

PIRATES

1. **3 500** (= 5 250 : 1½) **pesos**. Boatswaine got 1½ share. We are suppose to find out the value of 1 share, if 1½ share is 5 250, which can be done by a thought or by the rule of proportion.
2. **5 040, 5 840, 5 680 or 6 480 pesos**

The answer depends on whether Jack and Edwards were or were not mutilated. According to the rules the carpenter Jack could have got

- 1¼ share (if he was not mutilated): if 1¼ of the share is 7 100 pesos, then

$$1 \text{ share} = 7\,100 : 1\frac{1}{4} = 5\,680 \text{ pesos}$$

So Edward could have got

- 1 share (if he was not injured), hence **5 680 pesos**,
- 1 share + 800 pesos (if mutilated), it is 5 680 + 800 = **6 480 pesos**.
- 1¼ share + 800 pesos (if mutilated), then

$$1 \text{ share} = (7\,100 - 800) : 1\frac{1}{4} = 5\,040 \text{ pesos}$$
 In that case Edward could have got
 - 1 share (if not mutilated), it means **5 040 pesos**,
 - 1 share + 800 pesos (if mutilated), it is 5 040 + 800 = **5 840 pesos**.

So, Edward could have got

- 5 040 pesos (if Jack was and Edward was not mutilated),
 - 5 680 pesos (if neither one of them was mutilated),
 - 5 840 pesos (if both of them were mutilated)
 - 6 480 pesos (if Edward was and Jack wasn't mutilated).
3. From the loot we firstly subtract $17 \cdot 800 = 13\,600$ pesos for 17 mutilated, the rest is

$$500\,000 - 13\,600 = 486\,400 \text{ pesos.}$$

This money has to be divided into

$$2 \cdot 2 + 2 \cdot 1\frac{1}{2} + 5 \cdot 1\frac{1}{4} + 223 = 236\frac{1}{4} \text{ shares}$$

(2 · 2 are the captain's and the first officer's shares, $2 \cdot 1\frac{1}{2}$ shares belong to the main cannoneer and a boatswaine, $5 \cdot 1\frac{1}{4}$ are the shares of a carpenter and other 4 officers). One share is

$$486\,400 : 236\frac{1}{4} = 2058,835\dots \text{ pesos.} \quad (*)$$

An expected answer is **2 058 pesos** (eventually **2 058,8 pesos**, the reality of this answer depends on what other smaller parts of 1 peso there were, we'll get to it later). By the share value of 2 059 pesos or 2 058.9 pesos (these values were created by rounding off the result (*)), some of the pirates would have got less than they deserved.

Teacher should motivate a discussion about possible answers, e.g. why the value of one share should not be rounded up or how much of the loot would remain undivided if the value of one share was 2 058 pesos. During the discussion about the answer 2 058.8 pesos the teacher can use some additional information (it is in the text before the question n. 5) about a division of one peso: 1 peso = 8 *reals*. In the past peso coins were really cut into smaller 4 or 8 parts, and these parts had a value of 2 or 1 *real* (it was possible to divide coins because their value depended on the amount of silver in the coin). If we want to divide the loot as precise as possible we will divide it in reals, where the nearest lower value to 0.835.... peso is $\frac{6}{8} = 0,75$ peso (a number $\frac{7}{8} = 0,875$ is already bigger than 0. 835...). In that case we choose that the value of 1 share will be 2 058 pesos and 6 reals. Another possibility is to express the result (*) in reals:

$$2058,835\dots \text{ pesos} = 16\,470.68 \dots \text{ reals,}$$

therefore one share will be 16 470 reals, or **2 058 pesos and 6 reals**.



Note: The amount of 500 000 silver pesos mentioned in the text is real. The value of gold and silver transported by the Spanish ships was really enormous. For example the value of gold and silver transported by 11 Spanish ships which sank by the Florida coast in 1715 (look at the text below the golden escudo picture after the exercise 6) was almost 56 million reals.

4. It could happen if the value of one share was **less than 3 200 pesos**.

An increase of a simple soldier's profit can be caused by his mutilation. If a mutilated soldier should have bigger profit than a not mutilated officer with his $1\frac{1}{4}$ share, 800 pesos for mutilation would have to be more than $\frac{1}{4}$ of a share. From an inequality

$$\frac{1}{4} \text{ of a share} < 800 \text{ pesos}$$

we get that the quotient has to be smaller than 3 200 pesos. If we take an officer with a $1\frac{1}{2}$ share instead of an officer with a $1\frac{1}{4}$ share, the quotient would have to be smaller than 1 600 pesos, in case of a captain smaller than 800 pesos. It follows: if the share is bigger than 3 200 pesos then each officer gets more from the loot than any simple soldier (regardless his mutilation).

5. does not give the right

Referring to the relations mentioned before the exercise 5 we can say

$$4 \text{ £} = 1 \text{ dublon} = 8 \text{ escudos} = 8 \cdot 16 \text{ reals} = (8 \cdot 16) : 8 \text{ pesos} = 16 \text{ pesos,}$$

therefore

$$1 \text{ £} = 4 \text{ pesos.}$$

The value mentioned in the Article 9 is

$$1 \text{ 000 £} = 4 \text{ 000 pesos,}$$

it is more than 3 500 pesos.

Other possibility is to change 3 500 pesos to pounds: we get

$$3500 : 4 = 875 \text{ (£)}$$

It is less than the amount 1 000 £ stated in the article 9.

6. **approximately 680 thousand euros.**

The amount 3 800 we have to

- divide by 4, we get the value in the past time pounds,
- then multiply by 550, we will get the approximate value in today's pounds,
- and finally multiply by 1.3, we'll get the approximate value in euro.

As the numbers 550 and 1.3 are just approximate numbers it has no sense to mention the result with exactness to hundreds and tens or even tenths of euro. Therefore we requested the number

$$(3\,800 : 4) \cdot 550 \cdot 1,3 = 679\,250 \text{ (euro)} \quad (**)$$

to be rounded to ten thousands (e.g. when changing the number 550 £ to 548 £ we would get the result : 676 780 (euro) which differs from (**) by more than 2000 euro.)