



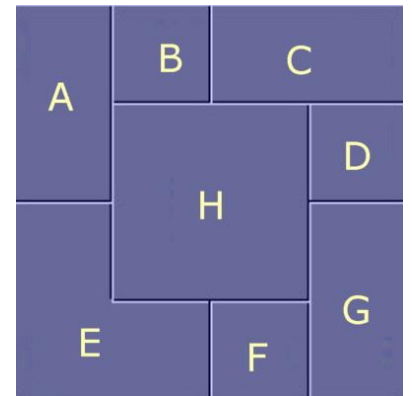
VIC SKEPTICS

Logic and Maths Puzzles 87 October 2019

1. Which of the following statements is/are true?

- a. Exactly one of the statements in this list is false.
- b. Exactly two of the statements in this list are false.
- c. Exactly three of the statements in this list are false.
- d. Exactly four of the statements in this list are false.
- e. Exactly five of the statements in this list are false.

2. Given eight squares of paper **that are all the same size**, it is possible to make the pattern to the right by laying them one on top of the other with some overlapping. The last square to go on is H. Write down the order in which the squares of paper were placed from bottom up.



3. There are two glasses, one containing a litre of milk, the other a litre of water. Take one tablespoon of milk and mix it with the water. Now take one tablespoon of the water/milk mixture and mix it in with the pure milk to obtain a milk/water mixture. Is there



(A) more water in the milk/water mixture

or (B) more milk in the water/milk mixture, or

(C) as much water in the milk/water mixture as milk in the water/milk mixture?

4. A prince picked a basketful of golden apples in the enchanted orchard.

On his way home, he was stopped by a troll who guarded the orchard. The troll demanded payment of one-half of the apples, plus two more. The prince gave him the apples and set off again.

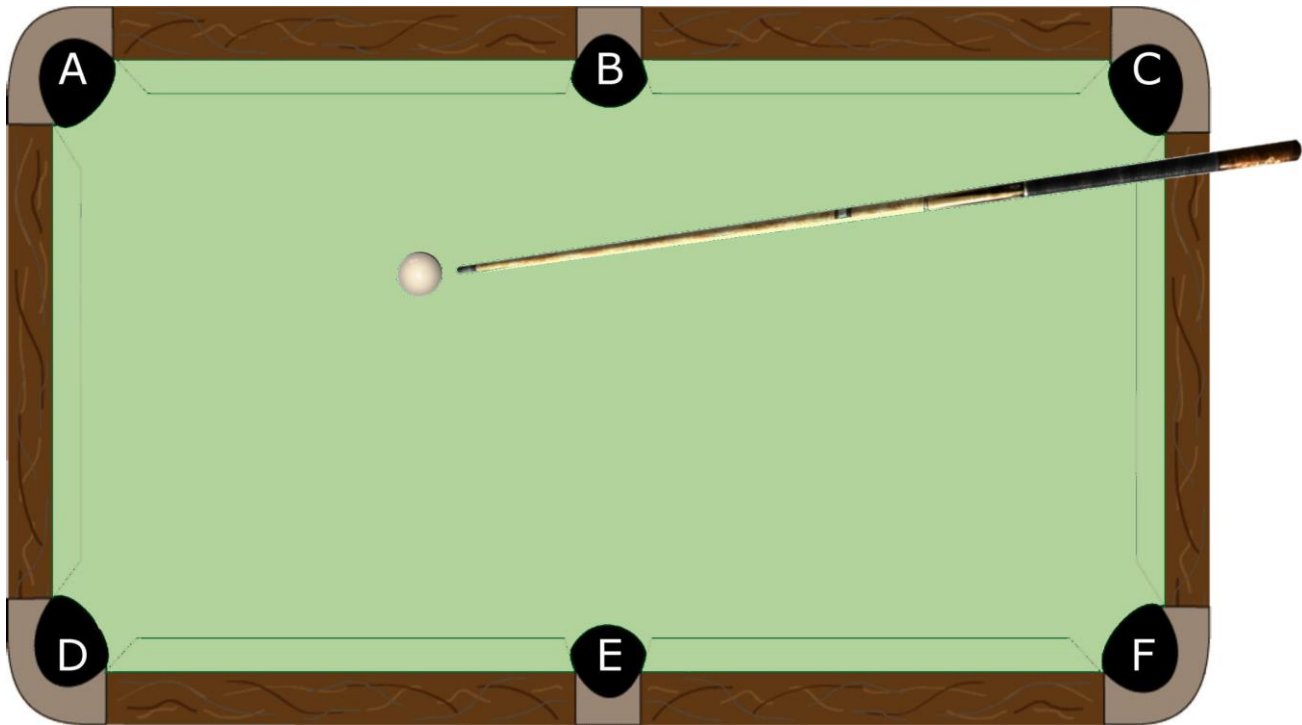


A little further on, a second troll guard stopped the prince and demanded payment of one-half of the apples the prince now had, plus two more. The prince paid the troll and set off again.



Just before leaving the enchanted orchard, a third troll stopped the prince and demanded one-half of his remaining apples plus two more. The prince paid him and returned home. He had only two golden apples left. How many apples did the prince pick?

5.



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?

6. If each of the letters of the alphabet is assigned a number value as follows.

- a = 1
- b = 2
- c = 3

And so on to

z = 26

Calculate the product of the 26 terms: (m-a), (m-b), (m-c), through to (m-z)

In other words,

(m-a) X (m-b) X (m-c) X X (m-z)

7. Assuming that it's possible in each case:

(a) A man of average height walks once around the earth which has a diameter of just under 13,000 km. How much further does the man's head travel than his feet?

A. 0 m B. 10 m C. 100 m D. 1 km E. 10 km F. 100 km G. 1000 km
(choose the closest answer)

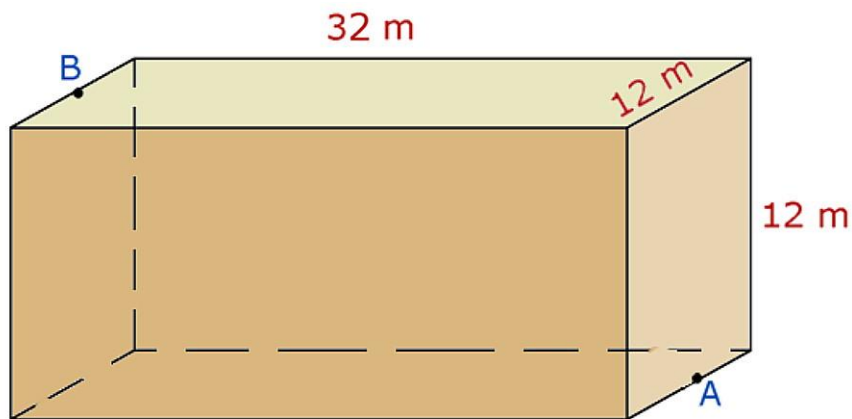
(b) The same man walks once around the moon, which is about 3,500 km in diameter. How much further does the man's head travel than his feet?

A. 0 m B. 10 m C. 100 m D. 1 km E. 10 km F. 100 km G. 1000 km
(choose the closest answer)

(c) He now walks once around Jupiter, which is about 140,000 km in diameter. How much further does the man's head travel than his feet?

A. 0 m B. 10 m C. 100 m D. 1 km E. 10 km F. 100 km G. 1000 km
(choose the closest answer)

8.



The picture represents a large store room in the shape of a square prism.

Its inside dimensions, wall-to-opposite-wall are 32 m X 12 m X 12 m as shown.

It is empty except for a hungry spider at point A, half-way along the bottom right edge; and a fly caught in a web halfway along the top left edge at point B.

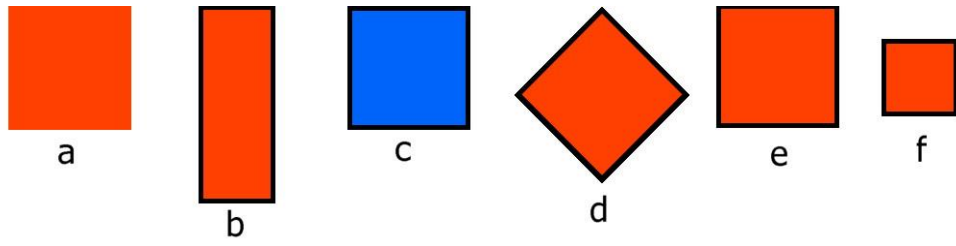
What is the shortest distance the spider must walk to get to the fly;

40 m, 42 m or 44 m ? (choose one)

9. (a) In a certain army, lower ranks salute equal and higher ranks and all salutes must be returned. Two Generals, two Colonels, two majors, two captains and a lieutenant enter a room. How many salutes are there?

(b) In a different army, you only salute officers of equal or higher rank to yourself. It is not necessary to return the salutes from lesser ranks. Two Generals, two Colonels, two majors, two captains and a lieutenant enter a room. How many salutes are there?

10.



Which of the six shapes above is the most representative of the group of six?

Answers:

1. d. Exactly four of the statements in this list are false.
2. A, B, C, D, G, F, E, H
3. (c) as much water in the milk/water mixture as milk in the water/milk mixture
4. 44

This is best done by working backwards from the fact that the Prince is left with two apples after paying the third troll.

If the third troll takes half the Prince's apples plus two apples and leaves him with two apples, that is because he had eight apples when he encountered the third troll, left to him by the second troll.

$$[\text{Half of } 8 = 4 \quad 4 + 2 = 6 \quad 8 - 6 = 2]$$

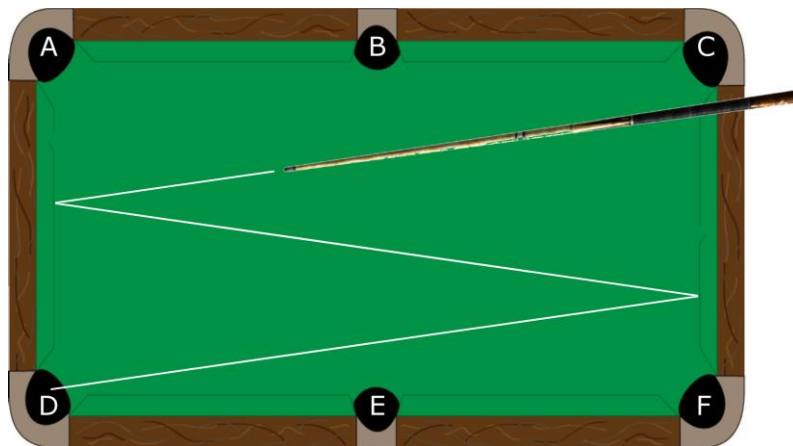
If the second troll takes half the Prince's apples plus two apples and leaves him with eight apples, that is because he had twenty apples when he encountered the second troll, left to him by the first troll.

$$[\text{Half of } 20 = 10 \quad 10 + 2 = 12 \quad 20 - 12 = 8]$$

If the first troll takes half the apples that the Prince picked plus two apples and leaves him with twenty apples, he must have picked 44.

$$[\text{Half of } 44 = 22 \quad 22 + 2 = 24 \quad 44 - 24 = 20]$$

5. D

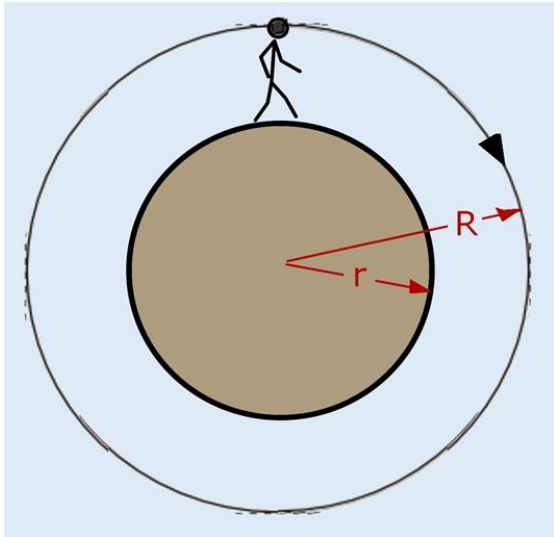


6. 0 (zero)

The term $(m-m) = 0$. The product of any string of numbers of which one number is zero will be zero.

7. (a) B. 10 m (b) B 10 m (c) C 10 m

The head will always travel the same distance further than the feet!



Let's assume the man is 1.7 m tall
 The circumference of the body he's walking around (where his feet are) is $2\pi r$
 The circumference of the circle made by his head is $2\pi R$

So the difference in circumferences is
 $(2\pi R) - (2\pi r)$
 $= 2\pi(R-r)$

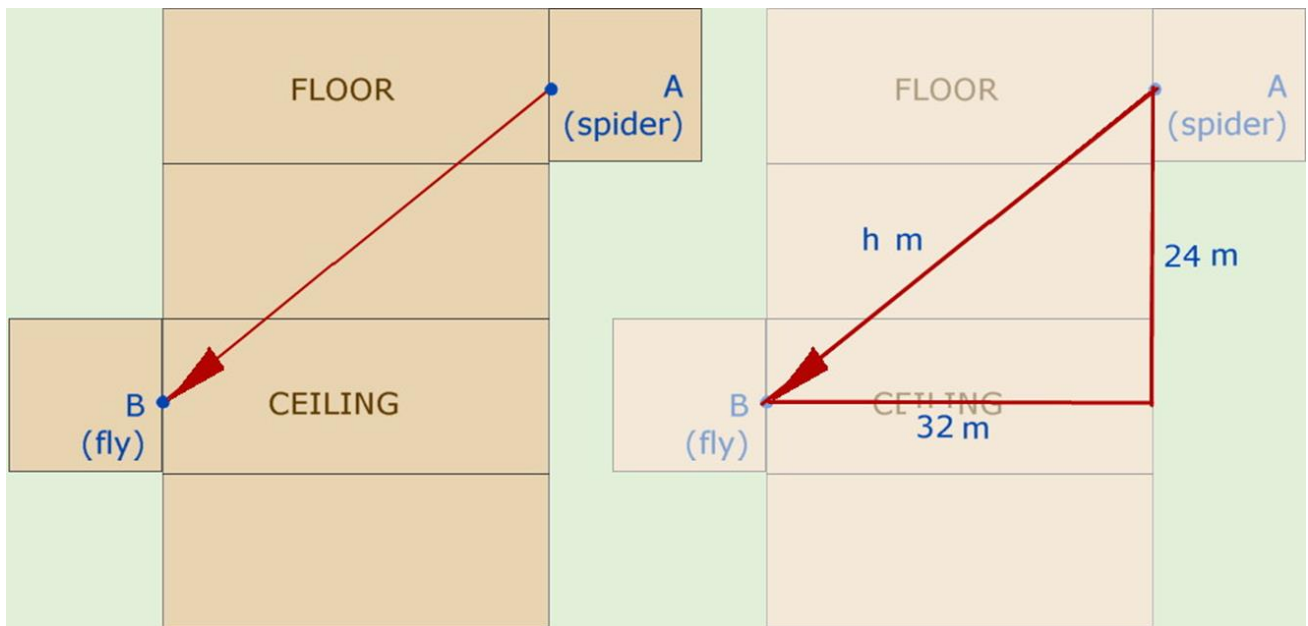
But $(R - r)$ is 1.7
 $2\pi \times 1.7$ is about 10.6 m REGARDLESS of the size of the object he's walking around

8. 40 m

If the spider walks along the middle of the floor to the opposite wall, then straight up that wall, it would travel $(32 + 12) = 44$ m

However, there's a shorter way!

Imagine that the room is a box and that the walls can be unfolded to make a flat area.



$$\begin{aligned} h^2 &= a^2 + b^2 \\ &= 1024 + 576 \\ &= 1600 \\ h &= 40 \end{aligned}$$

9. (a) 72 salutes (b) 40 salutes

(a) There are 9 people in the room. Each person must salute each other person. Each person salutes 8 times. There are therefore $9 \times 8 = 72$ salutes

(b)

Lieutenant salutes all other officers in the room	2 cap + 2 maj + 2 col + 2 gen	8
Captain 1 salutes Captain 2 and all higher ranks	1 cap + 2 maj + 2 col + 2 gen	7
Captain 2 salutes Captain 1 and all higher ranks	1 cap + 2 maj + 2 col + 2 gen	7
major 1 salutes major 2 and all higher ranks	1 maj + 2 col + 2 gen	5
major 2 salutes major 1 and all higher ranks	1 maj + 2 col + 2 gen	5
colonel 1 salutes colonel 2 and both generals	1 col + 2 gen	3
colonel 2 salutes colonel 1 and both generals	1 col + 2 gen	3
The two generals salute each other		2
	Total salutes	40

10. Shape e

They all have the same colour except one.

They all have the same shape except one.

They all have a border except one.

They all have the same orientation except one.

They all have the same size except one.

Shape e shares the same size, shape, colour, border and orientation of four of the other five in each case