

# MYSTERY PICTURE

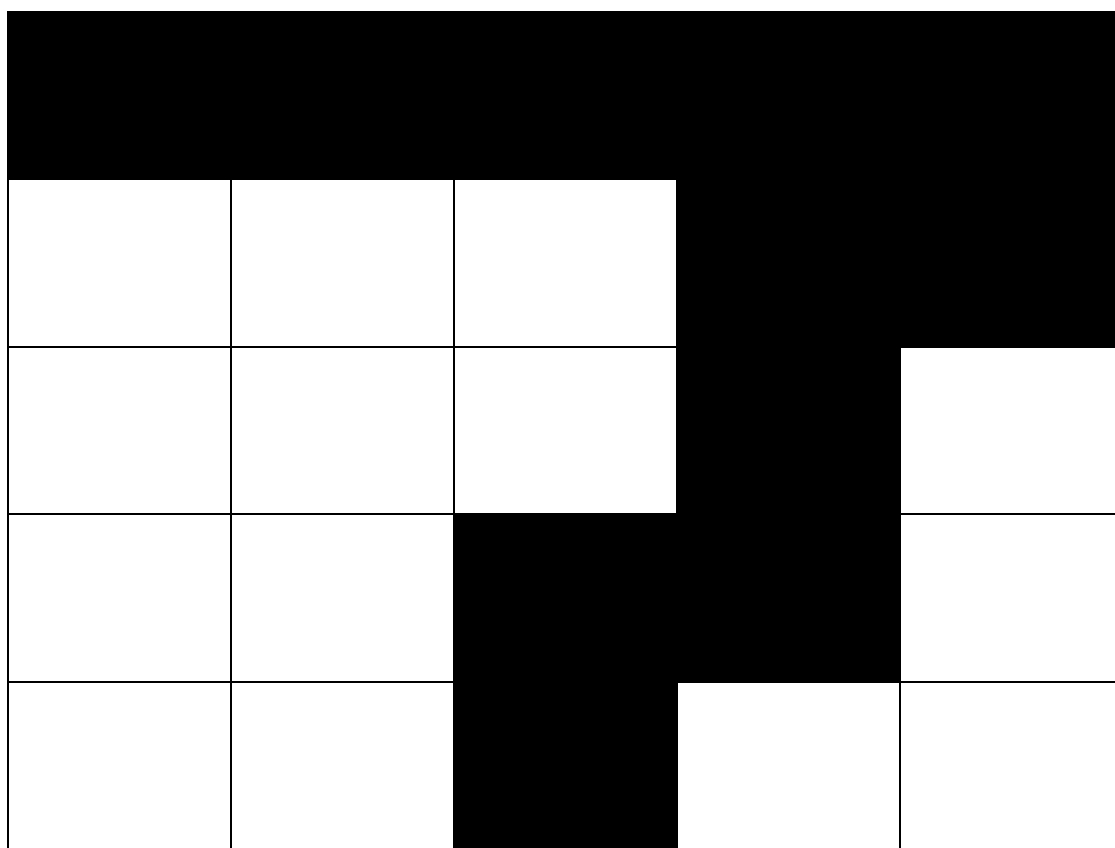


## TRIANGLE ANGLE SUM AND THE EXTERIOR ANGLE THEOREM

### Which One Is the Exterior Angle?

25–35 minutes · no arithmetic · wrong answers show in the picture

**FREE**



25 squares · 1 student sheet · answer key · 4 pages

Geometry · Grades 8–10 · [chooseyourlesson.com](http://chooseyourlesson.com)

1. **Hand out page 3**, one per student. Nothing else is needed.
2. **Say this once:** *“Look at the two arms of the arc. One of them has to be a side of the triangle. The other has to be that side carried straight on past the corner. If both arms are sides of the triangle, or if an arm is not a side at all, leave it white.”*
3. **Fill it with slanted lines if the marked angle is an exterior angle. Leave it white if it is not.** A picture appears. 11 of the 25 squares are filled.

**Student sheet** page 3, one per student. It shows five pictures that explain what an exterior angle is.  
**Answers** page 4. It shows the finished picture and the reason for every square.

**There is no arithmetic on this sheet.** No angle has a measure. Every problem in the second half of this lesson starts with finding the exterior angle in the figure. A student who cannot do that cannot start, even when the subtraction is easy for them.

**9 of the 14 white squares are marked outside the triangle.** That is what makes the sheet hard. In 5 of them, the marked angle is between the two sides carried on past a corner. It is equal to the triangle's own angle at that corner. Students often mark it once they learn that an exterior angle is “outside.” In 4, the angle is between a side and a line that is not a side at all. Only 5 white squares mark the plain interior angle. The picture shows students that being outside the triangle is not enough.

**The picture is the check.** The filled squares make the number 7. If one square is wrong, part of the picture is missing or one square does not fit. The student can see that from their own desk, and the sheet tells them what to do.

**Why slanted lines and not shading.** 11 squares of pencil shading come out pale gray, and pale gray does not survive a school copier. Slanted lines survive, they are faster, and the student can still read the drawing to check a square again.

**If a student is stuck on a square,** do not point at the answer. Ask: *“Put your finger on each arm of the arc. Is it a side of the triangle, a side carried on past the corner, or neither?”* That question is the definition, and it answers every square on the sheet.



**This is the free lesson this activity came from.** The worksheet, the full answers and the lesson plan are on it, at three levels of difficulty.  
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# Mystery Picture

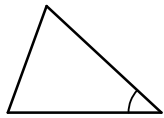
Which one is the exterior angle?

Name \_\_\_\_\_

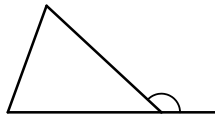
Period \_\_\_\_\_

Date \_\_\_\_\_

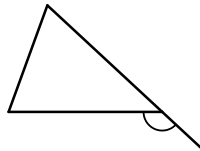
**One arm a side, the other arm a side carried on past the corner? Fill the square with slanted lines. Anything else? Leave it white.** Being outside the triangle is not enough. A picture appears. If it does not look right, check the squares again.



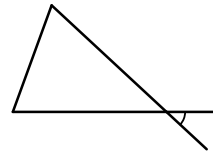
**Interior angle**  
inside — two sides



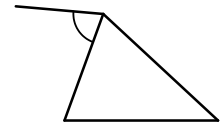
**EXTERIOR angle**  
a side and the extension of  
the other



**Also exterior**  
the other side carried past C

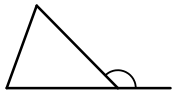


**NOT one**  
both arms are extensions

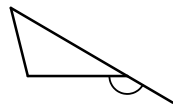


**NOT one**  
that arm is along no side

1



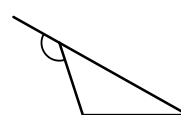
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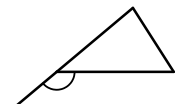
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4



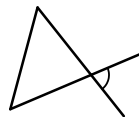
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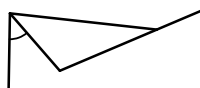
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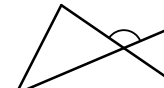
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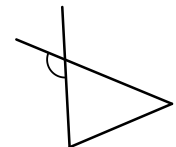
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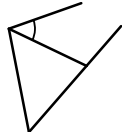
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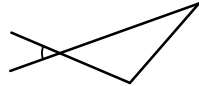
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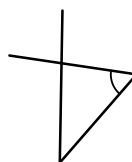
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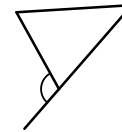
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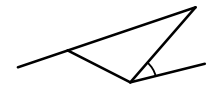
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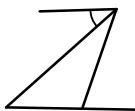
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15



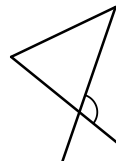
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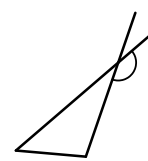
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18



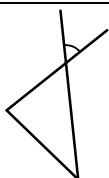
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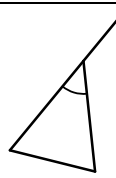
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21



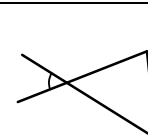
22



23



24



25

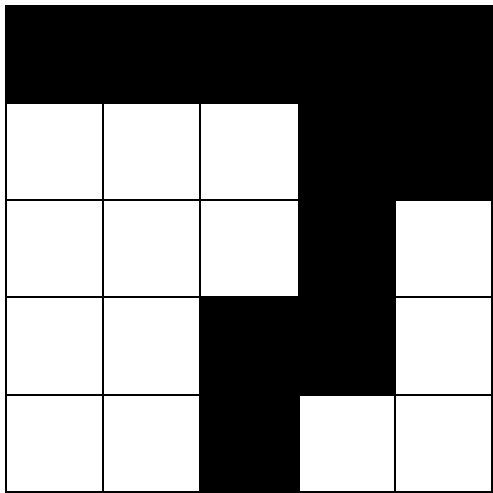


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# Mystery Picture — answers

For the teacher

The finished picture is the number 7. The table reads left to right, the way the sheet is read. The squares are numbered on the student's sheet.



|       |                                                 |                                                 |                                          |                                                 |                                                 |
|-------|-------------------------------------------------|-------------------------------------------------|------------------------------------------|-------------------------------------------------|-------------------------------------------------|
| 1–5   | <i>FILL</i><br>an exterior angle                | <i>FILL</i><br>an exterior angle                | <i>FILL</i><br>an exterior angle         | <i>FILL</i><br>an exterior angle                | <i>FILL</i><br>an exterior angle                |
| 6–10  | <i>white</i><br>the interior angle              | <i>white</i><br>between two sides<br>carried on | <i>white</i><br>one arm is not a<br>side | <i>FILL</i><br>an exterior angle                | <i>FILL</i><br>an exterior angle                |
| 11–15 | <i>white</i><br>one arm is not a side           | <i>white</i><br>between two sides<br>carried on | <i>white</i><br>the interior<br>angle    | <i>FILL</i><br>an exterior angle                | <i>white</i><br>one arm is not a side           |
| 16–20 | <i>white</i><br>one arm is not a side           | <i>white</i><br>the interior angle              | <i>FILL</i><br>an exterior<br>angle      | <i>FILL</i><br>an exterior angle                | <i>white</i><br>between two sides<br>carried on |
| 21–25 | <i>white</i><br>between two sides<br>carried on | <i>white</i><br>the interior angle              | <i>FILL</i><br>an exterior<br>angle      | <i>white</i><br>between two sides<br>carried on | <i>white</i><br>the interior angle              |

The 11 filled squares are 1, 2, 3, 4, 5, 9, 10, 14, 18, 19, 23. In each of them one arm of the arc is a side of the triangle and the other is the triangle's other side at that corner, carried straight on past it.

The three ways a square is white. In squares 6, 13, 17, 22, 25, both arms of the arc are sides of the triangle, so the marked angle is the interior angle. In squares 7, 12, 20, 21, 24, both arms are sides carried on past the same corner. That angle is outside the triangle, but it is equal to the triangle's own angle at that corner, because the two are vertical angles. So it is not an exterior angle. In squares 8, 11, 15, 16, one arm runs along a line that is not a side of the triangle at all. That angle is outside the triangle, but it is not an exterior angle either.

The one sentence to remember. An exterior angle has one arm along a side of the triangle, and its other arm along the other side at that corner, carried straight on.