



Origami+Money =
OriMoney

**Hands-on Geometric
proofs.**

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Warm up folding.

Possible motivation: Flat cookie box below....

See how much geometry there is!



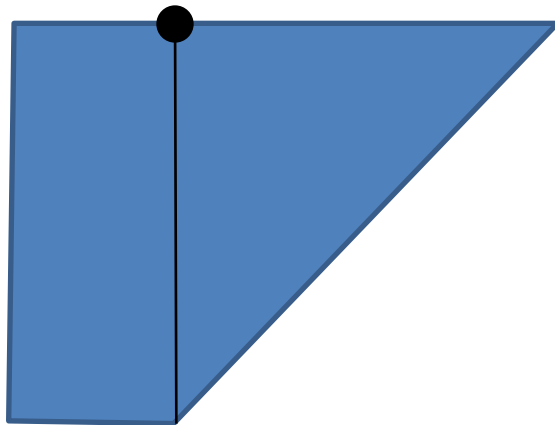
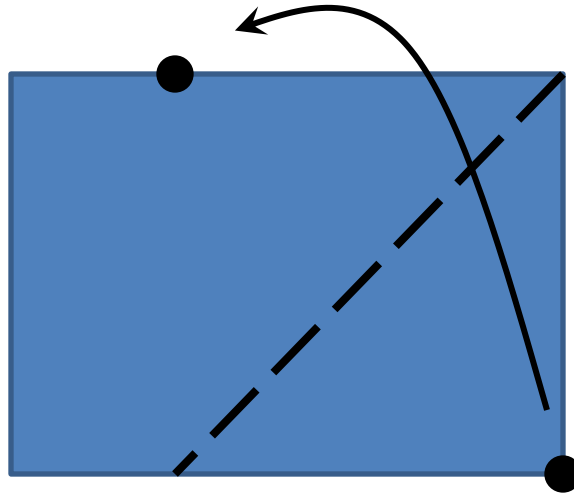
Can you create a square from a
piece of paper?

Folding a rectangle into a square

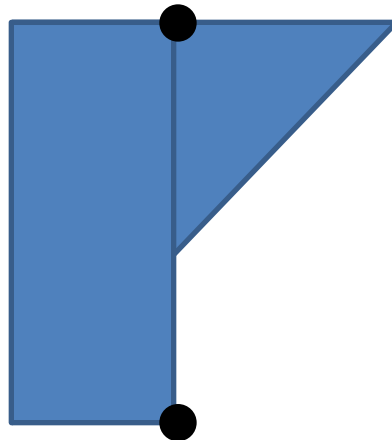
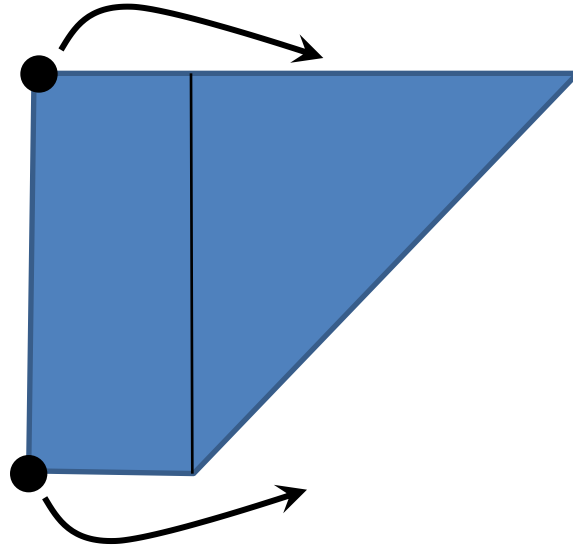


We know this is a rectangle to start with!

Folding a rectangle into a square: Step 1.

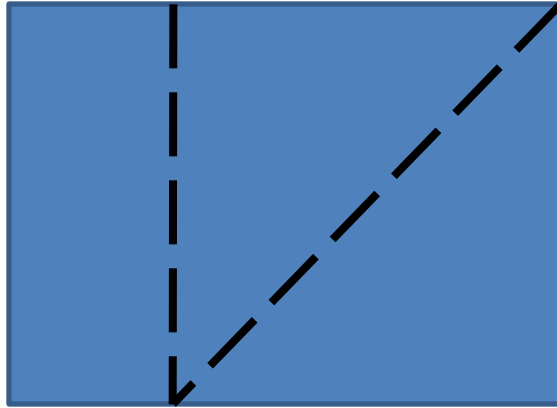


Folding the flap to get the crease:
Step 2.



Unfold all, and view the creases

Step 3.



Can you prove it is a square?

We are looking for origami/folding proof of the following:

- Four angles of 90 degrees?
- Equal sides?

Solution....

By folding along the two symmetry lines you can show that all angles are of equal measure, and all are 90 degrees.

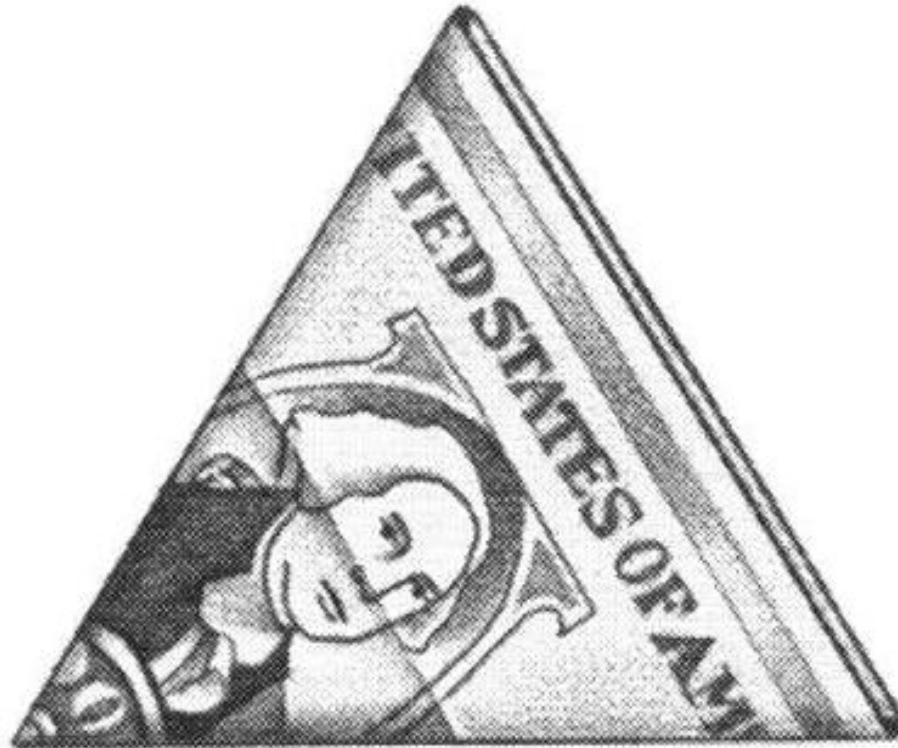
The same for sides.

It is good for passing time, but....

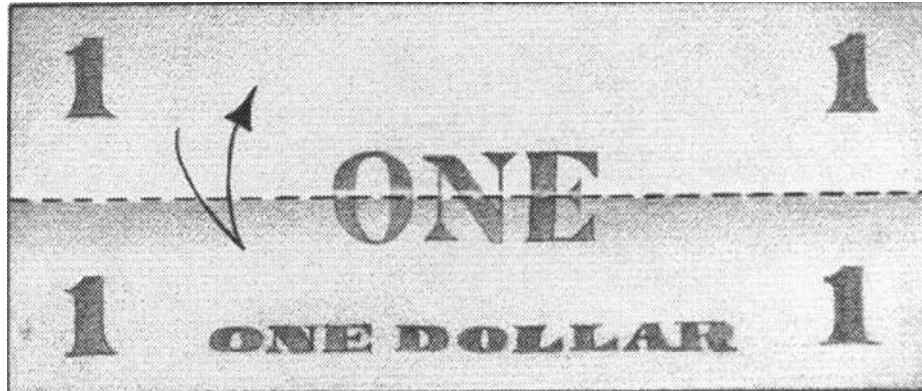


ANY OTHER STRENGTHS?

Next : Folding money!

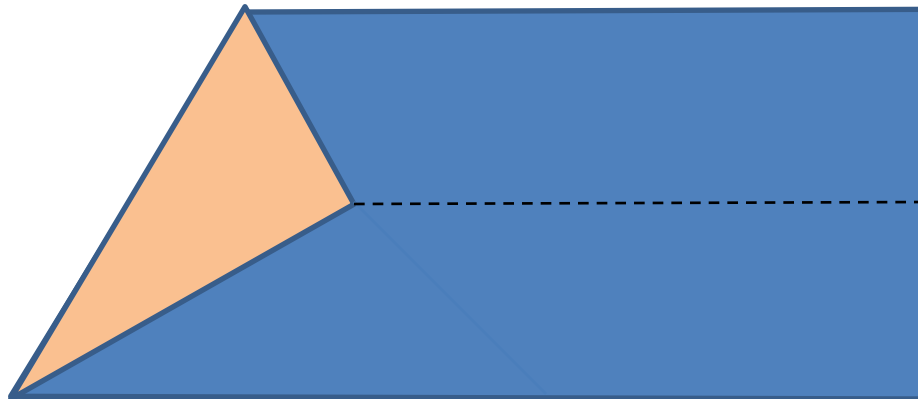
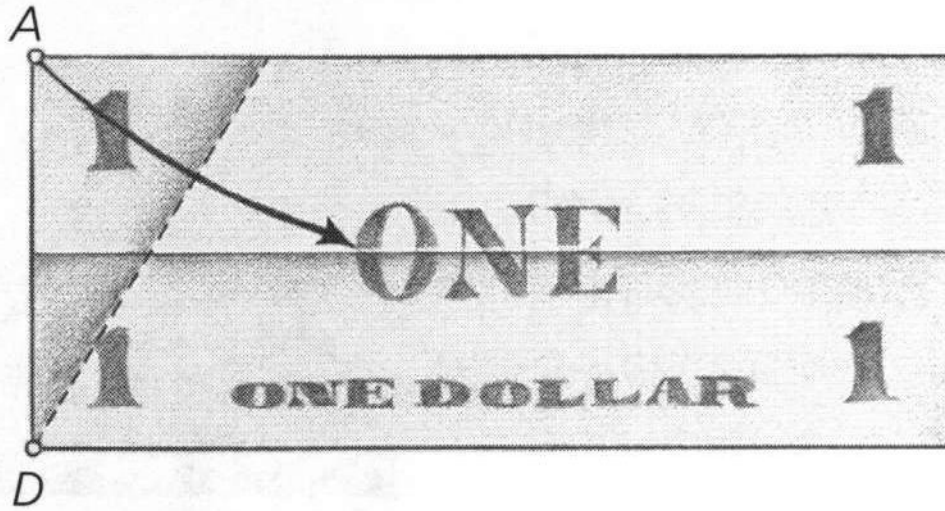


Step 1: Fold the \$1 bill into half, and unfold.

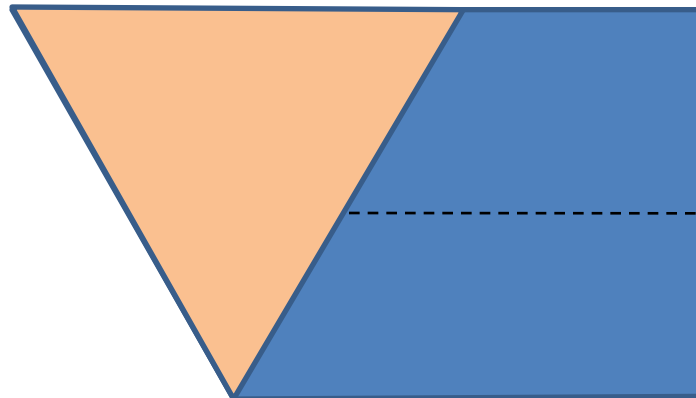
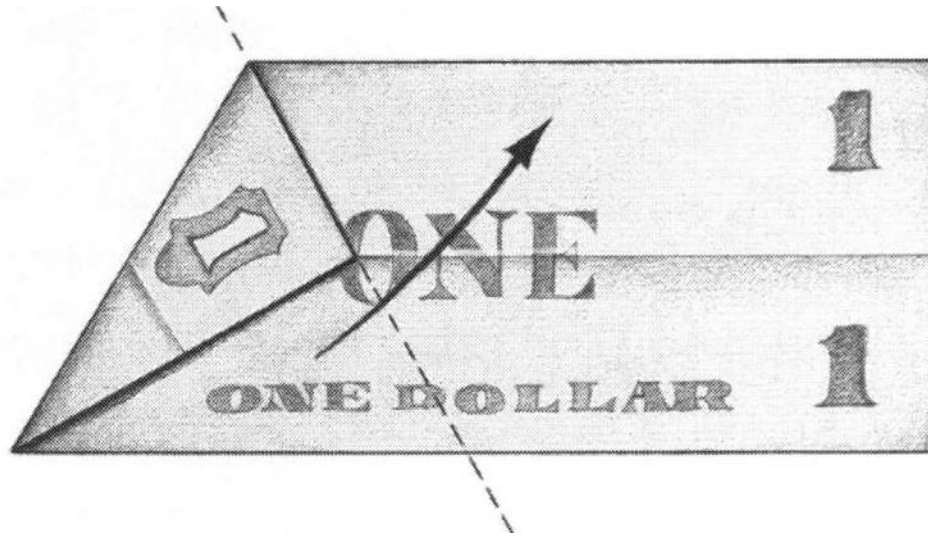


Step 2: Fold the top-left corner so that A falls on the crease.

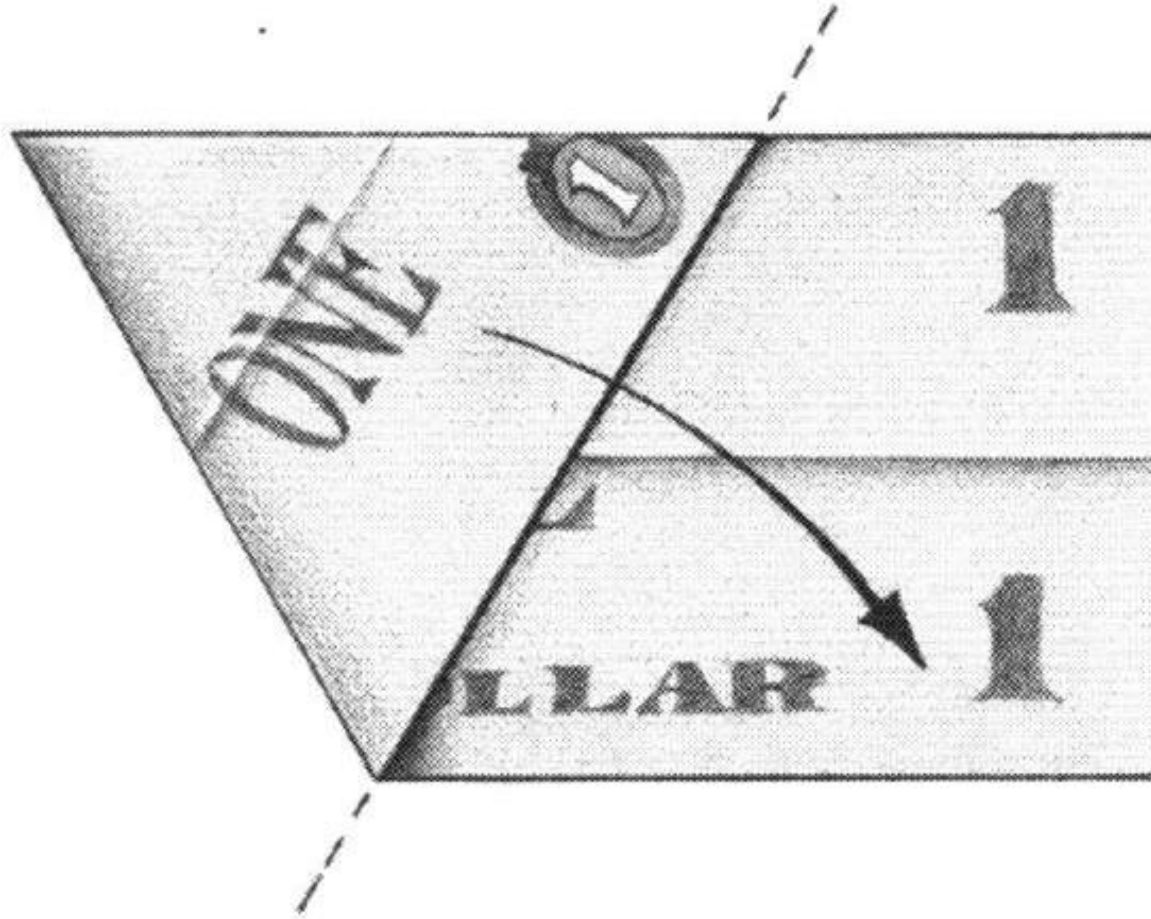
Also, the fold must go through point D.



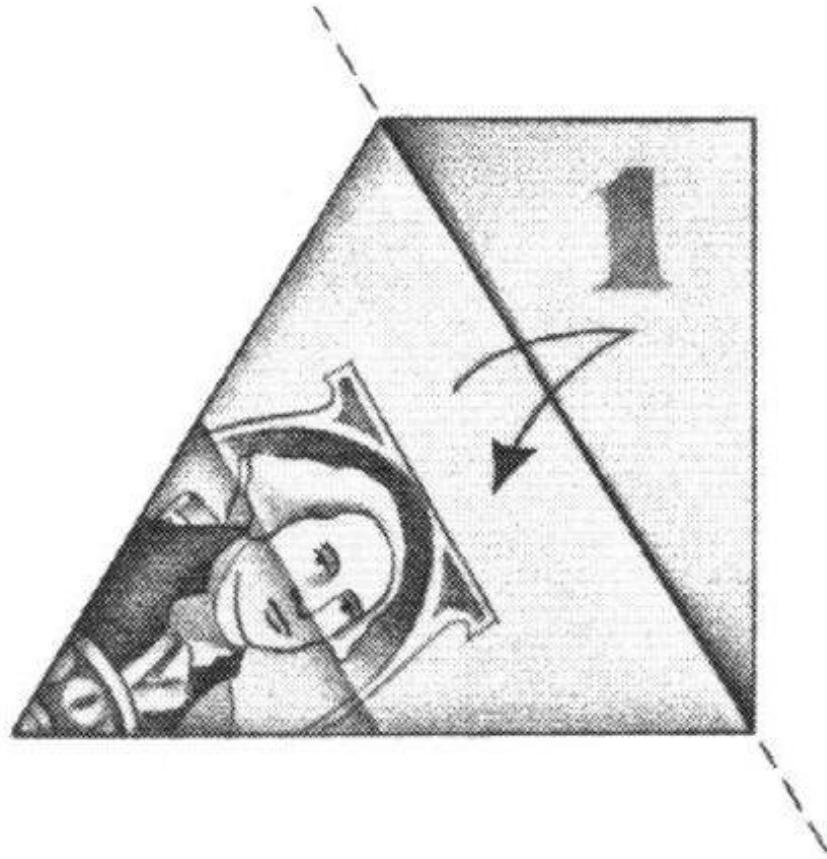
Step 3: Use one edge of the triangle you made as the new fold line.



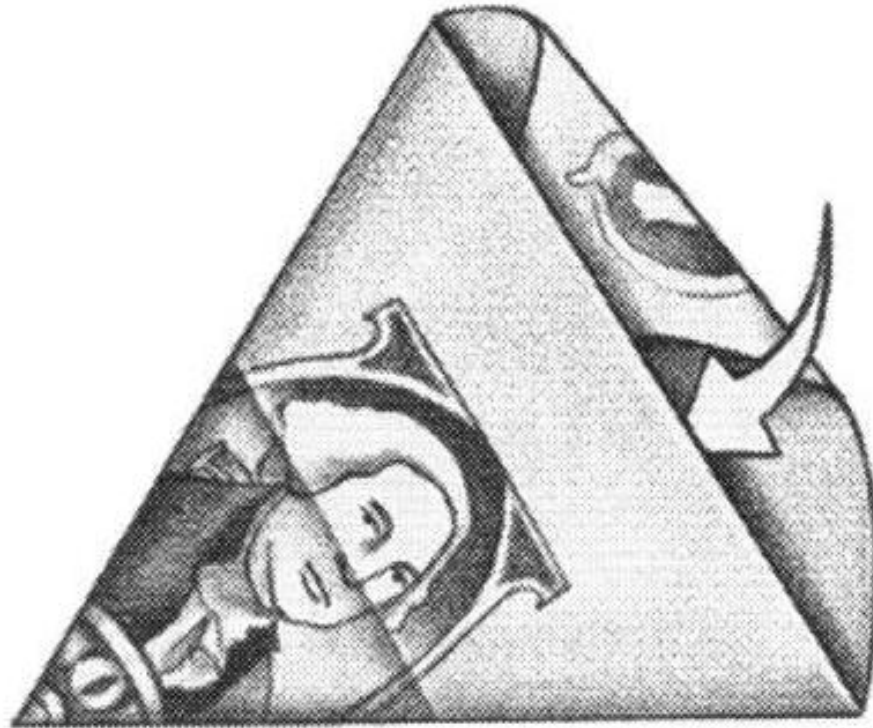
Step 4: Use the edge of the triangle as your next fold line.



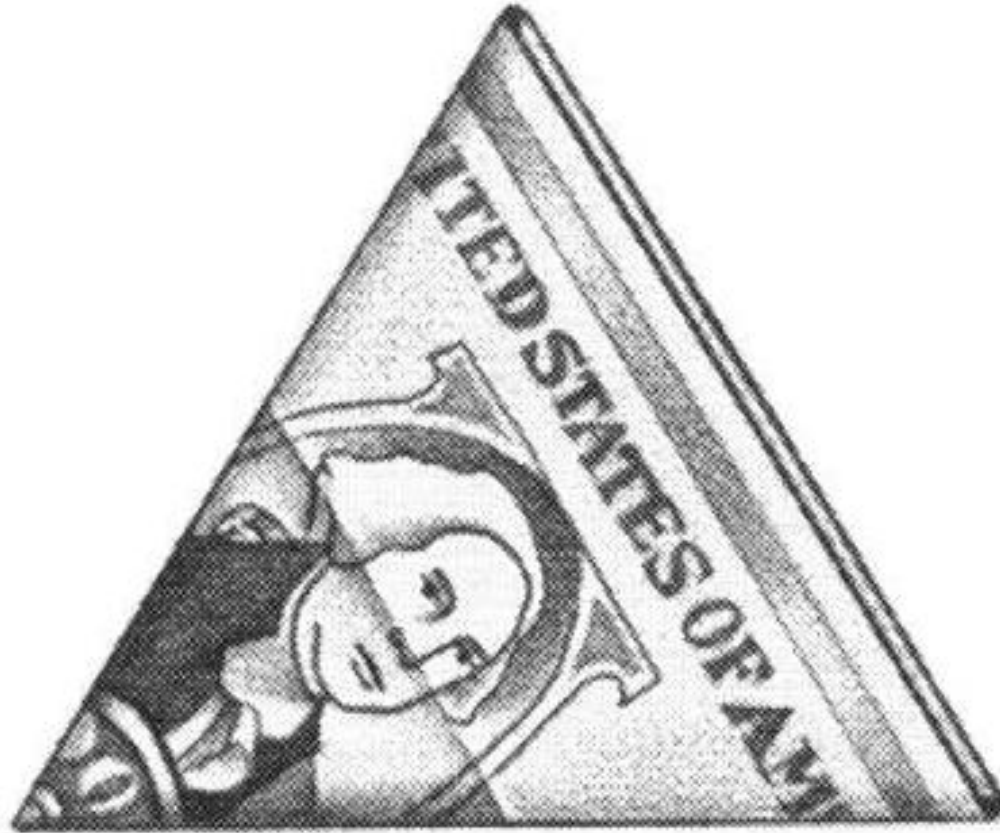
Step 5: Use the edge of the triangle as your next fold line.



Step 6: Unfold the last fold. Tuck the flap into the pocket.

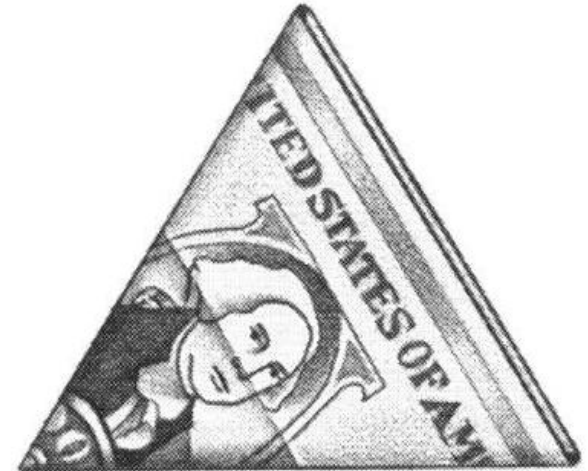


Step 7: The complete piece looks like this.



Questions?

- What does the resulting triangle looks like?
- Can you prove it using folding or by using another triangle?
- What is each angle then?



Answers

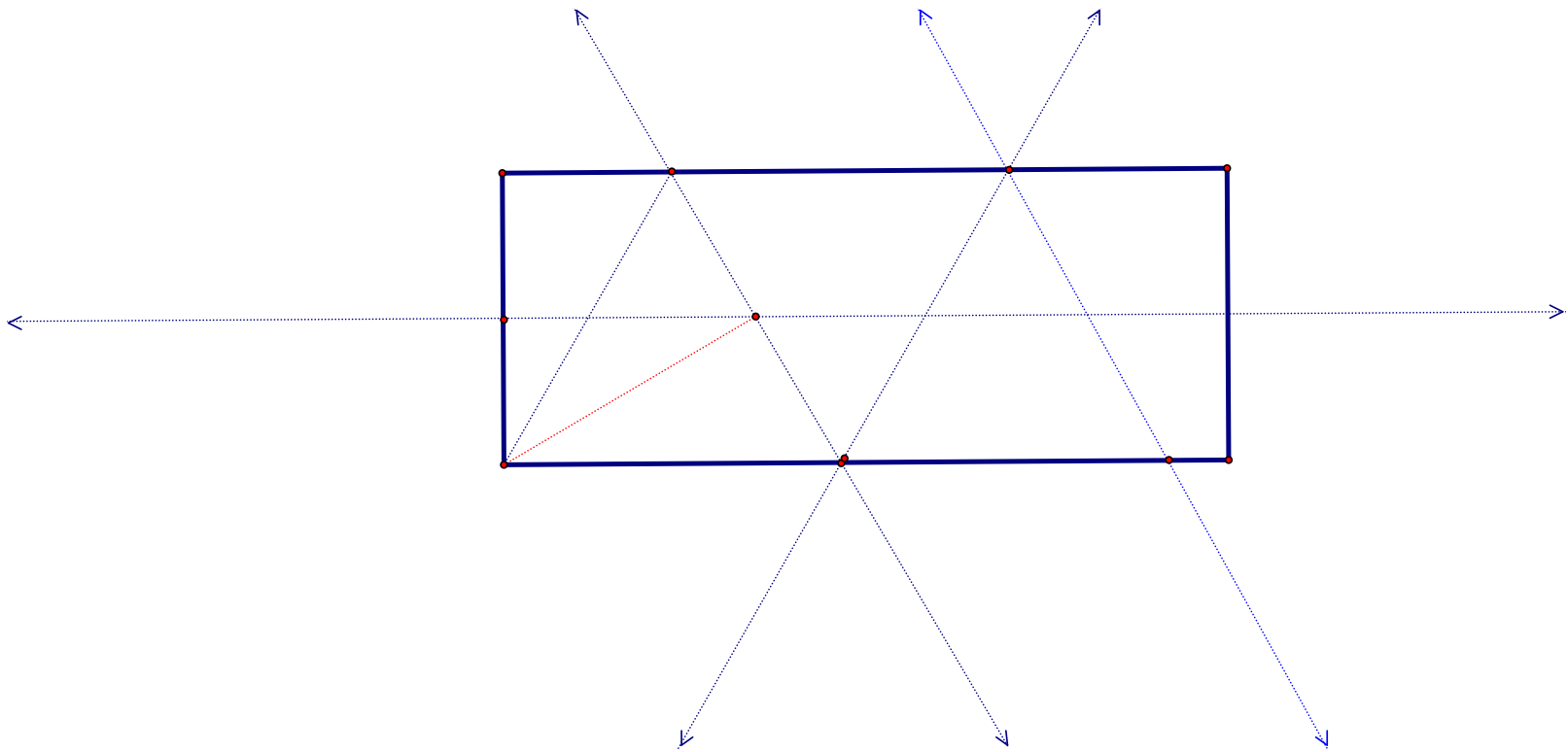
- What does the resulting triangle look like?
 - Equilateral.
- Can you prove it using folding or another triangle?
 - Folding: Show all 3-sides are congruent.
 - Using another triangle: Rotate and compare.
- What is each angle then?
 - 60-degrees.

Points to discuss

- Congruent Vs. Equal.
- Definition(s) of equilateral:
 - Three sides equal.
 - Triangle where each angle is 60-degrees.

Ready for higher level of
geometry proofs?!?

Unfold all the way, and look at the creases.



How many Equilateral triangles can you find?

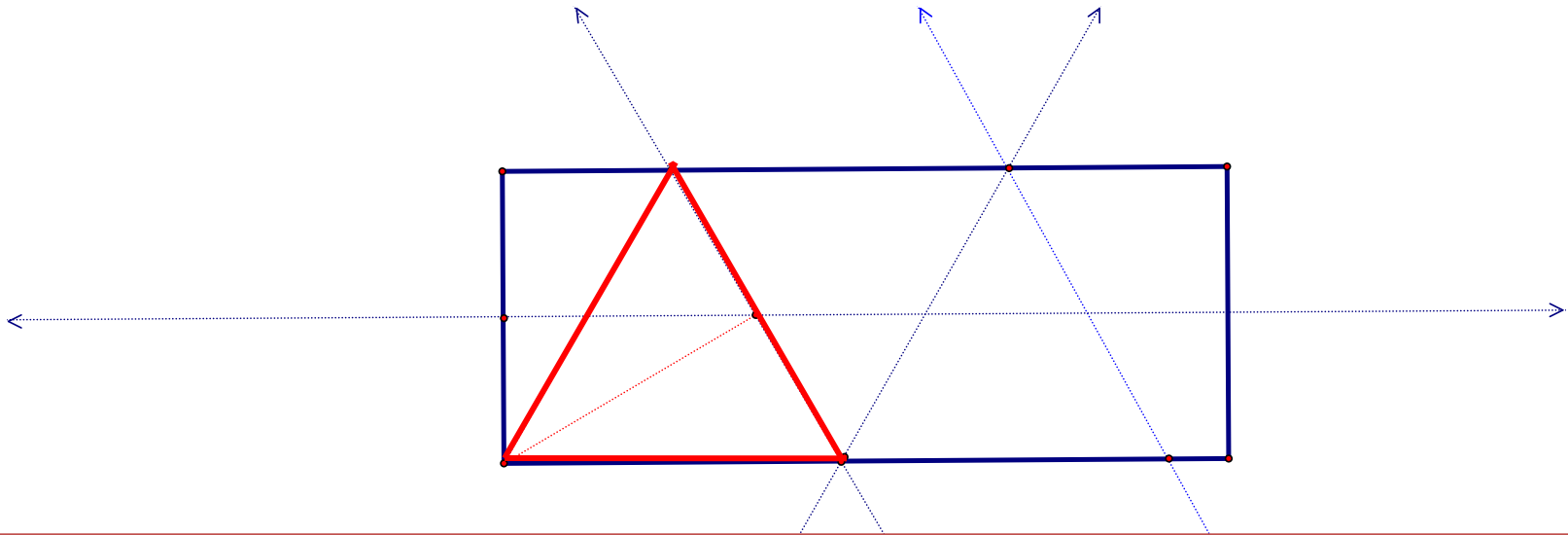
From here on, it really depends on what the students know.

1. Following a 30-60-90 triangle.
2. Chasing angles.
3. Using parallel lines.

Or otherwise just using 'folding proofs'.

Therefore, I will just outline a few ideas here, and one will need to choose accordingly...

Can we prove?

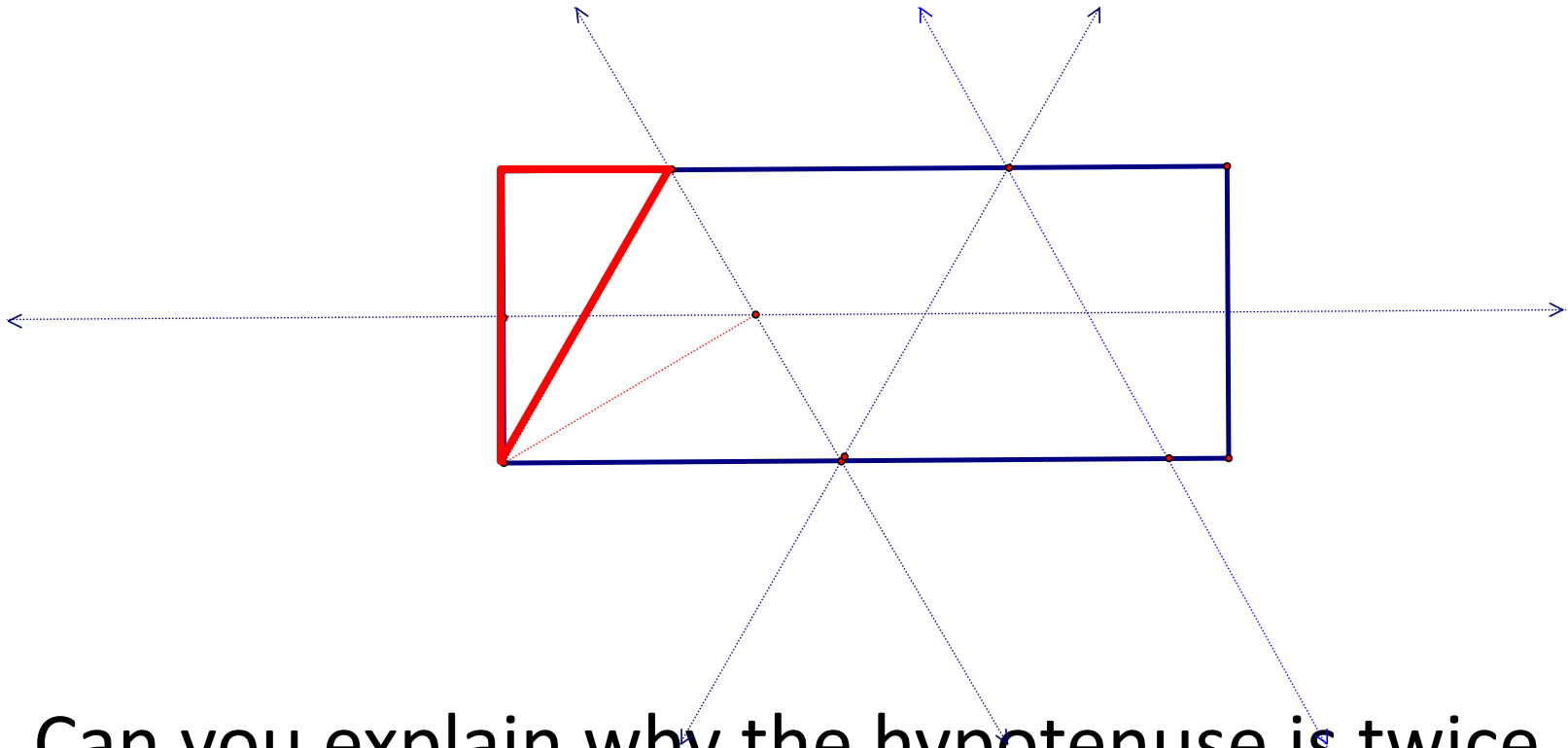


Can we prove that the first triangle is an equilateral from the construction?

(as contrasted with merely checking that it is)

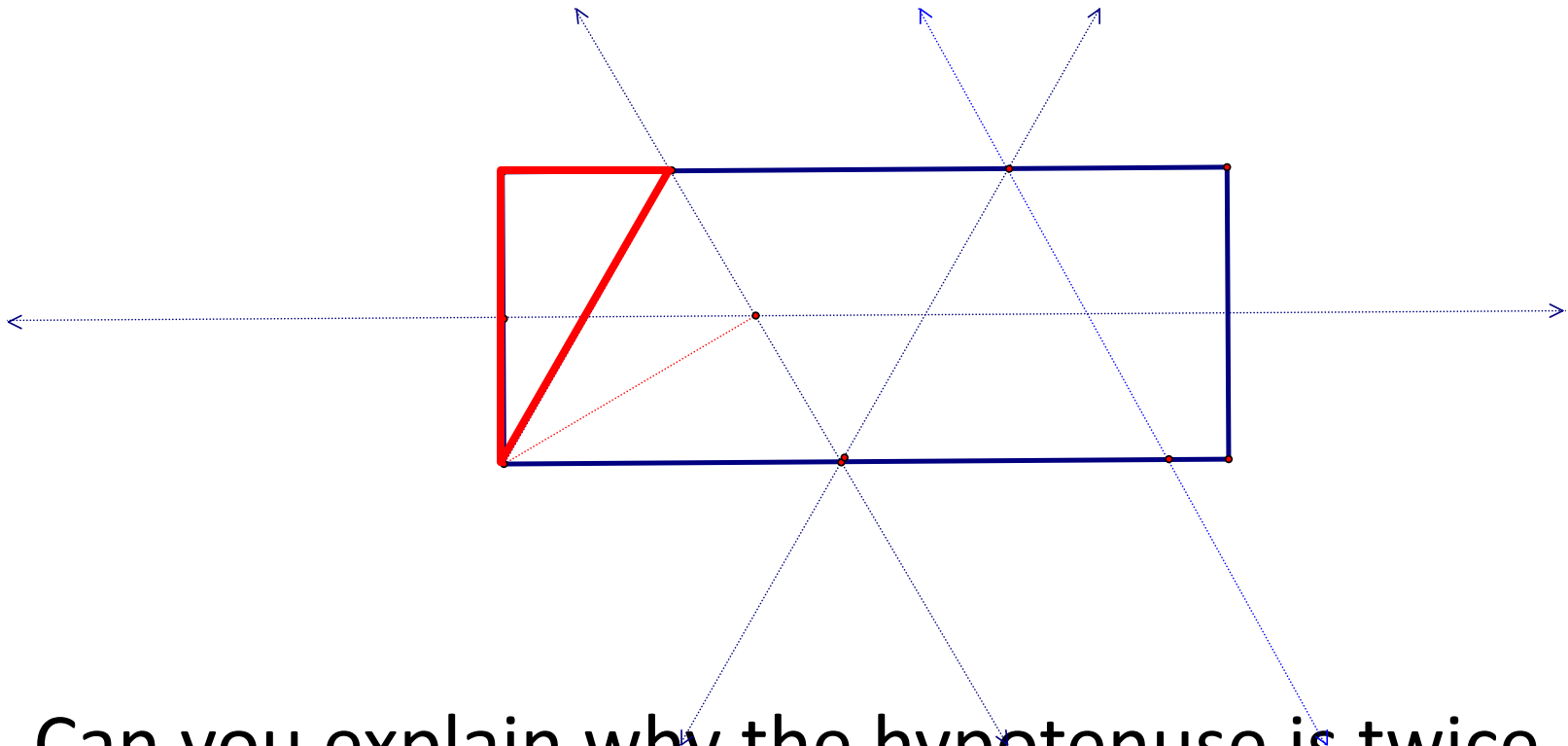
Using 30-60-90

30-60-90 triangle



- Can you explain why the hypotenuse is twice the top side?

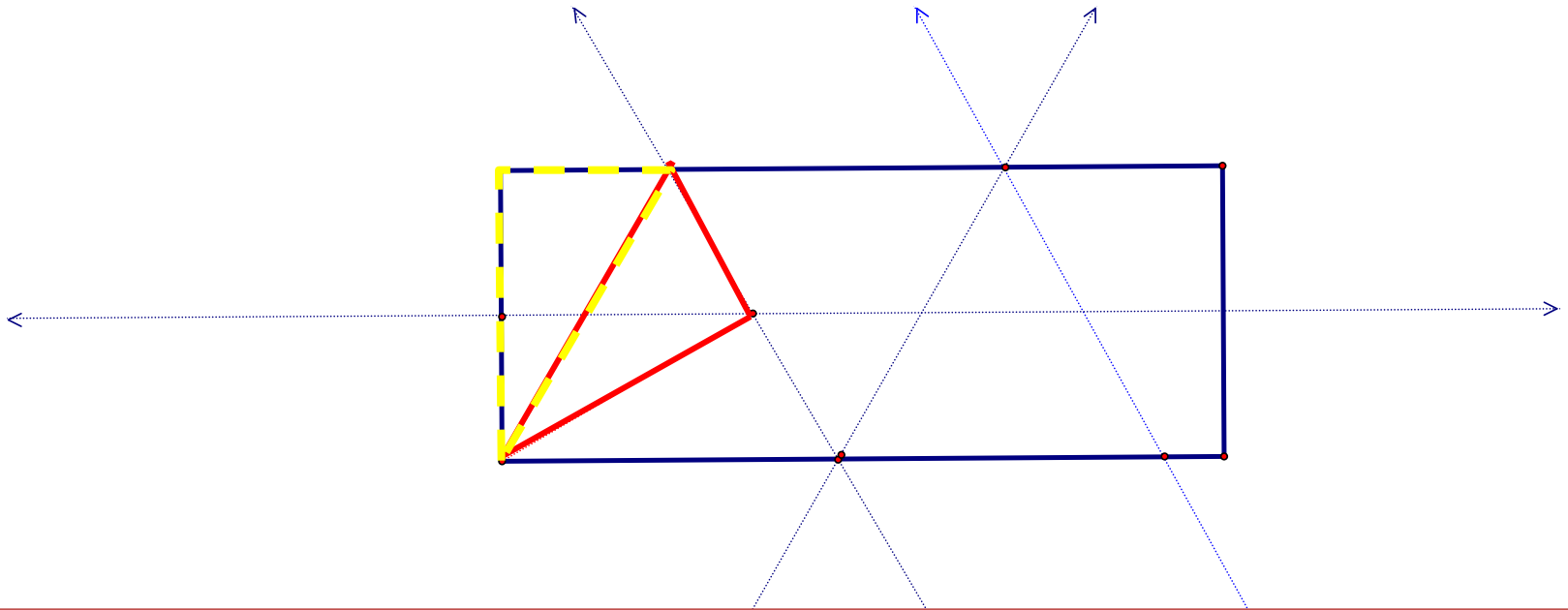
30-60-90 triangle



- Can you explain why the hypotenuse is twice the top side?
 - One option: Using symmetry.

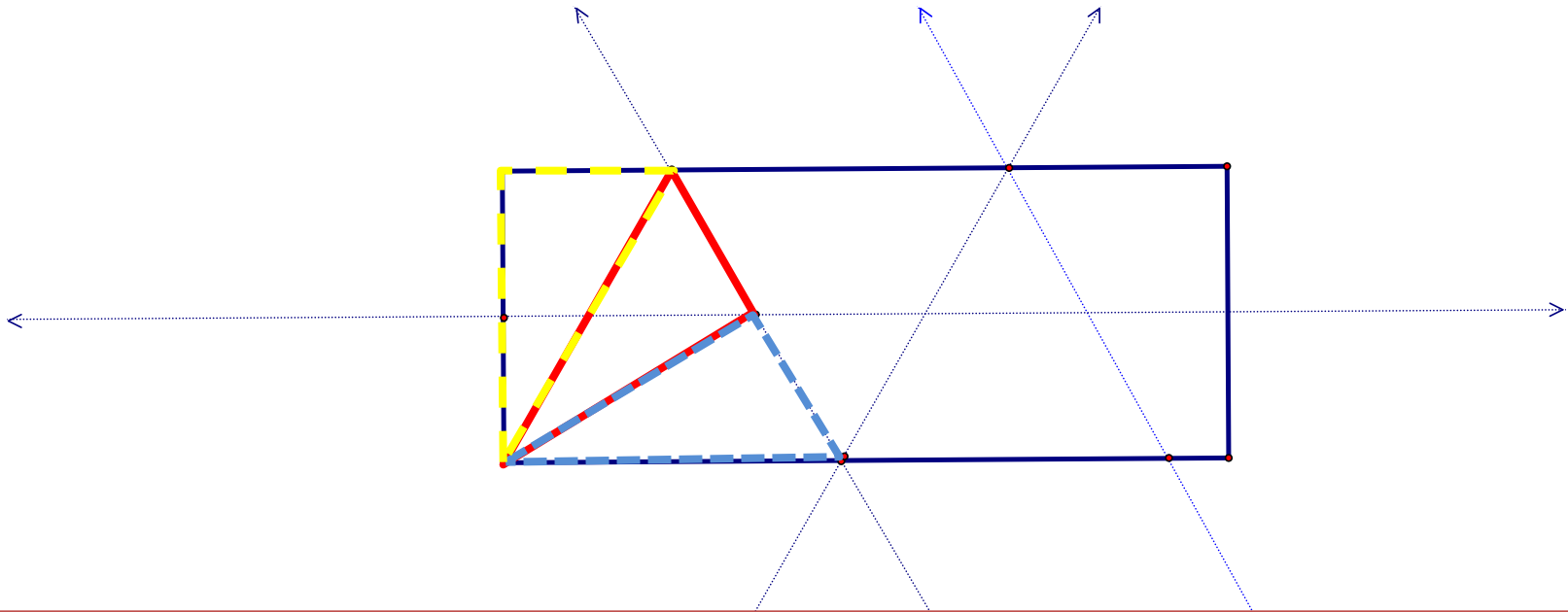
Using congruent triangles

Starting from the beginning.



Are the first two small triangles congruent?!?

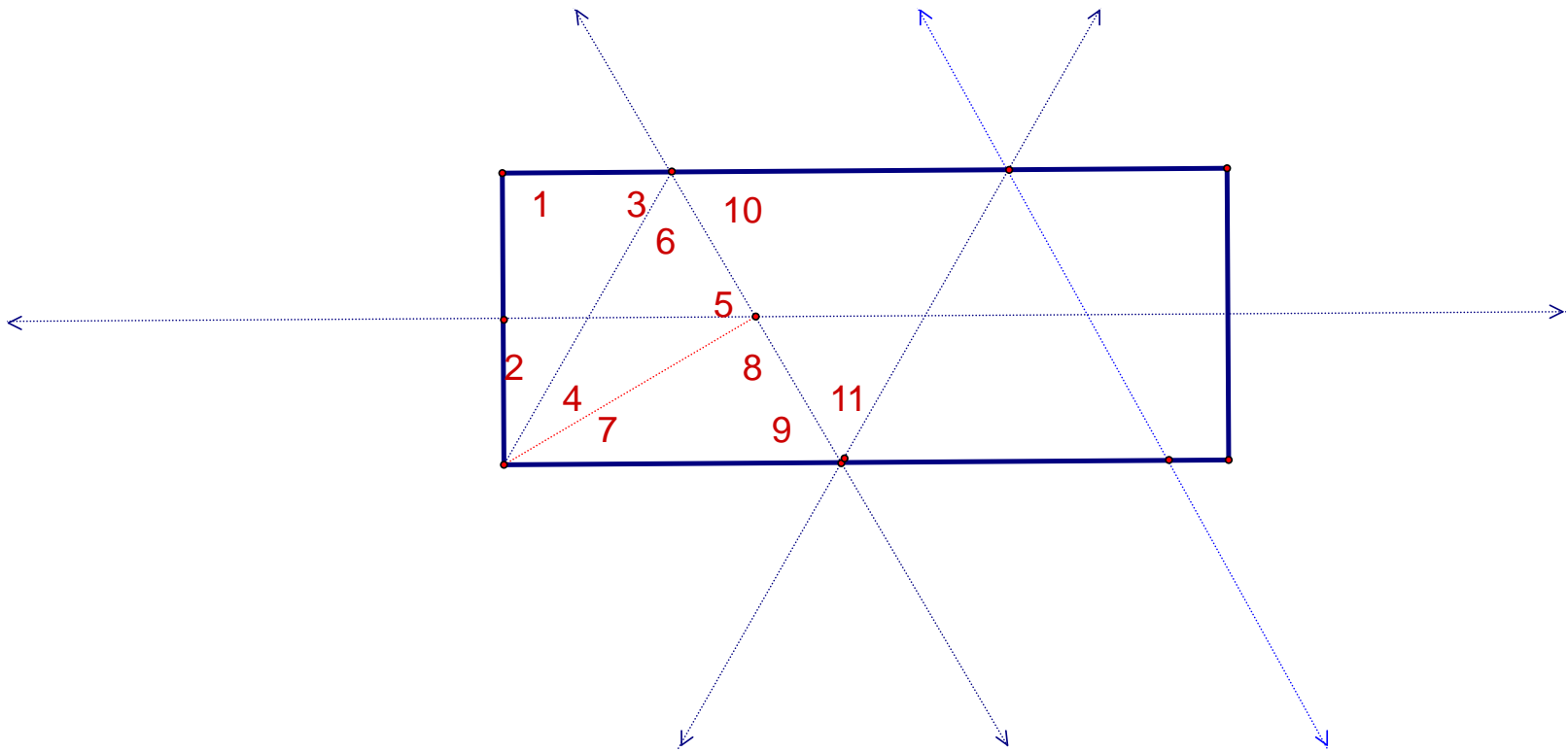
One more step.



Is the third one congruent?
What does it tell us about the angles then?!?

Can you now 'chase angles', and
find all in the following?

Chasing angles?

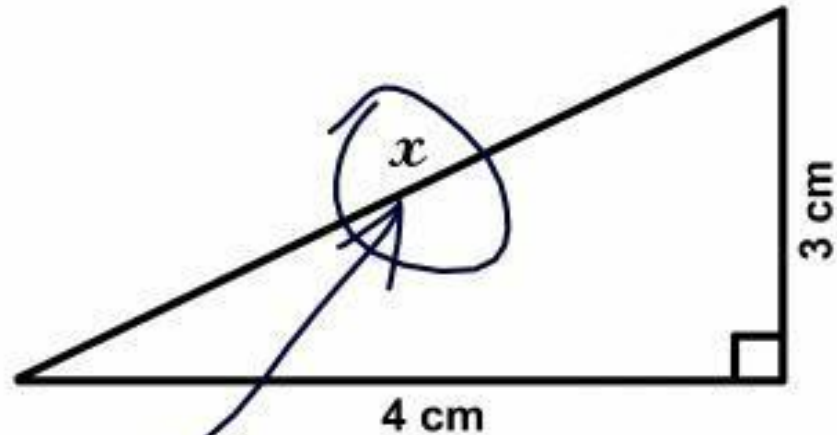


And so on... fill in all angles!

Wrap up

- Cool trick in Origami !
 - Use it next time you are waiting in the airport...
- Proofs:
 - By folding/construction/validating.
 - By formal arguments.
 - Two column proofs.
- Next step (aka Challenge problem)
 - Constructing this in SketchPad : How to translate these folds into geometric constructions?!?

3. Find x .



Here it is

Ocular Trauma - by Wade Clarke ©2005

The End