

MYSTERY PICTURE

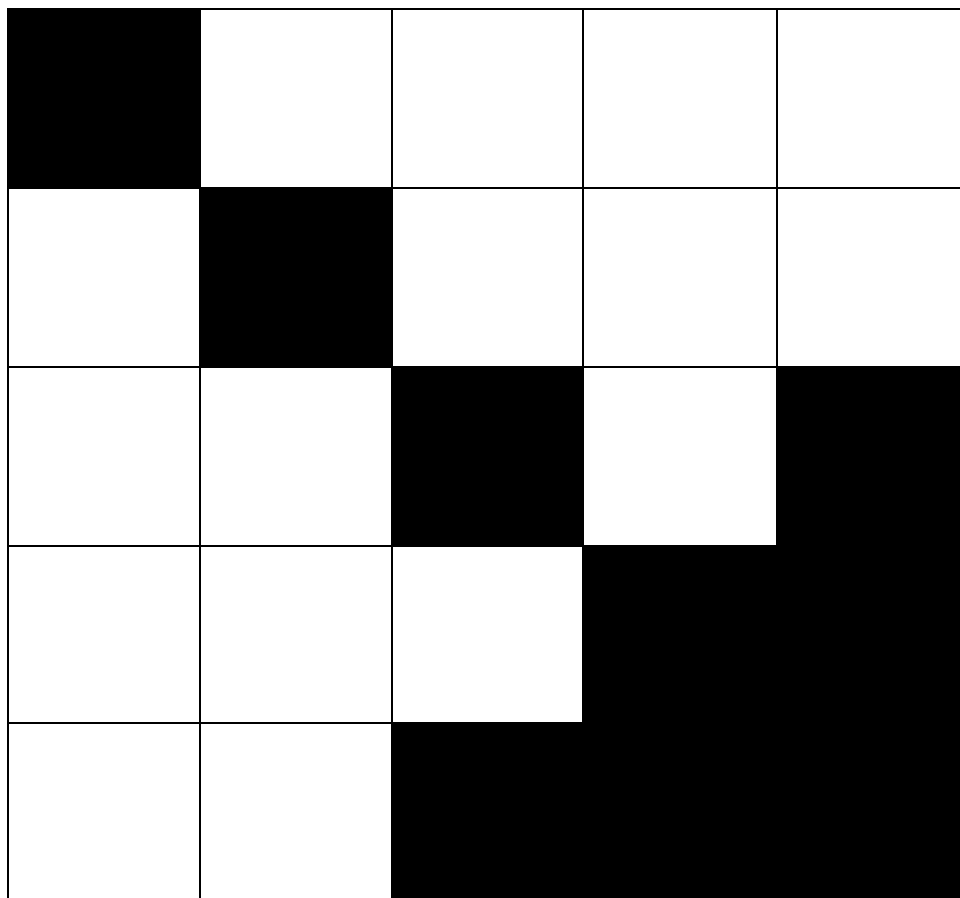


INTERIOR AND EXTERIOR ANGLES OF POLYGONS

Is That Really an Exterior Angle?

25 polygons · one marked angle each · exterior or not?

FREE



1. **Hand out page 3**, one per student. Pencils. Nothing else is needed.
2. **Say this once:** *“An exterior angle is made by carrying one side straight on past the corner. It is the angle between that line and the other side. If the marked angle is an exterior angle, fill the square with slanted lines. If not, leave it white.”*
3. **When a student finishes, look at the picture.** If it is not a down-right arrow, a square is wrong. The student finds it and checks it again.

Student sheet	page 3, one per student. At the top it shows two exterior angles and one angle that is not an exterior angle, as three small drawings.
Answers	page 4: the finished picture and the reason for every square.

This sheet practices one question: which angle at a corner is the exterior angle? Carry one side of the polygon straight on past the corner. The exterior angle is between that line and the other side. Either side may be carried on. The two angles made that way are the same size. Every exterior angle and the interior angle at its corner add up to 180° . Students need to find this angle before any total of exterior angles makes sense.

Most squares are white, and each white square shows a common mistake. Four squares mark the angle all the way around the outside of the corner. Many students think “exterior” means “the angle outside”, so they pick this one. Four squares carry both sides on and mark the angle between the two thin lines. It is the same size as the interior angle, and neither of its lines is a side. In five squares the thin line does not continue a side in a straight line, so it makes no exterior angle. Three squares mark the interior angle.

Nine squares are filled and sixteen are white. In four filled squares the corner is sharp, so the exterior angle is bigger than a right angle. Students often expect exterior angles to be small. Guessing does not work. Every simple guessing rule, such as filling every square where the arc is outside the polygon, gets at least nine squares wrong.



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

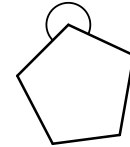
Is it an exterior angle?

Name _____

Period _____

Date _____

Each square shows a polygon with one angle marked by an arc. Is the marked angle an exterior angle of the polygon? If yes, fill the square with slanted lines. If no, leave it white. When you finish, look at the picture. If part of it is missing, or one square does not fit, check that square again.



An **exterior angle**: carry one side straight on past the corner. It is between that line and the other side.

Carry the other side on: this is an exterior angle too, the same size.

Not an exterior angle: the angle all the way around the outside.

A thin line must carry a side **straight on** past the corner. The exterior angle is between that thin line and the **other** side of the polygon.

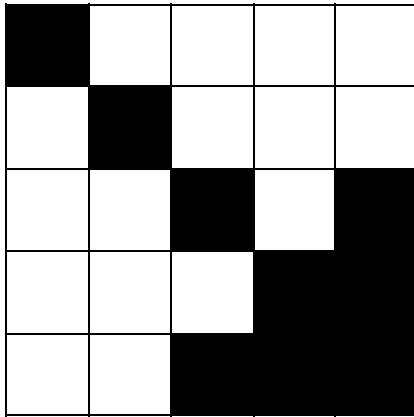
1 	2 	3 	4 	5
6 	7 	8 	9 	10
11 	12 	13 	14 	15
16 	17 	18 	19 	20
21 	22 	23 	24 	25



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Mystery Picture — answers

For the teacher



The finished picture is a **down-right arrow**: a line from the top-left corner to the bottom right, with the arrowhead at the bottom right.

A square is filled when the arc is between a side carried straight on past the corner and the other side of the polygon. It is white when the arc marks the interior angle, the angle all the way around the outside, the angle between two thin lines, or an angle made by a thin line that does not continue a side.

To check a square with a student, lay a ruler along the side and ask: “Does the thin line carry this side straight on? Is the other line of the arc a side of the polygon?”

1–5	1 · FILL The thin line carries a side straight on past the corner. The arc is between it and the other side, so it is an exterior angle.	2 · white The arc goes all the way around the outside of the corner. That angle is not an exterior angle.	3 · white The arc is inside the polygon. It marks the interior angle.	4 · white The thin line does not carry a side straight on. It points another way, so this is not an exterior angle.	5 · white The arc is between the two thin lines. Neither line is a side, so it is not an exterior angle. It equals the interior angle.
6–10	6 · white The thin line does not carry a side straight on. It points another way, so this is not an exterior angle.	7 · FILL The thin line carries a side straight on past the corner. The arc is between it and the other side, so it is an exterior angle.	8 · white The thin line does not carry a side straight on. It points another way, so this is not an exterior angle.	9 · white The arc goes all the way around the outside of the corner. That angle is not an exterior angle.	10 · white The thin line does not carry a side straight on. It points another way, so this is not an exterior angle.
11–15	11 · white The arc is between the two thin lines. Neither line is a side, so it is not an exterior angle. It equals the interior angle.	12 · white The thin line does not carry a side straight on. It points another way, so this is not an exterior angle.	13 · FILL Both sides are carried on. The arc is between one thin line and the other side, so it is an exterior angle.	14 · white The arc is inside the polygon. It marks the interior angle.	15 · FILL The thin line carries a side straight on past the corner. The arc is between it and the other side, so it is an exterior angle.
16–20	16 · white The arc goes all the way around the outside of the corner. That angle is not an exterior angle.	17 · white The arc is between the two thin lines. Neither line is a side, so it is not an exterior angle. It equals the interior angle.	18 · white The arc is between the two thin lines. Neither line is a side, so it is not an exterior angle. It equals the interior angle.	19 · FILL The thin line carries a side straight on past the corner. The arc is between it and the other side, so it is an exterior angle.	20 · FILL The thin line carries a side straight on past the corner. The arc is between it and the other side, so it is an exterior angle.
21–25	21 · white The arc goes all the way around the outside of the corner. That angle is not an exterior angle.	22 · white The arc is inside the polygon. It marks the interior angle.	23 · FILL Both sides are carried on. The arc is between one thin line and the other side, so it is an exterior angle.	24 · FILL The thin line carries a side straight on past the corner. The arc is between it and the other side, so it is an exterior angle.	25 · FILL The thin line carries a side straight on past the corner. The arc is between it and the other side, so it is an exterior angle.