1. An Op Shop sold four items yesterday; a book, a desk, a lamp and an oil painting.
Each went to a different buyer; (Mr Brown, Mr Gray, Ms Green and Mr White).
From the following clues, work out who bought which item, and at what price.

	Mr Brown	Mr Gray	Ms Green	Mr White	$	$	$	$
Book								
Desk								
Lamp								
Painting								
$								
$								
$								
$								

(i) Mr Brown paid $50 for his item, which wasn't the book

(ii) Mr Gray's item cost twice as much as the painting

(iii) The item that sold for $250 wasn't the book

(iv) The desk was the most expensive item at $400. A man bought it.

2.

F i g u r e   I t   O u t

If three hours ago it was as long after two o'clock in the afternoon as it was before two o'clock in the morning, what time is it now?

3.

F i g u r e   I t   O u t

It takes Farmer Fred four hours to sow a field. His son requires six hours to sow the same field. How long would it take them to sow the field if they work cooperatively together on the job?
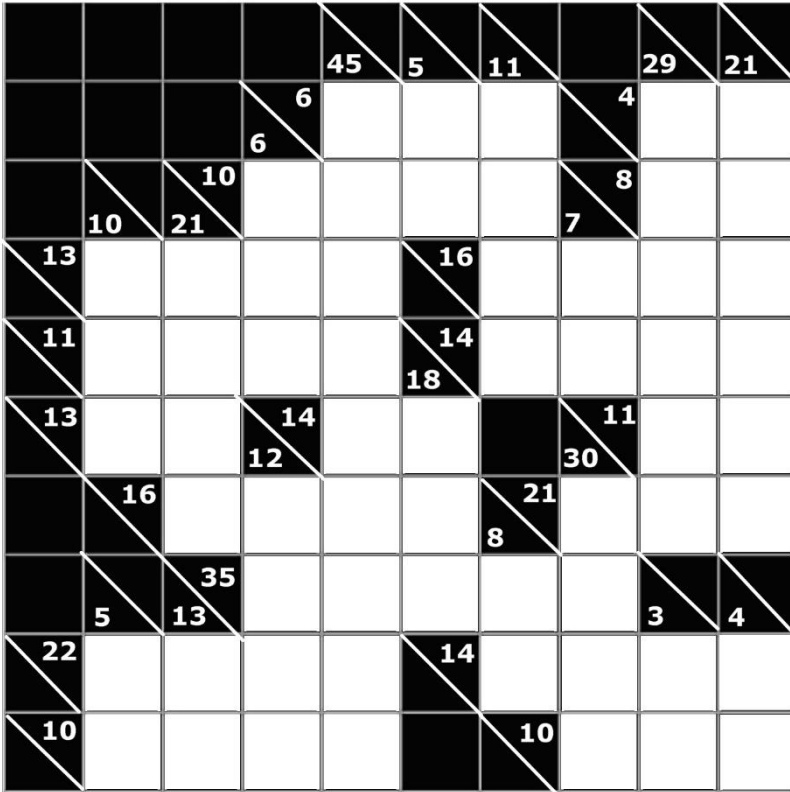
4.

F i g u r e   I t   O u t

Adam, Beth, Chris, Dell and Eric entered a contest to guess how many ping-pong balls there were in a large glass jar.

Adam guessed 25, Beth guessed 24, Chris guessed 23, Dell guessed 21 and Eric guessed 19.

Two of them were out by 1. One was wrong by 5, and another was wrong by 3.

One of them was correct. Who was it, and how many ping-pong balls were in the jar?

5.

This is a Cross Sum puzzle.
It is solved by inserting one digit from 1 to 9 into each white square so that each horizontal or vertical string of digits adds up to a given target number.
For example means "find two digits that add up to 7"
and this
means "find three digits that add up to 9"

The digits you use must agree horizontally and vertically, just like the letters in a crossword puzzle

You can only use each digit once in any string. For example, the target number 16 can be made up from 9 and 7, NOT 8 and 8.

6.

Parcel Pickle

When sorting the mail, Postman Pete found four parcels without labels, and the four labels that had fallen off the parcels. He had no idea which label belonged to which parcel, so he decided to take a guess, and stuck one label back on each parcel at random.
What was the probability that he got every parcel correctly labeled?

7.

Figure It Out

Nine years ago, Jessie was seven times the age of her daughter.
Today, their ages add up to 66. How old are Jessie and her daughter?

8.

TRUE STORY

Three friends discussed a best-selling celebrity novelist who was widely suspected of having a team of ghost-writers actually writing the books in her name. Only one of them knew the truth.

"She has written hundreds of books", Gill said.

"No she hasn't", Jane said. "She has written fewer than that"

"Well, she has written at least one", Sheila said.

If **only one** of those three statements is true, how many books has the novelist genuinely written?

9. The local gym runs exercise, sports, nutrition and lifestyle classes which are conducted by its staff.

On Thursdays five classes run in the morning and a further five in the afternoon, as shown in the grid below. Five staff members each take one morning and one afternoon class. From the clues below, and with the aid of the grid, work out which staff member is responsible for each morning and each afternoon activity.

(i) The three women are Amy, the one who takes basketball in the morning and the one who takes dance in the afternoon.

(ii) The two who run squash and volleyball in the morning are the same two who take athletics and self-defence in the afternoon.

(iii) Neither Joe nor Rod run the athletics session.

(iv) Table Tennis and Archery are not taken by the same person.

(v) Eve takes gymnastics

(vi) The squash supervisor isn't Amy.

(vii) Rod doesn't teach self-defence.

	MORNING					AFTERNOON				
	Basketball	Squash	Table Tennis	Gymnastics	Volleyball	Archery	Dance	Self-Defence	AFL Football	Athletics
Amy										
Joe										
Eve										
Rod										
Sue										
Archery										
Dance										
Self-Defence										
AFL Football										
Athletics										

(The afternoon rows — Archery, Dance, Self-Defence, AFL Football, Athletics — are cross-referenced only against the MORNING columns.)

10. Four speakers at a convention (Ed, Max, Sophie and Tracy) had their lunch provided; each was expected to choose two of the following eight items: a pastie, a sausage roll, a chicken roll, a hamburger, and four sandwiches (ham, tuna, salad and cheese). However, in practice the earliest of the four to arrive at the lunch venue had a free choice; the last had to take the two remaining items.

Using the following clues and the table below, determine the order in which the four speakers arrived at the lunch venue, and the two food items each took.

Order	Speaker's name	Meal item 1	Meal Item 2

(i) Max took the hamburger and one of the sandwiches.

(ii) The sausage roll was gone by the time Sophie arrived.

(iii) Tracy saw the ham sandwich when she arrived, but didn't take it.

(iv) The tuna sandwich was selected before the salad sandwich.

(v) The first person to arrive chose either two sandwiches or no sandwiches at all.

(vi) Sophie selected the cheese sandwich some time before Tracy took the pastie.

Answers:

1. Mr Brown bought the painting for $50. Mr Gray bought the book for $100
Ms Green bought the lamp for $250, and Mr White paid $400 for the desk.

2. 11 pm

3. 2 hours 24 minutes

4. Beth was correct with a guess of 24 ping-pong balls

5.

				45	5	11		29	21
			6⟍⁶	1	3	2	4	1	3
		10⟍ 10⟍²¹	3	4	2	1	8⟍⁷	7	1
13	3	2	1	7	16	5	6	3	2
11	1	3	2	5	14⟍¹⁸	3	1	4	6
13	6	7	14⟍¹²	9	5		11⟍³⁰	6	5
	16	9	1	2	4	21⟍⁸	9	8	4
	5⟍ 13⟍³⁵	6	8	9	5	7	3⟍	4
22	4	9	3	6	14	3	8	2	1
10	1	4	2	3		10	6	1	3

6. One chance in sixteen, or expressed as odds, 15:1.

7. Jessie is 51; her daughter is 15.

8. none

9. Amy, volleyball in the morning, athletics in the afternoon.
   Joe, squash in the morning, self-defence in the afternoon.
   Eve, gymnastics in the morning, dance in the afternoon.
   Rod, table-tennis in the morning, AFL Football in the afternoon.
   Sue, basketball in the morning, archery in the afternoon.

10. First, Ed; chicken roll & sausage roll.
    Second, Sophie; tuna sandwich & cheese sandwich
    Third, Tracy; salad sandwich & pastie
    Fourth, Max: hamburger & ham sandwich

SOLUTIONS:

1. Three prices are given, and the fourth has to be worked out. You could start by putting the prices into the puzzle grid

Now start recording the information from the clues with ✓ and X

Clue (i) Mr Brown paid $50 for his item, which wasn't the book

(iii) The item that sold for $250 wasn't the book

(iv) The desk was the most expensive item at $400. A man bought it.

	Mr Brown	Mr Gray	Ms Green	Mr White	$50	$250	$400	$?
Book	X				X	X	X	
Desk		X			X	X	✓	X
Lamp							X	
Painting							X	
$50	✓	X	X	X
$250	X			
$400	X		X	
$?	X			

Now if you look at the grid you'll notice that the book is the one which went for the unknown price.

Going back to Clue (i) you know that Mr Brown wasn't the man who bought the desk because he only paid $50

From (ii) Mr Gray's item cost twice as much as the painting you know that

-Mr Gray didn't buy the painting
-The painting didn't cost $250 because then Mr Gray would have paid $500. Clue (iv) says the most expensive item cost $400.

	Mr Brown	Mr Gray	Ms Green	Mr White	$50	$250	$400	$?
Book	X				X	X	X	✓
Desk	X		X		X	X	✓	X
Lamp							X	X
Painting		X					X	X
$50	✓	X	X	X
$250	X			
$400	X		X	
$?	X			

The painting therefore cost $50; Mr Brown bought the painting
Mr Gray paid $100 for the book
The lamp cost $250 and Ms Green bought it
Mr White must therefore be the man who paid $400 for the desk.

	Mr Brown	Mr Gray	Ms Green	Mr White	$50	$250	$400	$100
Book	X	✓	X	X	X	X	X	✓
Desk	X	X	X	✓	X	X	✓	X
Lamp	X	X	✓	X	X	✓	X	X
Painting	✓	X	X	X	✓	X	X	X
$50	✓	X	X	X
$250	X	X	✓	X
$400	X	X	X	✓
$100	X	✓	X	X

2. The interval between two o'clock in the afternoon and two o'clock the next morning is twelve hours. Three hours ago it was midway between 2 pm and 2 am, i.e. (2 + 6) = 8 pm.
So it's 11 pm now

3. The time rate at which farmer Fred sows his field is 1 field per four hours, or one quarter of a field per hour. His son can manage a rate of one sixth of a field per hour. Working together they should be able to sow:
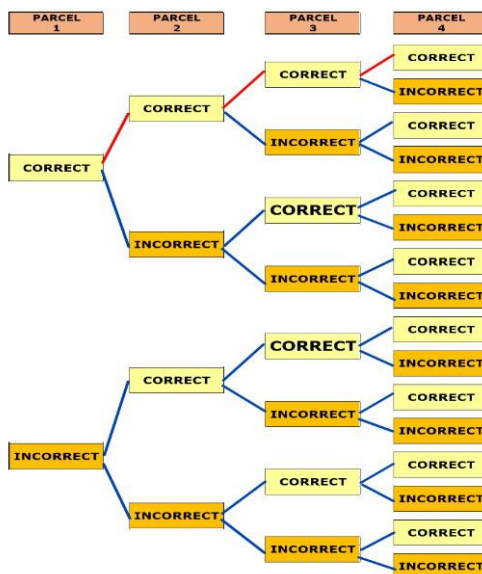
$$\frac{1}{4} + \frac{1}{6} = \frac{3+2}{12} = \frac{5}{12}$$ of a field each hour.

The combined time for one field is $\frac{12}{5}$ of an hour or $2\frac{2}{5}$ hours or two hours 24 minutes.

4. Trial-and-error. All of the five guesses meet some of the criteria, but only the number 24 meets them all

5. See above

6. Probabilities are usually calculated using an equation, but this probability tree diagram illustrates the one in 16 chance of all four parcels receiving the correct label, with fifteen other equally likely outcomes.

7. Let Jessie's age now be **j** years; let her daughter's age now be **d** years; then Jessie's age 9 years ago was (**j** - 9); her daughter's age was (**d** - 9)

        j + **d** = 66   [1]

        (**j** - 9) = 7(**d** - 9)   [2]

        Substitute (66 – **d**) for **j** in equation [2]

        (66 – **d** - 9) = 7(**d** – 9)

        57 – **d** = 7**d** – 63

        8**d** = 120

        d = 15

        j + 15 =66

        j = 51

8. If *"She has written hundreds of books"* is a true statement, then so is "*Well, she has written at least one".* But **only one** statement is true. *"She has written hundreds of books"* must be an incorrect statement.

The statement "*She has written fewer than that*" is a direct reply to *"She has written hundreds of books"*, therefore means *"She has written fewer than hundreds of books"*

If the statement "*Well, she has written at least one"* is true, then so is *"She has written fewer than hundreds of books".* **They can't both be true**.

The only solution is for the single correct statement to be *"She has written fewer than hundreds of books"* That means "*Well, she has written at least one"* is an incorrect statement, which further implies that the novelist has actually written **no** books.

9.

From clue (i)
- Amy doesn't take basketball or dance
- The basketball and dance supervisors are two different women

Clue (ii)
The two who run squash and volleyball in the morning are the same two who take athletics and self-defence in the afternoon.

Clue (iii) Neither Joe nor Rod run the athletics session.

Clue (iv) Table Tennis and Archery are not taken by the same person.

	MORNING					AFTERNOON				
	Basketball	Squash	Table Tennis	Gymnastics	Volleyball	Archery	Dance	Self-Defence	AFL Football	Athletics
Amy	X						X			
Joe	X						X			X
Eve										
Rod	X						X			X
Sue										
Archery		X	X		X					
Dance	X	X			X					
Self-Defence	X		X	X						
AFL Football		X			X					
Athletics	X		X	X						

Clue (v) Eve takes gymnastics, When that information is recorded, it only leaves Sue as the supervisor of basketball.

That in turn reveals Amy as the person who takes athletics and Eve as the person who takes dance.

That in turn leaves Sue as the person who takes both basketball **and** archery.

	MORNING					AFTERNOON				
	Basketball	Squash	Table Tennis	Gymnastics	Volleyball	Archery	Dance	Self-Defence	AFL Football	Athletics
Amy	X		X	X		X	X	X	X	✔
Joe	X			X		X	X			X
Eve	X	X	X	✔	X	X	✔	X	X	X
Rod	X			X		X	X			X
Sue	✔	X	X	X	X	✔	X	X	X	X
Archery	✔	X	X	X	X					
Dance	X	X	X	✔	X					
Self-Defence	X		X	X						
AFL Football	X	X			X	X				
Athletics	X		X	X						

Clue (vi) The squash supervisor isn't Amy. Amy takes volleyball, and we already know she takes athletics.
That reveals that the person who runs table tennis in the morning runs AFL football in the afternoon.

Clue (vii) Rod doesn't teach self-defence. His afternoon role is therefore AFL football which also makes him the person who runs table tennis in the morning.
Joe therefore runs squash and self-defense.

	Basketball	Squash	Table Tennis	Gymnastics	Volleyball	Archery	Dance	Self-Defence	AFL Football	Athletics
Amy	X	X	X	X	✓	X	X	X	X	✓
Joe	X	✓	X	X	X	X	X	✓	X	X
Eve	X	X	X	✓	X	X	✓	X	X	X
Rod	X	X	✓	X	X	X	X	X	✓	X
Sue	✓	X	X	X	X	✓	X	X	X	X
Archery	✓	X	X	X	X					
Dance	X	X	X	✓	X					
Self-Defence	X	✓	X	X	X					
AFL Football	X	X	✓	X	X					
Athletics	X	X	X	X	✓					

10. A reasonable way to start is to try to establish the order in which the speakers arrived for lunch. If we start with all four speakers in all four places, we can use the clues for elimination purposes
(ii) The sausage roll was gone by the time Sophie arrived; **Sophie wasn't first**
(iii) Tracy saw the ham sandwich when she arrived, but didn't take it. **Tracy wasn't last.**
(vi) Sophie selected the cheese sandwich some time before Tracy took the pastie.
Sophie wasn't last: Tracy wasn't first. Tracy's position is at least one later than Sophie's.
Clue (i) and Clue (v) considered together:
(i) Max took the hamburger and one of the sandwiches.
(v) The first person to arrive chose either two sandwiches or no sandwiches at all.
The first person to arrive wasn't Max. By elimination, it was Ed.
If neither Sophie nor Tracy was first or last, they must share 2nd and 3rd position. But Sophie came before Tracy, so Sophie is in 2nd, Tracy is in 3rd, leaving Max in 4th.

Order	Speaker's name			Meal item 1	Meal Item 2
1	**ED**	Max	Sophie	Tracy	
2	Ed	Max	**SOPHIE**	Tracy	
3	Ed	Max	Sophie	**TRACY**	
4	Ed	**MAX**	Sophie	Tracy	

Now to put the food items in order:

Clue (1) Max took the hamburger and one of the sandwiches.
Clue (ii) The sausage roll was gone by the time Sophie arrived.
Clue (v) The first person to arrive chose either two sandwiches or no sandwiches at all.

Order	Speaker's name	Meal item 1	Meal Item 2
1	ED	SAUSAGE ROLL	pastie, chicken roll
2	SOPHIE	pastie, chicken roll, ham sandwich, tuna sandwich, salad sandwich, cheese sandwich	pastie, chicken roll, ham sandwich, tuna sandwich, salad sandwich, cheese sandwich
3	TRACY	pastie, chicken roll, ham sandwich, tuna sandwich, salad sandwich, cheese sandwich	pastie, chicken roll, ham sandwich, tuna sandwich, salad sandwich, cheese sandwich
4	MAX	HAMBURGER	ham sandwich, tuna sandwich, salad sandwich, cheese sandwich

Clue (iii) Tracy saw the ham sandwich when she arrived, but didn't take it.
Clue (iv) The tuna sandwich was selected before the salad sandwich.

Order	Speaker's name	Meal item 1	Meal Item 2
1	ED	SAUSAGE ROLL	pastie, chicken roll
2	SOPHIE	TUNA SANDWICH	pastie, chicken roll, cheese sandwich
3	TRACY	SALAD SANDWICH	pastie, chicken roll, cheese sandwich
4	MAX	HAMBURGER	HAM SANDWICH

Clue (vi) Sophie selected the cheese sandwich some time before Tracy took the pastie.

Order	Speaker's name	Meal item 1	Meal Item 2
1	ED	SAUSAGE ROLL	CHICKEN ROLL
2	SOPHIE	TUNA SANDWICH	CHEESE SANDWICH
3	TRACY	SALAD SANDWICH	PASTIE
4	MAX	HAMBURGER	HAM SANDWICH