VIC SKEPTICS

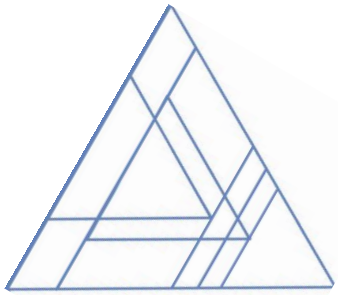
Logic and Maths Puzzles 104 March 2021

1. Four authors were short-listed for a prize in the History Books category. From the clues, and with the aid of the grid supplied, determine each author's full name, the title of his or her book, and the position he or she achieved.

	Boyd	Cline	Smith	Troy	1st	2nd	3rd	4th	*Pion.*	*Pilots*	*Turn*	*Traders*
Bill												
Claire												
Tom												
Sue												
Pion.												
Pilots												
Turn												
Traders												
1st												
2nd												
3rd												
4th												

(i) Only the winner had the same first initial for his or her first name and surname.
(ii) Boyd ranked one position below Smith. Neither wrote *Turn of the Screw* or *Traders in Textiles*.
(iii) Claire and the author of *Pilots in Peril* placed 1st and 3rd in some order.
(iv) Tom did not write *Pioneering Peoples* and didn't come 2nd.
(v) Claire either wrote *Turn of the Screw*, or she came 4th.
(vi) *Pioneering Peoples* was placed just below *Pilots in Peril*.
(vii) Sue's surname is not Smith.
(viii) Bill is not *Turn of the Screw's* author.

2. # How Many Triangles?



What is the total number of triangles in the above figure?

3. # Home-and-Away

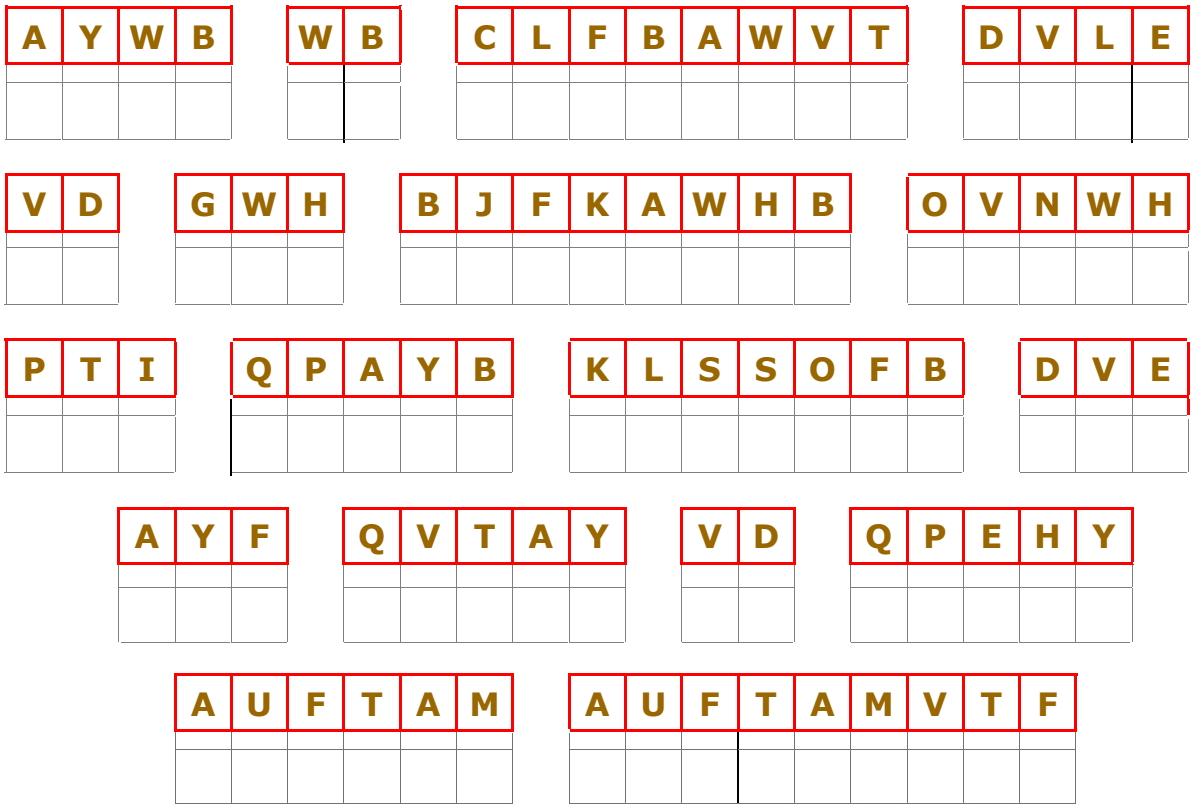
In a certain competition, each team plays each other team five times during the season.

If 75 games are played, how many teams are in the competition?

4.

CRYPTOGRAM

Decode this cryptogram.
In this cryptogram, each letter is substituted for a different letter of the alphabet. The same letter is substituted each time.



5.

PASS the PARCEL

In a party game, five people were sitting in a line. One of them was hiding a parcel.

A questioner had to try to find out where the parcel was.

The rules of the game were that each of the five was asked:

"Who has the parcel?"

and had to give **two** answers, about one of the other four suspects in each case.
One answer had to be true, the other had to be a lie.

Suspect	Answer 1	Answer 2
Alice	*It's Eve*	*It's not Ben*
Ben	*It's not Carol*	*It's Alice*
Carol	*It's Ben*	*It's not Eve*
Dave	*It's Carol*	*It's not Alice*
Eve	*It's Dave*	*It's Alice*

Who had the parcel?

6. # Pencils & Jars

I have a certain number of pencils and a certain number of jars.

If I put four pencils in each jar there will be one pencil left over.

If I put five pencils in each jar, there will be two jars left over.

How many pencils, how many jars?

7. # X's and O's

This is a bit like "noughts & crosses" or "tic-tac-toe" (in which the object is to get three noughts or three crosses in a row while preventing your opponent from beating you to it.)

Each of these 6 X 6 grids is to be completed using only **X**'s and **O**'s so that there are **no more than two** consecutive X's or O's in each **row** or **column**. (Diagonals can have three or more consecutive symbols)

X					
	O				X
		X	X		
		X			O
				X	
	X	X			

EASY

			O	O	
	X				
	X				
			X	X	
	O			O	O

HARDER

	X				
	X		O		
		X			
	O			O	
		X			X

HARDEST

8.  # Figure It Out

A paddock is rectangular in shape, is four times as long as it is wide and has an area of 1200 square metres.

How long is its perimeter fence?

9. # Word Logic

Work out what the logical link is between these apparently unrelated words;

CHINK, TRANCE, STAIN, TUBA and **PERK**

Now choose three words from the following list which also belong to this same logical family of words.

CHILD, EMBARGO, LAPS, BANANA, NIGHTMARE, CONSEQUENCE, TIGER, BRAIN

10.  # Figure It Out

Write out the numbers from 1 to 20
Now write out the same numbers in words, and place them in alphabetical order.
Which number retains its position?

Answers:

Worked solutions on the next page.

1. Clair Cline, *Turn of the Screw*, 1st.
   Bill Troy, *Traders in Textiles*, 2nd.
   Tom Smith, *Pilots in Peril*, 3rd.
   Sue Boyd, *Pioneering Peoples*, 4th.

2. 10 triangles

3. 6 teams

4.

A	Y	W	B
T	H	I	S

W	B
I	S

C	L	F	B	A	W	V	T
Q	U	E	S	T	I	O	N

D	V	L	E
F	O	U	R

V	D
O	F

G	W	H
V	I	C

B	J	F	K	A	W	H	B
S	K	E	P	T	I	C	S

O	V	N	W	H
L	O	G	I	C

P	T	I
A	N	D

Q	P	A	Y	B
M	A	T	H	S

K	L	S	S	O	F	B
P	U	Z	Z	L	E	S

D	V	E
F	O	R

A	Y	F
T	H	E

Q	V	T	A	Y
M	O	N	T	H

V	D
O	F

Q	P	E	H	Y
M	A	R	C	H

A	U	F	T	A	M
T	W	E	N	T	Y

A	U	F	T	A	M	V	T	F
T	W	E	N	T	Y	O	N	E

5. Dave

6. 45 pencils, 11 jars

7.

X	X	O	O	X	O
X	O	O	X	O	X
O	O	X	X	O	X
O	X	X	O	X	O
X	O	O	X	X	O
O	X	X	O	O	X

EASY

X	O	X	O	O	X
O	X	O	X	X	O
O	X	X	O	O	X
X	O	O	X	X	O
O	X	O	O	X	X
X	O	X	X	O	O

HARDER

O	X	O	X	O	X
O	X	X	O	X	O
X	O	X	O	X	O
X	O	O	X	O	X
O	X	X	O	O	X
X	O	O	X	X	O

HARDEST

8. 200 m

9. Child, laps, tiger

10. The number 5 (five)

SOLUTIONS:

1. From clue (i), the only possible full names for the winner are Bill Boyd, Claire Cline, Tom Troy or Sue Smith.
   However, from clue (ii), Boyd was not first, therefore Bill was not first.
   From clue (vii), Sue is not Smith. Therefore, neither Sue nor Smith is first.
   Recording that information and other straightforward information from the clues gives:

	Boyd	Cline	Smith	Troy	1st	2nd	3rd	4th	*Pion.*	*Pilots*	*Turn*	*Traders*
Bill					X						X	
Claire						X		X		X		
Tom						X			X			
Sue			X		X							
Pion.												
Pilots						X		X				
Turn	X		X					X				
Traders	X		X									
1st	X		X									
2nd												
3rd												
4th												

   Neither Boyd nor Smith wrote "*Turn*" or "*Traders*", so between them they wrote "*Pioneers*" and "*Pilots*". Therefore, Cline and Troy wrote "*Turn*" and "*Traders*" in some order.

   From clue (ii), Boyd is ranked one place below Smith. So Smith is 2nd and Boyd is 3rd, or Smith is 3rd and Boyd is 4th. Either way, neither Cline nor Troy is 3rd.
   From clue (vi), since *Pilots in Peril* is 1st or 3rd, *Pioneering Peoples* is 2nd or 4th.

	Boyd	Cline	Smith	Troy	1st	2nd	3rd	4th	*Pion.*	*Pilots*	*Turn*	*Traders*
Bill					X						X	
Claire						X		X		X		
Tom						X			X			
Sue			X		X							
Pion.		X		X	X		X					
Pilots		X		X		X		X				
Turn	X		X					X				
Traders	X		X									
1st	X		X									
2nd	X											
3rd		X		X								
4th			X									

   From Clue (iii) and clue (v), Claire did not come 4th, therefore she wrote *Turn of the Screw.*

   Since *Pilots* and *Turn* are 1st and 3rd in some order, *Pioneers* and *Traders* are 2nd and 4th.

   Claire is either Cline or Troy. Neither Cline nor Troy came 3rd. Claire, therefore, did not come 3rd. By elimination, se came first, so from clue (i) she must be Clair Cline.

	Boyd	Cline	Smith	Troy	1st	2nd	3rd	4th	Pion.	Pilots	Turn	Traders
Bill		X			X						X	
Claire	X	✓	X	X	✓	X	X	X	X	X	✓	X
Tom		X			X	X			X		X	
Sue		X	X		X						X	
Pion.		X		X	X		X					
Pilots		X		X	X	X		X				
Turn	X	✓	X	X	✓	X	X	X				
Traders	X	X	X		X		X					
1st	X	✓	X	X								
2nd	X	X										
3rd		X		X								
4th		X	X									

By elimination, *Pilots* is 3rd, and Troy wrote *Traders*.
From clue (i), Bill is not Boyd and Tom is not Troy.
From clue (vi), Pioneer is placed just below Pilots, i.e. 4th.

	Boyd	Cline	Smith	Troy	1st	2nd	3rd	4th	Pion.	Pilots	Turn	Traders
Bill	X	X			X						X	
Claire	X	✓	X	X	✓	X	X	X	X	X	✓	X
Tom		X		X	X	X		X	X		X	
Sue		X	X		X						X	
Pion.		X	X	X	X	X	X	✓				
Pilots		X		X	X	X	✓	X				
Turn	X	✓	X	X	✓	X	X	X				
Traders	X	X	X	✓	X		X	X				
1st	X	✓	X	X								
2nd	X	X										
3rd		X		X								
4th		X	X	X								

The grid can now be completed by elimination.

	Boyd	Cline	Smith	Troy	1st	2nd	3rd		4th	Pion.	Pilots	Turn	Traders
Bill	X	X	X	✓	X	✓	X		X	X	X	X	✓
Claire	X	✓	X	X	✓	X	X		X	X	X	✓	X
Tom	X	X	✓	X	X	X	✓		X	X	✓	X	X
Sue	✓	X	X	X	X	X	X		✓	✓	X	X	X
Pion.	✓	X	X	X	X	X	X		✓				
Pilots	X	X	✓	X	X	X	✓		X				
Turn	X	✓	X	X	✓	X	X		X				
Traders	X	X	X	✓	X	✓	X		X				
1st	X	✓	X	X									
2nd	X	X	X	✓									
3rd	X	X	✓	X									
4th	✓	X	X	X									

2. 10 triangles

2. If there are n teams, each team needs to play (n-1) games to complete a full round, where each team has played each other team once. However, Team A playing Team B is the same event as Team B playing team A. So the number of actual games in

(continued next page)

Each round is not n(n-1), it's n(n-1)/2.
E.g. for two teams, the number of games is 2(2-1)/2 =1.
For three teams it's 3(3-1)/2 = 6/2 = 3 games
For four teams it's 4(4-1)/2 = 6 games.
If each team plays each other team five times for 75 games, each round must consist of 75/5 = 15 games.
n(n-1)/2 =15
n(n-1) =30
which is only satisfied by n = 6.

4. You solve a cryptogram by making a series of intelligent guesses. As this is a fairly long piece of text, you can expect that statistical patterns that are general to the English language might apply.
Letters that should occur most frequently are E, then A, R, I, O, T, N & S.
Three-letter words are quite possibly "THE" or "AND".
In two-letter words, one of the letters must be a vowel or Y.
(If there are any single-letter words they must be "A" or "I", although that doesn't help in this case)
Double letters within a word could be TT, LL, EE, SS, DD, OO, BB, PP, RR or ZZ

5. From Eve's answer the parcel-hider must have been either Dave or Alice.
When Dave says "*It's Carol*", either way, that's his false statement. "*It's not Alice*" must be true. Dave was the hider.
CHECKING:
Alice says: "*It's Eve*" (false) and "*It's not Ben*" (true)
Ben says: "*It's not Carol*" (true) and "*It's Alice*" (false)
Carol says: "*It's Ben*" (false) and "*It's not Eve*" (true)

6. Let the number of pencils be p, the number of jars be j.

$p = 4j + 1$ {*equation 1*}

$j = p/5 + 2$ {*equation 2*}

substitute 4j + 1 for p in equation 2

$j = (4j + 1)/5 + 2$

$j - 2 = (4j + 1)/5$

$5(j - 2) = 4j + 1$

$5j - 10 = 4j + 1$

$5j - 4j = 1 + 10$

$j = 11$ *(there are 11 jars)*

substitute 11 for j in equation 1

$p = 4 \times 11 + 1$

$p = 44 + 1 = 45$ *(there are 45 pencils)*

7. (no solution provided)

8. Let the width of the rectangle be w metres. The length is therefore $4w$ metres.

Area = length by width

$A = lw$

$1600 = w \times 4w$

$4w^2 = 1600$

$w^2 = 400$

$w = 20$ *{the paddock is 20 m wide, therefore 80 m long}*

The perimeter of the paddock is the sum of the length of its sides

$= 2 \times 20 + 2 \times 80 = 40 + 160 = 200$m

9. Each word can be turned into a country by changing one letter; so your three answers should be CHILD (Chile) LAPS (Laos) and TIGER (Niger)

10.

1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
eight	eighteen	eleven	fifteen	five	four	fourteen	nine	nineteen	one	seven	seventeen	six	sixteen	ten	thirteen	three	twelve	twenty	two