

→ We can write the number like this: $abcde fghij abcde \dots$

$$a+b+c+d+e+f+g+h+i+j=45$$

We also know that the sum of all the digits is 2017.

From there we can write the sum of all digits like this:

$$45Q + K = 2017 \quad Q, K \in \mathbb{N} \quad K < 45$$

And we found Q and K.

The biggest multiple of 45 and also smaller than 2017 is 1980. From that we find $Q=40$ and $K=37$

Q is the number of times we are gonna repeat the numbers: 0 to 9 without counting the numbers to do 37.

So we have 40 times 10 numbers plus the number of numbers to do 37. 37 can be done like this:

$$2+3+4+5+6+8+9=37 \Rightarrow 7 \text{ digits}$$

$$0+2+3+4+5+6+8+9=37 \Rightarrow 8 \text{ digits}$$

$$3+4+6+7+8+9=37 \Rightarrow 6 \text{ digits}$$

$$0+3+4+6+7+8+9=37 \Rightarrow 7 \text{ digits}$$

$$2+5+6+7+8+9=37 \Rightarrow 6 \text{ digits}$$

$$0+2+5+6+7+8+9=37 \Rightarrow 7 \text{ digits}$$

$$1+3+4+5+7+8+9=37 \Rightarrow 7 \text{ digits}$$

$$0+1+3+4+5+7+8+9=37 \Rightarrow 8 \text{ digits}$$

$$1+2+3+4+5+6+7+9=37 \Rightarrow 8 \text{ digits}$$

$$0+1+2+3+4+5+6+7+9=37 \Rightarrow 9 \text{ digits}$$

⇒ the number 37 can be written as a sum of 6, 7, 8, or 9 digits.

there for ~~the~~ ~~answers~~

those are the only answers:

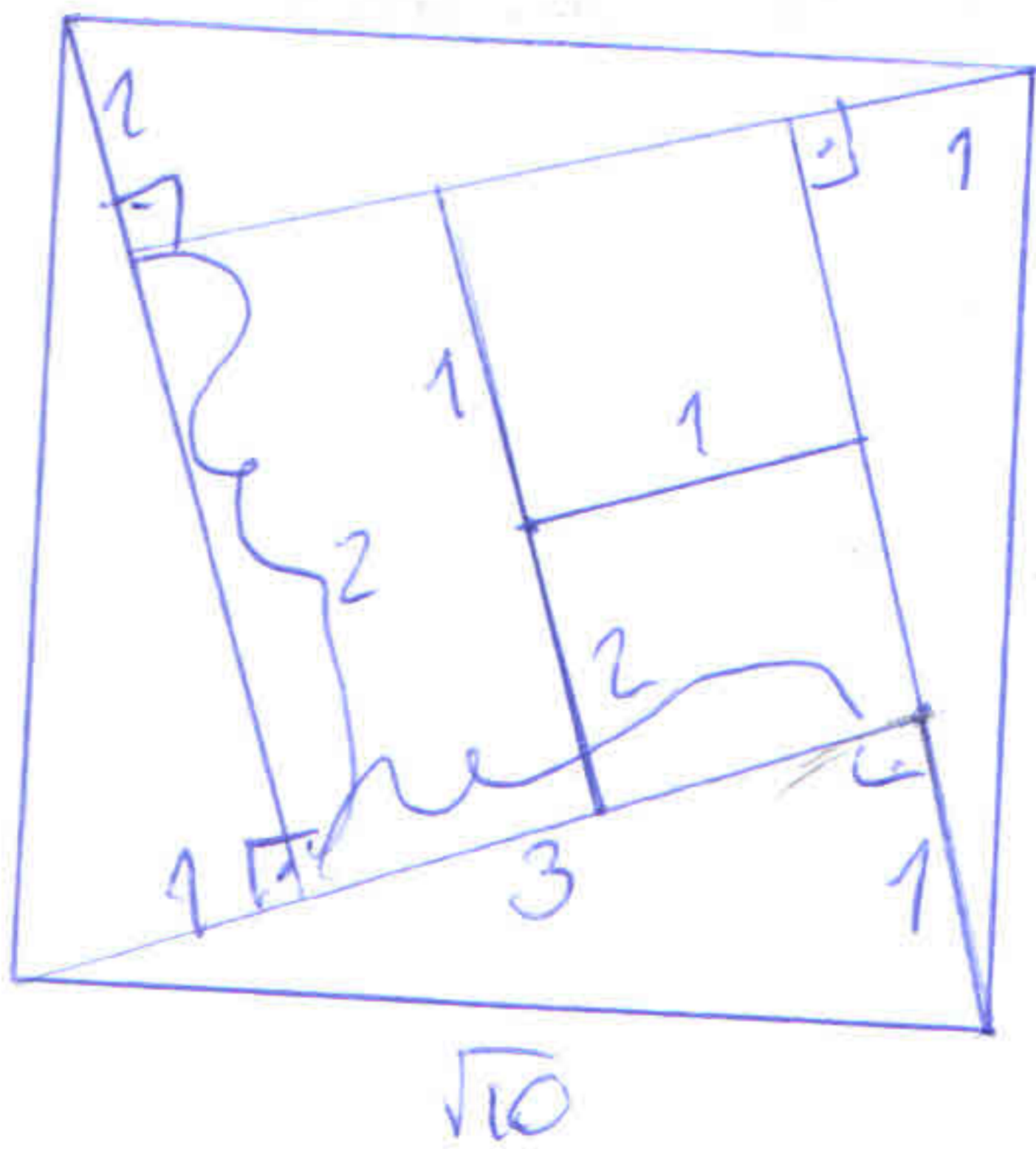
$$400+6=406$$

$$400+7=407$$

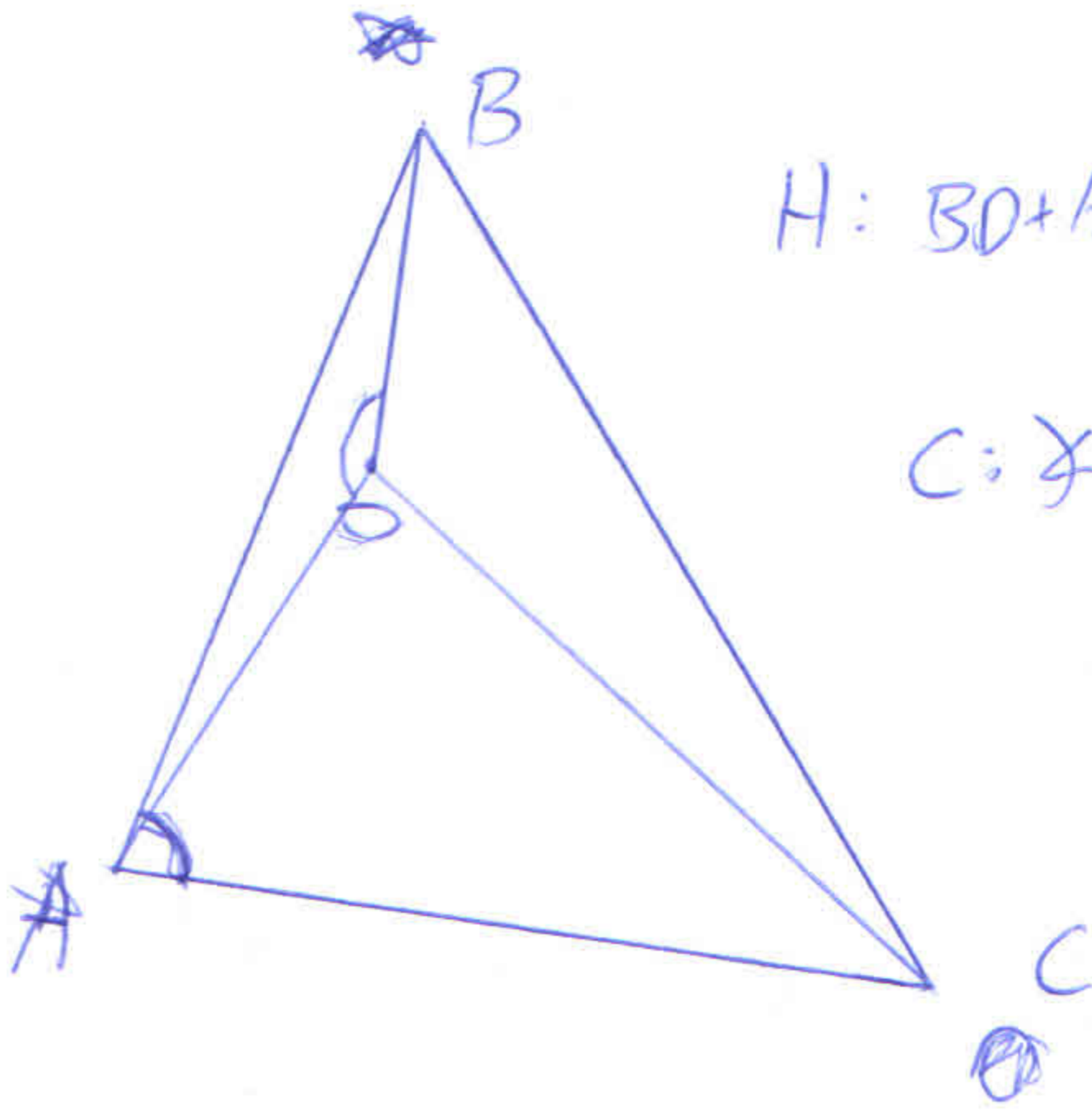
$$400+8=408$$

$$400+9=409$$

2) $\sqrt{10} = \sqrt{3^2 + 1^2}$ which suggests a rectangle of 3×1 cm. So 4 of those triangles could make the sides of a $\sqrt{10} \times \sqrt{10}$ ~~square~~ square. And then we must have a smaller square in the middle of the original square. And its dimensions are 2×2 and we just have to divide the 2×2 square in 3 parts like this: 2×1 rectangle and 2 squares of 1×1



3)



$$H: BD + AC < BC$$

$$C: \angle BDA + \angle DAC > 180^\circ$$

~~PROOF~~

$$D: BD + DC > BC \text{ (inequality of triangles)}$$

$$BD + AC < BC \Rightarrow AC < DC^*$$

$$\Delta ADC^*: \angle DAC > \angle ADC \text{ (} AC < DC \text{)} \textcircled{1}$$

$$\Delta ABC: D \text{ inside of } \Delta ABC \Rightarrow \angle BDC < 180^\circ \Rightarrow \angle BDA + \angle ADC > 180^\circ \textcircled{2}$$

$$\textcircled{1} + \textcircled{2} \Rightarrow \angle BDA + \angle DAC > 180^\circ$$

~~If he wants to give his gold coins equally in 2, 3, 4, or 5 people, we need to find the least common multiple of 2, 3, 4, 5 which is (60)~~

~~He needs to do 60 bags of one coin each.~~

5) No matter the number of solutions for 32 tiles we just have to choose 16 of those 32 tiles to have a solution. There for we have more solutions with 16 tiles than for 32 tiles.

4) We want to be able to divide the coins in ~~12, 15, 20 and 30~~ 2, 3, 4, 5 so we need groups of 12, 15, 20 and 30.

if we make groups of 15 we don't need to worry about the groups of 30

~~we~~ we minimise the number of bags by making as many bags of 12 coins as we can.

To make the 15's we ~~are~~ need bags of 3. ($15 = 12 + 3$)

for 20 we need to complete the 3's by 2 ($20 = 12 + 3 + 3 + 2$) and to minimise we make a bag of

8 coins ~~so~~ so the bags should be: 12, 12, 12, 3, 3, 3, 3, 2, 2

So we have 10 uses.