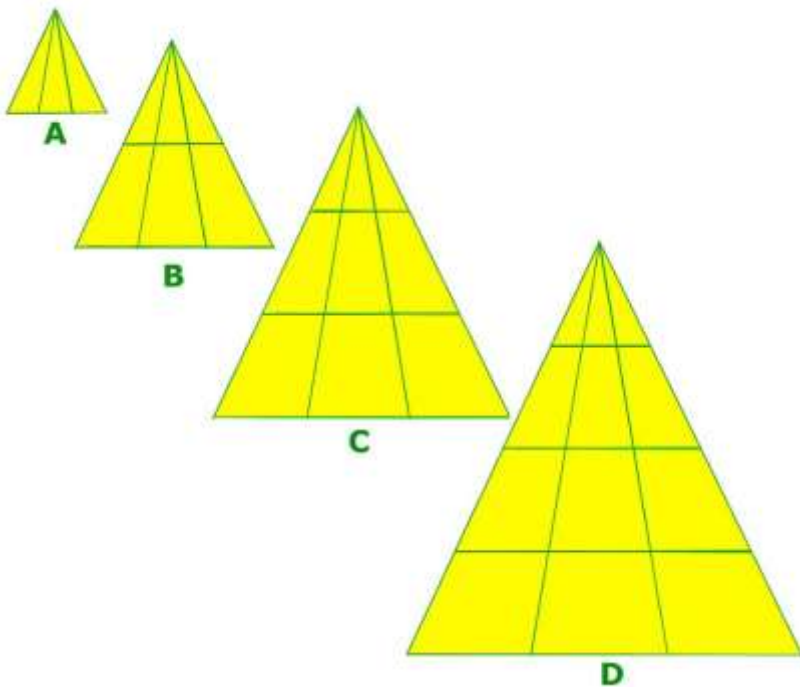


SPECIAL May 2020 – PUZZLES No 31

Logic & Maths (With Solutions)

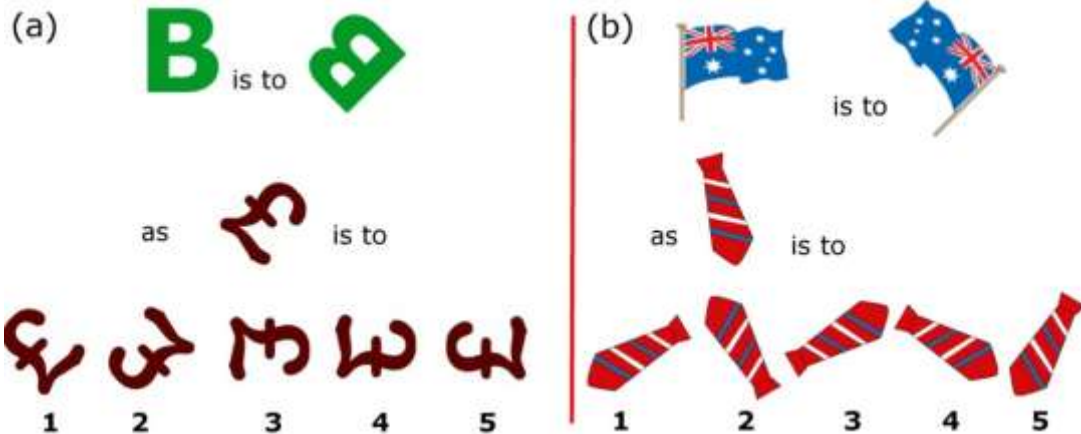
1.



If Figure A at left contains a total of 6 triangles, how many triangles are contained by figures B, and C?

Guess how many triangles are in D without counting, based on the developing number sequence.

2.



3. In the film *2001 A Space Odyssey*, the computer's name HAL was said to be derived by a sequential transformation of the brand name IBM. Explain.

4. Sisters Alice, Brenda, Carol and Donna decide to give their Mum a birthday present by cleaning the house.

Alice, who is the oldest, could do the job by herself in three hours; Brenda could probably manage it in four hours, as could her twin Carol. Donna, the youngest, would require six hours to clean the house by herself.

Assuming they don't get in each other's way, calculate how long it should take them to clean the house working together.

5. The highest possible score with a throw of three darts is 180.

(a) What is the second highest possible score?

(b) What is the highest score possible which is NOT a multiple of 3?

6.

99	Π	79	ж	59	д	39	φ	19	&
98	◇	78	Π	58	φ	38	ђ	18	∞
97	•	77	Δ	57	Г	37	%	17	•
96	#	76	ш	56	Δ	36	∞	16	◇
95	φ	75	ш	55	Σ	35	•	15	Ј
94	&	74	д	54	∞	34	#	14	%
93	Σ	73	†	53	Σ	33	д	13	#
92	Э	72	∞	52	д	32	φ	12	Ω
91	%	71	Ω	51	Ω	31	•	11	¥
90	Σ	70	Ω	50	д	30	€	10	Σ
89	я	69	•	49	Π	29	Σ	9	∞
88	†	68	ж	48	Δ	28	ђ	8	Ω
87	Σ	67	&	47	њ	27	∞	7	◇
86	¥	66	%	46	†	26	†	6	Δ
85	Ω	65	ж	45	∞	25	#	5	Ј
84	ш	64	Σ	44	◇	24	∞	4	•
83	я	63	∞	43	€	23	Ω	3	Σ
82	€	62	ђ	42	φ	22	Π	2	Π
81	∞	61	Ω	41	Ј	21	•	1	¥
80	€	60	Δ	40	◇	20	Σ	0	€

Here is a popular mind-reading trick.

i. Choose any two-digit number

ii. Add both digits together

iii. Subtract the total from your original number.

Example: Let's say you chose 57.

$$5 + 7 = 12.$$

$$57 - 12 = 45$$

iv. When you have your answer, look at the chart on the left and find the symbol that corresponds to it.

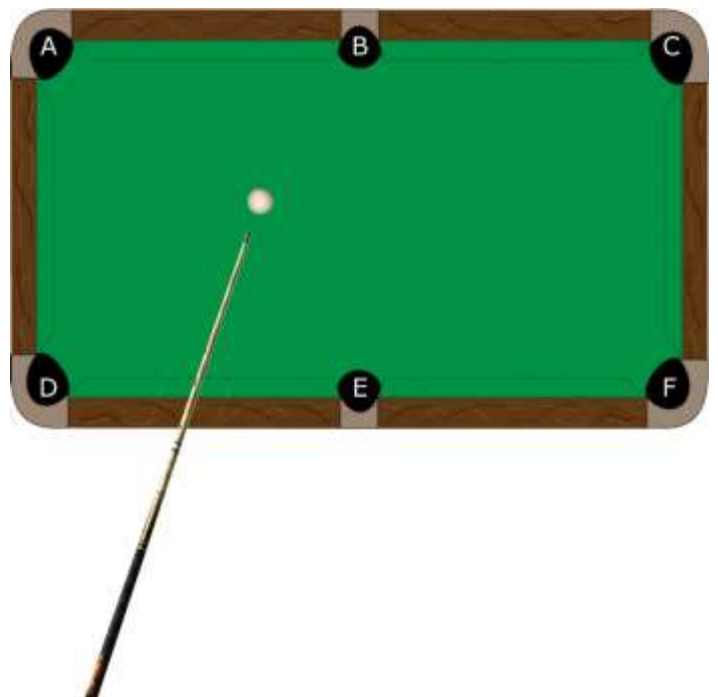
CONCENTRATE on this symbol.

FIX it in your mind.

Now go to the bottom of the very last page, where we'll tell you what symbol you were thinking of.

Were we right? How does this trick work?

7. Assuming the cue ball is struck cleanly, the ball is struck with the correct weight and the cushions play true, which pocket will the cue ball end up in?



8. In the belief that speed cameras between her home and the shops only focus on one side of the road, Jan drove to the shops at a steady average speed of 50 km/h but returned home at an average speed of 90 km/h.

Her average driving speed for the entire journey was closest to:

- 55 km/h 60 km/h 65 km/h 70 km/h 75 km/h 80 km/h

[Choose one]

9. 100 people leave Footscray on a Werribee-bound train. Only 1% of the people on that train will go all the way to Werribee; the others will get off at earlier stops.



No-one gets on or off before Laverton.

Some people do get off at Laverton, but no-one gets on.

Once the train leaves Laverton, 98% of the people left on the train will get off at one of the remaining stops before Werribee.

How many people get off at Laverton?

10. A driving school has set up a roster for four of its instructors, each paired with a different learner-driver on one each of four consecutive weekdays.

- i. Rose's lesson is 2 days before William's and Yasmin's is after Sara's.
- ii. Yasmin's instructor is either Mr. Cox or the one going out on May 15.
- iii. Of May 15's and May 13's instructors, one is Mrs. Budd and the other is Rose's.
- iv. Mr. Dunn's appointment is later in the week than that of Mr. Ames.

		instructors				Learner drivers			
		Mr. Ames	Mrs. Budd	Mr. Cox	Mr. Dunn	Rose	Sara	William	Yasmin
dates	May 13								
	May 14								
	May 15								
	May 16								
Learner drives	Rose								
	Sara								
	William								
	Yasmin								

- (a) Who was Sara's instructor?
- (b) What date was Yasmin's appointment?

ANSWERS

1. B 12 triangles C 18 triangles D 24 triangles

2. (a) 5 (b) 1

In 2(a), note that the top "loop" of the **B** is slightly smaller than the bottom. It is not vertically symmetrical. You can tell whether or not reflection has taken place. It is clear that the **B** has just been rotated, not reflected. The rotation involving the least turning to get from the initial position of B to the final position is an anti-clockwise rotation of about $\frac{3}{8}$ of a full circle or 135° . Putting the **E** symbol through the same rotation results in position 5.

In 2(b) between the first and last position of the flag it has clearly been reflected as well as rotated. In the first position, the stripes on the tie are sloping downward left to right. Reflecting the tie reverses that slope; so position 4 and 5 are eliminated. The simplest transformation of the flag is to reflect it horizontally (with the flagpole as the axis) then turn it clockwise through about 45° . The same steps when applied to the tie result in position 1.

3. H, A & L are each one letter earlier in the alphabet than I, B & M respectively.

4. I hour

Let the rate at which the girls clean the house be $\frac{1}{3}$ houses per hour for Alice, $\frac{1}{4}$ houses per hour each for Brenda and Carol, and $\frac{1}{6}$ for Donna.

In each hour, the fraction of the house cleaned by all four girls

$$\begin{aligned} &= \frac{1}{3} + \frac{1}{4} + \frac{1}{4} + \frac{1}{6} \\ &= \frac{4+3+3+2}{12} = \frac{12}{12} = 1 \end{aligned}$$

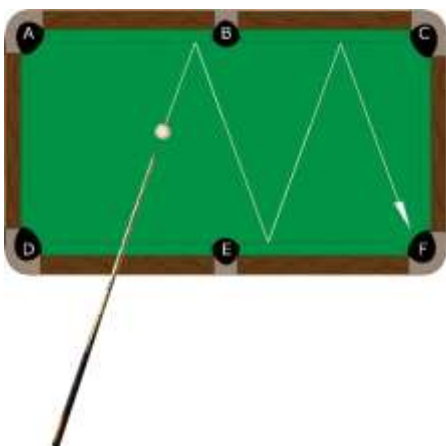
In other words, exactly one house per 1 hour.

5. (a) 177 (two treble 20s and a treble 19)

(b) 160 (two treble 20s and a double 20) (All possible higher scores require three trebles)

6. Performing the specified arithmetic on ANY two digit number always gives a multiple of 9 as a result. While we've randomized the other symbols and numbers in the table pretty thoroughly, we've chosen to make multiples of 9 always correspond to a ∞ sign.

7. F



8. 65 km/h (actually about 64.3 km/h)

Let the distance from Jan's home to the shops be d km.

The distance for the journey there and back is therefore $2d$ km.

Let the time taken from home to shops = t_1 hours

And the time taken from shops to home = t_2 hours

Total time taken = $t_1 + t_2$ hours

Given that Speed = Distance divided by Time or $S = D/T$

then Time taken = Distance divided by Speed or $T = D/S$

$t_1 = d/50$ and $t_2 = d/90$

Average speed for the whole distance = total distance \div total time

$$= 2d / (t_1 + t_2)$$

$$= 2d / (d/50 + d/90)$$

$$= 2d / \frac{(5d + 9d)}{450}$$

$$= 2d \times \frac{450}{(14d)}$$

$$= 450 \times (2d/14d) = 450 / 7 \approx 64.3 \text{ km/h}$$

9. Fifty people get off at Laverton

As the train leaves Footscray, 1% of 100, that is, only one person is going to Werribee.

As the train leave Laverton, 98% of the people are NOT going all the way to Werribee.

In other words, 2% are going to Werribee.

But that 2% is still only one person. There are only fifty people left on the train after Laverton.

50 people got off after Laverton

10. (a) Mr Dunn (b) May 16

QUESTION 6: Mind Reading trick.

You were thinking of a ∞ sign