VIC SKEPTICS

Logic and Maths Puzzles 76 November 2018

1. Alice, Connie, Jake and Matt were contestants on a TV game show. One hundred people had been surveyed with the question "What is the first thing you do when you get up in the morning?"

Each of the four contestants attempted to guess the most popular answer. Their answers were: "brush teeth", "exercise", "coffee" and "shower".

As it turned out, these were the four most popular answers, though in no particular order.

Each contestant scored either 100 points for guessing the most popular answer, 80 points for second, 60 points for third or forty points for fourth.

The one who scored 100 points wasn't Connie.

The most popular answer was "coffee".

Matt didn't earn 60 points.

Jake scored 20 points more than the person who said "exercise".

Connie, (who didn't answer "shower") scored higher than the one who said "brush my teeth".

Alice scored only 40 points.

(a) Who had the top score?

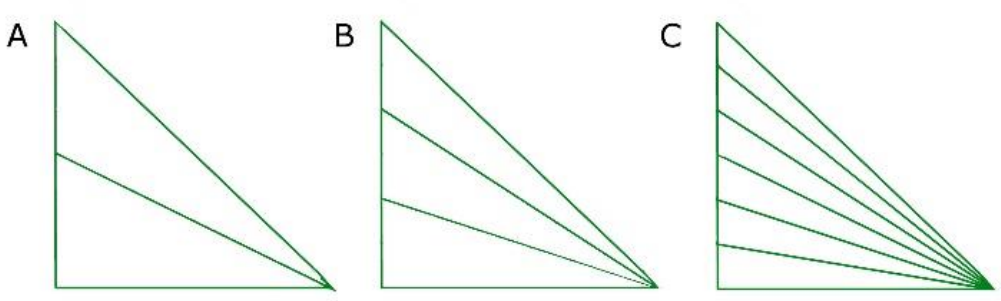
(b) What was the second most popular answer?

	Teeth	Coffee	Exercise	Shower	100	80	60	40
Alice								
Connie								
Jake								
Matt								
100								
80								
60								
40								

2. Somebody at a party introduces you to your mother's only sister's husband's sister–in-law. He has no brothers. What is this lady to you?

3. What is the total number of triangles in:

a. Diagram A?
b. Diagram B?
c. Diagram C?



4. This is "*The Monty Hall Problem*". You are shown three doors.

You are told that there is a valuable prize behind one of the doors, and nothing behind each of the other two doors. You can win the prize if you pick the right door.

You pick door X

You are then shown that one of the other two doors (Y) does not conceal the prize; it's still behind either door X or door Z.

You are then asked whether you want to stay with door X or switch to door Z.

Statistically, which of these three statements is correct? (Answer a, b or c)

To win the prize:

a. You are better off staying with door X
b. You should switch to door Z
c. It doesn't matter: (the prize is equally likely to be behind either X or Z)

5. Write the number thirteen in binary form.

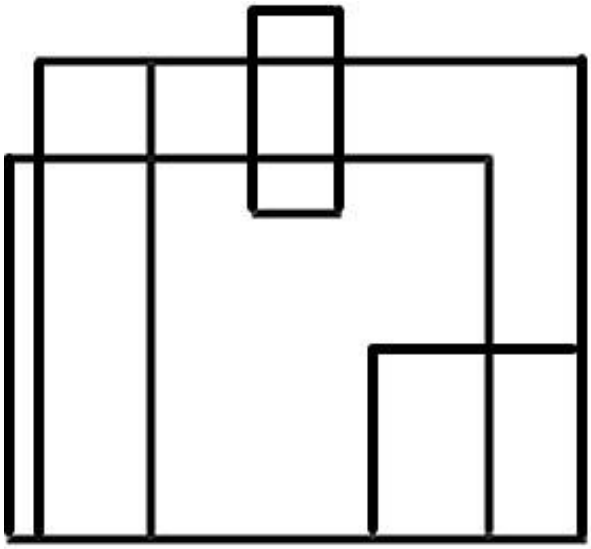
6. Jack is looking at Anne, but Anne is looking at George. Jack is married, but George is not. Is a married person looking at an unmarried person?

A: Yes
B: No
C: Cannot be determined

7. The Smith Family, the Jones family, the Brown family and the White family go on a picnic together, with their sons and daughters.
Mr and Mrs Smith have one daughter.
Mr and Mrs Jones have two daughters.
Mr and Mrs Brown have three daughters.
Mr and Mrs White have four daughters.
Each of the daughters has a brother.
How many people are at the picnic?

8. Bill has $10 more than Joe. Fred has half as much money as Joe and $14 less than Bill. how much money in total do Bill, Fred and Joe have between them?

9.

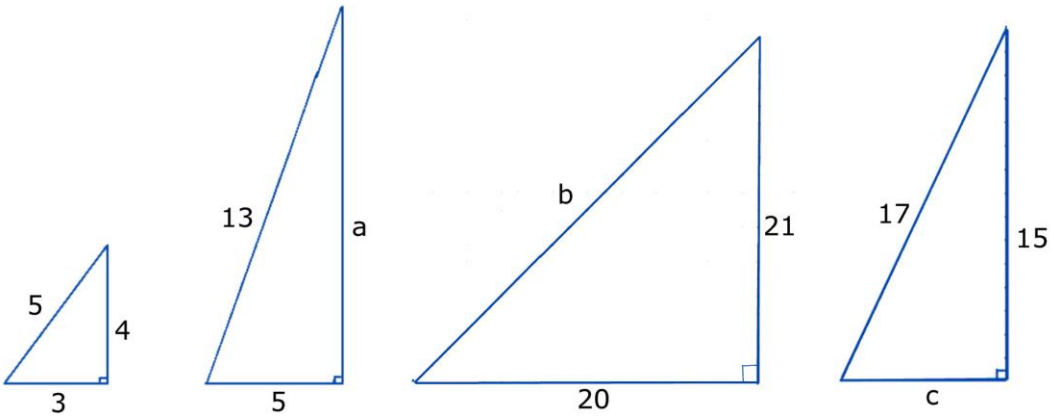


How many rectangles are in this figure?
Hint: It's more than twelve!

10. Pythagoras's Theorem for right-angled triangles can be written symbolically as

$$H^2 = A^2 + B^2$$

where **H** is the length of the hypotenuse and **A** and **B** are the lengths of the two shorter sides. Pythagorean triangles are right-angled triangles where this is achieved with all three sides having whole numbers. The simplest is a triangle with sides of 3, 4 and 5 units. Here are some Pythagorean triangles.



Calculate a, b and c.

Answers:

1. **(a) Matt (b) "take a shower" (c) "Brush teeth"**

2. **Your mother**

3. **a. 3 b. 6 c. 21** (note that the answer in each case is (n) + (n-1) + (n-2) ….. etc where n is the number of smallest unit triangles making up the diagram)

4. b. You should **switch to door Z**. (Suggest you look at You Tube; there are several good Monty Hall Problem explanations; e.g. https://www.youtube.com/watch?v=mhlc7peGlGg

5. **1101**

2^4	2^3	2^2	2	units
	1	1	0	1

6. **Answer A** (Yes, a married person is looking at an unmarried person)

Explanation: If Anne is married, then a married person is looking at an unmarried person (Anne is looking at George), and if she isn't, a married person is looking at an unmarried person (Jack is looking at Anne).

7. **22** people

Four sets of parents
10 daughters in total
If each daughter has one brother, there must only be one son in each family
(4 X 2) + 10 + (4 X 1) = 22

8. **$30**
Let the amount of money Bill has = $b, Fred has = $f and Joe has = $j

b = j + 10 [1]
j = 2f [2]
b = f + 14 [3]

substitute (f + 14) for b in [1]

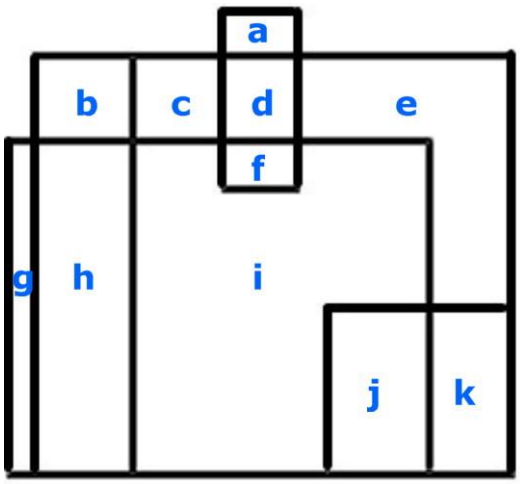
f + 14 = j + 10
2f + 28 = 2j + 20 [4]

Substitute j for 2f in [4]

j + 28 = 2j + 20
2j – j = 28 – 20 = 8

Joe has $8, Fred has $4 and Bill has $18 ; total is $30

9. **23** rectangles



Suggested method: Label the "tiles" that make up the diagram a to k as shown.
Most tiles are rectangles; e & i are not. Larger rectangles are combinations of two or more tiles.
It is important to count each rectangle **once only**.

Three rectangles contain tile a:

a, a + d, a + d + f

Five rectangles contain tile b:

b, b + c, b + c + d, b + h
b + c + d + e + f + h + i + j + k

Three rectangles contain tile c (but not a or b)
c, c+d, c + d + e + f + h + I + j + k

Two rectangles contain tile d (but not a, b or c)
d, d + f

No rectangles contain tile e that don't also contain b, c or d

Four Rectangles contain tile f (but not a, b, c, d or e)

f, f + g + h + i + j, f + h + i + j, f + i + j

Two rectangles contain tile g (but not a, b, c, d, e or f)
g, g + h

One rectangle contains h (but not a, b, c, d, e, f or g)
h

No rectangles contain tile i (but not a, b, c, d, e, f, g or h)

Two rectangles contain tile j (but not a, b, c, d, e, f, g, h or i)
j, j+ k

One rectangle contains tile k (but not a, b, c, d, e, f, g, h, i or j)
k

10. **a = 12 b = 29 c = 8**

a. $\mathbf{H^2 = A^2 + B^2}$
$A^2 = H^2 - B^2$
$a^2 = 13^2 - 5^2$
$a^2 = 144$
$a = 12$

b. $\mathbf{H^2 = A^2 + B^2}$
$b^2 = 20^2 + 21^2$
$b^2 = 841$
$b = 29$

c. $\mathbf{H^2 = A^2 + B^2}$
$A^2 = H^2 - B^2$
$c^2 = 17^2 - 5^2$
$c^2 = 64$
$c = 8$