



VIC SKEPTICS

Logic and Maths Puzzles 101 December 2020

1.

	EDDIE	BITZ	BERTHA	FREDDIE	FRITZ	Ford	Ford	Holden	Holden	Toyota
Eric										
Evan										
Bea										
Frank										
Frida										
Ford										
Ford										
Holden										
Holden										
Toyota										

Evan, Frida and three other Australian teenage friends each purchased a cheap second-hand car (one of which was a Toyota) on the day after successfully gaining their driver's licence. They each gave their car a pet name.

From the clues, work out who purchased which brand of car and the pet name they bestowed on it.

- (i) The two Fords have pet names beginning with the same letter.
- (ii) The two Holdens have pet names which rhyme.
- (iii) Eric and Bea bought the same brand of car
- (iv) No car was given a pet name beginning with the same letter as its owner.
- (v) Frank's car has a longer pet name than Frida's



Figure It Out

2.

You are a contestant in an Australian TV Game Show.

You are blindfolded and put in front of a bowl.

Inside the bowl, there are lots of \$5, \$10, \$20, \$50 and \$100 notes. The rules are that you can keep taking one note at a time until you have drawn three notes of the same denomination. What is the greatest sum of money that you could possibly win?

3.

No Fuelin'!

A service station made the following sales of fuel in its first two hours of opening..

15 litres, 16 litres, 18 litres, 19 litres, 20 litres and 31 litres (All exact volumes)

Five purchases were of petrol; one purchase was of diesel.

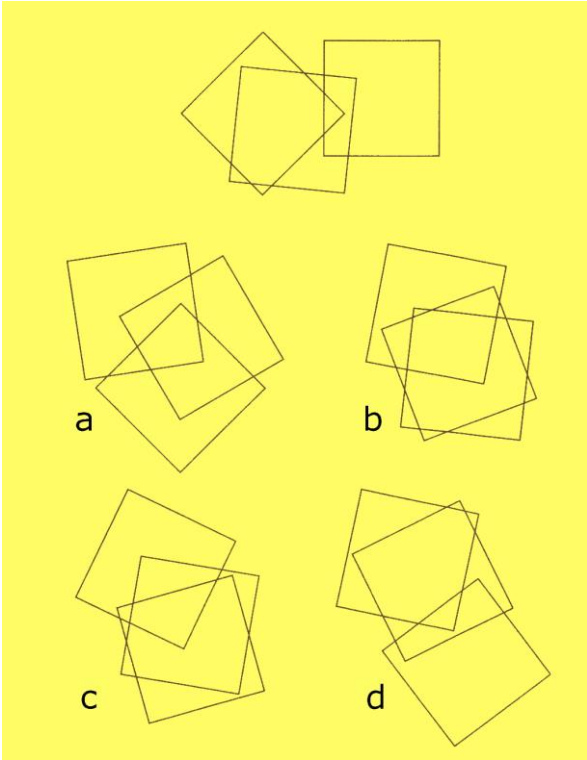
Two customers filled up with petrol in the first hour

Twice as much petrol was sold in the second hour.

How much diesel was purchased?

5.

Three Squares



Look at the set of three squares at the top.

They have a certain feature which is shared by only one of the four groups of three squares below.

a. What is it?

b. Which group shares this feature:

a, b, c or d?

6.

Crack the code

Here are two coded messages.

A different simple substitution code applies to each message.

Write the two decoded messages.

The grids are supplied below to assist you with your working.

a.

S	I	E	T	T	L	I

O	S

O	N

W	E	S	H	O	N	G	T	U	N

S	T	E	T	I

b.

J

B	N

B	C	C	L	N	W	C	J	D	F

C	H

Y	H	K	M	L

B

Q	H	X	L

W	A	R	R	K	L

Big Deal

7.



Seven cards have been dealt face up.

For one point each, identify the first, third and fifth cards to be dealt.

8.

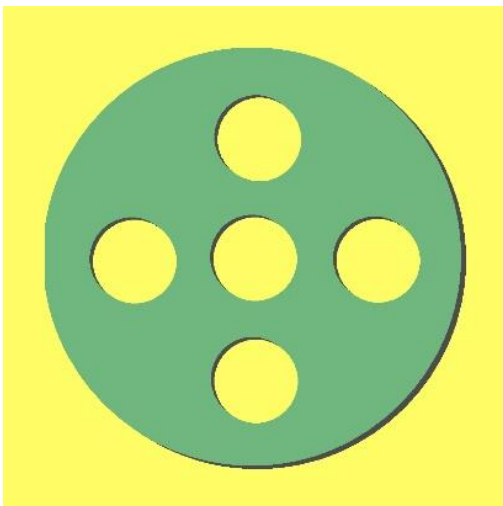
SNAP!

Yesterday, I had 84 photos in album A, and 20 photos in album B. Today, I put enough photos in each album to make the number of photos in album A three times the number of photos of album B.

What is the total number of photos in the two albums now?

9.

A Boring Problem



The diagram represents a green metal disc of 100 centimetres diameter.

It has had five 20 centimetre diameter holes bored through it.

Before boring, the disc weighed 10 kg. What does it weigh after boring?

10. The TV ratings have been published with interest around the five most popular shows, one of which is *Cornucopia*.

From the clues below, and using the table provided, work out the position of each of those shows by title, and also the genre of each show and the main star actor or presenter. (One first name is Priscilla; one surname is Kay)

- (i) *Today* is not the Reality program, which is not the highest-rating show.
- (ii) Chris White does not feature in the horror series, which rates above Ms Frost's program.
- (iii) Lester does not front the nature documentary, which is #3 on the list.
- (iv) Sally's program is directly above *Roundup*, which is directly above the horror series.
- (v) *Yesterday*, which is not a Soap Opera is rating higher than at least one of the other four programs.
- (vi) In no particular order, the five top-rating programs are the one holding #2 spot, *Kaleidoscope*, the variety show, the one featuring Davis, and the Reality program.
- (vii) Gary's program is out-rating Smith's

Position	Title	Genre	Star or Presenter
1			
2			
3			
4			
5			

Answers:

The answers are repeated together with worked solutions on the next page.

1. Eric bought a Holden which he called Freddie.
Evan bought a Toyota which he called Fritz.
Bea bought a Holden which she called Eddie.
Frank bought a Ford which he called Bertha.
Eric bought a Holden which he called Freddie.
Frida bought a Ford which she called Blitz.
2. \$470
3. 20 litres
4. Brian Nash delivered magazines on Tuesday.
Jim Vance delivered the mail on Thursday.
Meg James delivered milk on Friday.
Nell Brady delivered vegetables on Monday.
Val Martin delivered bread on Wednesday.
5. a. They overlap to make four triangles b. Set d shares this feature
6. (a) *Seattle is in Washington State*
(b) *I am attempting to solve a code puzzle*
7. 1st : Eight of Hearts; 3rd : Ace of Hearts; 5th King of Spades
8. 128 photos
9. 80 g
10. Position 1; *Yesterday*; Variety program featuring Chris White
Position 2: *Today*; Soap Opera featuring Sally Kay
Position 3: *Roundup*; Nature program featuring Gary Davis
Position 4: *Kaleidoscope*; Horror program featuring Lester Smith
Position 5: *Cornucopia*; Reality program featuring Priscilla Frost

ANSWERS WITH SOLUTIONS:

1.

	EDDIE	BITZ	BERTHA	FREDDIE	FRITZ	Ford 1	Ford 2	Holden 1	Holden 2	Toyota
Eric										
Evan										
Bea										
Frank										
Frida										
Ford 1	X	✓	X	X	X					
Ford 2	X	X	✓	X	X					
Holden 1	✓	X	X	X	X					
Holden 2	X	X	X	✓	X					
Toyota	X	X	X	X	✓					

Taking Clue (i) and Clue (ii) together;

The two Fords could be (BITZ & BERTHA) or (FREDDIE & FRITZ).

The two Holdens could be (EDDIE & FREDDIE) or (BITZ & FRITZ).

If the two Fords are BITZ & BERTHA, the two Holdens must be EDDIE & FREDDIE.

If the two Fords are FREDDIE & FRITZ, the two Holdens cannot be EDDIE & FREDDIE or BITZ & FRITZ.

So the two Fords are BITZ & BERTHA, the two Holdens are EDDIE & FREDDIE. By elimination, the Toyota is FRITZ.

	EDDIE	BITZ	BERTHA	FREDDIE	FRITZ	Ford 1	Ford 2	Holden 1	Holden 2	Toyota
Eric	X	X	X	✓	X	X	X	X	✓	X
Evan	X	X	X	X	✓	X	X	X	X	✓
Bea	✓	X	X	X	X	X	X	✓	X	X
Frank	X	X	✓	X	X	X	✓	X	X	X
Frida	X	✓	X	X	X	✓	X	X	X	X
Ford 1	X	✓	X	X	X					
Ford 2	X	X	✓	X	X					
Holden 1	✓	X	X	X	X					
Holden 2	X	X	X	✓	X					
Toyota	X	X	X	X	✓					

Applying the other clues, Evan is the Toyota (FRITZ) driver by elimination

Bea bought a Holden; so did Eric (clue (iii)). Eric's Holden wasn't EDDIE (same initial) so it was FREDDIE. Bea's Holden was EDDIE.

That leaves Frank and Frida owning Fords BITZ and BERTHA in some order. By clue (v), Frank owns BERTHA, Frida owns BITZ

2. \$470

If you draw in some order two notes of each denomination, that's
 $2 \times (5 + 10 + 20 + 50 + 100) = 370$ dollars. Your next note will be the third
in any denomination; if it's \$100, the total becomes \$470.

3. The five purchases of petrol must be such that some of the five purchases
must represent twice the volume of the rest of those purchases. (It's also true
that the total of those five purchases must be a multiple of three. Why?).

All six purchases add up to 119 litres.

If the diesel was the 15 litre purchase, the five petrol sales would account for 104
litres. That's not a multiple of three, so not a possible answer.

If the diesel was the 16 litre purchase, the five petrol sales would account for 103
litres. Not a multiple of three, not a possible answer.

If the diesel was the 18 litre purchase, the five petrol sales would account for 101
litres. Not a multiple of three, not a possible answer.

If the diesel was the 19 litre purchase, the five petrol sales would account for 100
litres. Not a multiple of three, not a possible answer.

If the diesel was the 20 litre purchase, the five petrol sales would account for 99
litres. That's a multiple of 3, hence a possible answer.

If the diesel was the 31 litre purchase, the five petrol sales would account for 88
litres. Not a multiple of three, not a possible answer.

So only one possibility exists. The diesel was the 20 litre purchase. Purchases of
petrol in the first hour totalled 33 litres (15 + 18), in the second hour 66 litres.
(16 + 19 + 31).

4. This is not a particularly difficult logic problem once you realise:

Clue (ii) means that milk, bread and vegetables were delivered in some order on
Monday, Wednesday and Friday. The mail and the magazines were delivered on
Tuesday and Thursday in some order.

Clue (vi) means that Brian delivered the magazines.

The clues and the Christian names allow you to work out fairly early that Brady,
James and Martin are women; Nash and Vance are men. If Brian picked up the
magazines, then Jim picked up the mail.

5. See above

6. (a) "*Seattle is in Washington State*". Only the vowels have been substituted.

The "E"s have been swapped for "I"s.

The "A"s have been swapped for "E"s.

The "I"s have been swapped for "O"s.

The single "O" has been swapped for a "U".

There are no "U"s in the message.

(b) "*I am attempting to solve a code puzzle*". This is a proper cryptogram, in
which each letter of the alphabet has been substituted for a different letter. The
best way to begin is to realise that "J" and "B" in the code must each stand for
either "I" or "A".

7. See above

8. Let the number of photos added to each album today be "n".

$$3(n + 20) = n + 84$$

$$3n + 60 = n + 84$$

$$2n = 24$$

$$n = 12.$$

There are now $12 + 84 = 96$ photos in album A

There are now $12 + 20 = 32$ photos in album B

The total of photos is now $96 + 32 = 128$

9. You can assume that the disc is uniformly thick. That makes it possible to calculate the weight of metal lost by boring as a fraction of the area of the original disc.

$$\text{Area of disc} = \pi r R^2 = \pi \times 50 \times 50$$

$$\text{Total area of five bored holes} = 5 \times \pi r^2 = 5 \times \pi \times 10 \times 10$$

The weight of metal lost by boring (in grams) is

$$\frac{5 \times 10 \times 10 \times 100}{50 \times 50}$$

$$= 20 \text{ grams}$$

The weight of the bored disc is $(100 - 20) = \mathbf{80 \text{ g}}$

(Continued next page)

10. Suggest you begin by listing all the possibilities not directly excluded by first reading of the clues.

Position	Title	Genre	Star or Presenter	
1	<i>Kaleidoscope</i>	Soap Opera	Chris White	
	<i>Yesterday</i>	Variety	Lester	Davis
	<i>Today</i>		Gary	Kay
	<i>Cornucopia</i>		Priscilla	
2	<i>Yesterday</i>	Soap Opera	Chris White	
	<i>Today</i>	Variety	Sally	(Ms) Frost
	<i>Cornucopia</i>		Lester	Smith
			Gary	Kay
			Priscilla	
3	Roundup	Nature	Chris White	
	<i>Kaleidoscope</i>		Sally	(Ms) Frost
	<i>Yesterday</i>		Gary	Smith
	<i>Today</i>		Priscilla	Davis
	<i>Cornucopia</i>			Kay
4	Roundup	Horror	Chris White	
	<i>Kaleidoscope</i>	Reality	Priscilla	(Ms) Frost
	<i>Yesterday</i>	Soap Opera	Lester	Smith
	<i>Today</i>	Variety	Gary	Kay
	<i>Cornucopia</i>			
5	<i>Kaleidoscope</i>	Reality	Chris White	
	<i>Today</i>	Soap Opera	Priscilla	Frost
	<i>Cornucopia</i>	Variety	Lester	Smith
				Davis
				Kay

Clue (vii): Gary's program is outranking Smith's

By elimination, position 4 is Lester

By elimination, Position 2 is the Soap Opera, hence position 1 is the Variety Show and Position 5 is the Reality show.

Clue (i): *Today* is not the Reality show

Clue (v) *Yesterday* is not the Soap Opera

Clue (vi) *Kaleidoscope* is not the reality program. By elimination, *Cornucopia* is the reality program.

Clue (vi) The variety show does not feature Davis. By elimination, Davis features in position 3 and must therefore be Gary Davis. By elimination, Chris White is the presenter in Position 1.

Position	Title	Genre	Star or Presenter	
1	Kaleidoscope	Variety	Chris White	
	Yesterday		Lester	Davis
	Today		Gary	Kay
	Cornucopia			
2	Yesterday	Soap Opera	Sally	Smith
	Today			Kay
	Cornucopia			
3	Roundup	Nature	Chris White	
			Gary Davis	
				Kay
4	Kaleidoscope	Horror	Lester	Smith
	Today			Kay
	Yesterday			
	Cornucopia			
5	Kaleidoscope	Reality	Priscilla Frost	
	Today			
	Cornucopia			

Clue (vi) *Kaleidoscope* is not the variety program: *Yesterday* is, by elimination. *Kaleidoscope* must be the horror program.

Clue (vii) Gary's program is outranking Smith's. Lester is Lester Smith. By elimination, Sally is Sally Kay.

Position	Title	Genre	Star or Presenter	
1	Kaleidoscope	Variety	Chris White	
	Yesterday			
2	Today	Soap Opera	Sally	Smith
				Kay
3	Roundup	Nature	Gary Davis	
4	Kaleidoscope	Horror	Lester	Smith
	Yesterday			Kay
5	Cornucopia	Reality	Priscilla Frost	