1 tosses the coin: if HEAD, move first counter one place to the right →

if TAIL, move first counter one place down ↓

Then player 2 tosses the coin: if HEAD, move first counter to the left ←

if TAIL, move first counter up↑

Continue in turn until one of the counters reaches a 'home' square A,B,C,D,E or F.

As each counter reaches home you start another one off.

When all counters reach home the winner is the one with the most counters on squares A and F (if this is a tie then the counters at B and E are counted instead)

Is there any pattern to the results?

—— Turn over ——

??????????????????????????????????????
?   ?
?   How many different routes are   ?
?   ?
?   there to each home square?   ?
?   ?
??????????????????????????????????????

(1) If player 2 got a counter to A he must have tossed 5 heads in a row. Why?

(2) If player 2 got a counter to B, he must have tossed 4 heads and 1 tail; but there are 5 possible paths:

H	H	H	H	T
H	H	H	T	H
H	H	T	H	H
H	T	H	H	H
T	H	H	H	H

Check them.

(3) Copy and complete this table of possible route for player 2 (use a whole page)

Home Square	Router	Total
A	HHHHH	1
B	HHHHT HHHTH HHTHH HTHHH THHHH	5
C		

(4) How would this table be different for player 1?

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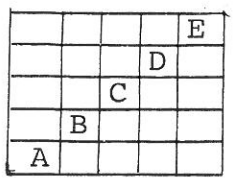
(5)



If you played the same game on a 5 x 5 board, how many possible routes would there be for player 2 to home squares A,B,C,D and E?

What are the possibilities with a 4 x 4 board?

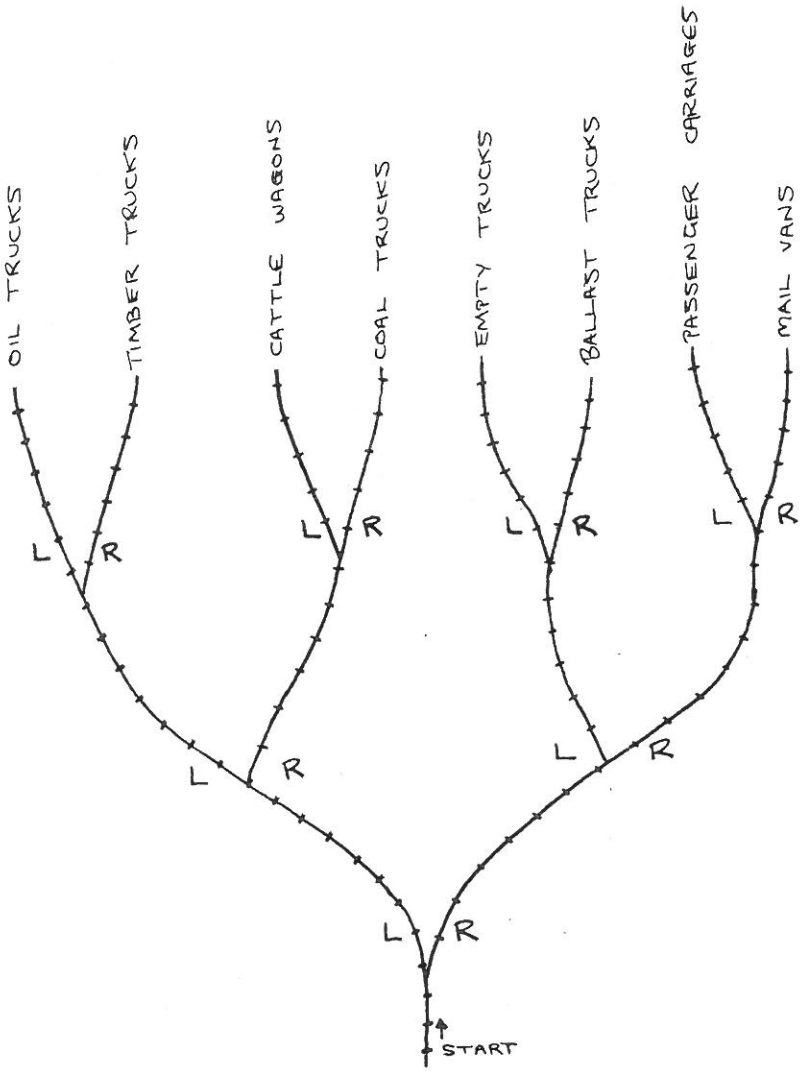
a 3 x 3 board?

Is there a pattern to your results?

Can you use this pattern to find the number of routes to each home square on a 6 x 6 board? What about an 8 x 8 board?

SORTING YARD

Rolling stock is sorted into a siding by passing through sorting levels.



An empty truck would have to be sent right, left and left again to be sorted into the correct siding. This can be coded RLL.

(1) What is the code for sorting coal trucks?

(2) How many different codes are there?

(3) The codes LRL and LLR both have two L's and one R. Are there any more?

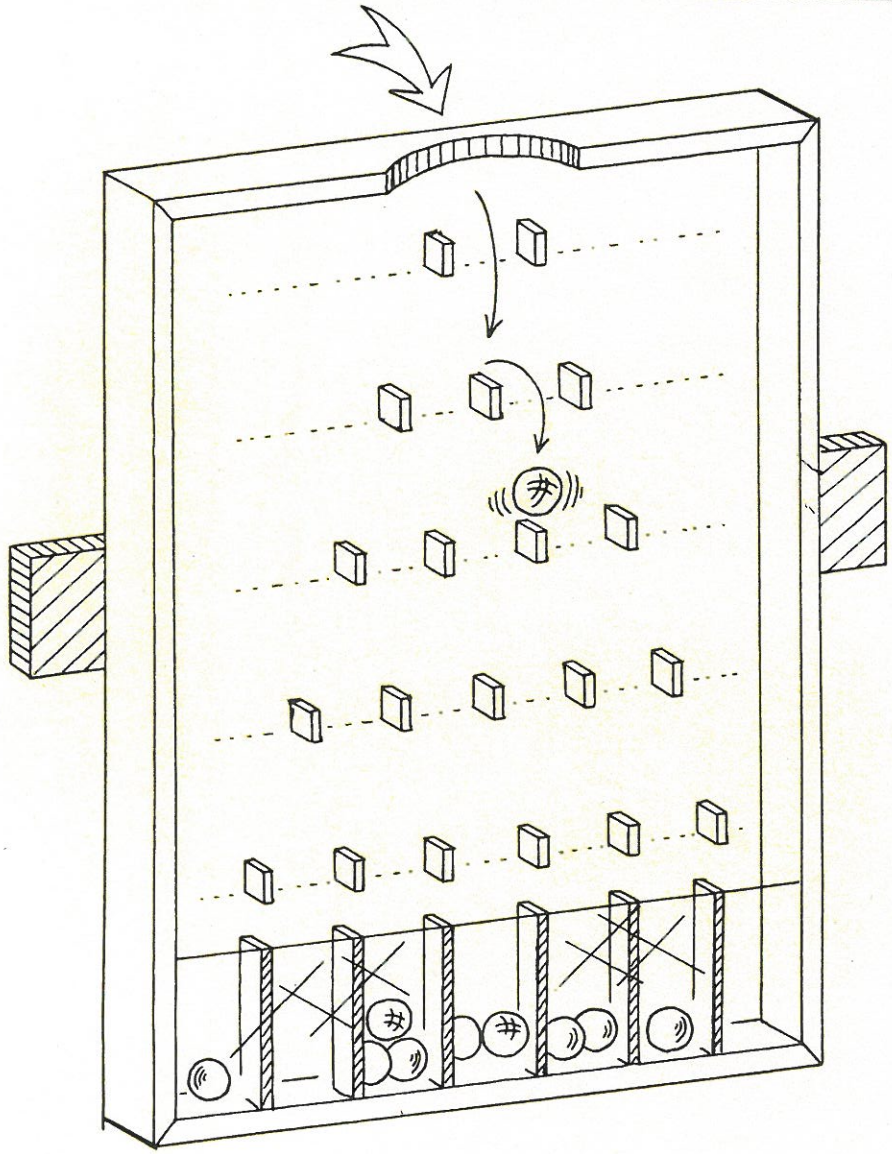
Copy and complete this table:

Combinations	Path	Total number of paths
Three L's	LLL	1
Two L's and one R	LLR,LRL,R11	3
Two R's and one L		
Three R's		

Investigate what happens if you have a sorting yard with four sorting levels.

0746 D

You will need: probability maze



PROBABILITY MAZE

If you roll a ball through the maze several times, how often will it fall in each column?

You can answer by:

(a) guessing

(b) doing an experiment

(c) 'working it out' (see over)

Compare your answers for (b) and (c).

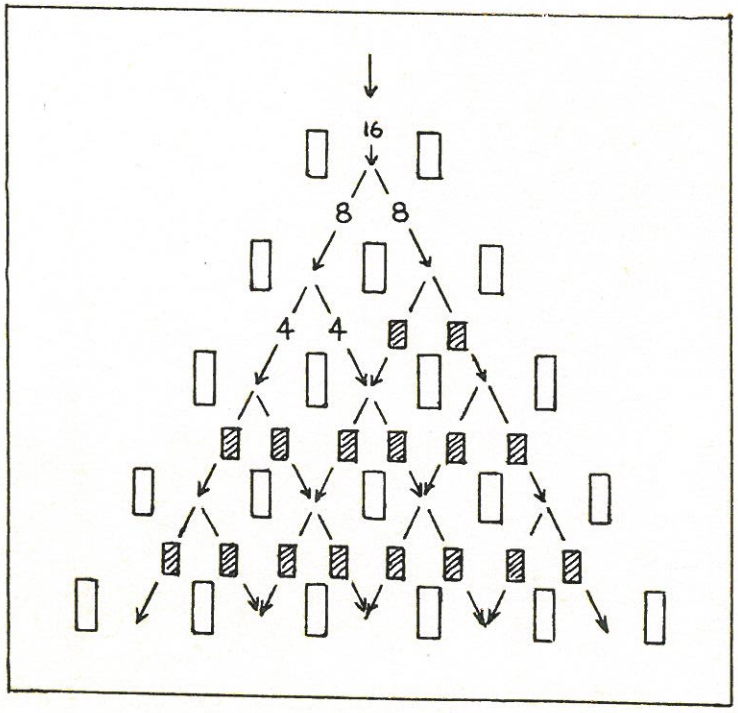
Explain any differences.

Imagine that the rule below always works.

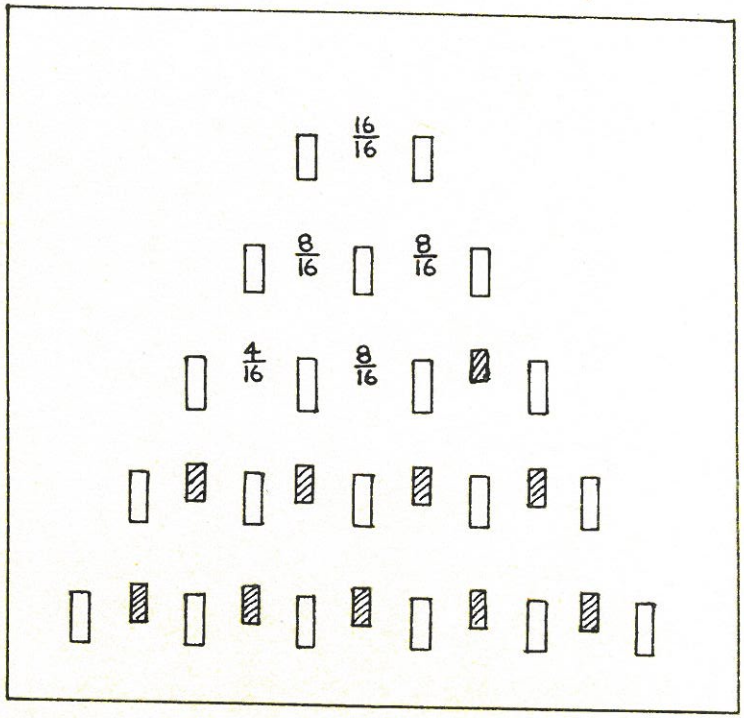
> Each time the ball drops onto a peg, it has an even chance of falling to the left or to the right.

Suppose a ball falls through the maze 16 times:
Copy and complete the numbers:

(a)



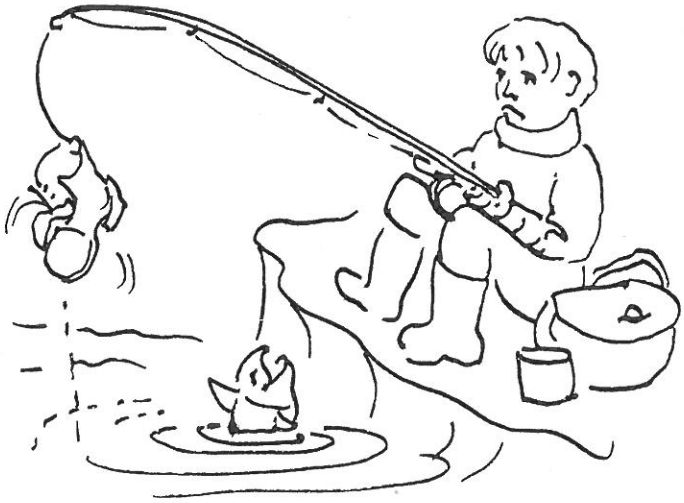
(b)



Suppose the maze had another row of pegs. Investigate.

THREE MEN IN A BOAT

Davy, Hilary, Simon and Tim went on a fishing trip.



When they arrived at the river they decided it would be a good idea to hire a boat.

(1) How many ways could they choose one person to go to get the boat? Write all these ways down.

"How about an ice-cream? said Tim
"Do you need any help?" asked Simon (who was not very keen on fishing anyway).

"I'll go" said Hilary.

They all decided to have an ice-cream and sent two people to buy four cornets.

(2) How many different ways could they choose two people to send? Write them all down.

They decided to row out into the middle of the river, but unfortunately there was only room in the boat for three of them.

(3) How many ways could they choose three people out of four to go in the boat? Write them all down.

The next day they went fishing again, but this time Ronnie came too, so there were five altogether.

(4) How many ways could they choose one person to send for the boat?

(5) Write down all the ways they could choose two people to send for the ice-creams.

(6) Write down all the ways they could pick three people to go out in the boat.

(7) The boat hit a rock and sank. They managed to drag it ashore, but it needed four people to carry it back to the boat-house.

How many ways could they choose four people to carry it back? (Hilary was just as strong as the boys!)