

Junior Circle – The Treasure Island

1. Three pirates need to cross the sea on a boat to find the buried treasure on Treasure Island. Since the treasure chest is very large, they need to bring a wagon to transport it. Unfortunately,
 - The wagon is so heavy that it can only be loaded onto the boat and unloaded from the boat by three people.
 - The boat fits either two people and the wagon, or three people.Can you help the pirates move the wagon to the island? (Note: They can go back and forth several times).

2. While traveling on the boat, the pirates are playing Magic Squares. In each square, they have to fill numbers 1 through 9 so that the sum of the numbers in any row, column, or diagonal is the same. Help the pirates complete the magic squares below:

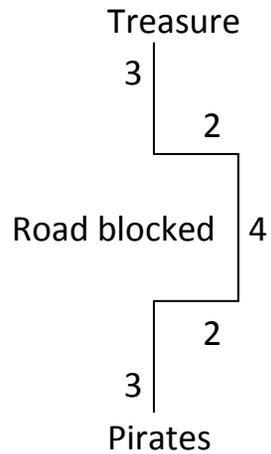
a.)

2		6
	5	
4		

b.)

8		4
	5	
6		

3. Once on Treasure Island, the pirates need to go north for 10 miles to find the buried treasure. However, due to a recent hurricane, part of the road leading north is blocked and they have to use a bypass (see picture below, numbers listed in miles). How many extra miles would the pirates have to walk because of the bypass?



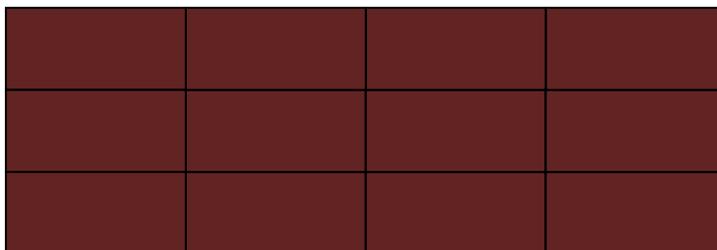
4. Next to the bypass, there is a small farm surrounded by a fence. The pirates can only see animals' heads above the fence and animals' feet below the fence. They counted 11 animal heads and 34 animal legs.
- a.) Could all the animals on the farm have the same number of legs? Why?
- b.) Assuming that there are only cows and geese there, how many cows are there and how many geese?

5. On the fence, the pirates saw a puzzle:

$$\begin{array}{r} A \\ A \\ + B \\ \hline C C \end{array}$$

Assuming that the same letter always represents the same digit, solve the puzzle.

6. While the pirates were walking, they were snacking on a chocolate bar. The chocolate bar (see picture below) is a rectangle of size 4 by 3. The pirates want to break it into 12 small rectangles. How many times do they have to break it? Does it depend on the order in which they break it?



7. When the pirates eventually find the treasure chest, they decide to split the gold according to their ranks. The captain pirate gets twice as much gold as the other two pirates combined. The co-captain pirate gets twice as much gold as the third pirate. Altogether, there are 90 coins. How many pieces does each pirate get?

8. The third pirate finds out that exactly one of his coins is fake. The fake coins weigh less than the real coins and the real coins all weigh the same weight. He has a balance scale to figure out which coin is fake (see picture below). What is the smallest possible number of weighings to find the fake coin?



9. He ends up in the situation where he has two coins left to be weighed and one coin is real and the other is fake. Just as he is about to do the final weighing to determine which one is real and which is fake, two islanders ambush him and take his eight real coins and demand the other two coins!

The pirate begs them to keep one of the two coins, but he doesn't know which of the two is real or fake. The islanders know which is real and which is fake. Of the two islanders, one always tells the truth and one always lies, but the pirate does not know which pirate tells the truth and which pirate lies!

He must ask, "Is this the real coin?" to the two islanders for one coin and then again for the other coin. Fill in the table below with the answers "Yes" or "No".

	Islander #1	Islander #2
Coin #1		
Coin #2		

What are the possible outcomes and can he find which coin is real?

10. Now the two islanders leave and three new islanders show up. They tell us that two of them tell the truth and one lies. The pirate must now ask, "Is this the real coin?" to all three of them for each of the two coins. What are the possible outcomes and can he find which coin is real?

	Islander #1	Islander #2	Islander #3
Coin #1			
Coin #2			

11. On their way back home, the pirates do more Magic Squares.

- a. Now they have to fill in the numbers 2 through 10 so that the sum of the numbers in any row, column, or diagonal is the same. Help the pirates complete the Magic Square below:

9		7
4		8
	10	

- b. Now they have to fill the numbers 1 through 16 so that the sum of the numbers in any row, column, or diagonal is the same. Help the pirates complete the Magic Square below:

1	15	14	
12	6		9
8		11	5
	3	2	16

- c. Now they have to fill the numbers 2 through 17 so that the sum of the numbers in any row, column, or diagonal is the same. Help the pirates complete the Magic Square below:

	16	15	
13		8	10
9	11		6
14	4	3	