THE BOOK OF FIVE HUNDRED PUZZLES

and

CURIOUS PARADOXES

NEW YORK

DICK and FITZGERALD

PUBLISHERS.

RICE, 25 CENTS.

THE BOOK OF

CURIOUS PUZZLES:

CONTAINING A LARGE COLLECTION OF

NTERTAINING PARADOXES,

LEXING DECEPTIONS IN NUMBERS, AND
AMUSING TRICKS IN GEOMETRY.

E AUTHOR OF "THE SOCIABLE," "THE SECRET OUT," "THE
MAGICIAN'S OWN BOOK," "PARLOR GAMES," AND
"PARLOR THEATRICALS," ETC.

Illustrated with a great Variety of Engravings.

NEW YORK:
CK & FITZGERALD, PUBLISHERS,

And Curious Paradoxes.

nce the days of the Egyptian Sphynx, Puzzles, Paradoxes, nd other mystifications have been popular sources of amuse-rom tne simplest Riddle to the most abstruse Paradox, they are tive of a peculiar and lively pleasure. The youthful mind is analytical and inquiring, and takes delight in searching to m of anything that appears difficult to understand. Puzzles, are excellent means for the development of these natural s, combining, as they do, the elements of work and play. ngthen the memory by exercising it, teach us application and nce, enable us to improve the faculty of holding several ideas nd at once, and, in short, are highly beneficial to all the more al qualities.

easure of arriving at the correct solution of a difficult problem, ong and patient study over it, is as great as that arising from mental victory, and even the study itself has no small amount re in it.

uzzles in the following pages, have been selected from many nd a considerable number of them have never before been in so as to render them explicit and easy of comprehension; but our young friends should remember that the pleasure lies in working out the answers themselves, instead of jumping at once to the printed solutions.

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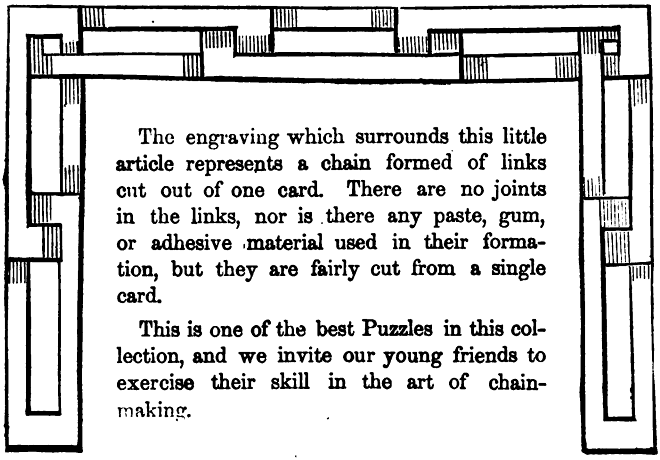
1. THE CARD CHAIN PUZZLE.

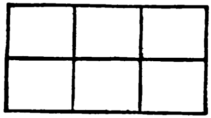


The engraving which surrounds this little article represents a chain formed of links cut out of one card. There are no joints in the links, nor is there any paste, gum, or adhesive material used in their formation, but they are fairly cut from a single card.

This is one of the best Puzzles in this collection, and we invite our young friends to exercise their skill in the art of chain-making.

2. THE MAGIC SQUARE.

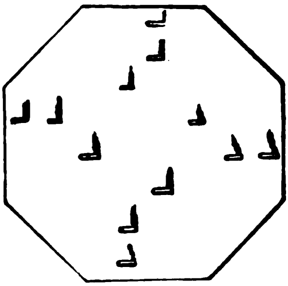
With seventeen pieces of wood (lucifer matches will answer the purpose, but be careful to remove the combustible ends, and see that they are all of the same length) make the following figure:



The Puzzle you propose is—to remove only five matches, and yet leave no more than three perfect squares of the same size remaining.

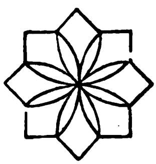
3. THE PRACTICABLE ORCHARD.

4. THE OCTAGON PUZZLE.

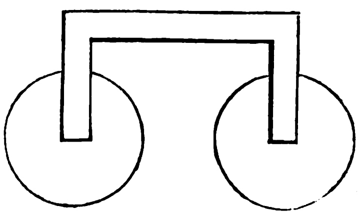


ve a piece of ground, which is neither square nor round,
ut an octagon; and this I have laid out
novel way, though plain in appearance, and retain
hree posts in each compartment; but I doubt
ether you discover how I apportioned it, e'en tho'
inform you 'tis divided into four.
if you solve it right, 'twill afford you much delight,
nd repay you for the trouble, I am sure.

5. THE METAMORPHOSIS PUZZLE.

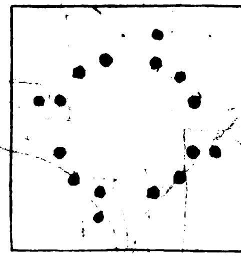


re a piece of thin wood, cardboard, or writ-
er; let the same be formed into a perfect
3 in. or more), after which divide it into
arts, and with them form the accompanying
s:



6. THE DIVIDED SQUARE.

Divide this square into four equal parts, so as to obtain two dots in each division, and eignt in the centre.



7. PUZZLE PLEASURE GARDEN.

By aid of hoe, and rake, and spade,
And perseverance too,—I've made
A pleasure garden,—and a view
Of the self-same I give to you.
Within this piece of fancy ground,
Which by a wall's encompassed round,
Are zig-zag walks both plain and neat
That lead into a calm retreat,
And all who would an entrance find
Should this observe, and bear in

They *once* and *only once* must tread
O'er *every* path, 'round every bed
Of plants and flowers that deck this maze,
In which a fountain freely plays.
Now, those who may, with firm resolve,
This little puzzle truly solve,
And to the fount admittance gain,
May at their pleasure there remain,
And then retrace their footsteps o'er

8. THE FLORIST'S PUZZLE.

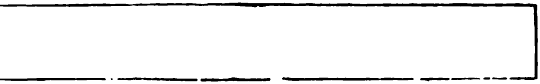
st planted thirty-one varieties of flowers (only one of each that he had one circle containing eighteen varieties; seven th six varieties in each; six straight rows with six varieties and three straight rows with six varieties in each.

9. THE FARMER'S PUZZLE.

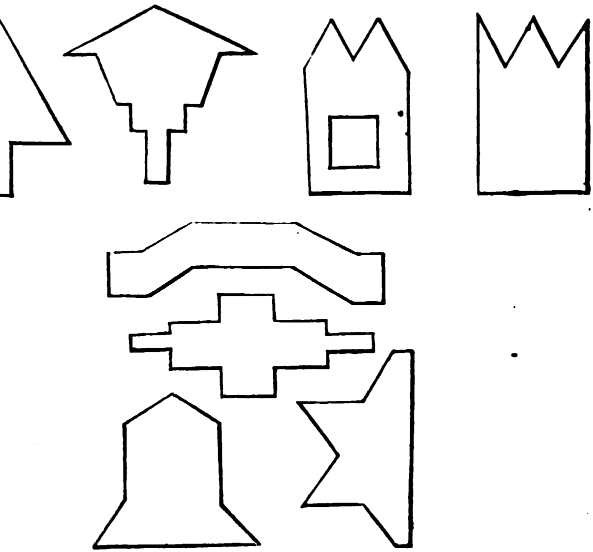
er planted eleven trees in eleven rows, with three trees in . How were they planted?

10. THE PROTEAN PUZZLE.

piece of stiff cardboard, let the same be formed thus—



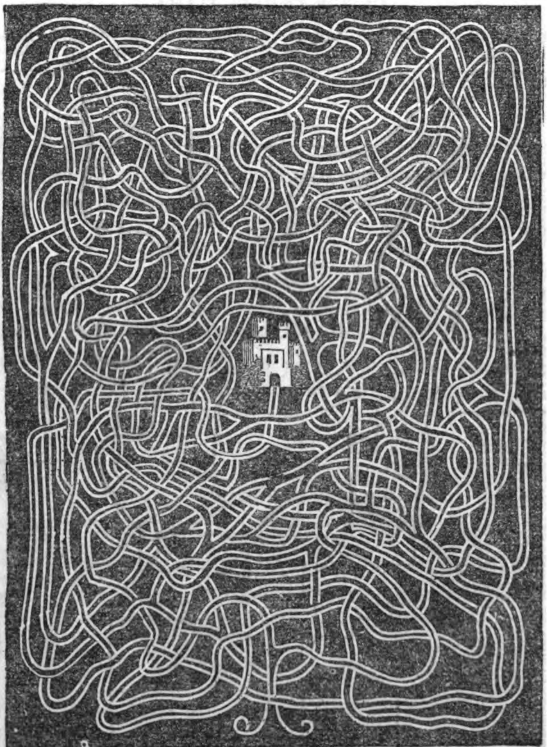
nches long, by one inch broad; cut it into eleven pieces, and m represent a cross. Again, by reversing, form the various ven below.



11. THE TRAVELLER'S MAZE.

Instructions to the Traveller through the Maze.

The instructions for this fireside amusement are as follow: The Traveller must enter at the opening at the foot, and must pass between the lines forming the road to the Castle in the middle. There are no bars in the route: one road crosses another by means of a bridge, so that care must be taken that, in following the route, the Traveller does not stray from one road to another, and thus lose the track. For instance, on entering, he will have to pass *under* a bridge of another



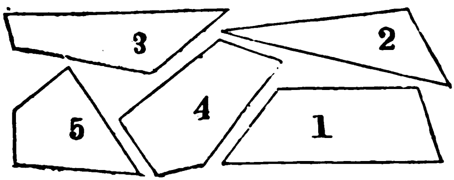
road crossing over his path: in continuing the route he will next pass over a bridge crossing another road, and thus continue his course. A ctice will accustom the Traveller to the method of the Maze. a fair test of the merits of the Maze to commence from the out the Traveller will be at full liberty, *when* he has entered e, to get out again if he can.

12. THE GEOMETRICAL ORCHARD.

ing out an orchard of peach trees, a farmer planted twenty-ees so as to have nine rows, and six trees in each row. How this?

13. THE HEXAGON PUZZLE.

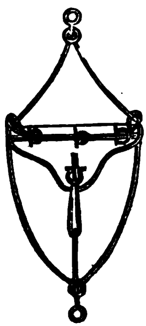
ange the following five pieces into a perfect *hexagon*—that is, having six equal sides.



14. THE CARPENTER'S PUZZLE.

k was to be cut in two; the carpenter cut it half through on e, and found he had two feet still to cut. How was it?

15. PUZZLE PURSE.



a piece of morocco, or any other suitable mate- purse be constructed similar to the one given The puzzle is to open the same without re- any of the rings.

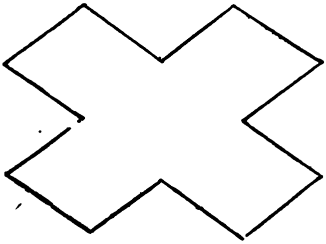
16. PROBLEM OF MONEY.

one of the series, place it upon some other, with this proviso, that you pass over just one dime. Repeat this till there is no single half-dime left.

17. THE APPLE-TREE PUZZLE.

How can ten apple trees be planted, so that there shall be five rows, and four trees in each row?

18. THE ANGULAR PUZZLE.



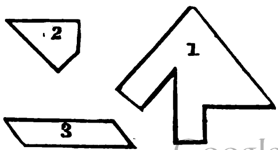
Cut a piece of cardboard into the form of, and of equal proportions to, the figure given here, after which, produce, with the same, three successive pyramidal or angular boxes, alternately bearing the respective numbers of 7, 6, and 5 corners, still keeping the cardboard in one piece.

19. THE PERPLEXED CARPENTER.

There is a hole in the barn floor just two feet in width and twelve in length. How can it be entirely covered with a board three feet wide and eight feet long, by *cutting the board only once in two?*

20. THE MAGIC OCTAGON.

Upon a piece of cardboard draw
  The three designs below;
I should have said of each shape four,
  Which when cut out will show,
If joined correctly, that which you
  Are striving to unfold,—
An octagon, familiar to
  My friends both young and old.



21. THE BLIND ABBOT AND THE MONKS.

ay always be nine in each row, though the whole number may m eighteen to thirty-six.

ve an air of interest to this problem, the old writers state it in owing manner:—A convent, in which there were nine cells, was d by a blind abbot and twenty-four monks, the abbot lodging entre cell, and the monks in the side cells, three in each, form- row of nine persons on each side of the building, as in the anying figure.

3	3	3
3		3
3	3	3

Fig. 1.

4	1	4
1		1
4	1	4

Fig. 2.

abbot, suspecting the fidelity of the monks, frequently went at night and counted them, when, if he found nine in each row, ired to rest quite satisfied. The monks, however, taking advan- f his blindness, conspired to deceive him, and arranged themselves cells as in Fig. 2, so that four could go out, and still the abbot l find nine in each row.

2	5	2
5		5
2	5	2

Fig. 3.

1	7	1
7		7
1	7	1

Fig. 4.

he monks that went out returned with four visitors, and they were nged with the monks as in Fig. 3, so as to count nine each way, consequently the abbot was again deceived.

mboldened by success, the monks next night brought in four more tors, and succeeded in deceiving the abbot by arranging themselves n Fig. 4.

Again four more visitors were introduced, and arranged with the nks as in Fig. 5.

Finally, even when the twelve clandestine visitors had departed, carrying off six of the monks with them, the abbot, still finding nine in

0	9	0
9		9
0	9	0

Fig. 5.

5	0	4
0		0
4	0	5

Fig. 6.

each row, as in Fig. 6, retired to rest with full persuasion that no one had either gone out or come in.

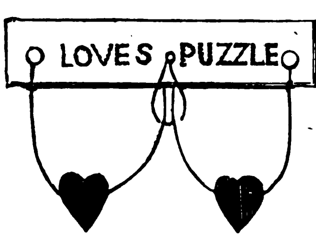
22. THE PEACH ORCHARD PUZZLE.

A New Jersey farmer planted twenty-seven peach trees in ten rows, with six trees in each row. How did he plant them?

23. THE GRASPING LANDLORD.

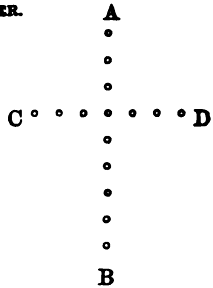
Suppose a certain landlord had eight apple trees around his mansion, around these eight houses of his tenants, around these ten pear trees,—he wants to have the whole of the pear trees to himself, and allot to each of his tenants one of his apple trees in their place. How must he construct a fence or hedge to accomplish it?

24. LOVE'S PUZZLE.



Cut a piece of thin wood about four inches long and three-quarters broad. Perforate it with three holes. Cut pieces of bone, cork, or wood, into the shape of two hearts, and then arrange the whole upon strings, as in the diagram. The puzzle is, to get the two hearts upon the same loop. It is a good puzzle for lovers, and suggests the idea of the "union of hearts," of which, when solved

25. THE DISHONEST JEWELLER.



ly sent a diamond cross to a jeweller to aired. To provide against any of her ds being stolen, she had the precaution nt the number of diamonds, which she the following manner:—She found the contained in length from A to B, nine ads; reckoning from B to C, or from B she also counted nine. When the cross eturned, she found the number of dia- thus counted precisely the same, yet iamonds had been purloined. How was this managed?

26. THE GARDENER'S PUZZLE.

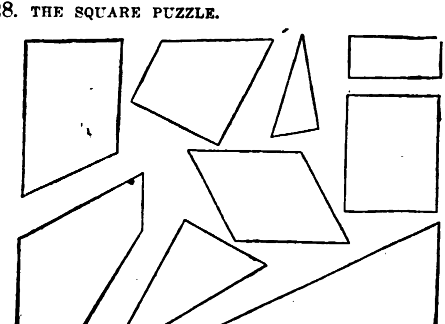
gardener having twenty-four rose-bushes, planted them in two twelve bushes in each, and each bed containing six rows, with bushes in each row. Anxious to appear singular, the gardener ed each bed entirely different from the other in design. How his done?

27. THE CIRCLE PUZZLE.

Twenty lines upon paper place,
On every line five circles trace;
These circles should just in amount,
Or number, thirty-seven count;
And every circle, orb, or round,
Upon an angle should be found—
At an equal distance, too, should be
Upon each line—solve this for me?

28. THE SQUARE PUZZLE.

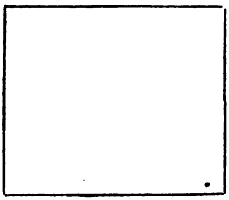
Arrange the pieces in e following figure, so at when set close to- ther they shall form perfect square.



29. THE TREE PUZZLE.

Arrange fifteen trees in sixteen rows, with three in each row; also two rows of four trees, and one row of seven trees.

30. THE GEOMETRICAL PUZZLE.



Given, a square, to divide it into seventeen smaller but equal squares.

31. THE PUZZLE OF THE CHRISTIANS AND TURKS.

Fifteen Christians and fifteen Turks being at sea in the same vessel, a dreadful storm came on which obliged them to throw all their merchandise overboard; this, however, not being sufficient to lighten the ship, the captain informed them that there was no possibility of its being saved, unless half the passengers were thrown overboard also. Having therefore caused them all to arrange themselves in a row, by counting from nine to nine, and throwing every ninth person into the sea, beginning again at the first of the row when it had been counted to the end, it was found that after fifteen persons had been thrown overboard, the fifteen Christians remained. How did the captain arrange those thirty persons so as to save the Christians?

32. THE TULIP PUZZLE.

A gentleman having nineteen tulips, planted them in nine rows, with five in each row. How did he plant them?

33. THE THREE GENTLEMEN AND THEIR SERVANTS.

Three gentlemen and their servants having to cross a river, find a boat without its owner, which can only carry two persons at a time. In what manner can these six persons transport themselves over by pairs, so that none of the gentlemen shall be left in company with any of the servants, except when his own servant is present?

34. THE DROVER'S PROBLEM.

One morning I chanced with a drover to meet,
Who was driving some sheep up to town,
Which seemed very near ready to drop from the heat,
Whereupon I exclaimed with a frown:

834
159
672

on't you think it is wrong to treat animals so?
Why not take better care of your flock?"
would do so," said he, "but I've some miles to go
Between this and eleven o'clock."

Vell, supposing you have," I replied, "you should let
Them have rest now and then by the way."
o I will, if you believe I can get
There in time for the market to-day.

Tow as you seem to know such a lot about sheep,
Perhaps you'll tell us how many I've got?"
To, a casual glance as they stand in a heap,
Won't permit of it, so I cannot."

Vell, supposing as how I'd as many again,
Half as many, and seven, as true
As you're there, it would pay me to ride up by train;
Because I should have thirty-two."

35. THE MARKET WOMAN'S PUZZLE.

rket woman bought 120 apples at two for a cent, and 120 more ner sort, at three for a cent, but not liking her bargain, she mixed gether, and sold them out again at five for two cents, thinking uld get the same sum; but on counting her money, she found, surprise, that she had lost four cents. How did this happen?

36. THE PLUM TREE PUZZLE.

rmer planted nine plum trees in ten rows, with three trees in w. How were they planted?

37. THE LAND PUZZLE.

e is a square piece of land containing twenty-five acres, designed reception of twenty-four poor men and their governor, who are o have a house situated in its own ground, the governor's in the . How many persons' land must the governor pass through he gets to the outside of the whole?

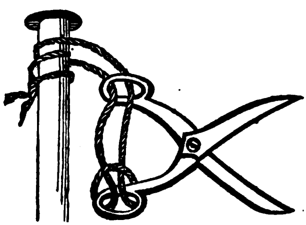
38. THE NINE DIGITS.

ce the nine digits (that is, the several figures or numbers under n three rows, in such a way that, adding them together either up wn across, or from corner to corner, they shall always make fifteen.

39. THE LANDLORD TRICKED.

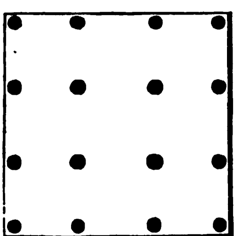
Twenty-one persons sat down to dinner at an inn, with the landlord at the head of the table. When dinner was finished, it was resolved that one of the number should pay the whole score; to be decided as follows. A person should commence counting the company, and every seventh man was to rise from his seat, until all were counted out but one, who was to be the individual who should pay the whole bill. One of the waiters was fixed upon to count the company out, who, owing his master a grudge, resolved to make him the person who should have to pay. How must he proceed to accomplish this?

40. THE SCISSORS ENTANGLED.



This is an old but a capital puzzle. A piece of double twine is fastened to a pair of scissors (as shown in the cut), and both the ends are held with the hand, whilst some person extricates the scissors from the twine.

41. THE CARPENTER PUZZLED.



A ship having sprung a leak at sea, and being in great danger, the carpenter could find nothing to mend it with, except a piece of wood, of which the annexed is a correct representation; supposing the black dots in it to represent holes in the wood, thus apparently preventing him from cutting out of it the sized piece he wanted, which was exactly one quarter of the board. Required, the way in which he must cut this piece of wood, to obtain out of it a piece exactly one-fourth its own size having no holes in it.

42. THE MECHANIC'S PUZZLE.

43. THE GRECIAN PARADOX.

;oras, a Greek philosopher, agreed to instruct a young man in
or a sum of money, one half of which was paid down, and the
er to be liquidated *when the pupil made his first successful plead-*
courts. Long after the instructions were concluded, the pupil
paid *nor pleaded,* and Protagoras brought an action for the
of the unpaid money. The question is, could Protagoras
he same?

44. THE FIVE ARAB MAXIMS.

in the five Arab maxims following:

ever	All	For he who	Every thing	Often	More than
'ell	You may know	Tells	He knows	Tells	He knows
empt	You can do	Attempts	He can do	Attempts	He can do
lieve	You may hear	Believes	He hears	Believes	He hears
y out	You can afford	Lays out	He can afford	Lays out	He can afford
ecide upon	You may see	Decides upon	He sees	Decides upon	He sees

45. THE JESUIT'S PLACARD.

Sunday the 8th of October, 1850, when the Pope went to cele-
he Nativity of the Virgin, at Rome, the following Placard was
in various parts of the city. We give a translation, in which
uble meaning will be better seen.

MORTE A	PIO NONO
MAZZINI	VIVA LUNGAMENTE
LA REPUBLICA E	IL PIU DOLICE GOVERNO
PIU INFAME GOVERNO	E QUELLO DEI PRETI
ABASSO	IL POTERE DEI PRETI
L DOMINO DEL POPOLI	REGNI IN ETERNO.

46. A DOZEN QUIBBLES.

1. How must I draw a circle round a person placed in the centre of a room, so that he will not be able to jump out of it, though his legs should be free?

2. I can stretch my arms apart, having a coin in each hand, and yet, without bringing my hands together, I can cause both coins to come into the same hand. How is this to be done?

3. Place a candle in such a manner, that every person shall see it except one, although he shall not be blindfolded, or prevented from examining every part of the room, neither shall the candle be hidden.

4. A person may, without stirring from the room, seat himself in a place where it will be impossible for another person to do so. Explain this?

5. A person tells another that he can put something into his right hand, which the other cannot put into his left.

6. How can I get the wine out of a bottle if I have no corkscrew, and must not break the glass, or make any hole in it or in the cork?

7. If five times 4 are thirty-three, what will the fourth of twenty be?

8. What two numbers multiplied together will produce seven?

9. If you cut thirty yards of cloth into one yard pieces, and cut one yard every day, how long will it take?

10. Divide the number 50 into two such parts that, if the greater part be divided by 7, and the less multiplied by 3, the sum of the quotient and the product will make 50.

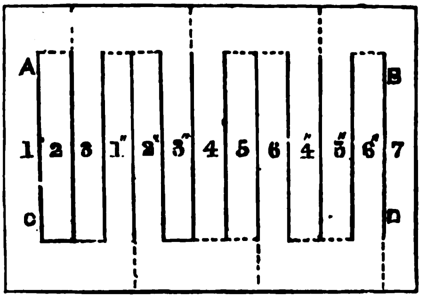
11. What is the difference between twice twenty-five and twice five and twenty?

12. Place four fives so as to make six and a half.

Answers to Practical Puzzles.

1. ANSWER TO CARD CHAIN PUZZLE.

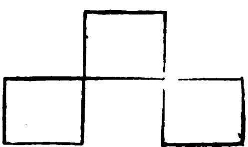
card, say four inches long and two and a half inches wide, or
ther size thought fit; but the larger the card the better it
actice. Draw a
cil line from A to
nother line from
about a quarter
h from the edge
card. Now lay
in water for a
ne; after which
down from the
h a pen-knife, as
pencil line, and
the card aside



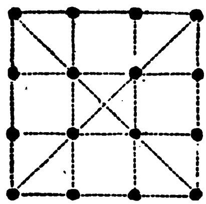
s perfectly dry, when you will resume your task as follows:—
sharp pen-knife cut right through the *straight* lines indicated
ngraving, but only half way through the *dotted* lines, as that
plit portion of the card. The figures show the bar of each
the chain. Thus 1 and 1″ belong to the same link, and are
ed at the top and bottom, the latter by the upper half of the
d the former by the under half of the split; the links 2 and 2″
connected in the same way, and so on to the end of the chain
ery link is released, thus forming a cable, which, if not useful
mechanical purpose, will at least serve to amuse.

2. ANSWER TO THE MAGIC SQUARE.

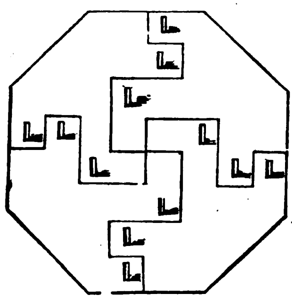
seeming impossibility is rendered
removing the two upper corners
h side and the centre line below,
he three squares will appear thus:—
ingenious device is the best problem
or magicians we are acquainted with.



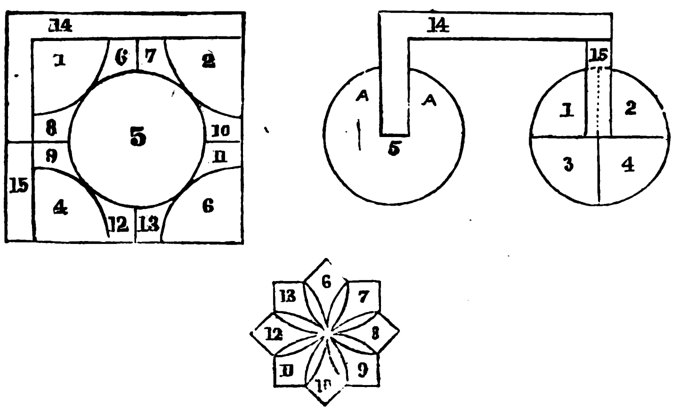
3. ANSWER TO THE PRACTICABLE ORCHARD.



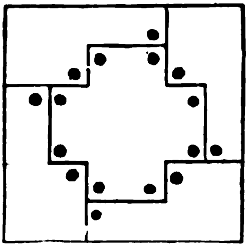
4. ANSWER TO OCTAGON PUZZLE.



5. ANSWER TO THE METAMORPHOSIS PUZZLE.



6. ANSWER TO THE DIVIDED SQUARE.

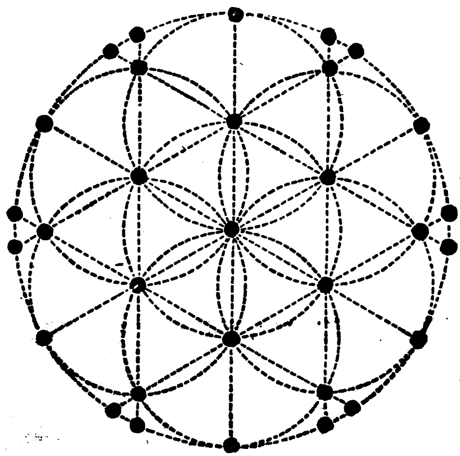


7. ANSWER TO PUZZLE PLEASURE GARDEN.

at door, No. 1; then pass on to the following numbers—15, 0, 19, 36, 12, 3, 32, 43, 10, 50, 33, 41, 28, 37, 25, 11, 22, 7, 35, 26, 34, 46, 38, 2, 45, 14, 42, 31, 5, 24, 21, 29, 6, 18, 49, 8, 9, 17, 23, 16, 44, 52, 58, 55, 57, 60, 56, 53, 54, 61, 59, 62. en return in the same order from 62 to 59, 61, 54, etc., etc.

8. ANSWER TO FLORIST'S PUZZLE.

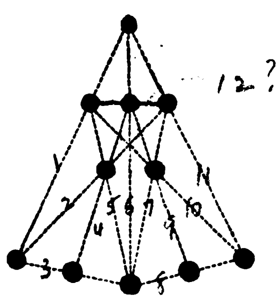
plant 31 kinds of flowers, one of each kind, so as to have 18 es in one circle; 7 circles with 6 varieties in each; 6 straight rows with 6 varieties in each and 3 straight rows with 5 varieties in each.



This will make a pretty flower-bed if smaller plants are put where they come nearest together.

9. ANSWER TO FARMER'S PUZZLE.

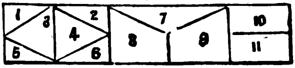
They were planted as represented in the following illustration:—

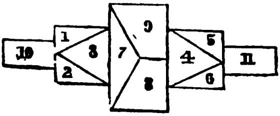


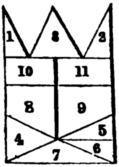
10. ANSWER TO THE PROTEAN PUZZLE.

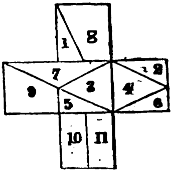
e cardboard as in figure A, and with the pieces the bifferent may be formed.

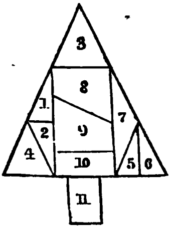
A

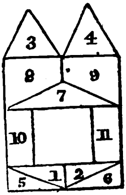


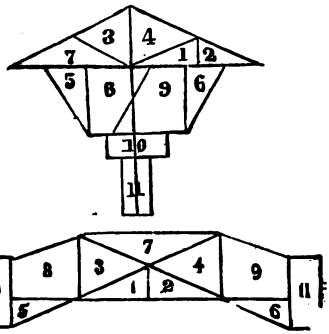










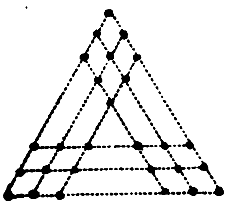


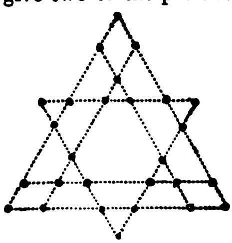
11. KEY TO THE TRAVELLER'S MAZE.

On entering the Maze, pass to the left, leaving the road to the right (which is a feint). In following up the course, after some windings, we fall into a cross road, a little below on the left of the Castle. Turning to the right we come to a fork, close to the entrance of the Castle. Take the *lower* road, *leading to the left*, which passes close over the flag-staff of the Castle. We then fall into a branch road up and down, close under a bridge; take the road down, and this will lead to a point, or meeting of four roads. Take the road leading to the right of the Castle, and by following it up, we pass close to the right corner of the Castle. A little further on the road again separates into two, under a bridge; come down, and avoiding the road leading to the left of the Castle, we come to a fork a little to the left of the entrance. By taking the lower road, and avoiding the road to the right, the Castle will at once be reached.

12. ANSWER TO THE GEOMETRICAL ORCHARD.

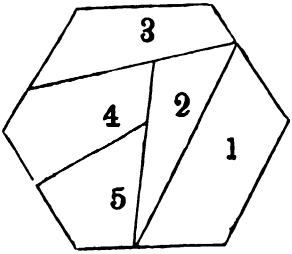
The trees could be planted in a great many ways so as to answer the conditions of the problem. Below we give two of the prettiest:—





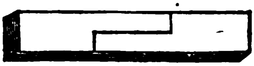
13. ANSWER TO HEXAGON PUZZLE.

nge the pieces in this manner :—



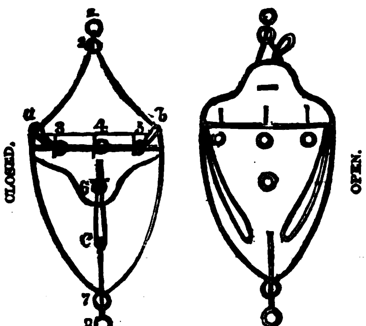
14. ANSWER TO THE CARPENTER'S PUZZLE.

plank was to be cut in this way :—



15. ANSWER TO PURSE PUZZLE.

s loop *a* up through ring No. 2 and over No. 1, then pass loop *b* ·ings 1 and 2 up through No. 2, and over No. 1, as before; when ıme may be easily drawn through rings 3, 4, 5. Again pass loop ugh ring No. 7 over 8, draw it up through ring 6, and the purse nplete



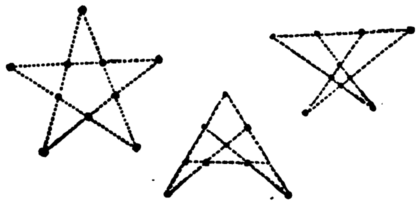
16. ANSWER TO MONEY PROBLEM.

1 2 3 4 5 6 7 8 9 10 half-dimes.

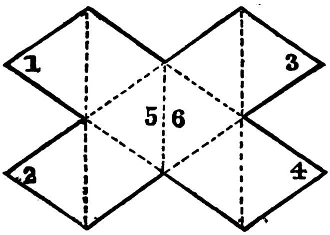
Place 4 upon 1, 7 upon 3, 5 upon 9, 2 upon 6, and 8 upon 10.

17. ANSWER TO APPLE TREE PUZZLE.

Either of these three diagrams will answer the conditions of the problem.



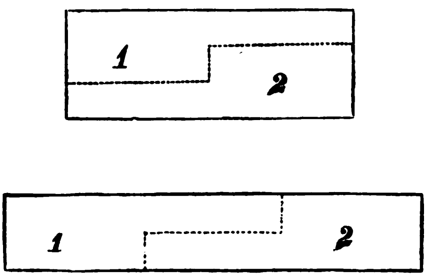
18. ANSWER TO ANGULAR PUZZLE.



Cut the cardboard half through at the dotted lines, to enable it to bend the more readily; close the spaces between 1—2 and 3—4 by bringing the ends together; bend the whole between 5 and 6, and the seven-cornered box will be produced; then fold the parts 1—2, and 3—4, underneath each other, and the six-cornered box will be formed; and by again placing the angular sections inwards, the remaining box will present itself.

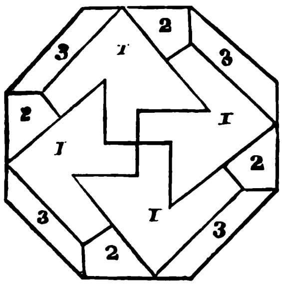
19. ANSWER TO THE PERPLEXED CARPENTER.

The board was cut after the manner of the annexed diagram:



20. ANSWER TO THE MAGIC OCTAGON.

pieces are put together in the following manner:

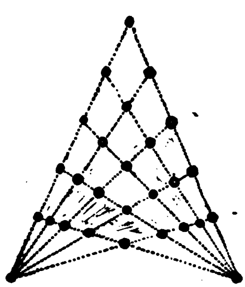


. ANSWER TO THE PROBLEM OF THE BLIND ABBOT AND THE MONKS.

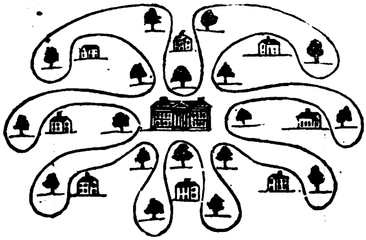
s almost needless to explain in what manner the illusion of the abbot arose. It is because the numbers in the angular cells of quare were counted twice; these cells being common to two the more therefore the angular cells are filled, by emptying in the middle of each band, these double enumerations become er; on which account the number, though diminished, appears s to be the same; and the contrary is the case in proportion as iddle cells are filled by emptying the angular ones, which renders essary to add some units to have nine in each band.

22. ANSWER TO THE PEACH ORCHARD PUZZLE.

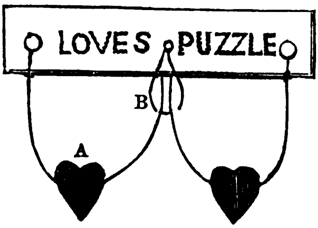
planted them as in the following diagram:



23. ANSWER TO THE GRASPING LANDLORD.



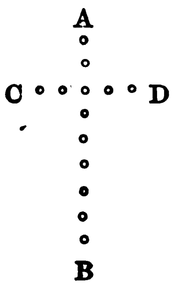
24. ANSWER TO LOVE'S PUZZLE.



First draw the heart A along the string through the loop B, until it reaches the back of the centre hole, then pull the loop through the hole, and pass the heart through the *two* loops that will then be formed; then draw the string back through the hole as before, and the heart may easily be passed to its companion.

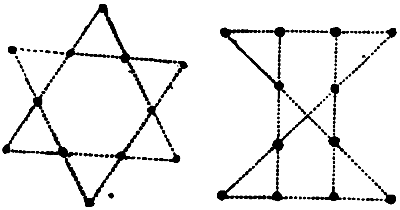
25. ANSWER TO THE DISHONEST JEWELLER.

The jeweller arranged the diamonds thus:

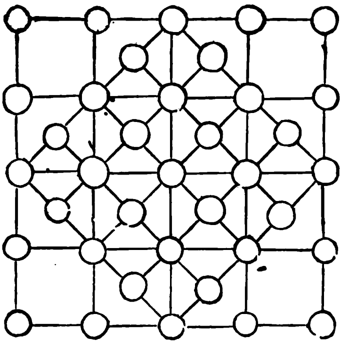


26. ANSWER TO THE GARDENER'S PUZZLE.

y were planted in the following manner:

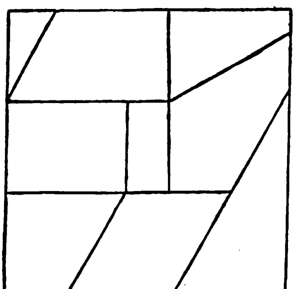


27. ANSWER TO THE CIRCLE PUZZLE.



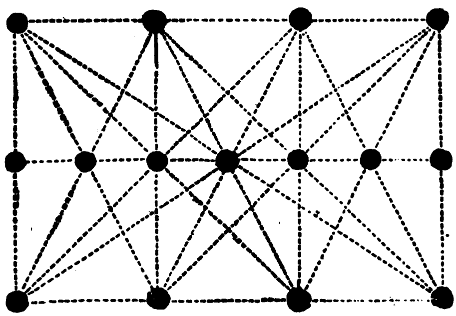
28. ANSWER TO THE SQUARE PUZZLE.

ange the pieces as in the following diagram:

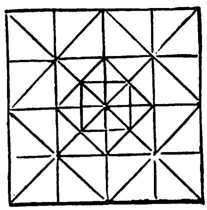


29. ANSWER TO THE TREE PUZZLE.

Arrange the trees in the following manner:



30. ANSWER TO THE GEOMETRICAL PUZZLE.



Divide each side of the square into four portions. By drawing lines across each way to these points you produce sixteen of the squares. Unite the points by which the diamond is formed; within which you will find a square one quarter the size of the first. Next draw a diamond within this quarter-sized square, and by drawing lines—like a Saint Andrew's Cross—through the whole figure, you have the points for the seventeenth square, as in the figure.

31. ANSWER TO THE PUZZLE OF THE FIFTEEN CHRISTIANS AND FIFTEEN TURKS.

The method of arranging the thirty persons may be deduced from these two lines in English:

4 5 2 13 1 1
"From numbers aid and art

2 2 3 1 2 2 1
Never will fame depart."

Or these two French verses—

4 5 2 13 1 1
Mort, tu ne faillras pas

2 2 3 1 2 2 1
En me livrant le trepas.

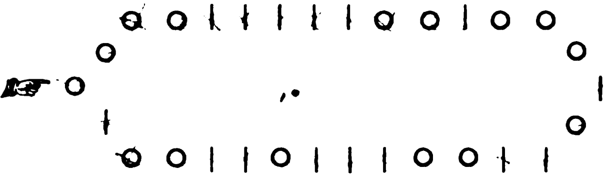
Or the following Latin one—

4 5 21 3 1 1 2 2 3 1 2 2 1
Populeam Virgam Mater regina ferebat.

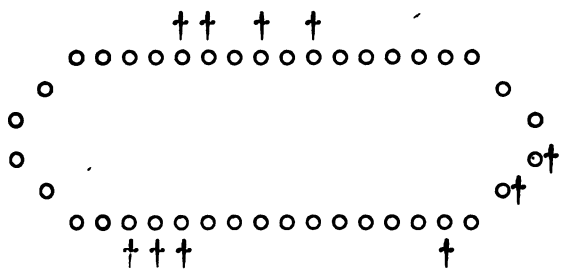
ation must be paid to the vowels a, e, i, o, u, contained in the s of these verses; observing that, a is equal to 1, e to 2, i to 3, and u to 5. You must begin then by arranging 4 Christians r, because the vowel in the first syllable is o, then 5 Turks, the vowel in the second syllable is u, and so on to the end. eeding in this manner, it will be found, taking every ninth circularly, that is to say beginning at the first of the row, after led, that the lot will fall entirely on the Turks.

FOR EXAMPLE.

stians O Turks |



solution of this problem may be easily extended still farther. be required, for example, to make the lot fall upon 10 persons counting from 12 to 12. Arrange 40 ciphers in a circular form, w:—



n beginning at the first, make every twelfth one with a cross, ue in this manner, taking care to pass over those already crossed, proceeding circularly till the required number of places has been ed. If you then count the places of the marked ciphers, those on the lot falls will be easily known; in the present case they are th, 8th, 10th, 12th, 21st, 22nd, 24th, 34th, 35th and 36th.

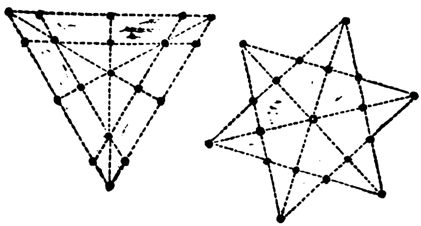
A captain obliged to decimate his company might employ this expedient, to make it fall on the most culpable.

It is related that Josephus, the historian, saved his life by means of this expedient. Having fled for shelter to a cavern with forty other Jews after Jotapat had been taken by the Romans, his companions resolved to kill each other rather than surrender. Josephus tried to dissuade them from their horrid purpose, but not being able to succeed, he pretended to coincide with their wishes, and retaining the authority he had over them as their chief, to avoid the disorder which would necessarily be the consequence of this cruel execution if they should kill each other at random, he prevailed on them to arrange themselves in order, and beginning to count from one end to a certain number, to put to death the person on whom that number should fall, until there remained only one, who should kill himself. Having all agreed to this proposal, Josephus arranged them in such a manner, and placed himself in such a position, that when the slaughter had been continued to the end, he remained with only one more person, whom he persuaded to live.

Such is the story related of Josephus by Hegesippus; but we are far from warranting the truth of it. However, by applying to this case the method above indicated, and supposing every third person was to be killed, it will be found that the two last places on which the lot fell were the 16th and 31st, so that Josephus must have placed himself in one of these, and the person whom he was desirous of saving in the other.

32. ANSWER TO THE TULIP PUZZLE.

Either of the annexed diagrams will answer the conditions of the problem:



33. ANSWER TO PUZZLE OF THE THREE GENTLEMEN AND THEIR SERVANTS.

First, two servants must pass over; then one of them must bring back the boat, and repass with the third servant; then one of the three

two gentlemen pass over to their servants; then one of these
-men with his servant must bring back the boat, and, the servant
ning, his master must take over the remaining gentlemen. Lastly,
rvant who is found with the three gentlemen must return with
oat, and at twice take over the other two servants.

34. ANSWER TO THE DROVER'S PROBLEM.

in the flock; ten, as many again; five, half as many; seven
es; total, thirty-two.

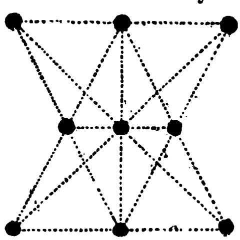
35. ANSWER TO THE MARKET-WOMAN'S PUZZLE.

the first view of the question, there does not appear to be any
for if it be supposed that in selling five apples for two cents, she
three of the latter sort (viz. those at three for a cent) and two of
ormer (viz. those at two for a cent), she would receive just the
money as she bought them for; but this will not hold throughout
hole, for, admitting that she sells them as above, it must be evi-
that the latter stock would be exhausted first, and consequently
ust sell as many of the former as remained overplus at five for
ents, which she bought at the rate of two for a cent, or four for
cents, and would therefore lose. It will be readily found, that
she had sold all the latter sort in the above manner, she would
sold only eighty of the former, for there are as many threes in one
red and twenty, as twos in eighty; then the remaining forty must
ld at five for two cents, which were bought at the rate of four for
ents, viz:

	A.		C.		A.		C.
If	4	:	2	::	40	:	20, prime cost of 40 of the first sort.
	5	:	2	::	40	:	16, selling price of ditto.
							—
							4 cents loss.

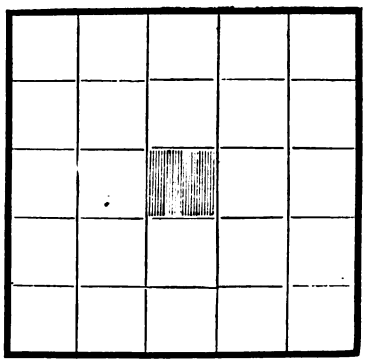
36. ANSWER TO THE PLUM TREE PUZZLE.

e annexed diagram will show how they were planted.



37. ANSWER TO THE LAND PUZZLE.

Two; for the ground being a square, it will consist of twenty-five plots, each containing five acres, as seen in the diagram.



38. ANSWER TO THE NINE DIGITS.

15	6	7	2
15	1	5	9
15	8	3	4
15	15	15	15

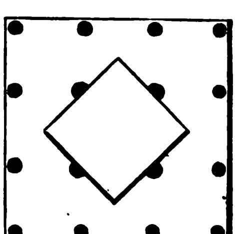
39. ANSWER TO THE LANDLORD TRICKED.

Commence with the sixth from the Landlord.

40. ANSWER TO THE SCISSORS PUZZLE.

The scissors may be released by drawing the noose upwards through the eye of the scissors, and passing it completely over them.

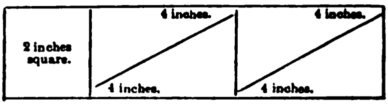
41. ANSWER TO THE CARPENTER PUZZLED.



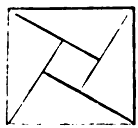
An examination of this diagram will show how the square piece was cut from the board.

42. ANSWER TO THE MECHANIC'S PUZZLE.

t the wood or pasteboard, as in this diagram,



vith the pieces form a square thus:—



43. GRECIAN PARADOX.

istory informs us, both parties argued in person; Protagoras con-ed that whichever way the cause was decided he must recover, for e pupil lost, the money must be paid according to decree of court; if the pupil gained, the *successful pleading* would make the money according to agreement.

n the contrary, the pupil contended that the money ought *not* to be ; for if he (the pupil) gained, the decree of court would excuse him n payment; but if he lost, the *unsuccessful pleading* would equally use him from payment according to agreement.

he perplexed judges came to no determination, and dismissed the , which operated as an extinguishment of Protagoras's claim; but *reasonable* that Protagoras should lose his money in consequence he caprice of the pupil not following his profession?

44. ANSWER TO THE ARAB'S MAXIMS.

Read the first and second alternately. "Never tell all you may know, he who tells everything he knows, often tells more than he knows." en the first and third, first and fourth, first and fifth.

45. ANSWER TO THE JESUIT'S PLACARD.

Let the lines in the two placards be read right across.

DEATH TO	PIUS THE NINTH
MAZZINI	FOR EVER
THE REPUBLIC IS	THE MILDEST OF GOVERNMENTS
E MOST INFAMOUS OF GOVERNMENTS	IS THAT OF THE PRIESTS.
DOWN WITH	THE POWER OF THE PRIESTS

46. ANSWER TO A DOZEN QUIBBLES.

1. Draw it round his body.
2. Place the coin on a table, then, turning round, take it up with the other hand.
3. Place the candle on his head, taking care that no mirror is in the room.
4. The first person seats himself in the other's lap.
5. The last person's left elbow.
6. Push the cork into the bottle.
7. $8\frac{1}{4}$.
8. 7 and 1.
9. Twenty-nine days.
10. 35 and 15.
11. Twice twenty-five is fifty; twice five, and twenty, is thirty.
12. $5\frac{5}{8}$ ·5.

LOVE PUZZLES ALL.

PUZZLES IN ARITHMETIC;

OR,

HE MAGIC OF NUMBERS.

he principal object of this volume is to enable the reader to learn something in his sports, and to under- vhat he is doing, we shall, before proceeding to the tricks and feats connected with the science of num- resent him with some arithmetical aphorisms, upon most of the following examples are founded.

APHORISMS OF NUMBER.

' two even numbers be added together, or subtracted ach other, their sum or difference will be an even r.

' two uneven numbers be added or subtracted, their difference will be an even number.

he sum or difference of an even and an uneven number or subtracted, will be an uneven number.

he product of two even numbers will be an even r, and the product of two uneven numbers will be an n number.

'he product of an even and uneven number will be an number.

ber, their sum and their difference will also be divisible by that number.

7. If several different numbers, divided by 3, be added or multiplied together, their sum and their product will also be divisible by 3.

8. If two numbers, divisible by 9, be added together, the sum of the figures in the amount will be either 9, or a number divisible by 9.

9. If any number be multiplied by 9, or by any other number divisible by 9, the amount of the figures of the product will be either 9, or a number divisible by 9.

10. In every arithmetical progression, if the first and last term be each multiplied by the number of terms, and the sum of the two products be divided by 2, the quotient will be the sum of the series.

11. In every geometric progression, if any two terms be multiplied together, their product will be equal to that term, which answers to the sum of these two indices. Thus, in the series—

1	2	3	4	5
2	4	8	16	32

If the third and fourth terms 8 and 16 be multiplied together, the product 128 will be the seventh term of the series. In like manner, if the fifth term be multiplied into itself, the product will be the tenth term, and if that sum be multiplied into itself, the product will be the twentieth term. Therefore, to find the last, or any other term of a geometric series, it is not necessary to continue the series beyond a few of the first terms.

Previous to the numerical recreations, we shall here describe certain mechanical methods of performing arithmetical calculations, such as are not only in themselves entertaining, but will be found more or less useful to the young reader

PALPABLE ARITHMETIC.

The blind mathematician, Dr. Saunderson, adopted a very ingenious device for performing arithmetical operations by the sense of touch.

Small cubes of wood were provided, and in one face of each, nine holes were pierced, thus:

1 2 3 o o o

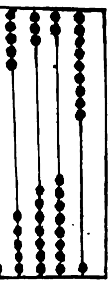
es represented the nine digits, as in the figure, and any figure, a small peg was inserted into the hole .ding to it. If the number consisted of several nore cubes were used, one for each. A cipher was ed by a peg of different shape from that of the ıd inserted in the central hole.

'orm any arithmetical process, a square board was divided by ridges into recesses of the same width bes, and by this the cubes were retained in the re- ›rizontal and perpindicular lines. Suppose it was 7 to add together the numbers 763, 124, 859, the 1 pegs would be arranged thus :

```
        o o o   o o o   o o ●
        o o o   o o ●   o o o
        ● o o   o o o   o o o

        ● o o   o ● o   o o o
        o o o   o o o   ● o o
        o o o   o o o   o o o

        o o o   o o o   o o o
        o o o   o ● o   o o o
        o ● o   o o o   o o ●

● o o   o o o   o o o   o o o
o o o   o o o   ● o o   o o ●
o o o   ● o o   o o o   o o o
```

THE ABACUS.

nstrument is used for teaching numeration, and the ıciples of arithmetic.



5 7 8 1

Upon a frame are placed wires, parallel to one another, and at equal distances. Ten small balls are strung upon each wire, being placed as in the margin. The right wire denotes units, the next tens, and so on, the 7th wire being the place of millions. In using the abacus, all the balls are first ranged at one end, and a number of them are then moved to the other end of each wire, to correspond to the figures required. The example given in the margin is 15,781, the height of

NAPIER'S RODS.

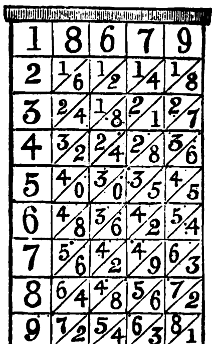
The object of this contrivance is to render arithmetical multiplication more easy, and to secure its correctness; it was much used by astronomers before the invention of logarithms.

To appreciate the merits of this invention, we must consider the process of multiplication as usually performed. Suppose we had to multiply 8,679 by 8:

$$\begin{array}{r} 8{,}679 \\ 8 \\ \hline 69{,}432 \end{array}$$

We first multiply 9 by 8=72, and putting down 2 as the first figure in the product, carry the 7 to add to the next product of 7 by 8=56; this gives us 63, the 3 being put down as the second figure; 6 is carried to add to the product of 6 by 8, and so on.

A blunder may be made in each part of this process; for 1st, we might reckon 8 times 9 as some other number than 72; 2d, after multiplying the 7 by the 8, we might add to the resulting 56 some other figure than the 7, which we carried; 3d, we may add 56 to 7 inaccurately, making some other sum of it than the right one, 63. Errors in a long multiplication problem are usually made in one of these three ways, and to prevent such errors, Lord Napier* introduced this useful contrivance. Thin strips of card, wood, or bone, 9 times as long as they are broad, are each divided into 9 equal squares, a figure is printed or written on the top square, and in each of the squares underneath is the product of multiplying that figure by 2, 3, 4, &c., up to 9.



To use these in multiplication, select the strips, the top figures of which make the number to be multiplied. For example:

To multiply 8,679 by 8, look at the eighth line of squares from the top, and on that line will be found the product of each of the integers 8, 6, 7, 9, when multiplied by 8. We have then to write down the 2 as the first figure of the product,

nd 6 together=13; write 3 as the next figure, carry
d to the sum of 8 and 5, and so on.

reason for dividing the figures in each square by a
al line, and for placing the left-hand figure higher
e right is, that the eye may be thus assisted in add-
carried figure of one slip to the unit of the next.

rovide for the occurrence of more than one of the same
in the multiplicand, there should be several slips or
r each of the digits.

actice the rods are placed on a flat piece of wood,
vo ridges at right angles, by which they are pre-
in a proper position.

instrument can be made useful in "divisions," by
by means of it a table of the product of the divisor,
ied by each of the numbers 1 to 9.

THE ARITHMETICAL BOOMERANG.

boomerang is an instrument of peculiar form, used
natives of New South Wales, for the purpose of
wild fowl and other small animals. If projected for-
it at first proceeds in a straight line, but afterwards
n the air, and after performing sundry peculiar gy-
, returns in the direction of the place where it was
.

term is applied to those arithmetical processes by
you can divine a number thought of by another. You
forwards the number by means of addition and mul-
ion, and then, by means of subtraction and division,
ing it back to the original starting point, making it
d in a track so circuitous as to evade the superficial
of the tyro.

TO FIND A NUMBER THOUGHT OF.

First Method.

is an arithmetical trick which, to those who are un-
nted with it, seems very surprising; but, when ex-
d, it is very simple. For instance, ask a person to
f any number under 10. When he says he has done
ire him to treble that number. Then ask him whether
m of the number he has thought of (now multiplied
be odd or even; if odd, tell him to add 1 to make the
ven. He is next to halve the sum, and then treble
elf. Again ask whether the amount be odd or even

If odd, add 1 (as before) to make it even, and then halve it. Now ask how many nines are contained in the remainder. The secret is, to bear in mind whether the first sum be odd or even; if odd, retain 1 in the memory; if odd a second time, retain 2 more (making in all 3 to be retained in the memory;) to which add 4 for every nine contained in the remainder.

For example, No. 7 is odd the first and also the second time; and the remainder (17) contains one nine; so that 1, added to 2, make 3, and 3, added to 4, make 7, the number thought of. No. 1 is odd the first time (retain 1), and even the second (of which no notice is taken), but the remainder is not equal to nine. No. 2 is even the first and odd the second time (retain 2), but the remainder contains no nine. No. 3 is odd the first and the second time, still there is no nine in the remainder. No. 4 is even both times, and contains one nine. No. 5 is odd the first time and the remainder contains one nine. No. 6 is odd the second time, and contains one nine in the remainder. No. 8 is even both times, and the remainder contains two nines. No notice need be taken of any overplus of a remainder, after being divided by nine.

The following are illustrations of the result with each number:

1	2	3	4	5	6	7	8	9
3	3	3	3	3	3	3	3	3
—	—	—	—	—	—	—	—	—
3	2)6	9	2)12	15	2)18	21	2)24	27
Add 1	—	Add 1	—	Add 1	—	Add 1	—	Add 1
—	3	—	6	—	9	—	12	—
2)4	3	2)10	3	2)16	3	2)22	3	2)28
—	—	—	—	—	—	—	—	—
2	9	5	2)18	8	27	11	2)36	14
3	Add 1	3	—	3	Add 1	3	—	3
—	—	—	9)9	—	—	—	9)18	—
2)6	2)10	15	—	2)24	2)28	33	--	2)42
—	—	Add 1	1	—	—	Add 1	2	—
3	5	—		9)12	9)14	—		9)21
		2)16		—	—	2)34		—
		—		1	1	—		2
		8				9)17		
						—		
						1		

Second Method.

EXAMPLE.

erson think of a number, say - - 6
et him multiply it by 3 - - - - 18
dd 1 - - - - - - - 19
ultiply by 3 - - - - - 57
dd to this the number thought of - - 63

n inform you what is the number produced ; it will
nd with 3. Strike off the 3, and inform him that he
of 6.

Third Method.

EXAMPLE.

e the number thought of to be - - 6
et him double it - - - - - 12
dd 4 - - - - - - - 16
ultiply by 6 - - - - - - 80
dd 12 - - - - - - - 92
ultiply by 10 - - - - - - 920

n inform you what is the number produced. You
every case subtract 320 ; the remainder is, in this
600 ; strike off the two ciphers, and announce 6
umber thought of.

Fourth Method.

a person to think of a number, say 6. He must
ceed—

EXAMPLE.

'o multiply this number by itself - - 36
o take 1 from the number thought of - 5
'o multiply this by itself - . - 25
'o tell you the difference between this pro-
duct and the former - - - - 11
must then add 1 to it - - - - 12
d halve this number - - - - - 6
ich will be the number thought of.

Fifth Method.

e a person to think of a number, say 6. He must

EXAMPLE.

1. Add 1 to it - - - - - - - 7
2. Multiply by 3 - - - - - - 21
3. Add 1 again - - - - - - - 22
4. Add the number thought of - - - - 28

Let him tell you the figures produced (28):

5. You then subtract 4 from it - - - 24
6. And divide by 4 - - - - - - - 6

Which you can say is the number thought of.

Sixth Method.

EXAMPLE.

Suppose the number thought of - - - - - 6
1. Let him double it - - - - - - 12
2. Desire him to add to this any number you tell him, say 4 - - - - - 16
3. To halve it - - - - - - - 8

You can then tell him that if he will subtract from this the number he thought of, the remainder will be, in the case supposed, 2.

Note.—The remainder is always half of the number you tell him to add.

TO DISCOVER TWO OR MORE NUMBERS THAT A PERSON HAS THOUGHT OF.

1*st Case.*—Where each of the numbers is less than 10. Suppose the numbers thought of were 2, 3, 5.

EXAMPLE.

1. Desire him to double the first number making - - - - - - - 4
2. To add 1 to it - - - - - - - - 5
3. To multiply by 5 - - - - - - - 25
4. To add the second number - - - 28

There being a third number, repeat this process—

5. To double it - - - - - - - - 56
6. To add 1 to it - - - - - - - - 57
7. To multiply by 5 - - - - - - 285
8. To add the third number - - - - 290

And to proceed in the same manner for as many numbers as were thought of. Let him tell you the last sum produced (in this case 290). Then, if there were two numbers thought of, you must subtract 5; if three, 55; if four, 555. You must here subtract 55, leaving a remainder of 235, which

—Where one or more of the numbers are 10, or 10, and where there is an *odd* number of numbers

he fixes upon five numbers, viz. 4, 6, 9, 15, 16. add together the numbers as follows, and tell rious sums :

he sum of the 1st and 2d	- -	10
he sum of the 2d and 3d	- - -	15
he sum of the 3d and 4th	- -	24
he sum of the 4th and 5th	- - -	31
he sum of the 1st and last	- -	20

t then add together the 1st, 3d and 5th sums, viz.)=54, and the 2d and 4th, 15+31=46; take one ther, leaving 8. The half of this is the 1st num you take this from the sum of the 1st and 2d you he 2d number, 6; this taken from the sum of the will give you the 3d, 9; and so on for the other

—Where one or more of the numbers are 10, or 10, and where an *even* number of numbers has ;ht of.

he fixes on six numbers, viz. 2, 6, 7, 15, 16, 18. dd together the numbers as follows, and tell you each case :—

he sum of the 1st and 2d	- -	8
he sum of the 2d and 3d	- - -	13
he sum of the 3d and 4th	- -	22
he sum of the 4th and 5th	- -	31
he sum of the 5th and 6th	- -	34
he sum of the 2d and last	- - -	24

then add together the 2d, 4th and 6th sums, 13+ 3, and the 3d and 5th sums, 22+34=56. Sub- rom the other, leaving 12; the 2d number will be of this; take the 2d from the sum of the 1st and l get the 1st; take the 2nd from the sum of the and you will have the 3d, and so on.

HOW MANY COUNTERS HAVE I IN MY HANDS?

n having an equal number of counters in each required to find how many he has altogether.

he has 16 counters, or 8 in each hand. Desire nsfer from one hand to the other a certain number of them, and to tell you the number so transferred. Suppose it be 4, the hands now contain 4 and 12. Ask him how many times the smaller number is contained in the larger; in this case it is 3 times. You must then multiply the number transferred, 4, by the 3, making 12, and add the 4, making 16; then divide 16 by the 3 *minus* 1; this will bring 8, the number in each hand.

In most cases fractions will occur in the process: when 10 counters are in each hand, and if 4 be transferred, the hands will contain 6 and 14.

He will divide 14 by 6 and inform you that the quotient is $2\frac{2}{6}$ or $2\frac{1}{3}$.

You multiply 4 by $2\frac{1}{3}$, which is $9\frac{1}{3}$.

Add 4 to this, making $13\frac{1}{3}$, equal to $\frac{40}{3}$.

Subtract 1 from $2\frac{1}{3}$, leaving $1\frac{1}{3}$ or $\frac{4}{3}$.

Divide $\frac{40}{3}$ by $\frac{4}{3}$, giving 10, the number in each hand.

THE MYSTERIOUS HALVINGS.

To tell the number a person has thought of.

One of the company must fix upon any one of the numbers from 1 to 15; this he keeps secret, as well as the numbers produced by the succeeding operations:

Suppose he fixes on - - - - -	8
He must add 1 to it, making - - - -	9
Triple it - - - - - - - -	27
Halve it*—1st *halving*—(*larger half*) -	14
Triple it - - - - - - - -	42
Halve it—2d *halving* - - - -	21
Triple it - - - - - - - -	63
Halve it—3d *halving*—(*larger half*) -	32
Triple it - - - - - - - -	96
Halve it—4th *halving*. - - - -	48

He need not inform you that 48 is the figure produced, but he must let you know in which of the four halvings he was obliged to take a "larger half;" having ascertained this point, you discover the number fixed upon in the following manner. Carry in your mind, or on a slip of paper, the following list of names in which the letter A occurs in one or more of the three syllables of all except the last.

* When an *exact half* cannot be taken without a fraction, he must take the *larger half*—you must tell him this before he commences. Here it is the *larger half*.

ree syllables are intended to represent the 1st, 2d, alvings, and the occurrence of the letter A corres- the occurrence of a "larger half" in one or more three halvings. Having been informed where the *f* was taken, refer to the word which has A in the nding syllable, and against it stand two numbers, nich was the number thought of; and of these two, hand number is the correct one *if a larger half was he 4th stage*, and the left hand one *if the 4th halving* .

example given, a *larger half* occurred in the 1st tage; this points us to *Car-ro-way*, and the halving h stage being exact, shows us that 8 was the num- upon.

	If the 4th halving is *exact*.	If a *larger half* occurs in the 4th halving.
ing-ton	4	12
ette	2	10
v-WAy	8	0
t-tAn	6	14
-ny	13	5
rAph	3	11
Arte	1	9
el-low	15	7

be observed that there is always a difference of 8 the numbers of the columns, so that it is necessary ct only one of them. Perhaps some of our readers to be adepts in this game, would prefer recollect- bove table if put in this form:

1-2	3	1-2-3	1-3	2	none
2	3	4	8	13	15

upper line denotes the cases in which the "larger s taken, and the lower line the numbers of the column above given.

Another Method.

son having chosen any number from one to fifteen, add twenty-one to that number, and triple the Then,

is to take half of that triple, and triple that half. take the half of the last triple, and triple that

take the half of the last triple

4th, To take the half of the last half.

In this operation there are four distinct cases or stages where the half is to be taken. The three first are denoted by one of the eight following Latin words, each word being composed of three syllables, and the syllables containing the letter *i* corresponding in numerical order with the cases where the half cannot be taken without a fraction ; consequently, in those cases the person who makes the deduction is to add one to the number to be divided. The fourth case shows which of the two numbers corresponding to each word has been chosen. For if the fourth half can be taken without adding one, the number chosen is in the first, or left-hand column ; but if not, it is in the second column to the right.

The words.	The numbers denoted.	
Mi-ser-is	8	0
Ob-tin-git	1	9
Ni-mi-um	2	10
No-tar-i	3	11
In-fer-nos	4	12
Or-di-nes	13	5
Ti-mi-di	6	14
Te-ne-ant	15	7

Example.—Suppose the number chosen to be nine, to which is to be added one, making ten, and which last, being tripled, gives thirty. Then :

1st case.	The half of the triple is	15
	which tripled, makes	45
2nd case	The half of that triple, 1 being added to make an even number, is	23
	and that tripled, makes	69
3rd case,	The half of the last triple, 1 being added, is	35
4th case.	The half of the last half, 1 being again added, is	18

Here we see, that in the second and third case, one had to be added, and, looking at the table, we find that the only corresponding word having an *i* in its second and third syllables is *Ob-tin-git*, which represents the figures one and nine. Then, as one had to be added in the fourth case, we one required. Observe, that if no addition be re- at any of the four stages, the number thought of fifteen; and if one addition only be required at the stage, the number will be seven.

WHO WEARS THE RING?

is an elegant application of the principles involved overing a number fixed upon. The number of per- articipating in the game should not exceed nine. them puts a ring on one of his fingers, and it is oject to discover—1st. The wearer of the ring. 2d. nd. 3d. The finger. 4th. The joint.

company being seated in order the persons must be red 1, 2, 3, &c.; the thumb must be termed the first the fore finger being the second; the joint nearest remity must be called the first joint; the right hand and the left hand two.

e preliminaries having been arranged, leave the order that the ring may be placed unobserved by We will suppose that the third person has the ring right hand, third finger, and first joint; your object scover the figures 3131.

re one of the company to perform secretly the follow- thmetical operations:

Double the number of the person who has the ring; in the case supposed, this will produce	6
Add 5 - - - - - - - - - -	11
Multiply by 5 - - - - - - - -	55
Add 10 - - - - - - - - - -	65
Add the number denoting the hand - -	66
Multiply by 10 - - - - - - -	660
Add the number of the finger - - - -	663
Multiply by 10 - - - - - - -	6630
Add the number of the joint - - - -	6631
Add 35 - - - - - - - - -	6666

nust apprise you of the figures now produced, 6666: ill then in all cases subtract from it 3535; in the t instance there will remain 3131, denoting the per- o. 3, the hand No. 1, the finger No. 3, and the joint

PROBABILITIES.*

When we look around us at results happening daily, of the causes of which we are ignorant, we are led to regard them as isolated incidents subject to no law or rule; but could we see and understand the secret workings and connection existing between cause and effect, we might frequently discover that all works by rule. As it is, we may readily mark the boundaries, within which events must happen in very many instances; and do much to estimate their probability. We speak of *Chance* as something without plan or design, but taking in a large range, our calculations will approximate closely to the truth. When we throw a copper into the air, the chances of "heads or tails," as the boys say, are equal, and though one or the other may occur most frequently for a few throws, in a large number, say a thousand, the results will be about equally divided. In this case the sides of the coin must be equal in weight, else it will be like the grumbler's bread and butter:

"I never had a piece of bread,
Particularly good and wide,
But fell upon the sanded floor,
And always on the buttered side."

Had he put on less butter, perhaps the sides would have been more equal in weight, and the probability of the buttered side being uppermost would have been increased. Disturbing causes unknown to us, may often shape the result; but in the absence of these, we may pretty accurately estimate our chances.

We see accidents from fire and flood, happening at times and points least expected; but the insurer has learned by observation to estimate probabilities, and by taking a wide range of country and a period of years, he does a comparatively safe business. Death takes the young and the old; but the life insurer has conned the bills of mortality, and studied the ages of those who have died, until he can estimate at once the probability of duration of life, and determine what he can afford to pay for an annuity contingent on life, or engage for a present sum, or an annual sum paid for life, to pay the heirs at the death of the insured. In one instance his estimate may fall short, and in another exceed, but the average will be about right.

* From Parkes' Philosophy of Arithmetic, a capital work published by

the man who deals in lotteries and games of chance, e data and calculates carefully the probabilities, gh "luck" may sometimes be against him, his esti- probabilities are based on mathematical principles, secure in being ultimately the gaining party.
ese chances are calculated, depends on the data ase, and it is not within the range of our present tempt more than giving a general idea of the and this with any one of ordinary prudence, will nt to prevent all intermeddling with lotteries and er species of gambling. The probabilities are always e casual operator, even if all be conducted fairly ; n must they be when fraud and dishonesty are ed? It is downright swindling!
ry schemes generally, fifteen per cent. is reserved but this is a small part of what may be secured ; this amounts to a great deal. If a man were to ize nominally of $100,000, fifteen thousand would ed at once, and he would be entitled to only $85,000. that in his good fortune he would not probably re- abatement, but that does not change the principle.

VARIATIONS.

vious that if we have a number of single things in any order, we may change the arrangement riety of forms, and in doing so, we may take all or we may take only part at once. For instance, rrange the six vowels, a e, i, o, u, y, in a great ways, as a, e i o u y, a i e o u y, e a i o u y, or we may form them into groups, as ae, io, uy, ai, c. ; or, we may take three, four, five, or, as above, ne ; and it is reasonable to suppose that the num- ssible changes may, in all cases, be calculated.
all are taken together, the operation is called *on* ; but if a part only be taken, it is called either *n* or a *Combination ;* a e, i o, u y, are distinct com- and are also considered one of the variations of hich those six letters are susceptible ; e a, o i, y u, other variations, but they are the same combina- r a change of order will constitute a new variation new combination ; hence the number of variations ys exceed the number of combinations.
ctrine of variations and combinations forms the

basis of many forms of lotteries, and of other calculations used in practical life.

COMBINATIONS AND PERMUTATIONS.

"Combinations are the different ways in which a certain number of things can be selected out of a larger number, when taken 1 at a time, 2 at a time, or any other number each time, but without regard to the order in which the selected numbers can be arranged among themselves. The latter is the province of "Permutation," which refers to the different ways in which a number can be selected out of one that is larger, and, *in addition to this*, to the different ways of *grouping* these selected numbers.

Thus 4 things can be taken 2 at a time in 6 different ways ; for instance, the letters a, b, c, d, can be taken 2 at a time thus, a and b, a and c, a and d, b and c, b and d, c and d ; if we regard the *order* of the selected letters we shall find that these 4 letters are capable of 12 different permutations, as ab, ba, ac, ca, ad, da, bc, cb, bd, db, cd, dc.

If we selected 3 letters at a time we could make 4 different selections, and 24 different changes of grouping.

The rule to compute the number of these different ways is very simple, but sometimes involves a multitude of figures.

To determine the number of permutations, commence with unity, and multiply by the successive terms of the natural series 1, 2, 3, &c., until the highest multiplier shall express the number of individual things. The last product will indicate the number of possible changes.

Example 1. How many changes can be made in the arrangement of 5 grains of corn, all of different colors, laid in a row ? *Solution.* $1\times2\times3\times4\times5=120$, *Ans.*

This may seem improbable, the number being so great, but if there were but a single grain more, the possible changes would be 720 ; and another would extend the limit to 5040 ; and so onward in a constantly increasing ratio. The reason, however, will be obvious on a little scrunity. If there were but one thing, as *a*, it would admit of but one position ; but if two, as *a b*, it would admit of two positions, *ab*, *ba*. If three things, as *a b c*, then they will admit of $1\times2\times3=6$ changes, for the last two will admit of two variations, as *a b c*, *a c b*, and each of the three may sucs, so that $3 \times 2 = 6$, the number of possible changes. ame way we may show that if there be four in- things, each one will be first in each of the six which the other three will undergo, and conse- there will be 24 changes in all. In this way we ow that when there are 5 individual things, there times as many changes as when there were but 4 ; 1 6, there will be 6 times as many changes as when only 5 ; and so on *ad infinitum*, according to the .

le 2. In how many ways may a family of 10 per- themselves differently at dinner? *Ans.* 3,628,800. we consider that this would require a period of ears, the mind is lost in astonishment. The story an who bought a horse at a farthing for the first s shoe, a penny for the second, &c., is thrown into e ; and we incline to doubt whether there is not take ; and yet on just such chances as one to all gamblers constantly risk their money!

le 3. I have written the letters contained in the I M R O D on 6 cards ; being one letter on each, ıg thrown them confusedly into a hat, I am offered aw the cards successively, so as to spell the name What is my chance of success worth? *Ans.* $1\frac{7}{18}$

le 4. In order to form a lottery scheme, I have put vheel as many cards as I can put 4 letters of the rleston on, without having the same letters in the er upon any two cards. I offer $100 to him who card having on it the first four letters of the said their natural order (Char). What is the chance ıg a prize worth?

ıre 10 letters in the word, and the combination is ı class ; and, according to the mode of determin- inations with repetitions. we find the whole num- mbinations of the 4th class which the word admits Then he has one chance in 210 of drawing the ıar, in *some* order. The number of permutations of idual things is $1 \times 2 \times 3 \times 4 = 24$, and $210 \times 24 = 5040$ e of drawing them in the right order, and $100 y 5040 gives *Ans.* $1\frac{62}{63}$ cents.

e that the numbers from 1 to 78, inclusive, be on 78 cards, and the cards placed in a wheel by which they are thoroughly mixed; and then 13 cards be successively drawn out, by a person who has no means of choosing, and the numbers on them registered. Suppose also that tickets have been issued, containing each three of the 78 numbers, but no two having *all* the same numbers, and that he who holds the ticket having on it the first three drawn numbers in their regular order, shall be entitled to $100,000; what would the probability of drawing such a ticket be worth? *Ans.* 21 $\frac{5183}{5858}$ cents.

Note.—It is usual also, to give smaller prizes to the holders of tickets having the numbers in any order, or having any two or one of the drawn numbers. Lotteries may be arranged on a great diversity of plans, and in each the probability of drawing prizes will vary.

A speaks the truth 3 times in 4; B 4 times in 5, and C 6 times in 7. What is the probability of an event which A and B assert, and C denies? *Ans* $\frac{140}{143}$

Suppose a coin be thrown up, having two faces; what is the probability that the obverse (heads) side will fall upward, and what the reverse?

Here there are only two possible cases, and one favors each of the contingencies the probability of each will be $\frac{1}{1+1}=\frac{1}{2}$; there being no reason why one side should fall uppermost rather than the other.

What would be the probability of either side presenting upwards twice in two throws?

Here we have 4 possible cases, viz.:

Obverse and reverse;
Obverse both times;
Reverse and obverse;
Reverse both times.

Of the 4 possibilities there is only one which favors the turning up of the obverse twice in successsion, and the same is true of the reverse, hence the probability of either is only $\frac{1}{4}$.

In like manner we might show that the probability of the obverse presenting upwards three times in succession will be $\frac{1}{8}$, or $\frac{1}{2}\times\frac{1}{2}\times\frac{1}{2}$; the general principle being to multiply successively together the independent probabilities of an

THE MATHEMATICAL FORTUNE TELLER.

ure six cards, and having ruled them the same as lowing diagrams, write in the figures neatly and .

required to tell the number thought by any person, nbers being contained in the cards, and such num- t to exceed 60. How is this done?

5	7	9	11	1
15	17	19	21	23
27	29	31	33	35
39	41	43	45	47
51	53	55	57	59

5	6	7	13	12	4
14	15	20	21	22	23
28	29	30	31	36	37
52	38	39	44	45	46
47	53	54	55	60	13

10	11	12	13	8
15	24	25	26	27
29	30	31	40	41
43	44	45	46	47
57	58	59	60	13

3	6	7	10	11	2
14	15	18	19	22	23
26	27	30	31	34	35
38	39	42	43	46	47
50	51	54	55	58	59

18	19	20	21	16
23	24	25	26	27
29	30	31	48	49
51	52	53	54	55
57	58	59	30	60

33	34	35	36	37	32
38	39	40	41	42	43
44	45	46	47	48	49
50	51	52	53	54	55
56	57	58	59	60	41

est the person to give you the cards containing the together, which will give the correct answer. For example: suppose 10 is the number thought of, the cards with 2 and 8 in the corners will be given, which makes the answer 10, and so on with the others.

THE DICE GUESSED UNSEEN.

A pair of dice being thrown, to find the number of points on each die without seeing them. Tell the person who cast the dice to double the number of points upon one of them, and add 5 to it; then to multiply the sum produced by 5, and to add to the product the number of points upon the other die. This being done, desire him to tell you the amount, and, having thrown out 25, the remainder will be a number consisting of two figures, the first of which, to the left, is the number of points on the first die, and the second figure, to the right, the number on the other. Thus:

Suppose the number of points of the first die which comes up to be 2, and that of the other 3; then, if to four, the double of the points of the first, there be added 5, and the sum produced, 9, be multiplied by 5, the product will be 45; to which, if 3, the number of points on the other die, be added, 48 will be produced, from which, if 25 be subtracted, 23 will remain; the first figure of which is 2, the number of points on the first die, and the second figure 3, the number on the other.

THE SOVEREIGN AND THE SAGE.

A sovereign being desirous to confer a liberal reward on one of his courtiers, who had performed some very important service, desired him to ask whatever he thought proper, assuring him it should be granted. The courtier, who was well acquainted with the science of numbers, only requested that the monarch would give him a quantity of wheat equal to that which would arise from one grain doubled sixty-three times successively. The value of the reward was immense; for it will be found by calculation that the sixty-fourth term of the double progression divided by 1, 2, 4, 8, 16, 32, &c., is 9223372036854775808. But the sum of all the terms of a double progression, beginning with 1, may be obtained by doubling the last term, and subtracting from it 1. The number of the grains of wheat, therefore, in the present case, will be 18446744073709551615.

728; and, as eight gallons make one bushel, if we di- ie above result by eight times 73728 we shall have 97411295 for the number of the bushels of wheat) the above number of grains, a quantity greater than ie whole surface of the earth could produce in several ind which in value would exceed all the riches, per- n the globe.

THE KNOWING SHEPHERD.

epherd was going to market with some sheep, when a man who said to him, "Good morning, friend, with ore." "No," said the shepherd, "I have not a score; had as many more, half as many more, and two nd a half, I should have just a score." How many ad he?

ad 7 sheep: as many more 7; half as many more, d 2½; making in all 20.

THE CERTAIN GAME.

persons agree to take, alternately, numbers less than number, for example, 11, and to add them together of them has reached a certain sum, such as 100. By eans can one of them infallibly attain to that number he other?

whole artifice in this consists in immediately making of the numbers 1, 12, 23, 34, and so on, or of a series continually increases by 11, up to 100. Let us sup- t the first person, who knows the game, makes choice is evident that his adversary, as he must count less can at most reach 11, by adding 10 to it. The first n take 1, which will make 12; and whatever number ond may add the first will certainly win, provided he ally add the number which forms the complement of his adversary to 11; that is to say, if the latter take st take 3; if 9, he must take 2; and so on. By fol- this method he will infallibly attain to 89, and it will impossible for the second to prevent him from get- t to 100; for whatever number the second takes he in only to 99; after which the first may say—"and 1 00." If the second take 1 after 89, it would make his adversary would finish by saying—"and 10 make Between two persons who are equally acquainted

THE ASTONISHED FARMER.

A and B took each 30 pigs to market, A sold his at 3 for a dollar, B at 2 for a dollar, and together they received **$25.** A afterwards took 60 alone, which he sold *as before*, at 5 for $2, and received but $24 ; what became of the other dollar?

This is rather a catch question, the insinuation that the first lot were sold at the rate of five for $2, being only true in part. They commence selling at that rate, but after making ten sales, A's pigs are exhausted, and they have received $20 : B still has 10 which he sells at "2 for a dollar" and of course receives $5 ; whereas had he sold them at the rate of 5 for $2, he would have received but $4. Hence the difficulty is easily settled.

MAGICAL CENTURY.

If the number 11 be multiplied by any one of the nine digits, the two figures of the product will always be alike, as appears in the following example :—

11	11	11	11	11	11	11	11	11
1	2	3	4	5	6	7	8	9
11	22	33	44	55	66	77	88	99

Now, if another person and yourself have fifty counters a-piece, and agree never to stake more than ten at a time, you may tell him that if he permit you to stake first, you always complete the even century before him.

In order to succeed, you must first stake 1, and remembering the order of the above series, constantly add to what he stakes as many as will make one more than the numbers 11, 22, 33, &c., of which it is composed, till you come to 89, after which your opponent cannot possibly reach the even century himself, or prevent you from reaching it.

If your opponent has no knowledge of numbers, you may stake any other number first, under 10, provided you subsequently take care to secure one of the last terms, 56, 67, 78, &c.; or you may even let him stake first, if you take care afterward to secure one of these numbers.

This exercise may be performed with other numbers ; but, in order to succeed, you must divide the number to be attained by a number which is a unit greater than what you er you must first stake. Suppose, for example, the er to be attained be 52 (making use of a pack of cards ad of counters), and that you are never to add more 6; then, dividing 52 by 7, the remainder, which is 3, be the number which you must first stake; and what- your opponent stakes, you must add as much to it as make it equal to 7, the number by which you divided, o in continuation.

THE UNLUCKY HATTER.

blackleg passing through a town in Ohio, bought a hat 3 and gave in payment a $50 bill. The hatter called on rchant near by, who changed the note for him, and the leg having received his $42 change went his way. next day the merchant discovered the note to be a coun- t, and called upon the hatter, who was compelled forth- to borrow $50 of another friend to redeem it with; but urning to search for the blackleg he had left town, so the note was useless on the hatter's hands. The ques- s, what did he lose—was it $50 besides the hat, or was) including the hat?

is question is generally given with names and circum- ces as a real transaction, and if the company knows such ns so much the better, as it serves to withdraw atten- from the question; and in almost every case the first ession is, that the hatter lost $50 besides the hat, though evident he was paid for the hat, and had he kept the $8 eeded only to have borrowed $42 additional to redeem ote.

THE BASKET OF NUTS.

person remarked that when he counted over his basket its, two by two, three by three, four by four, five by or six by six, there was one remaining; but when he ted them by sevens, there was no remainder. How y had he?

he least common multiple of 2, 3, 4, 5, and 6 being 60, evident, that if 61 were divisible by 7, it would answer conditions of the question. This not being the case, ever, let $60\times2+1$, $60\times3+1$, $60\times4+1$, &c., be tried essively, and it will be found that $301=60\times5+1$, is sible by 7; and consequently this number answers the ditions of the question. If to this we add 420, the least common multiple of 2, 3, 4, 5, 6 and 7, the sum 721 will be another answer; and by adding perpetually 420, we may find as many answers as we please.

THE UNITED DIGITS.

Arrange the figures 1 to 9 in such order that, by adding them together, they amount to 100.

```
 15
 36
 47
 --
 98
  2
---
100
```

DECEMBER AND MAY.

An old man married a young woman; their united ages amounted to C. The man's age multiplied by 4 and divided by 9, gives the woman's age. What were their respective ages?

ANSWER.—The man's age, 60 years 12 weeks; the woman's age, 30 years 40 weeks.

THE TWO DROVERS.

Two drovers, A and B, meeting on the road, began discoursing about the number of sheep they each had. Says B to A, "Pray give me one of your sheep and I will have as many as you." "Nay," replied A, "but give me one of your sheep and I will have as many again as you." Required to know the number of sheep they each had?

A had seven and B had five sheep.

THE BASKET AND STONES.

If a hundred stones be placed in a straight line, at the distance of a yard from each other, the first being at the same distance from a basket, how many yards must the person walk who engages to pick them up, one by one, and put them into the basket? It is evident that, to pick up the first stone, and put it into the basket, the person must walk two yards; for the second, he must walk four; for the third, six; and so on increasing by two, to the hundredth.

e number of yards, therefore, which the person must will be equal to the sum of the progression, 2, 4, 6, he last term of which is 200 (22). But the sum of the ession is equal to 202, the sum of the two extremes, plied by 50, or half the number of terms : that is to say, 0 yards, which makes more than $5\frac{1}{2}$ miles.

THE FAMOUS FORTY-FIVE.

w can number 45 be divided into four such parts that, he first part you add 2, from the second part you sub- 2, the third part you multiply by 2, and the fourth ou divide by 2, the sum of the addition, the remainder subtraction, the product of the multiplication, and the nt of the division be all equal?

he 1st is	8;	to which add 2, the sum is	10
he 2nd is	12;	subtract 2, the remainder is	10
he 3rd is	5;	multiplied by 2, the product is	10
he 4th is	20;	divided by 2, the quotient is	10
	45		

uired to subtract 45 from 45, and leave 45 as a re- er?

TION.—9+8+7+6+5+4+3+2+1=45
1+2+3+4+5+6+7+8+9=45
8+6+4+1+9+7+5+3+2=45

SUBTRACTION.

n 1 mile subtract 7 furlongs, 39 rods, 5 yards, 1 foot, es.

miles,	furlongs,	rods,	yards,	feet,	inches.
1	0	0	0	0	0
0	7	39	5	1	5
0	0	0	0	0	1

his problem, instead of borrowing 1 foot, we borrow $\frac{1}{2}$ =6 inches, from which we take 5 inches, and 1 re- we then carry $\frac{1}{2}$ to 1, and borrowing $\frac{1}{2}$ a yard=$1\frac{1}{2}$ feet, ve $1\frac{1}{2}$ from $1\frac{1}{2}$=0, and afterwards proceed as usual.

THE EXPUNGED FIGURE.

he first place desire a person to write down secretly, ne any number of figures he may choose and add them together as units; having done this, tell him to subtract that sum from the line of figures originally set down; then desire him to strike out any figure he pleases, and add the remaining figures in the line together as units, (as in the first instance,) and inform you of the result, when you will tell him the figure he has struck out.

76542–24
24
———
76518

Suppose, for example, the figures put down are 76542; these, added together, as units, make a total of 24: deduct 24 from the first line, and 76518 remain; if 5, the center figure be struck out, the total will be 22. If 8, the first figure be struck out, 19 will be the total.

In order to ascertain which figure has been struck out, you make a mental sum one multiple of 9 higher than the total given. If 22 be given as the total, then 3 times 9 are 27, and 22 from 27 show that 5 was struck out. If 19 be given, that sum deducted from 27 shows 8.

Should the total be equal multiplies of 9, as 18, 27, 36, then 9 has been expunged.

With very little practice any person may perform this with rapidity, it is therefore needless to give any further examples. The only way in which a person can fail in solving this riddle is, when either the number 9 or a cipher is struck out, as it then becomes impossible to tell which of the two it is, the sum of the figure in the line being an even number of nines in both cases.

THE MYSTERIOUS ADDITION.

It is required to name the quotient of five or three lines of figures—each line consisting of five or more figures—only seeing the first line before the other lines are even put down. Any person may write down the first line of figures for you. How do you find the quotient?

Example.—When the first line of figures is set down, subtract 2 from the last right-hand figure, and place it before the first figure of the line, and that is the quotient for five lines. For example, suppose the figures given are 86,214, the quotient will be 286,212. You may allow any person to put down the two first and the fourth lines, but you must always set down the third and fifth lines, and in doing so, always make up 9 with the line above, as in the following example:

86,214
42,680
57,319
62,854
37,145
68,212

Therefore in the annexed diagram you will see that you have made 9 in the third and fifth lines with the lines above them. If the person desire to put down the figures should set down a 1 or 0 for the last figure, you must say we will have another figure, and another, and so on until he sets down something above 1 or 2.

67,856
47,218
52,781
67 855

In solving the puzzle with three lines, you subtract 1 from the last figure, and place it before the first figure, and make up the third line yourself to 9. For example: 67,856 is given, and the quotient will be 167,855, as shown in the above diagram.

TO TELL AT WHAT HOUR A PERSON INTENDS TO RISE.

t the person set the hand of the dial of a watch at any he pleases, and tell you what hour that is; and to the ber of that hour you add in your mind 12; then tell him unt privately the number of that amount upon the dial, nning with the next hour to that on which he proposes se, and counting backwards, first reckoning the number e hour at which he has placed the hand. For example: ppose the hour at which he intends to rise be 8, and he has placed the hand at 5; you will add 12 to 5, and him to count 17 on the dial, first reckoning 5, the hour hich the index stands, and counting backwards from hour at which he intends to rise; and the number 17 necessarily end at 8, which shows that to be the hour ose.

FIND THE DIFFERENCE BETWEEN TWO NUMBERS, THE GREATEST OF WHICH IS UNKNOWN.

ke as many nines as there are figures in the smallest ber, and subtract that sum from the number of nines. another person add the difference to the largest number, taking away the first figure of the amount add it to the figure, and that sum will be the difference of the two bers.

r example: John, who is 22, tells Thomas, who is older, he can discover the difference of their ages; he there- privately deducts 22 from 99 (his age consisting of figures, he of course takes two nines); the difference, h is 77, he tells Thomas to add to his age, and to take away the first figure from the amount, and add it to the last figure and that will be the difference of their ages; thus,

The difference between John's age and 99 is......77
To which Thomas adding his age..................35

The sum is........................ 112
Then by taking away the first figure 1, and adding it to the figure 2, the sum is............. .13
Which add to John's age.................... ..22

Gives the age of Thomas........................35

THE REMAINDER.

A very pleasing way to arrive at an arithmetical sum, without the use of either slate or pencil, is to ask a person to think of a figure, then to double it, then add a certain figure to it, now halve the whole sum, and finally to subtract from that the figure first thought of. You are then to tell the thinker what is the remainder.

The key to this lock of figures is, that HALF of whatever sum you request to be added during the working of the sum IS THE REMAINDER. In the example given, five is the half of ten, the number requested to be added. Any amount may be added, but the operation is simplified by giving only even numbers, as they will divide without fractions.

Example.

Think of...................................... 7
Double it......................................14
Add 10 to it...................................10

Halve it....................................2)24

Which will leave...............................12
Subtract the number thought of..................7

THE REMAINDER will be...........................5

A PERSON HAVING AN EQUAL NUMBER OF COUNTERS, OR PIECES OF MONEY, IN EACH HAND, TO FIND HOW MANY HE HAS ALTOGETHER.

Request the person to convey any number, as 4, for example, from the one hand to the other, and then ask how many times the less number is contained in the greater. Let us ose that he says the one is the triple of the other; and, s case, multiply 4, the number of the counters convey- y 3, and add to the product the same number, which nake 16. Lastly, take 1 from 3, and if 16 be divided by emainder 2, the quotient will be the number contained ch hand, and consequently the whole number is 16.

is curious problem deserves another example. Let us n suppose that 4 counters are passed from one hand to ther, and the less number is contained in the greater mes. In this case, we must, as before, multiply 4 by which will give $9\frac{1}{3}$; to which, if 4 be added, we shall $13\frac{1}{3}$, or $\frac{40}{3}$; if 1, then, be taken from $2\frac{1}{3}$, the remainder be $1\frac{1}{3}$, or $\frac{4}{3}$, by which, if $\frac{40}{3}$ be divided, the quotient 10 be the number of counters in each hand.

THE THREE JEALOUS HUSBANDS.

ree jealous husbands, A, B, and C, with their wives, be- ready to pass by night over a river, find at the water a boat which can carry but two at a time, and for want waterman they are compelled to row themselves over river at several times. The question is how those six ons shall pass, two at a time, so that none of the three es may be found in the company of one or two men, un- her husband be present?

is may be effected in two or three ways; the following be as good as any: Let A and wife go over—let A re- —let B's and C's wives go over—A's wife returns—B and o over—B and wife return, A and B go over—C's wife rns, and A's and B's wives go over—then C comes back his wife. Simple as this question may appear, it is found e works of Alcuin, who flourished a thousand years ago, dreds of years before the art of printing was invented.

THE FALSE SCALES.

cheese being put into one of the scales of a false bal- e, was found to weigh 16 lbs., and when put into the er only 9 lbs. What is the true weight?

The true weight is a mean proportional between the two se ones, and is found by extracting the square root of ir product. Thus $16 \times 9 = 144$; and square root $144 = 12$., the weight required

THE APPLE WOMAN.

A poor woman, carrying a basket of apples, was met by three boys, the first of whom bought half of what she had, and then gave her back 10; the second boy bought a third of what remained, and gave her back 2; and the third bought half of what she had now left, and returned her 1; after which she found she had 12 apples remaining. What number had she at first?

From the 12 remaining, deduct 1, and 11 is the number she sold the last boy, which was half she had; her number at that time, therefore, was 22. From 22 deduct two, and the remaining 20 was $\frac{2}{3}$ of her prior stock, which was therefore 30. From 30 deduct 10, and the remainder 20 is half her original stock; consequently she had at first 40 apples.

THE GRACES AND MUSES.

The three Graces, carrying each an equal number of oranges, were met by the nine Muses, who asked for some of them; and each Grace having given to each Muse the same number, it was then found that they had all equal shares. How many had the Graces at first?

The least number that will answer this question is twelve; for if we suppose that each Grace gave one to each Muse, the latter would each have three, and there would remain three for each Grace. (Any multiple of 12 will answer the conditions of the question.)

THE JESUITICAL TEACHER

A teacher, having fifteen young ladies under her care, wished them to take a walk each day of the week. They were to walk in five divisions of three ladies each, but no two ladies were to be allowed to walk together twice during the week. How could they be arranged to suit the above conditions?

SUN.			MON.			TUES.			WEDN.			THURS.			FRID.			SAT.		
a	b	c	a	d	g	a	k	n	a	e	l	a	h	o	a	f	p	a	i	m
d	e	f	b	e	h	b	l	o	b	f	m	b	i	p	b	d	n	b	g	k
g	h	i	c	m	p	c	f	i	c	g	n	c	d	k	c	h	l	c	e	o
k	l	m	f	k	o	d	h	m	d	i	o	e	m	n	e	i	k	d	l	p
n	o	p	i	l	n	e	g	p	h	k	p	f	g	l	g	m	o	h	f	n

QUAINT QUESTIONS.

Vhat is the difference between twenty four quart bottles, four and twenty quart bottles?

ns.—56 quarts difference.

Vhat three figures, multiplied by 4, will make precisely 5?

ns.—$1\frac{1}{4}$, or 1·25.

Vhat is the difference between six dozen dozen, and half-ozen dozen?

ns.—792: Six dozen dozen being 864, and half-a-dozen en, 72.

lace three sixes together, so as to make seven.

ns.—$6\frac{6}{6}$.

dd one to nine and make it twenty.

ns. IX—cross the *I*, it makes XX.

lace four fives so as to make six and a half. *Ans.* $5\frac{5}{5}$·5

room with eight corners had a cat in each corner, seven before each cat, and a cat on every cat's tail. What the total number of cats? *Ans.* Eight cats.

rove that seven is the half of twelve. *Ans.*—Place the an figures on a piece of paper, and draw a line through middle of it, the upper will be VII.

THE FOX, GOOSE AND CORN.

countryman having a Fox, a Goose, and a peck of Corn, e to a river, where it so happened that he could carry one over at a time. Now as no two were to be left to-ier that might destroy each other, he was at his wit's for says he "Though the corn can't eat the goose, nor goose eat the fox; yet the fox can eat the goose, and goose eat the corn" How shall he carry them over, that shall not destroy each other?

et him first take over the Goose, leaving the Fox and n; then let him take over the Fox and bring the Goose k; then take over the Corn; and lastly take over the se again.

MULTIPLYING MONEY BY MONEY.

mongst the various questions that are given for the pur-e of puzzling the unwary arithmetician, the multiplication money by money is one of the most curious: take for in-

Multiply £99 19*s.* $11\frac{3}{4}$*d.* by £99 19*s.* $11\frac{3}{4}$*d.*

Multiply £11 11*s.* 11*d.* by £11 11*s.* 11*d.*

To the uninitiated they usually appear easy of solution but the various modes of working them out, and the different results obtained, prove that there is something absurd and wrong in the questions themselves. Some reduce all to farthings, and after multiplying one term by the other, return the product into pounds, shillings, and pence. Others convert them into decimals; whilst some work the problem in the style of duodecimals.

Having sufficiently puzzled the tyros, the querist remarks: "The problem itself is absurd, it is incapable of solution; for what is the nature of the product of pounds, shillings, and pence multiplied by pounds, shillings and pence? We know that a yard multiplied by a yard is a square yard, but who can tell what is a penny multiplied by a penny, or a penny by a pound?"

Now all this is quite correct, provided the question is limited, as above to the product of pounds, shillings, and pence, into pounds, shillings, and pence; put suppose the problem were put in this form—If a capital of £1 produces by compound interest, in a certain time, £99 19*s.* $11\frac{3}{4}$*d.*, how much would be produced by a capital of £99 19*s.* $11\frac{3}{4}$*d*? It is evident that, to answer this, we must multiply £99 19*s.* $11\frac{3}{4}$*d.* by £99 19*s.* $11\frac{3}{4}$*d.*: these are in fact the second and, third terms of an ordinary "rule of three;" and though one of the terms is a "concrete" quantity of pounds, shillings, and pence, the other must be regarded as an "abstract" mathematical quantity, being 99 and a fraction, of which the number of farthings in a pound is the denominator, 960, and the number of farthings in the third term is the numerator, 959; or, instead of this, the shillings and pence might be converted into decimals of a pound, or into aliquot parts. The product of multiplying £99 19*s.* $11\frac{3}{4}$*d.* by $99\frac{959}{960}$ is £9,999 15*s.* $10\frac{1}{3840}$*d.*; the quickest way of doing this, is to multiply by 100, and to subtract from the product the 960th part of the multiplicand.

In the other question proposed, the product of £11 11*s.* 11*d.* into £11 11*s.* 11*d.*, or $11\frac{143}{240}$, is £134 9*s* $3\frac{49}{240}$*d.*

Number and value are distinct abstract ideas, and cannot, without committing a logical absurdity, be confused. To usly impossible to bring *value* into the question. Value rbitrary; number is fixed. Put it in this way, and the urdity is evident: One pound is equivalent to 20 shill-s, or 240 pence, or 960 farthings. In value there is no erence whatever; but what an enormous difference be-en multiplying by 1, 20, 240, or 960!

THE UNFAIR DIVISION.

gentleman rented a farm, and contracted to give to his llord $\frac{2}{5}$ of the produce; put prior to the time of dividing corn, the tenant used 45 bushels. When the general sion was made, it was proposed to give to the landlord oushels from the heap, in lieu of his share of the 45 nels which the tenant had used, and then to begin and de the remainder as though none had been used. Would method have been correct?

he landlord would lose $7\frac{1}{5}$ bushels by such an arrange-t, as the rent would entitle him to $\frac{2}{5}$ of the 18. The int should give him 18 bushels from his own share after division is completed, otherwise the landlord would re-e but $\frac{2}{7}$ of the first 63 bushels.

A POPULAR FALLACY.

t is often suggested from the pulpit and elsewhere, that ugh persons have lived and died in the world to cover whole surface with bodies; and even two or three strata p. Is this probable?

ay the earth has existed 6000 years, the population always ing been 800,000,000, and the average life of man 30 rs; this being the utmost that could be claimed. Allow n the State of Virginia to contain 70,000 square miles, each grave to occupy a space of 6 feet by 2; the itory of the State would contain 162,624,000,000; while mighty army of the dead would number only 160,000, ,000; leaving 2,624,000,000 graves yet unoccupied. w wide of truth then is the position often set forth so itively!

TRICKS IN GEOMETRY.

"Let young beginners come and try
Their hands at our geometry."

THE word Geometry is derived from the Greek, and signifies the art of measuring land. The invention of it is ascribed by some to the Chaldeans and Babylonians, by others to the Egyptians, who were obliged to determine the boundaries of their fields after the inundation of the Nile, by geometrical measurements. According to Cassiodorus, the Egyptians either derived the art from the Babylonians, or invented it after it was known to them. Thales, a Phœnician, who died 548 years B. C., and Pythagoras of Samos, who flourished about 520 B. C., introduced it from Egypt into Greece. In elementary geometry, Euclid of Alexandria, as everybody knows, is particularly distinguished. Archimedes measured the sphere, and after him other philosophers prosecuted the science with the utmost assiduity. In Italy, where the sciences first revived after the dark ages, several mathematicians were distinguished in the 16th century. The French, and after them the Germans, followed; while in England, Hook, Newton, and others, carried the science to the highest pitch of usefulness, and through its aid made the most prodigious discoveries. It is not, however, our province to enter into a long disquisition on the subject, but simply to set before the young reader some of the more curious properties of the science, that he may be excited to study it for himself; and we will promise him that should he devote his mind to its study, he will be amply repaid for any amount of labor he may bestow upon it.

GEOMETRICAL DEFINITIONS.

In geometry a *point* is said to have neither breadth, length, nor thickness. A *line* is the distance between two points; parallel lines always keep at the same distance from each other. A *right* line is what is commonly called a straight

A *curve* is a line which continually changes its direc- An *angle* is the inclination or opening of two lines ng in a point. A *figure* is a bounded space, and is a superficies or a solid. A *triangle* is a figure with sides and three angles. A *square* has four equal sides, ur right angles. A *circle* is a plane figure bounded curved line running into itself. Its diameter is a htline drawn from one extremity of its circumference other, and its center is equally distant from every f the circumference. A *solid* is any body which has , breadth, and thickness ; and a sphere is a solid, ated by a convex surface, every part of which is at ual distance from a point within, called its center.

THE FIVE GEOMETRICAL SOLIDS.

following figures will show how the five geometrical may be cut out of a piece of cardboard. Where es are drawn the board is to be partly cut through penknife, so as to render the angles of the models as and as straight as possible. The edges which require

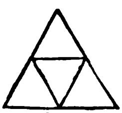


Fig. 1.

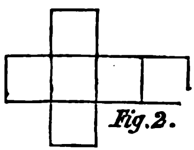


Fig. 2.

g are to be fastened together with a slip of thin paper um dissolved in just sufficient water to bring it to the tence of treacle. Fig. 1 will form a tetrahedron, a

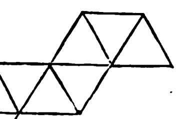


Fig. 3.

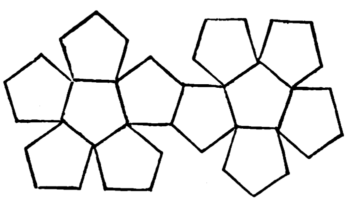


Fig. 4.

with four sides, each shaped like an equilateral tri- . Fig. 2 forms a cube or hexahedron, Fig. 3 an octohedron, with eight triangular sides. Fig. 4, a dodecahedron, with twelve sides shaped like pentagons, with five equal

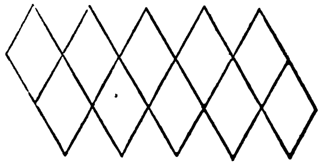


Fig. 5.

sides. Fig. 5, an isocahedron, with twenty sides, formed of equilateral triangles

HOW TO MAKE FIVE SQUARES INTO A LARGE ONE WITHOUT ANY WASTE OF STUFF.

Suppose you have five squares of cloth, or anything else, as in Fig. 7 ; find the center of one side of four of these

Fig. 7.

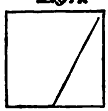
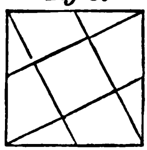


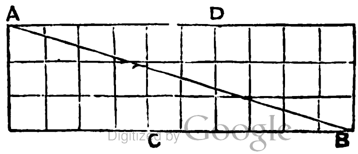
Fig. 8.



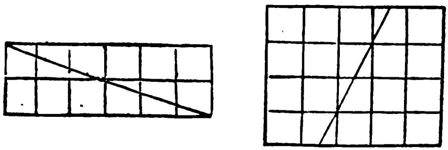
squares, and cut them from that point to the opposite corner, then place the perfect square in the centre, and the other pieces round, as seen in Fig. 8.

DECEPTIVE VISION.

The following sleight shows how easily the eye may be deceived. Take a piece of pasteboard, an inch and a half in width, and five inches in length, and divide it by inked



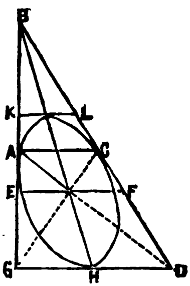
to form two triangles. After this cut off the top of triangles at C and D,* and arrange the pieces in this er:—



counting the squares in the first figure, there appear hirty, but the other arrangement of the same card to contain thirty-two. It does so, however, only in- ance, but it is only a very correct eye that can detect perfection.

THE CARPENTER PUZZLED.

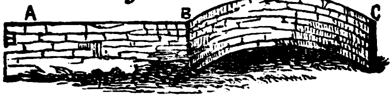
rpenter having a piece of mahogany of a triangular see Fig.) wished to know how he could make it up best advantage. His first idea was to make an ob- uare table of it, but he found that if he did so the f the wood would be very great. onsideration he discovered that st economical method of using od would be to form it into an To make this oval contain as ood as possible, he proceeded in lowing manner: Let B G D be ngular piece of wood; take G H lf of the base, and divide the by drawing a line from H to B. H in the compasses, and set it e of the sides from G to E, draw E F, and the point I will be the center of the oval; L parallel to E F, and at the same distance from the s the base G. The points A and C are found by the line from E to K and drawing A C, or by draw- dotted lines D A and G C through the center at I. oints being found, the oval must be completed by of the draughtsman.



THE BRICKLAYER PUZZLED

A bricklayer had to construct a wall, whose length in the direction A B C was twenty-four feet. The one half of this wall, namely from B to C, had to be built over a piece of

Fig. 1.



rising ground, so that the base of this part of the wall would necessarily be more than twelve feet. In making out his account he charged more for this half of the wall than for that which was built on level ground from A to B. A geometrician assured him that the square contents of both portions of the wall were exactly alike; which may be proved in the following manner:—

Fig. 2.

Fig. 3.

Cut two pieces of cardboard, in the form shown in Figs. 2 and 3, to represent the two parts of the wall; lay the piece representing the straight wall on the curved piece, and it will be found that the angles which project at A and B will exactly fill up the spaces at E and F. The piece of board representing the straight wall may thus be found to be exactly sufficient to form a piece equal to that representing the curved wall. You may then lay the curved piece upon the straight one, and reversing the experiment prove that the curved piece is capable of forming a rectangular piece equal to the other.

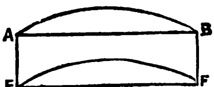
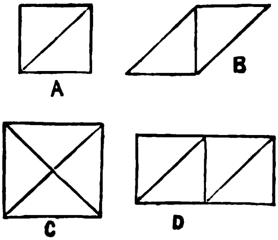


Fig. 4.

TRIANGULAR PROBLEM.

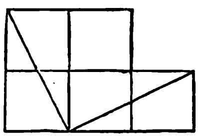
Take four square pieces of pasteboard of the same dimensions, and divide them diagonally, that is, by drawing a line from two opposite angles, as in the figures, into eight trired, orange, yellow, green, indigo, violet, and let the be white. To find how chequers or regular four- figures, different either in or color, may be made out se eight triangles.



t, by combining two of these les there may be formed, the triangular square A, or clined square B, called a Rhomb. Secondly, by com- four of the triangles the large square C may be , or the long square D, called a parallelogram. Now st two squares, consisting of two parts out of eight, ach of them by the eighth rank of the triangle be twenty-eight different ways, which makes fifty-six. e last two squares, consisting of four parts, may each en by the same rank of the triangle seventy times, makes 140.

TO FORM A SQUARE.

e a piece of card of the shape and size or proportions subjoined, and cut it into three and with these three form a per- uare.



o this, cut it in the direction of ted lines, and it will then be easy down the pieces to form a perfect .

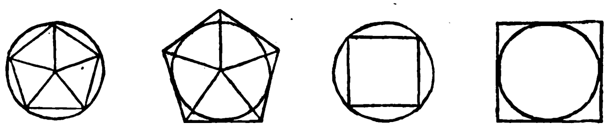
SQUARING THE CIRCLE.

uaring the circle," as it is called, is the puzzle of s, and there are many persons who fancy this can be plished, as there are also many who believe that they scover "perpetual motion."

meaning of this phrase *squaring* is scientifically ex- d by the term finding the quadrature of the circle ; , the act of producing a square equal to a given cir- nd many persons but slightly acquainted with mathe- have puzzled their brains to effect this object. The al de Cusa rolled a cylinder over a plane, till the which was first in contact with the plane touched it , and then, by a train of reasoning very unmathematical, he endeavored to determine the length of the line thus described. Oliver de Serras worked a circle, and also a triangle equal to an equilateral triangle, inscribed within the circle, and imagined that the former was exactly equal to two of the latter, forgetting that the double of this triangle is equal to the hexagon inscribed within the circle, and therefore smaller than the circle itself. A Frenchman challenged the world, and deposited 10,000 livres as a stake, that he could accomplish the feat. He reduced the problem to the mechanical process of dividing a circle into four quarters, and then turning these with their angles outwards, so as to form a square, which he asserted to be equal to the circle ; this however was soon proved to be ridiculous.

Some persons have taken a piece of pasteboard, and cutting it out into a circular form, and by cutting that circular disc into pieces of a square form and definite dimensions, and fitting the same turned pieces one into the other, have come *near* to a notion of the superficial area of a circle. But this kind of demonstration is purely mechanical, and is neither geometrical nor scientific, and, is in fact, no demonstration according to mathematics. For if we take the pieces of card, however exactly they may appear to be formed, and examine them with a microscope, we shall soon find that none of them are geometrically true, nor of the same length or breadth, and therefore the conclusion arrived at is a false one.

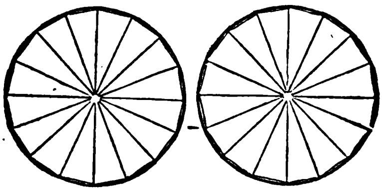
The early mathematicians, in their attempts to solve this problem, generally proceeded on the following plan. If we



draw a square exterior to a circle, that is, touching the square in four points, each side of the square being equal to the diameter of the circle, we can soon convince ourselves that the boundary of the square will be greater than the circumference of the circle, and the area of the former greater than that of the latter. But if the square be drawn within the circle, so that only the four corners touch it, then it is equally evident that the circle is larger, both in boundary and area, than the square. By this proceeding, we

ıal to it, and *larger* than one *internal* to it. Let us next
ɔse that we draw a regular pentagon, that is, a figure
ve equal sides, exterior to the circle, and touching it on
ɔoints ; then it is evident that as the circle is wholly
ained within the pentagon, it must be smaller than that
ı contains it. But if the pentagon be described within
circle, touching it at the five angular points, then of
se the circle is larger than the pentagon which it con-
.

ɔw, in geometry, my young readers must bear in mind,
xact periphery or circumference, and the exact area of
figure bounded by straight lines, may be determined
rigorous accuracy ; and if we draw two polygons—say
ıe hundred sides, one within and one without the circle
e can ascertain the exact area of those polygons, and
n that the area of a circle is greater than a certain
ınt, and less than another certain amount. These two
ınts, if the number of the sides of the polygon be so



e as we here suppose, may be so very nearly alike, that
er one will give the area of the circle with great close-
.

y some such means as these Archimedes found that
ıe diameter of a circle be called 7, then the circum-
ıce will be nearly 22 ; and that if the square of the
ıeter be 14, then the area of the circle will be equal
bout 11 ; but this computation was slightly in error, and
e to the area of the circle too great a measure by about
three-thousandth part of the whole. At a later period,
ever, a European mathematician, named Metius, discov-
l a method which makes an extraordinary approach to
ıracy, and is at the same time easily remembered. He
ıd that if the diameter be considered equal to 113, then
circumference would equal 355 ; or if we multiply the

will be given. Now this method is so very nearly correct, that the area of a circle one foot in diameter is given within the fifty-thousandth part of a square inch.

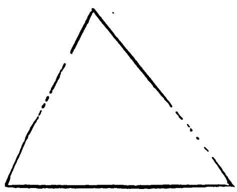
Other mathematicians have carried the approximation still further. Ludolph Van Ceulen worked it out to 36 places of figures, showing that if the diameter be 1, the circumference will be

3.14,159,265,358,979,323,846,264,338,327,950,288.

or that if the last figure be 8, the result will be a little below the truth, and if 9, a little above it.

Since this, Mr. Sharp, an English mathematician, carried the approximation to 72 places of figures; Mr. John Machin to 100 figures, and eclipsed all others. M. de Lagny worked it out to 128 places of figures, and of the degree of *nearness* to which this computation brings the proportion, Montucla says, "If we suppose a circle, the *diameter* of which is a thousand million times greater than the distance between the sun and the earth, the error in the proportion of the circumference would be a thousand million times less than the thickness of a hair."

But after all, none of these computations are quite correct; they all deviate from the truth, and bring us to the conclusion that there are no numbers or collection of numbers which will give the exact ratio of the circumference, or of the area of a circle to its diameter. We offer this explanation on the subject to our young friends that they may not be puzzled by the question; and that should they be asked to square the circle, or hear any one assert that he can do so, they may be able to show that they are "awake" to the question, and know how to explain it.



PRACTICAL PARADOXES AND PUZZLES.

A puzzle is not solved, impatient sirs,
By peeping at its answer, in a trice—
When Gordius, the plow-boy, king of Phrygia,
Tied up his implements of husbandry
In the far-famed knot, rash Alexander
Did not undo, by cutting it in twain.

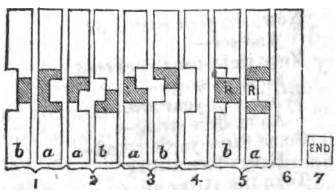
ARADOXES and Puzzles, although by many persons looked
n as mere trifles, have, in numerous instances, cost their
ntors considerable time, and exhibit a great degree of
nuity. We can readily imagine that some of the com-
ated puzzles in the ensuing pages may have been origi-
y constructed by captives, to pass away the hours of a
and dreary imprisonment; thus does the misery of a
frequently conduce to the amusement of many. We
upon a Paradox as a sort of superior riddle, and a tol-
le Puzzle, in our opinion, takes precedence of a first-rate
is. There is often considerable thought, calculation,
ence, and management, required to solve some of these
nge enigmas; and we have, ere now, followed the
es of a Puzzle so ardently, as to be entirely absorbed
evising means to extricate ourselt from its bewildering

achieving victory over it, as we have in conquering an adversary at some superior game of skill. It is "in good sooth, a right dainty and pleasant pastime," to watch the stray wanderings of another person attempting to elucidate a Paradox, or perform a Puzzle, with which one is previously acquainted. It is laughable to see him elated with hope at the apparent speedy end of his troubles, when you know that, at that moment, he is actually farther from his object than he was when he began; and it is no less amusing to watch his increasing despair, as he conceives himself to be getting more and more involved, when you are well aware that he is within a single turn of a happy termination of his toils; but what a mirthful moment is that, when there being only two ways to turn, the one right and the other wrong, as is usually the case, he takes the latter, and becomes more than ever

"**Pozed, puzzled, and perplexed.**"

Puzzles are by no means of modern origin; the Sphynx puzzled the brains of some of the heroes of antiquity, and even Alexander the Great, as it is written, made several essays to untie the knot with which Gordius, the Phrygian king, who had been raised from the plow to the throne, tied up his implements of husbandry in the temple, in so intricate a manner, that universal monarchy was promised to the man who could undo it: after having been repeatedly baffled, he, at length, drew his sword, considering that he was entitled to the fulfillment of the promise, by cutting the Gordian knot.

1. THE CHINESE CROSS.

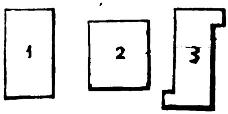


Have six pieces of wood, bone, or metal, made of the same length as No. 6, in the above figures, and each piece of the same size as No. 7. It is required to construct a ix arms, from these pieces, and in such a manner that l not be displaced when thrown upon the floor.

shaded parts of each figure represent the parts that t *out* of the wood, and each piece marked *a* is supto be facing the reader, while the pieces marked *b* are *ht* side of each piece turned over *towards* the left, so ace the reader. No. 7 represents the end of each of wood, &c., and is given to show the dimensions.

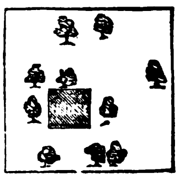
2. THE PARALLELOGRAM.

rallelogram, as in the illustrag. 1, may be cut into two so that by shifting the posithe pieces, two other figures formed, as shown by figs. 2



3. THE DIVIDED GARDEN.

rson let his house to several inwho occupied different floors, and a garden attached to the house, desirous of dividing it among There were ten trees in the gard he was desirous of dividing it so ch of the five inmates should have l share of garden and two trees. l he do it?



4. THE ENDLESS STRING.

Now, sir, your coat is off!
And see—
Your right-hand pocketed!
So let it be:
While o'er your arm
An endless string—
Some three yards round—
Hangs like a sling.
Take the string off—
But, just for fun,
It must be done
Keeping your right-hand in its place,
And not a smile must stir your face.
Until you find this puzzle out

5. CHINESE MAZE. THE WILLOW-PATTERN PLATE.

Ye fair ones who, in continent or isle,
  Long for delights which love alone can bring;
Whilst ruby lips display affection's smile,
  Haste through the maze, and reach the "wedding ring!"
The sweet Koong-see, whose spirit hovers near,
  Shall watch thee wand'ring through the doubtful way;
And when thou showest aught of hope or fear,
  Shall whisper to thee, as thy footsteps stray!

6. THE VERTICAL LINE PUZZLE.

Draw six vertical lines, as below, and, by adding five other lines to them, let the whole form nine.

7. THE THREE RABBITS.

w three rabbits, so that each shall appear to have two while, in fact, they have only three ears between them.

8. THE ACCOMMODATING SQUARE.

ke eight squares of card, then divide four of them from to corner, so that you will now have twelve pieces. a square with them.

9. THE CIRCLE PUZZLE.

w a circle upon a piece of paper, and thrust a pin gh it without crossing the circle, or thrusting it down-through the center.

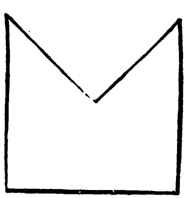
10. THE CARDBOARD PUZZLE.

Take a piece of cardboard or leather, of the shape and measurement indicated by the diagram, cut it in such a manner that you yourself may pass through it, still keeping it in one piece.

11. THE BUTTON PUZZLE.

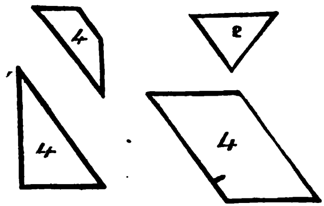
In the center of a piece of leather make two parallel cuts with a penknife, and just below a small hole of the same width ; then pass a piece of string under the slit and through the hole, as in the figure, and tie two buttons much larger than the hole to the ends of the string. The puzzle is, to get the string out again without taking off the buttons.

12. THE QUARTO PUZZLE.



de this figure into four equal parts, each of the same

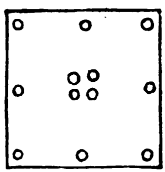
13. THE PUZZLE OF FOURTEEN.



Cut out fourteen pieces of paper, card, or wood, of the same size and shape as those shown in the diagram, and then form an oblong with them.

14. THE SQUARE AND CIRCLE PUZZLE.

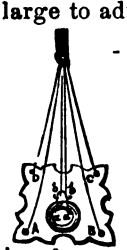
Get a piece of cardboard, the size and shape of the diagram, and punch in it twelve circles or holes in the position



shown. The puzzle is, to cut the cardboard into four pieces of equal size, each piece to be of the same shape, and to contain three circles, without cutting into any of them.

15. THE SCALE AND RING PUZZLE.

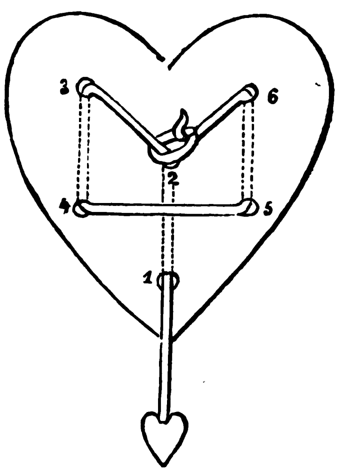
Provide a thin piece of wood of about two inches and a half square; make a round hole at each corner, sufficiently large to admit three or four times the thickness of the cord



you will afterwards use, and in the middle of the board make four smaller round holes in the form of a square, and about half an inch between each. Then take four pieces of thin silken cord, each about six inches long, pass one through each of the four corner holes, tying a knot underneath at the end, or affixing a little ball or bead to prevent its drawing through; take another cord, which, when doubled, will ddle holes *a a*, from the front to the back of the board, ord through each hole,) and again from back to front h the other holes *b b* ; tie the six ends together in a so as to form a small scale, and proportioning the of the cords, so that when you hold the scale sus- d, the middle cord, besides passing through the four holes, will admit of being drawn up into a loop of half an inch from the surface of the scale ; provide a f metal or bone, of about three quarters of an inch in ter, and place it on the scale, bringing the loop through ddle ; then, drawing the loop a little through the toward you, pass it, double as it is, through the hole corner A, over the knot underneath, and draw it back ; pass it in the same way through the hole at corner B, the knot, and draw it back ; then, drawing up the little more, pass it over the knot at top, and after- through the holes C and D in succession, like the s, and the ring will be fixed.

16. THE HEART PUZZLE.

a piece of thin wood the shape indicated by the dia- , and having perforated it as above, draw a piece of

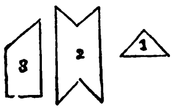


ng, with a smaller heart attached at the end, through

No. 1, pass it behind, and bring it through 2 before, and through 3, and so on to 6, when a loop must be made so as to enclose that part of the string which runs from 2 to 3. The puzzle is to remove the string from the large heart altogether, without unfastening the loop.

Care should be taken to avoid twisting or entangling the string. The length of the string should be proportioned to the size of the heart; if you make the heart two inches and a half high, the string when doubled should be about nine inches long.

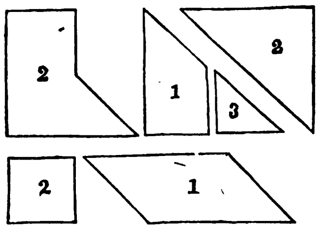
17. THE CROSS PUZZLE.



Cut three pieces of paper to the shape of No. 1, one to the shape of No. 2, and one to that of No. 3. Let them be of proportional sizes. Then place the pieces together so as to form a cross.

18. THE YANKEE SQUARE.

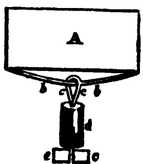
Cut as many pieces of each figure in cardboard as they



have numbers marked on each; then form the pride of the American army.

19. THE CARD PUZZLE.

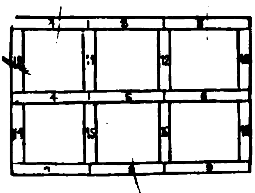
One of the best puzzles hitherto made is represented in the annexed cut. A is a piece of card; *b b* a narrow slip divided from its bottom edge, the whole breadth of the



card, except just sufficient to hold it on at each side; *c c* is another small slip of card with two large square ends, *e e*; *d* is a bit of tobacco-pipe, through which *c c* is passed, and which is kept on by the two ends *e e*. The puzzle consists in getting the pipe off without breaking it, or injuring any other part of the

This, which appears to be impossible, is done in the imple manner. On a moment's consideration it will plainly that there must be as much difficulty in getie pipe in its present situation, as there can be in it away. The way to put the puzzle together is as s: The slip *c c e e* is cut out of a piece of card in the delineated in Fig. 3. The card in the first figure hen be gently bent at A, so as to allow of the slip at ttom of it being also bent sufficiently to pass double h the pipe, as in Fig. 2. The detached slip with the ends (Fig. 3) is then to be passed half way through op *f* at the bottom of the pipe; it is next to be ed in the center at *a*, and pulled through the pipe, e, by means of the loop of the slip to the card. Upon ding the card the puzzle will be complete, and appear resented in Fig. 1.

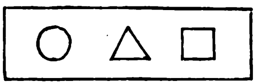
20. THREE SQUARE PUZZLE.



seventeen slips of cardboard ual lengths, and place them on e to form six squares, as in the am. It is now required to take five of the pieces, yet to but three perfect squares.

21. THE CYLINDER PUZZLE.

t a piece of cardboard about four inches long, of the e of the diagram, and make holes in it, as represented. puzzle is, to make one piece od to pass through, and also tly to fill, each of the three holes



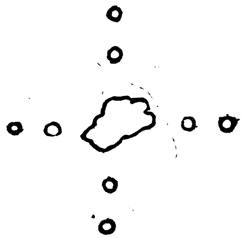
22. PUZZLE OF THE FOUR TENANTS.

ave a square plot of ground, in one quarter of which e built a house, which I have let to tenants. I tell them that if they divide the remaining ground into equal plots, alike in shape, and each aining one of the four apple trees ave planted, they shall have it out any increase of rent. How they succeed?

23. THE PUZZLE WALL.

Suppose there was a pond, around which four poor men built their houses, thus:

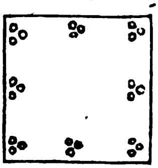
Suppose four evil-disposed rich men afterwards built houses around the poor people, thus:



and wished to have all the water of the pond to themselves. How could they build a high wall, so as to shut out the poor people from the pond?

24. THE NUNS.

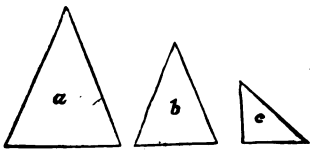
Twenty-four nuns were arranged in a convent by night, by a sister, to count nine each way, as in the diagram. Four of them went out for a walk by moonlight. How were the remainder placed in the square so as still to count nine each way? The four who went out returned, bringing with them four friends; how were they all placed still to count nine each way, and thus to deceive the sister, as to whether there were 20, 24, 28, or 32, in the square?



25. THE HORSE SHOE PUZZLE.

Cut a piece of apple or turnip into the shape of a horse shoe, stick six pins in it for nails, and then, by two cuts, divide it into six parts, each to contain one pin.

26. THE CARD SQUARE.



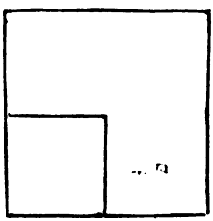
eight pieces of card or paper, of the shape of Fig.
of Fig. *b*, and four of Fig. *c*, and of proportionate
rm a perfect square.

27. THE DOG PUZZLE.

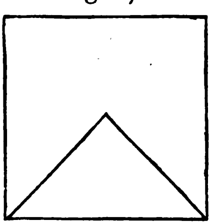
The dogs are, by placing two lines upon them, to be suddenly aroused to life and made to run. Query, How and where should these lines be placed, and what should be the forms of them?

28. PUZZLE OF THE TWO FATHERS.

athers have each a square of land. One father di-
s so as to reserve to himself one fourth; thus—



er father divides his so as to reserve to himself one
n the form of a triangle; thus—



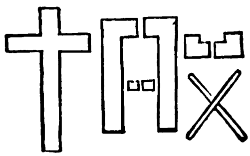
ch have four sons, and each divides the remainder among his sons in such a way that each son will share equally with his brother, and in similar shape. How were the two farms divided?

29. THE TRIANGLE PUZZLE.

Cut twenty triangles out of ten square pieces of wood; mix them together, and request a person to make an exact square with them.

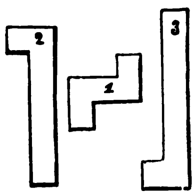
30. CUTTING OUT A CROSS.

How can be cut out of a single piece of paper, and with



one cut of the scissors, a perfect cross, and all the other forms as shown in the cuts?

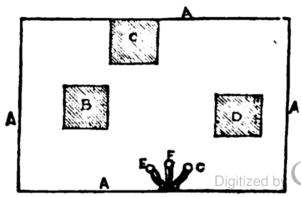
31. ANOTHER CROSS PUZZLE.



With three pieces of cardboa[illegible] the shape and size of No. 1, and one each of No. 2 and 3, to form a cross.

32. THE FOUNTAIN PUZZLE.

A is a wall, B C D three houses, and E F G three fountains or canals.



m F to C, without one crossing the other, or passing
e of the wall A.

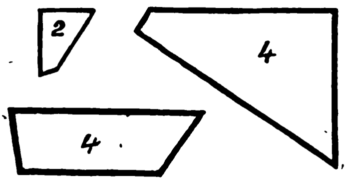
33. THE PUZZLE OF THE STARS.

Friends one and all, I pray you show
How you *nine stars* would so bestow,
Ten rows to form—in each row *three*—
Tell me, ye wits, how this can be?

34. THE COUNTER PUZZLE

e eight counters or coins, as in the diagram; it is
quired to lay them in four couples, removing only
a time, and in each removal passing the one in the
ver *two* on the table.

35. THE JAPAN SQUARE PUZZLE.



out ten pieces of card or wood of the same sizes and
as in the diagram, and then form a square with them

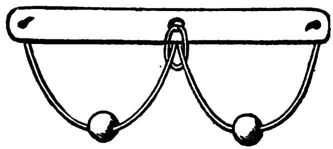
36. THE CABINET MAKER'S PUZZLE.

abinet-maker has a circular piece of veneering with
he has to veneer the tops of two oval stools; but it
pens that the area of the stools, exclusive of the hand-
in the center, and that of the circular piece, are the
How must he cut his stuff so as to be exactly
ent for his purpose?

37. THE STRING AND BALLS PUZZLE.

an oblong strip of wood or ivory, and bore three holes
as shown in the cut. Then take a piece of twine,
ng the two ends through the holes at the extremities,
ing them with a knot, and thread upon it two beads

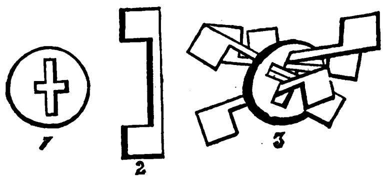
or rings, as depicted above. The puzzle is to get both beads



on the same side, without removing the string from the holes, or untying the knots.

38. THE DOUBLE-HEADED PUZZLE.

Cut a circular piece of wood as in the cut No. 1, and



four others, like No. 2. The puzzle consists in getting them all into the cross-shaped slit, until they look like Fig. 3.

39. ARITHMETICAL PUZZLE.

The sum of four figures in value will be.
Above seven thousand nine hundred and three;
But when they are halved, you'll find very fair
The sum will be nothing, in truth I declare.

40. GRAMMATICAL PUZZLE.

Let the rich, great, and noble, banquet in the festal halls,
And pass the hours away, as the most thoughtless revel;
Then seek the poor man's dreary home, whose very dingy walls
Proclaim full well to all how low his rank and level.

Take away one letter from a word in the above stanza, and substitute another, leaving the word so metamorphosed still a word of the English language; and, by that change, totally alter the syntactical construction of the whole sentence, changing the moods and tenses of verbs, turning verbs into nouns, nouns into adjectives, and adjectives into

41. THE TREE PUZZLE.

an orchard of twenty-one trees, so that there shall straight rows, with five trees in each row, the *out*-egular geometrical figure, and the trees all at une-stances from each other.

AN EPITAPH ON ELLINOR BACHELLOR, AN OLD PYE WOMAN.

Bene A. Thin Thed Ustt HEMO. Uld yo
L.D.C. RUSTO! Fnel L.B.
Ach El Lor. Lat. ELY,
Wa. S. shove N. W. How—Ass! kill'd I. N. T. H.
Ear T. Sofp, I, Escu Star.
D. San D T Art. San D K. N E. W. E
Ver——Yus E.—Oft He ove N W. Hens He
'Dli V'DL. on geno
Ug H S hem A.D.E. he R. la Stp. Uf——fap
Uf. F. B Y he. R hu
S. Ban D. M.
Uch pra is 'D. No. Wheres Hedot
HL. i. e. Tom. A kead I.R.T.P. Yein hop Esthathe
R. C. RUSTWI,
L L B. Era is '——D!

43. A CURIOUS LETTER.

Friends Sir, friends,
stand your disposition;
I bearing
a man the world
is whilst the
contempt,
ridicule.
are
ambitious.

44. A PUZZLING INSCRIPTION.

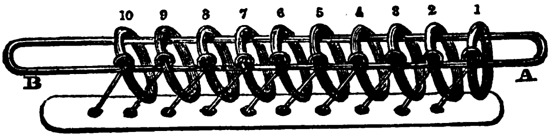
P R S V R Y P R F C T M N
V R K P T H S P R C P T S T N.

e two lines above were affixed to the communion table small church in Wales, and continued to puzzle the ed congregation for several centuries, but at length nscription was deciphered. What was it?

45. THE PUZZLING RINGS.

is perplexing invention is of great antiquity, and was ed on by Cardan, the mathematician, at the beginning e sixteenth century. It consists of a flat piece of thin metal or bone, with ten holes in it; in each hole a wire is loosely fixed, beaten out into a head at one end, to prevent its slipping through, and the other fastened to a ring, also loose. Each wire has been passed through the ring of the next wire, previously to its own ring being fastened on; and through the whole of the rings runs a wire loop or bow, which also contains, within its oblong space, all the wires to which the rings are fastened; the whole presenting so complicated an appearance, as to make the releasing the rings from the bow appear an impossibility. The construction of it would be found rather troublesome to the amateur, but it may be purchased at most of the toy shops very lightly and elegantly made. It also exists in various parts of the country, forged in iron, perhaps by some ingenious village mechanic, and aptly named "The Tiring Irons." The following instructions will show the principle on which the puzzle is constructed, and will prove a key to its solution.

Take the loop in your left hand, holding it at the end, B, and consider the rings as being numbered 1st to 10th. The 1st will be the extreme ring to the right, and the 10th the nearest your left hand.



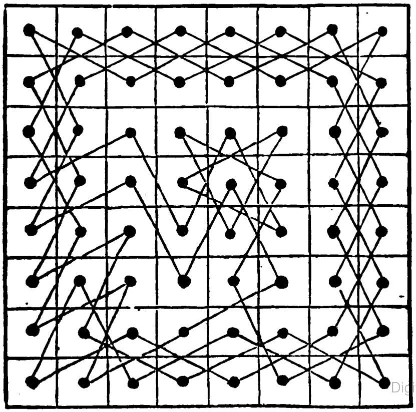
It will be seen that the difficulty arises from each ring passing round the wire of its right-hand neighbor. The extreme ring at the right hand, of course, being unconnected with any other wire than its own, may at any time be drawn off the end of the bow at A, raised up, dropped through the bow, and finally released. After you have done this, try to pass the second ring in the same way, and you will not succeed, as it is obstructed by the wire of the first ring; but if you bring the first ring on again, by reversing the process by which you took it off, viz., by putting it up through the bow, and on to the end of it, you will then find that by taking the first and second rings together, they will both draw off, lift up, and drop through the bow. Having done this, try to pass the third ring off, and you will not be able;

it is fastened on one side to its own wire, which is he bow, and on the other side to the second ring, without the bow. Therefore, leaving the third ring resent, try the fourth ring, which is now at the end one, and both of the wires which affect it being he bow, you will draw it off without obstruction; loing this, you will have to slip the third ring off, ill not drop through for the reasons before given; ng dropped the fourth ring through, you can only third ring on again. You will now comprehend th the exception of the first ring) the only ring n at any time be released is that which happens to d on the bow, at the right-hand end; because both s which affect it being within the bow, there will pediment to its dropping through. You have now and second rings released, and the fourth also— l still fixed; to release which we must make it last on the bow, and to effect which pass the first and ings together through the bow, and on to it; then he first ring again by slipping it off and dropping gh, and the third ring will stand as second on the its proper position for releasing, by drawing the nd third off together, dropping the third through, pping the second on again. Now to release the put the first up, through and on the bow; then slip together off, raise them up, and drop them through. h will now stand second, consequently in its proper r releasing; therefore draw it toward the end, A, fifth off, then the sixth, and drop it through; after eplace the fifth, as you cannot release it until it n the position of a second ring; in order to effect must bring the first and second rings together, and on to the bow; then in order to get the third the first off and down through the bow; then bring l up, through and on to the bow; then bring the first and on again, and, releasing the first and second r, bring the fourth through and on to the bow, re- the third; then bring the first and second together the first off and through, then the third the same, the first on the bow, take off the first and second r, and the fifth will then stand second, as you desired; toward the end, slip it off and through, replace the bring the first and second together up and on again, release the first, bring on the third, passing the second ring on to the bow again, replace the first, in order to release the first and second together; then bring the fourth toward the end, slipping it off and through, replace the third, bring the first and second together up and on again, release the first, then the third, replacing the second, bring the first up and on, in order to release the first and second together, which having done, your eighth ring will then stand second, consequently you can release it, slipping the seventh on again. Then to release the seventh, you must begin by putting the first and second up and on together, and going through the movements in the same succession as before, until you find you have only the tenth and ninth on the bow; then slip the tenth off and through the bow, and replace the ninth. This dropping of the tenth ring is the first effectual movement toward getting the rings off, as all the changes you have gone through were only to enable you to get at the tenth ring. You will then find that you have only the ninth left on the bow, and you must not be discouraged on learning, that in order to get that ring off, all the others to the right hand must be put on again, beginning by putting the first and second together, and working as before, until you find that the ninth stands as second on the bow, at which time you can release it. You will then have only the eighth left on the bow; you must again put on all the rings to the right hand, beginning by putting up the first and second together, till you find the eighth standing as second on the bow, or in its proper position for releasing; and so you proceed until you find all the rings finally released. As you commence your operations with all the rings ready fixed on the bow, you will release the tenth ring in one hundred and seventy moves; but as you then have only the ninth on, and as it is necessary to bring on again all the rings up to the ninth, in order to release the ninth, and which requires fifteen moves more, you will, consequently, release the ninth ring in two hundred and fifty-six moves; and, for your encouragement, your labor will diminish, by one half, with each following ring which is finally released. The eighth comes off in one hundred and twenty-eight moves, the seventh in sixty-four moves, and so on, until you arrive at the second and first rings, which come off together, making six hundred and eighty-one moves, which are necessary to take off all the rings the experience you will by this time have acquired, only necessary to say, that to replace the rings, you by putting up the first and second together, and following precisely the same system as before.

MOVING THE KNIGHT OVER ALL THE SQUARES ALTERNATELY.

problem respecting the placing the knight on given square, and moving him from that square y house on the board, has not been thought un- y the attention of the first mathematicians. Euler, m, De Montmart, De Moivre, De Majron, and , have all given methods by which this feat might be plished. It was reserved, however, for the present ry to lay this down on a general plan; and the only sh writer who has noticed this is Mr. George Walker, *Treatise on Chess.* The plan is this: Let the knight ced on any square, and move him from square to e, on the principle of always playing him to that from which, in actual play, he would command the other squares; observing, that in reckoning the es commanded by him you must omit such as he has y covered. If, too, there are two squares, on both of his powers would be equal, you may move him to

EULER'S METHOD.



ers, placing one on every square; and, when you clearly understand it, you may astonish your friends by inviting them to station the knight on any square they like, and engaging to play him, from that square, over the remaining sixty-three in sixty-three moves. When the automaton Chessplayer was last exhibited in England, this was made part of the wonders he accomplished, though as the above plan was not then known here, he could not adopt it, but used something like the method laid down by Euler, and which we subjoin.

Our young Chess-players must remember that it does not matter on which square the knight is placed at starting; as, by acquiring the plan by heart, which is soon done, he can play him over all the squares from any given point, his last square being at the distance of a knight's move from his first. It is obvious that this route may be varied many ways, and we have often amused ourselves by trying to work it on a slate.

ANOTHER METHOD.

The problem of the knight's covering successively each square of the board, has, in all ages, attracted the attention of the first mathematicians; it is only lately, however, that this very ingenious system for performing the feat without seeing the board, has been invented by an Edinburgh gentleman. We well recollect the surprise occasioned among chess-amateurs when it was first performed; indeed it was generally considered a greater mental effort than that of playing three games of chess at the same time, without seeing the board.

The general rule for moving the Knight upon all the squares of the board, is to commence by moving him to that square which commands the fewest points of attack, and by continuing this principle he will occupy all the squares in rotation, observing, that if on any two or more squares his power would be equal, he may be placed indifferently on either of such squares. Thus we see, that there are different routes which the Knight-errant may take in his progress over all the board; still, whichever of these routes for covering the sixty-four squares may be adapted, each move forms, if we may so express ourselves, a link in an endless chain, so that whatever square we start from, by taking of the chain, a Knight's move distant from the square r departure. Consequently, if any person could com- memory the consecutive moves of any one route over oard, he would be able to start from any one square in oute, in the same manner that any of us, if required ention the numerals up to sixty-four, could as easily at thirty and end at twenty-nine, as if we started at nd ended at sixty-four.

ese considerations greatly reduce the apparent impos- ty of performing the feat; but the reader will exclaim, at an immense undertaking it would be, to commit to ory the moves forming a Knight's route over the sixty- squares!" and we reply, "Certainly it would be, if we the language of Chess to designate the squares;" and n lies the beauty of the invention. A set of names, e application can be understood at a glance, are in-

t.	Let.	Ket.	Het.	Get.	Fet.	Det.	Bet.
n.	Len.	Ken.	Hen.	Gen.	Fen.	Den.	Ben.
x.	Lix.	Kix.	Hix.	Gix.	Fix.	Dix.	Bix.
v.	Liv.	Kiv.	Hiv.	Giv.	Fiv.	Div.	Biv.
r.	Lor.	Kor.	Hor.	Gor.	For.	Dor.	Bor.
e.	Lee.	Kee.	Hee.	Gee.	Fee.	Dee.	Bee.
o.	Loo.	Koo.	Hoo.	Goo.	Foo.	Doo.	Boo.
n.	Lun.	Kun.	Hun.	Gun.	Fun.	Dun.	Bun.
	L	K	H	G	F	D	B

vented for the squares, and the performer of the feat, having learned a route of the Knight, expressed by these invented names, thinks in the new language which he directs the moves in the terms of chess—just as many of us *think* in English, when we are writing or speaking French.

The diagram given above represents the chess-board; the distinction of white and black squares is not necessary for our purpose. The files, commencing from the right hand are distinguished by the consonants in alphabetical succession (C and J are, for obvious reasons, omitted.) Thus, the King's rook's file is known as B, the King's Knight's as D, the King's Bishops as F, the King's as G, the Queen's as H, the Queen's Bishop's as K, the Queen's Knight's as L, and the Queen's Rook's as M. This is all that has to be learned, in this system of Chess notation; for the lines of squares tell their own numbers—one being *un*, two *oo*, three *ee*, four *or*, six *ix*, seven *en*, eight *et*—being, in fact, the terminal sounds of the first eight numerals. Bun being B *one*, or King's Rook's square; Gix, G *six*, or King's sixth square. We consider it quite unnecessary to say another word in explanation of this system; its ingenious simplicity causes it to be understood and learned at a glance. All that is required now is, to select a Knight's route over all the squares of the board, and commit it to memory, not in the complicated terms of Chess, but in these simple equivalents. Suppose we start from the Queen's Knights seventh square, *len*, the route will be as follows:

Len	het	fen	bet.	Dix	bor	doo	gun.
Koo	mun	lee	kun.	Moo	kee	goo	dun.
Bee	div	ben	fet.	Hen	let	mix	lor.
Hee	kiv	gor	hix.	Liv	men	ket	gen.
Kix	giv	fee	hor.	Gix	for	hiv	gee.
Fiv	den	biv	dee.	Bun	foo	hun	loo.
Mor	lix	met	ken.	Got	fix	det	bix.
Dor	boo	fun	hoo.	Lun	mee	kor	miv

The only trouble is to commit this cabalistical-looking table to memory, which may be all accomplished in half an hour; the process will be greatly facilitated by the learner frequently playing the route over on the chess-board. He will be amply rewarded by the astonishment he htening pages; and, if not quite a first-rate player, he will quire an intimate knowledge of the peculiar powers and 'plexing peregrinations of the eccentric *Caballeros*, who

> "—— fiery coursers guide
> With headlong speed throng war's empurpled tide;
> Alert and brave they spring amidst the fight,
> From white to black, from black to candid white."

1	2	3	4	5	6	7	8
9	10	11	12	13	14	15	16
17	18	19	20	21	22	23	24
25	26	27	28	29	30	31	32
33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48
49	50	51	52	53	54	55	56
57	58	59	60	61	62	63	64

ANOTHER METHOD.

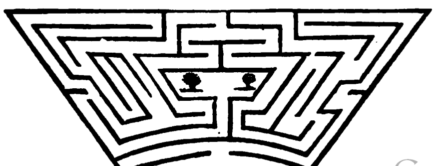
Let Black Queen's Rook's Square count 1, (as in the dia- am,) Black King's Rook 8, and count all the other Squares the same way from 9 to 64. Place the Knight upon Black ng's Rook's Square, 8, and move as follows: 23, 40, 55, 61, , 57, 42, 25, 10, 4, 14, 24, 39, 56, 62, 52, 58, 41, 26, 9, 3, 13, 7, , 32, 47, 64, 54, 60, 50, 33, 18, 1, 11, 5, 15, 21, 6, 16, 31, 48, , 53, 59, 49, 34, 17, 2, 12, 27, 44, 38, 28, 43, 37, 20, 35, 45, , 36, 18, 29, and 46. It may be well to chalk the figures the board, as a guide, until the feat is well understood.

47. ROSAMOND'S BOWER.

The subjoined cut represents, it is said, the Maze at Wood- ock, in which King Henry placed Fair Rosamond to pro- ct her from the Queen. It certainly is a most ingenious ontrivance, and may be made productive of much amuse- ent. The puzzle consists in getting, from one of the nu- erous outlets, to the bower in the center, without crossing ıy of the lines.

ROSAMOND'S BOWER.

48. A MAZE OR LABRYINTH.

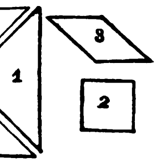


This maze is a correct ground-plan of one in the gardens

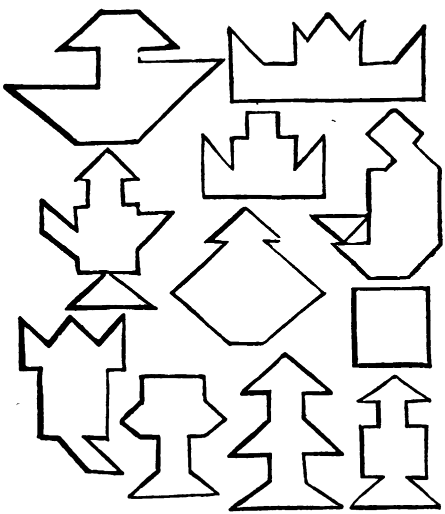
ed to it, of which we are aware, but its labyrinthine
s occasion much amusement to the numerous holiday
ies who frequent the palace grounds. The puzzle is
et into the center, where seats are placed under two
trees; and many are the disappointments experienc-
efore the end is attained; and even then, the trouble
t over, it beingquite as difficult to get *out* as to get *in*.

49. THE CHINESE PUZZLE.

is puzzle, being one for the purpose of constructing dif-
t figures by arranging variously-shaped pieces of card



or wood in certain ways, requires no separate explanation. Cut out of very stiff cardboard, or thin mahogany, which is decidedly preferable, seven pieces, in shape like the annexed figures and bearing the same proportion to each other; one piece must be made in the
e of figure 1, one of figure 2, and one of figure 3, and
of each of the other figures. The combinations of which

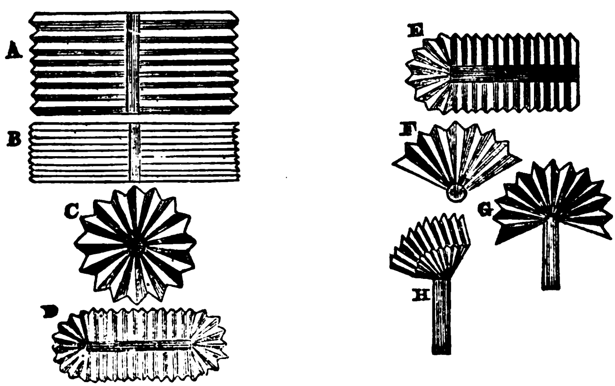


e figures are susceptible, are almost infinite; and we
ein a representation of a few of the most curious. It is

to be borne in mind, that all the pieces of which the puzzle consists, must be employed to form each figure.

50. TROUBLE-WIT.

Take a sheet of stiff paper, fold it down the middle of the sheet, longways; then turn down the edge of each fold outward, the breadth of a penny; measure it as it is folded, into three equal parts, with compasses, which make six divisions in the sheet; let each third part be turned outward, and the other, of course, will fall right; then pinch it a quarter of an inch deep, in plaits, like a ruff, so that, when the paper lies pinched in its form, it is in the fashion represented by A; when closed together, it will be like B; unclose it again, shuffle it with each hand, and it will resemble the shuffling of a pack of cards; close it and turn each corner inward with your fore finger and thumb, it will appear as a rosette for a lady's shoe, as C; stretch it forth, and it will resemble a cover for an Italian couch, as D; let go your fore finger at the lower end, and it will resemble a wicket, as E; close it again, and pinch it at the bottom, spreading the top, and it will represent a fan, as F; pinch it half way, and open the top, and it will appear in the form shown by G; hold it in that form, and with the thumb of your left hand turn out the next fold, and it will be as H.



In fact, by a little ingenuity and practice, Trouble-wit may be made to assume an infinite variety of forms, and be productive of very considerable amusement.

ANSWERS TO PRACTICAL PUZZLES.

1. THE CHINESE CROSS ANSWER.

Place Nos. 1 and 2 close together, as in Fig. 1; then hold em together with the finger and thumb of the left hand rizontally and with the square hole to the right. Push . 3—placed in the same position *facing you* (*a*) in No. 4—rough the opening at K, and slide it to the left at A, so it the profile of the pieces should be as in Fig. 2. Now

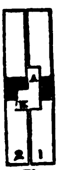


Fig 1

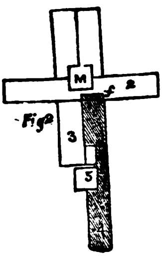


Fig 2

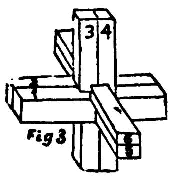
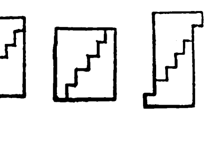


Fig 3

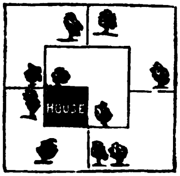
sh No. 4 *partially* through the space from below upwards, seen in f, Fig. 2 Place No. 5 cross-ways upon the part so that the point R is directed upwards to the right hand le; then push No. 4 quite through, and it will be in the sition shown by the dotted lines in Fig. 2. All that now nains is to push No. 6—which is the key—through the ening M and the cross is completed as in Fig. 3.

2. ANSWER TO THE "PARALLELOGRAM."



Divide the piece of card into five steps, and by shifting the position of the pieces, the desired figures may be obtained.

3. THE DIVIDED GARDEN ANSWER



4. ANSWER TO THE ENDLESS STRING.

The string must be put through the armhole, and over the head, then through the opposite armhole; then the hand must be put up underneath the waistcoat, and the string drawn down around the body until the former drops down about the waist, when the experimenter may jump out of it and claim his coat.

5. ANSWER TO THE CHINESE MAZE.

KOONG-SEE'S WHISPERS.

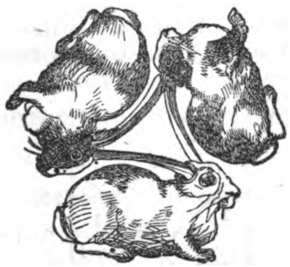
A Why linger near the fence? a word or two
Would kindle up a flame for ever true.
B Beware of rivals—mischief hovers near;
Or, worse mischance, parental frowns appear.
C Favored indeed, the open door to gain—
Let no dishonor now your conduct stain.
E The ground is rough, and difficult the road;
But, faint not, thou shalt reach thy love's abode!
F Against thy course runs the opposing tide,
And waves of trouble cast thy hopes aside.
G A modest competence thy lot will be;
But richer joys than wealth are stored for thee.
A Take heed! take heed! a strange transforming doom
May fix thy love, but never let it bloom.
J Be not too rash—nor leap the Bridge of Love,
Leaving fond eyelids, moist with tears, above.
K What dost thou on the house top? do not steal
Thy love, but win by dutiful appeal!
L A barren path this way thy footsteps tread;
Thy heart will soon grow cold, thy love be fled.
M Thou hast a friend can help thy onward way—

'oy ! thou hast reached, at length, the wedding ring ;
et white-robed maidens orange blossoms bring ;
'h may your years of happy wedlock be
right as your hopes, and from misgiving free.

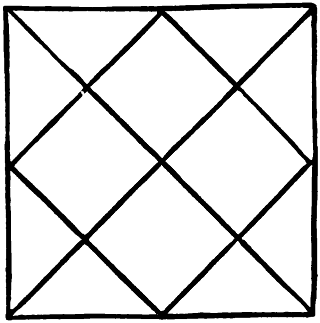
6. ANSWER TO VERTICAL LINE PUZZLE.

NINE

7. THE THREE RABBITS, ANSWER

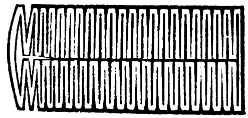


8. THE ACCOMMODATING SQUARE.



9. ANSWER TO THE CIRCLE PUZZLE.

10. ANSWER TO THE CUT CARD PUZZLE.

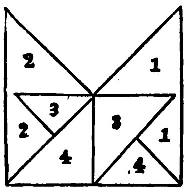


Double the cardboard or leather lengthways down the middle, and then cut first to the right, nearly to the end, (the narrow way,) and then to the left, and so on to the end of the card; then open it and cut down the middle, except the two ends. The diagram shows the proper cuttings. By opening the card or leather, a person may pass through it. A laurel leaf may be treated in the same manner.

11. ANSWER TO THE BUTTON PUZZLE.

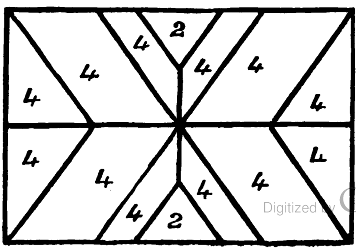
Draw the narrow slip of the leather through the hole, and the string and buttons may be easily released.

12. ANSWER TO THE QUARTO PUZZLE.

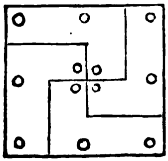


Divide the figure in the direction shown by the lines, and you will have four pieces of the same size and shape.

13. ANSWER TO THE PUZZLE OF FOURTEEN.



14. ANSWER TO THE SQUARE AND CIRCLE PUZZLE.



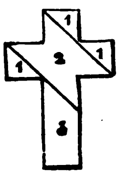
15. THE SCALE AND RING PUZZLE.

The puzzle consists in releasing the ring; to effect which, ou have only to reverse the former process, by passing the op through the holes D, C, B, and A, in the manner before escribed.

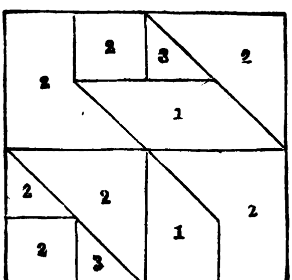
16. ANSWER TO THE HEART PUZZLE.

Loosen the string, and draw the loop through the hole No. ; pass it behind, and bring it through No. 1, and slip it ver the smaller heart; then the string may be easily drawn ut.

17. ANSWER TO THE CROSS PUZZLE.



18. ANSWER TO THE YANKEE SQUARE

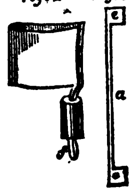


Arrange the pieces as shown in the figure above.

19. ANSWER TO THE CARD PUZZLE.

In order to take the pipe off, the card must be doubled (as in Fig. 2), the slip passed through it, until there is sufficient of the loop below the pipe to allow one of the square ends of the slip (Fig. 3) being passed through it. Fig. 3 is then to be taken away, and the pipe slipped off. The card for this puzzle must be cut very neatly, the puzzle handled gently, and great care taken that, in doubling the card to put on the pipe no creases are made in it, as they would in all probability spoil your puzzle, by betraying to an acute spectator the mode of operation.

Fig. 2 Fig. 3



20. ANSWER TO THE THREE SQUARE PUZZLE.

Take away the pieces numbered 8, 10, 1, 3, 13, and three squares only will remain.

21. ANSWER TO THE CYLINDER PUZZLE.

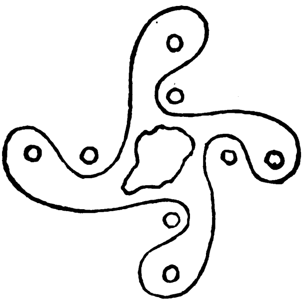
Take a round cylinder of the diameter of the circular hole, and of the height of the square hole. Having drawn a straight line across the end, dividing it into two equal parts, cut an equal section from either side to the edge of the circular base, a figure like that represented by the woodcut in the margin would then be produced, which would fulfill the required conditions.

1 2

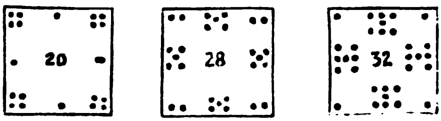
22. ANSWER TO THE FOUR TENANTS.

My ground is divided,
My tenants at work,
And he'll profit most
Who does not labor shirk
So let them toil on
Till cabbages rise,
And carrots and turnips
To gladden their eyes.
Gooseberries and currants
And raspberries too,
Shall amply repay
The work they may do.

23. THE PUZZLE WALL



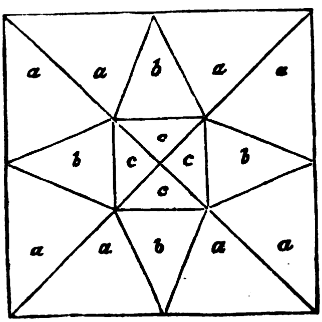
24. ANSWER TO THE NUN'S PUZZLE.



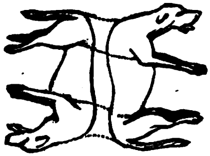
25. HORSE SHOE PUZZLE.

y cutting off the upper circular part containing two of pins, and by changing the position of the pieces, ther cut will divide the horse shoe into six portions, h containing one pin.

26. ANSWER TO CARD SQUARE PUZZLE.

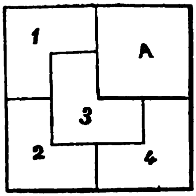


27. THE DOGS PUZZLE ANSWERED SEE DOTTED LINES.

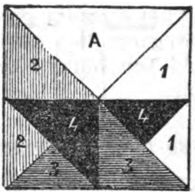


28. PUZZLE OF THE TWO FATHERS.

The first father divided the land in this way :

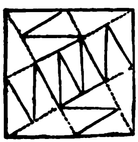


The second father divided the land in the following manner :



The different colors represent the several sons' portions.

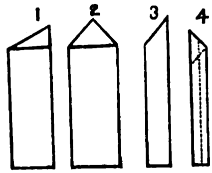
29. THE TRIANGLE PUZZLE.



The solution of this puzzle may be easily acquired by observing the dotted lines in the engraving ; by which it will be seen that four triangles are to be placed at the corners, and a small square made in the center. When this is done, the rest of the square may be

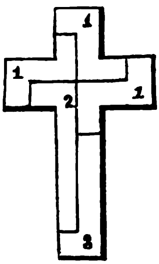
30. ANSWER TO CUTTING OUT A CROSS PUZZLE.

Take a piece of writing paper about three times as long it is broad, say six inches long and two wide. Fold the pper corner down, as shown in Fig. 1 ; then fold the other pper corner over the first, and it will appear as in Fig. 2 ; ou next fold the paper in half lengthwise, and it will ppear as in Fig. 3. Then the last fold is made lengthwise

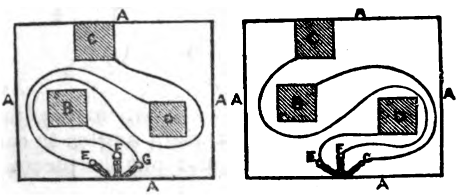


lso, in the middle of the paper, and it will exhibit the orm of Fig. 4, which, when cut through with the scissors the direction of the dotted line, willl give all the forms entioned.

31. ANSWER TO ANOTHER CROSS PUZZLE.

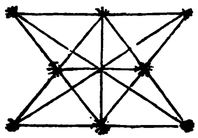


32. ANSWER TO THE FOUNTAIN PUZZLE



33. ANSWER TO THE STAR PUZZLE.

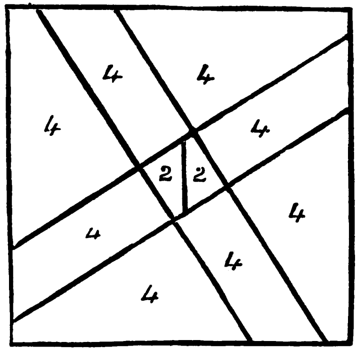
Good-tempered friends ! here *nine* stars see :
Ten rows there are, in each row *three!*



34. THE COUNTER PUZZLE ANSWER.

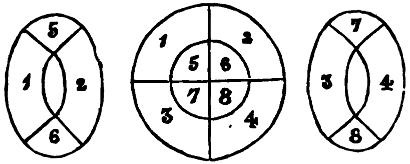
Place 4 on 7, 6 on 2, 1 on 3, and 8 on 5 ; *or*, 5 on 2, 3 on 7, 8 on 6, 4 on 1, &c.

35. ANSWER TO THE JAPAN SQUARE.



36. ANSWER TO THE CABINET MAKERS' PUZZLE.

The cabinet-maker must find the center of the circle, and strikc another circle, half the diameter of the first, and hav-



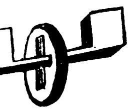
ing the same center. Then cut the whole into four parts, by means of two lines drawn at right angles to each other, then cut along the inner circle and put the pieces together as in the above diagram.

37. ANSWER TO THE STRING AND BALLS PUZZLE.

raw the loop well down, slipping either ball through it. ı it through the hole at the extremities, pass it over the , and draw it through again. The same process must epeated with the other ball ; the loop can then be drawn ugh the hole in the center, and the ball will slide along cord until it reaches the other side. The string is then aced, having both balls on the same side.

here is another and perhaps a neater way of performing trick. Draw the loop through the central hole, and g it through far enough to pass one of the balls through. ing done this, draw the string back, and both balls will ound on the same side.

38. ANSWER TO THE DOUBLE-HEADED PUZZLE.



Arrange them side by side in the short arms of the cross, draw out the center piece, and the rest will follow easily. The reversal of the same process will put them back again.

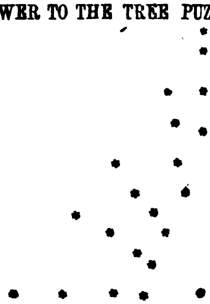
39. ARITHMETICAL PUZZLE.

he four figures are 8888, which being divided by a line wn through the middle, become $\frac{oooo}{oooo}$, the sum of which is ıt 0s, or nothing.

40. GRAMMATICAL PUZZLE.

'ake away L in the subjunctive "Let" at the beginning the first line, and substitute S, and so turn it into the imative "Set," when the changes which necessarily follow l be immediately apparent.

41. ANSWER TO THE TREE PUZZLE.



42. ANSWER TO AN EPITAPH ON ELLINOR BACHELLOR, AN OLD PIE WOMAN.

Beneath in the dust
The mouldy old crust
Of Nell Bachellor lately was shoven :
Who was skilled in the arts
Of pies, custards, and tarts,
And knew every use of the oven.
When she'd liv'd long enough,
She made her last puff,
A puff by her husband much prais'd :
Now here she doth lie,
To make a dirt pie,
In hopes that her crust will be rais'd.

43. ANSWER TO A CURIOUS LETTER.

"Sir, between friends, I understand your overbearing disposition ; a man even with the world is above contempt, whilst the ambitious are beneath ridicule."

44. ANSWER TO THE PUZZLE INSCRIPTION

By the use of the single vowel E, the following couplet was formed,

PERSEVERE YE PERFECT MEN,
EVER KEEP THESE PRECEPTS TEN

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