

**Cuts & Wounds**  
**Heal Quickly**  
**with**  
**CAMFOSA**  
**Non-irritant**

Prices: 1/3, 3/-,  
 11/6, & 22/6.

THE HEALTH CRUSADE

**Clean**  
**False**  
**Teeth**

this  
 easy  
 way

There is an easy way to keep false teeth stainless, sterilized and fresh. Just put your dentures in a tumbler of water in which 'Steradent' powder has been dissolved, as directed on the tin. This solution penetrates every crevice, dissolves film, removes even old stains and sterilizes your dentures by its own harmless, active energy. Many people leave their teeth in 'Steradent' overnight; others regularly for 20 minutes while they dress. Dentists cordially recommend 'Steradent' and all chemists stock it.

**Steradent**  
 cleans and sterilizes false teeth

**DIABETES**

Of vital importance to Every Diabetic is this New FREE BOOK entitled "DIABETES — its cause and treatment." New Discovery that is giving health and energy to thousands without injections, or strict dieting.

Write for this valuable book at once. Obtainable by return post from

**CHEMISTS' SUPPLIES CO.**  
 P.O. Box 1178L, CHRISTCHURCH.  
 (Kindly enclose 6d. stamps for handling.)

## PUZZLES

# THE TOSS OF A COIN

THE main course in this week's menu for minds is cooked up by that indefatigable chef from Taupo, H. G. Lambert. In the issue of June 28 he asked what the chances would be of a coin landing heads exactly five times out of ten tosses, and in the issue of July 12 he gave this answer: Exactly 63 times out of 256.

He told us he expected some queries, and sure enough they arrived. S. J. S. (Spreydon), voiced our own ideas when he said the answer did not satisfy him, since every toss has a 50/50 chance of being a head. Where, he asked, did the 256 come in? Pennies, we believed, came down whichever way they pleased; but now it seems that their behaviour can be analysed. H.G.L. was asked for an explanation, and obliged, as usual. Here it is:

The coin (he says) can land either of two ways in each of ten separate tosses, so that there are 1024 (two to the tenth power) possible ways in which the experiment can result, all equally possible.

Now the combination of 0 heads and 10 tails can happen only one way, so that its probability is 1/1024. But the combination of 1 head and 9 tails can happen 10 different ways, so that the probability of it happening at all is 10/1024. The combination of 2 heads and 8 tails can happen, by the same reasoning, 45 different ways, giving a probability of 45/1024. Similarly, the probability of the remaining possible combinations is as follows:

Heads	Tails	Chances in 1024
3	7	120
4	6	210
5	5	252
6	4	210
7	3	120
8	2	45
9	1	10
10	0	1

H.G.L. proves his table by noting that the number of ways in which each proportion of heads-to-tails can occur does indeed add up to 1024 (add it and see); and that the probability of the various proportions coming out adds up to 1 as it should. In the case of 5 heads out of 10 tosses the probability of 252 out of 1024 is by reduction 63 out of 256, which was the answer given.

There still remained some points to be cleared up. We could see clearly enough that 10 tails could only come down 1 way, as H.G.L. says; or that 1 head 9 tails, could only come down 10 ways. That is, the head could come into the sequence anywhere in the ten tosses. But it seemed to be more difficult to work out this variation of sequences with the other combinations. How, for example, did H.G.L. arrive at the statement that the number of ways 2 heads can result in 10 tosses is 45?

### Our Worry Anticipated

Fortunately, this admirable puzzler anticipated that worry and answered the question in advance. The two heads,

he points out, can occur on the first and second tosses, or the first and third, first and fourth, etc., or on the second and third, second and fourth, etc., or on the third and fourth, third and fifth, etc., etc.

In short, the number of possible ways is the number of combinations of 10 things taken two at a time, which, expressed mathematically, is 10! over (10-2)! (2)! when ! is the sign indicating that the figures are factorial. From this H.G.L. elucidates the general formula that the probability of N! out of 2 to the power of N (N-H)! H! equals N! over 2 to the power of N(N-H)! H!.

As the PP found himself able to follow all that (surprisingly enough!),

he gives it to puzzlers, expecting that they will be as interested as he was and as grateful to H.G.L. for all the trouble.

## ANSWERS

(See issue of July 26)

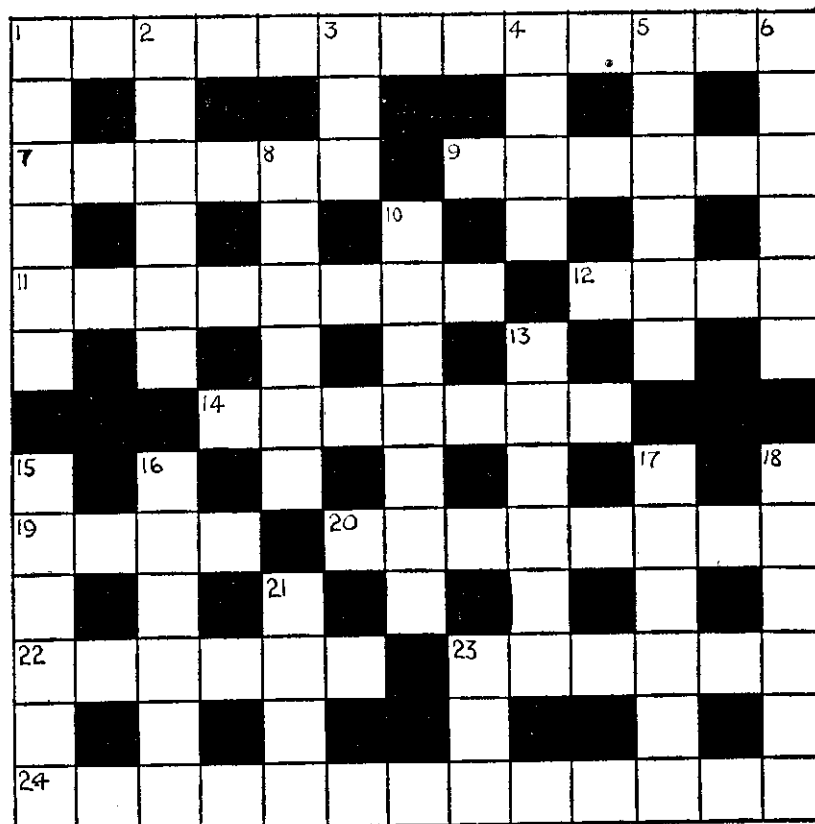
Condensed Crossword:

ROPE  
 AVER  
 SAWN  
 ELSE

The Five Travellers: Since C does not go as far as E, C gets out at Riccarton. Since E goes further than B, B gets out at Papanui. E goes at least as far as Belfast and A as far as Stewart's Gully. Since E does not get out at Belfast, D must do so. Since E does not go as far

## The Listener Crossword No. 19

(Constructed by R.W.C.)



### Clues Across

- A fairy tale character whose name suggests Russian equestrian headgear.
- This has been superseded by the bulldozer.
- Name of a famous family of poisoners.
- Submissive on a bone diet.
- A notorious fiddler.
- A violin has four of these.
- A monster to be found in 5 down.
- Sage tree offers poor accommodation.
- A famous sailor.
- A hopeful form of praise.
- Ate her sherbet? — actually the diet of this trio was porridge.

### Clues Down

- A decoration made partly of iron.

- Stored in a county on the South Coast of England.
- "It's dabbling in the — that makes the milkmaids fair."
- Rum and water.
- Is Gore the scene of oarousals?
- A victim of St. George.
- I a poet? That would send you to sleep.
- Even a tiny axe may cause concern.
- A species of heron found in 20 across.
- Garment for a coster.
- This fruit is a goner.
- A backward animal gives a thin coat.
- Separates from verses.
- "Ah, take the — and let the credit go, Nor heed the music of a distant drum." (Rubaiyat of Omar Khayyam)
- The end of 20 across.