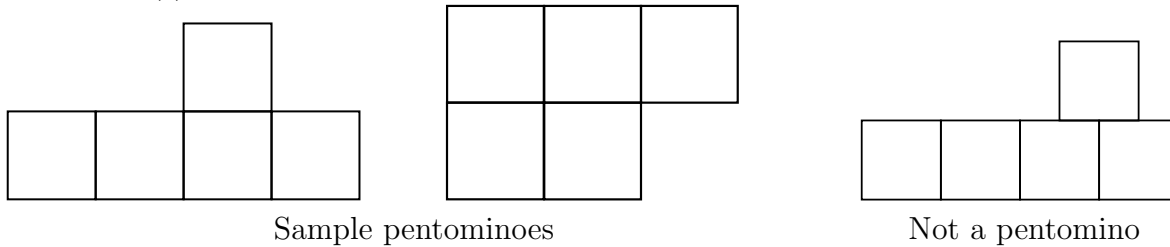


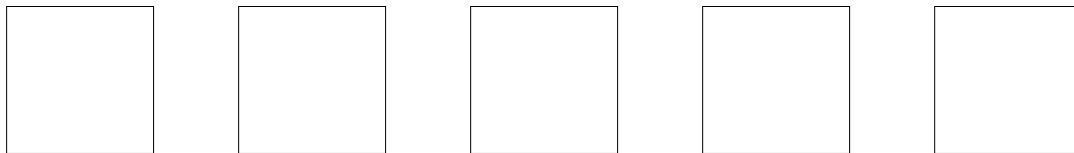
### Problem

#### Pentominoes and Boxes (suitable for pairs or groups of students)

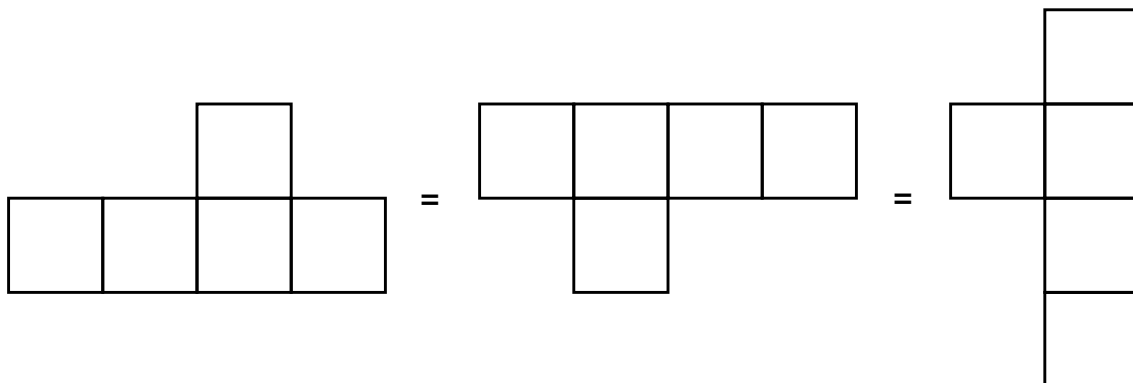
Pentominoes are formed using 5 square pattern blocks by matching the side(s) of one square exactly to the side(s) of another.



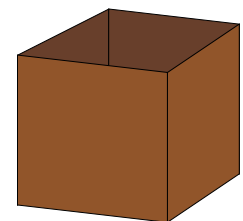
Cut out the squares below and use them to create all possible pentominoes. As you discover each one, sketch it on the grid paper below (as shown for the two samples).

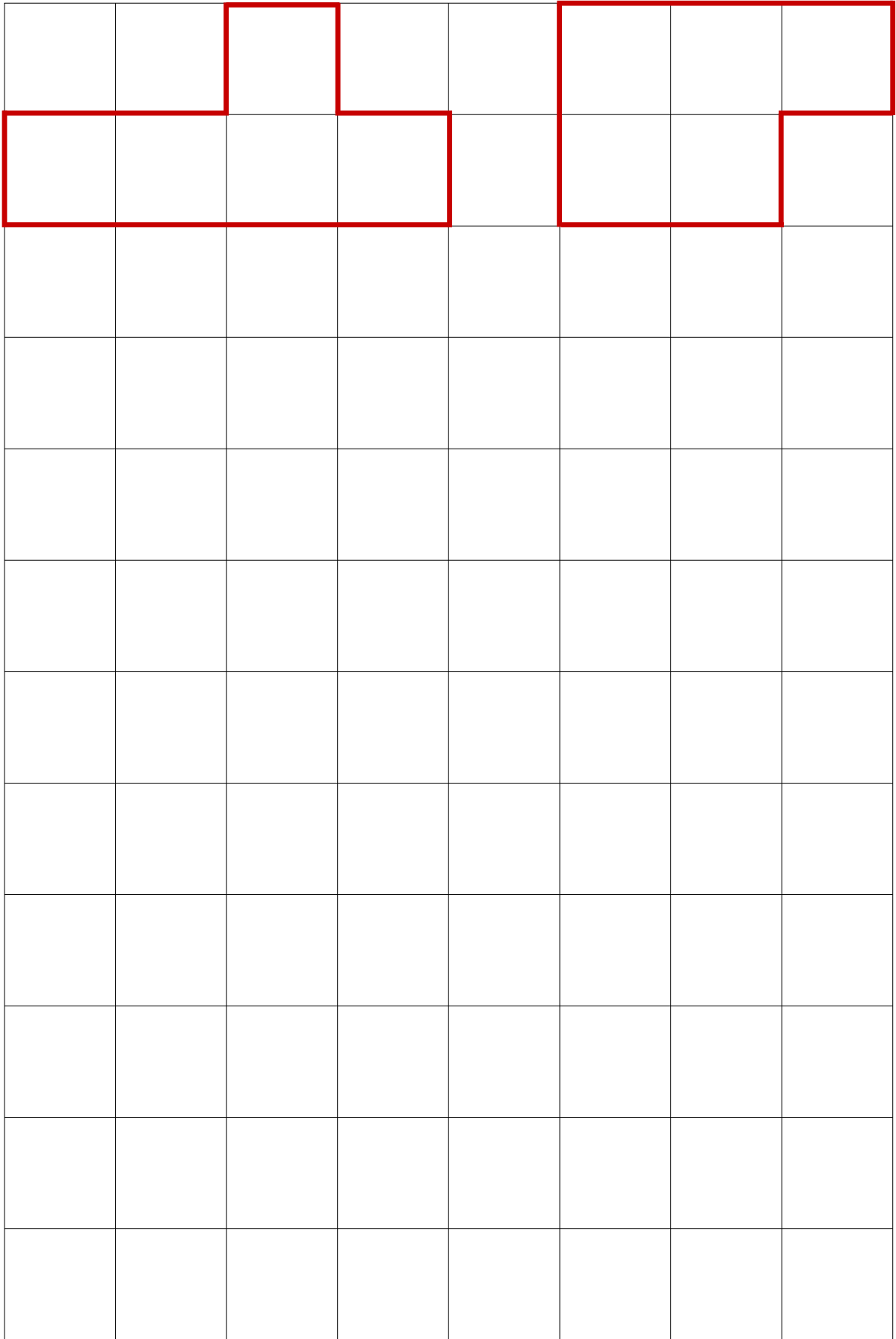


Remember that two shapes are the same pentomino if one can be obtained from flips, reflections or turns (rotations) of the other.



- Which pentomino has the greatest/least area?
- Which pentomino has the greatest/least perimeter?
- Which pentominoes can be made into open boxes (i.e., a cube missing one face?)

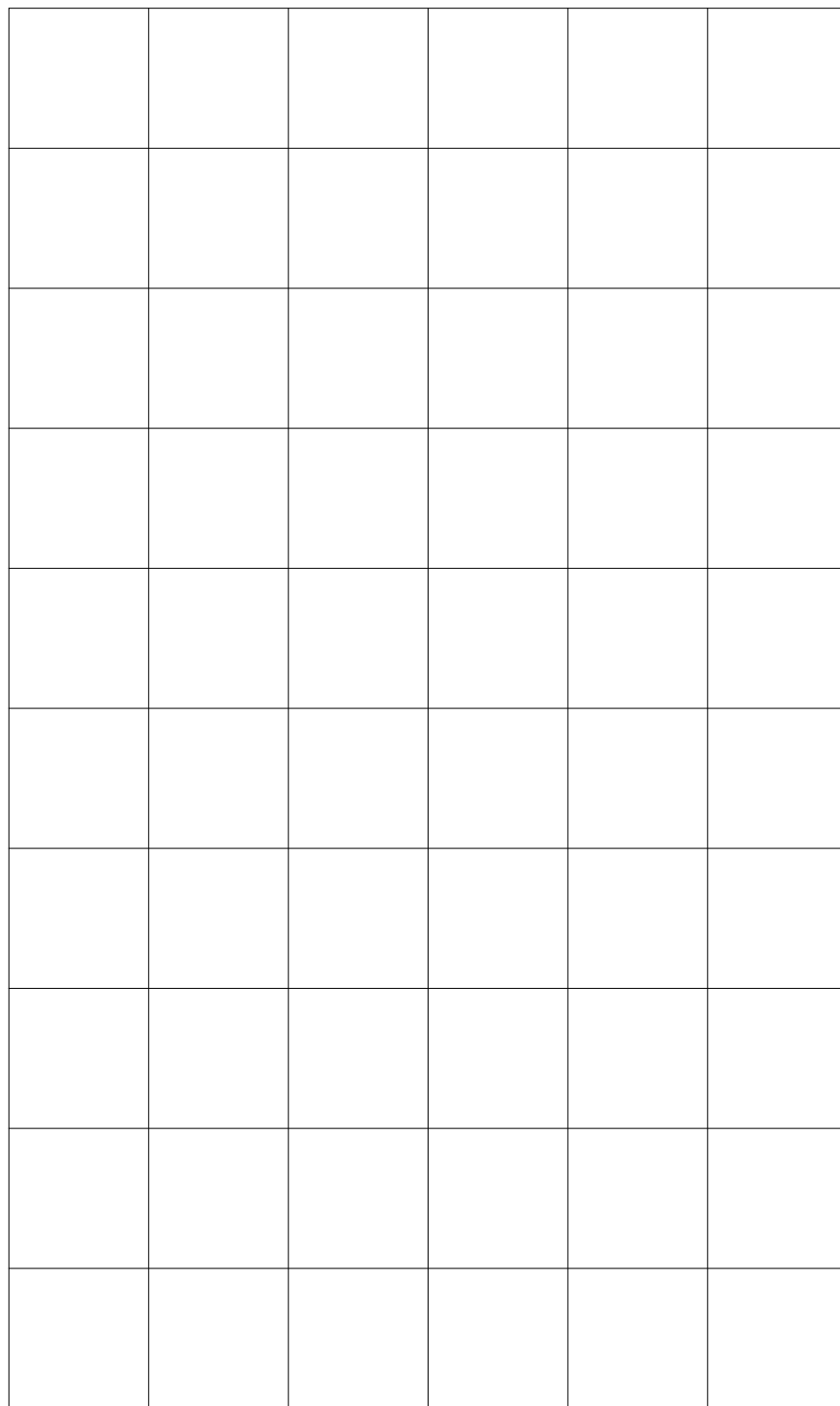




***Extension :***

Cut out all the pentominoes you found.

The entire set of pentominoes can be arranged (like a puzzle) to exactly fill the rectangle below. Give it a try!




**Hints**

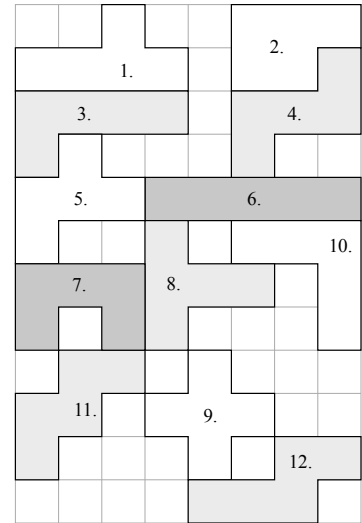
c) *Suggestions:*

1. Have students cut out the pentominoes and try to form boxes with each one.
2. Do a web search on pentominoes for many other interesting activities.

### Solution

#### (Pentominoes and Boxes)

- a) All 12 pentominoes have the same area, 5 square units.
- b) Of the 12 pentominoes, 11 have the same perimeter, namely 12 units of length. The exception is the pentomino labelled #2 in the diagram,  which has a perimeter of 10 units of length.
- c) The pentominoes labelled 1, 3, 4, 5, 8, 9, 11 and 12 can be made into open boxes. Cut them out and make the boxes to verify this.



*Extension:*

- 1. The diagram below (from the web) provides one solution. Try to find others!

