



VIC SKEPTICS

Logic and Maths Puzzles 82 May 2019

1. Four Language students, (Allan, Bob, Cathy and Donna) were each given one day to complete and submit an essay on *My Holiday* in the language they were studying.

Using only the clues that follow, match each essay to its author, day and language, and determine the length of each (in pages).

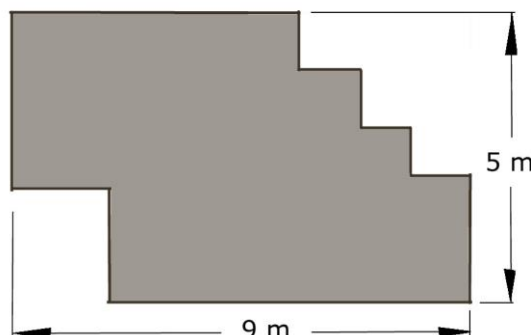
Then answer the three questions on your answer sheet.

- Cathy's essay is longer than Bob's essay.
 - Cathy's essay isn't in Spanish or Italian
 - Bob's essay is longer than Allan's essay.
 - The Italian essay is longer than the essay written on Friday.
 - The 5 page essay is either Thursday's essay or the German essay.
 - Cathy's essay is either the 4 page essay or the one written on Friday
 - The 3 page essay was written on Thursday
 - Wednesday's essay is a page shorter than Tuesday's essay.
- a. What language is Allan studying?
 - b. Who wrote the essay in French?
 - c. In what language is the 3 page essay?
 - d. Who wrote their essay on Wednesday?

| | Allan | Bob | Cathy | Donna | Tue | Wed | Thu | Fri | French | German | Italian | Spanish |
|---------|-------|-----|-------|-------|-----|-----|-----|-----|--------|--------|---------|---------|
| 2 pages | | | | | | | | | | | | |
| 3 pages | | | | | | | | | | | | |
| 4 pages | | | | | | | | | | | | |
| 5 pages | | | | | | | | | | | | |
| French | | | | | | | | | | | | |
| German | | | | | | | | | | | | |
| Italian | | | | | | | | | | | | |
| Spanish | | | | | | | | | | | | |
| Tue | | | | | | | | | | | | |
| Wed | | | | | | | | | | | | |
| Thu | | | | | | | | | | | | |
| Fri | | | | | | | | | | | | |

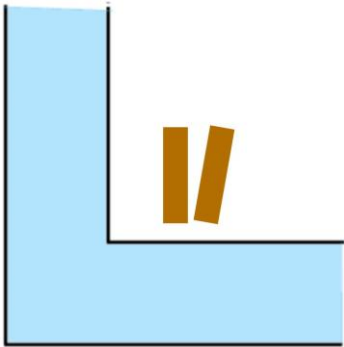
2. What are the 5 prime numbers between 50 and 100 which have a "7" as one of their digits?

3. What is the perimeter of (distance around) this figure? All angles are right angles



4. This question requires a "YES" or "NO" answer.

The picture shows a 4 m wide canal whose course makes a sharp 90 degree turn. You wish to cross the canal but all you have is two wooden planks 3.9 m long and no way of joining them to make a longer plank.

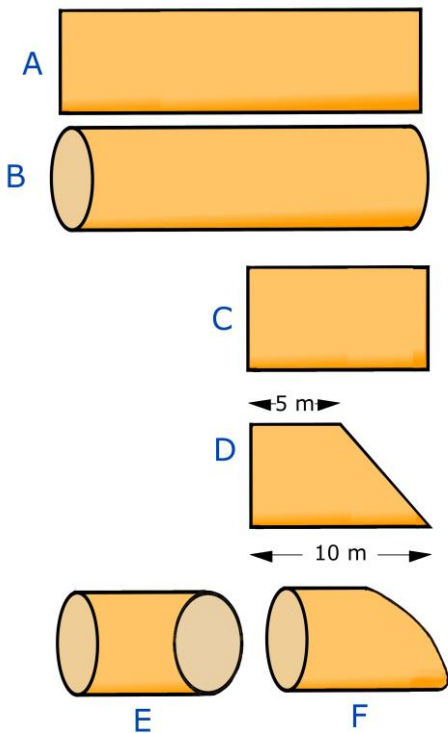


Is it possible to walk across the canal on those two planks laid flat?

5.

$$9 - 3 \div \frac{1}{3} + 1 = ?$$

6.



A and B are two views of a 20 m long cylindrical bar which is known to weigh 80 kg.

When the bar is cut in half at right angles to its length, the result is C.

C is then trimmed as shown with a straight cut to produce the final product, shape D.

E and F are two other views of the final product.

What is the weight of the final product?

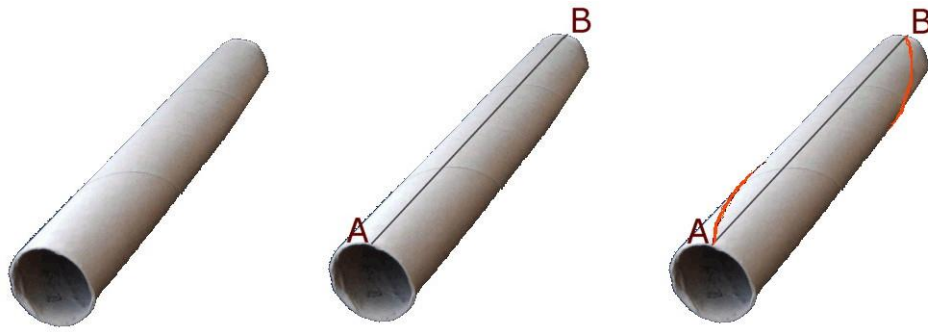
7.



"If roosters cost \$5 each, hens cost \$3 each and chicks are three for a dollar, how many roosters, hens and chicks do I buy if I buy 100 of them altogether for exactly \$100?"

This question is a bit unusual because it has FOUR correct answers. What are they?

8. At left is the cardboard cylinder from inside a paper towel roll.



It has a length of 24 cm and a circumference of 10 cm.

Now imagine a straight line on the surface of the tube and parallel to its axis.
Call the points at either end of this line "A" and "B".

Then imagine a piece of fine thread that starts at A and ends at B, having been wound tightly and evenly around the cylinder once only.

How long is the piece of thread?

9. Josh had a day out at The Show, for which he stuck to a strict budget.

- It cost him a quarter of his budgeted allowance just to get in
- 5% of his money went on a return train ticket.
- One tenth was spent on snacks and drinks
- One quarter was spent on rides
- He still had \$56 left over, which he spent on show bags.

How much did the day out cost him?

10. A fisherman in a boat at 10:00 am starts to row upstream at 5 km/h relative to the river's current.

The sudden motion causes his hat to fall off and to begin to float downstream.

At 10:05 am, he realizes he has lost his hat and starts rowing downstream in pursuit of the hat, again at 5 km/h relative to the current.

If the river is flowing at 3 km/h, at what time will he catch up with his hat?

Answers:

1. a. Spanish b. Cathy c. Italian d. Cathy

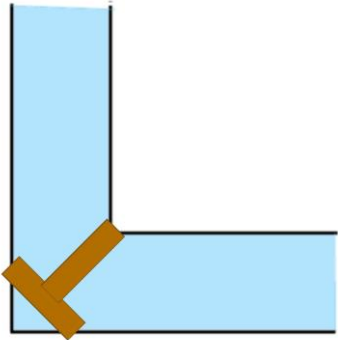
2. 67, 71, 73, 79, 97

3. 28 m

It would have exactly the same perimeter as a 5 X 9 rectangle. ($2 \times 5 + 2 \times 9$)

Imagine a paddock which is the shape and dimensions in the diagram. Then imagine a paddock which is a 5 X 9 rectangle. You have to put a fence around both paddocks.

4. Yes. Here's one solution:



5. 1

The order of operations that must be applied in any calculation is

Terms within brackets first

Then multiplications and divisions

Then additions and subtractions in order

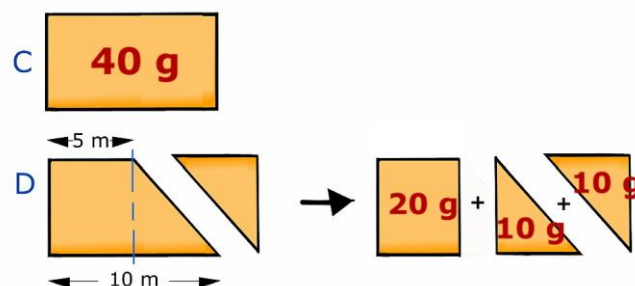
Dividing by $\frac{1}{3}$ is the same as multiplying by $\frac{3}{1}$

$$\begin{aligned}\text{So } & 9 - 3 \div \frac{1}{3} + 1 \\ & = 9 - 3 \times 3 + 1 \\ & = 9 - 9 + 1 \\ & = 0 + 1 \\ & = 1\end{aligned}$$

6. 30 kg

This could involve some complicated maths, but there is a simple logical way of looking at it. Shape C is exactly half of the original, so weighs 20g.

Imagine that when you removed the piece from shape C that turns it into shape D, you then make a second cut at the 5 m mark at right angles to the axis.

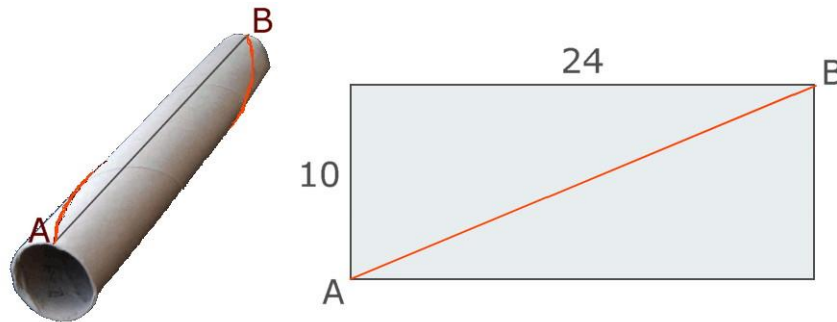


The actual piece removed from shape C and the imaginary second piece are clearly the same shape and size. In other words, they each represent a quarter of shape C's volume (and hence weight). Shape D therefore has three quarters of the weight of shape C or 30g

7. zero roosters, 25 hens and 75 chicks
 OR 4 roosters, 18 hens and 78 chicks
 OR 8 roosters, 14 hens and 78 chicks
 OR 12 roosters, 4 hens and 84 chicks

8. 26 cm

Imagine the thread as a line drawn on the cylinder.
 Imagine slitting the cylinder open along the line AB and folding it flat.
 The thread will be a straight line from A to B



By Pythagoras
 $(\text{Length})^2 = 24^2 + 10^2$
 $= 576 + 100$
 $= 676$
 $\text{Length} = \sqrt{676}$
 $= 26$

9. \$160

Let x dollars be the amount of money that Josh spent

$$\frac{x}{4} + \frac{5x}{100} + \frac{x}{10} + \frac{x}{4} + 56 = x$$

Taking a lowest common denominator of 100

$$\frac{25x+5x+10x+25x}{100} + 56 = x$$

$$\frac{65x}{100} + 56 = x$$

$$x - \frac{65x}{100} = 56$$

$$35x = 5,600$$

$$x = 160$$

10. 10:10 am

If his speed is relative to the current in both directions, then the current can be ignored. If it takes 5 minutes to row upstream, then it takes another 5 minutes to row back downstream for the hat.