

MYSTERY PICTURE

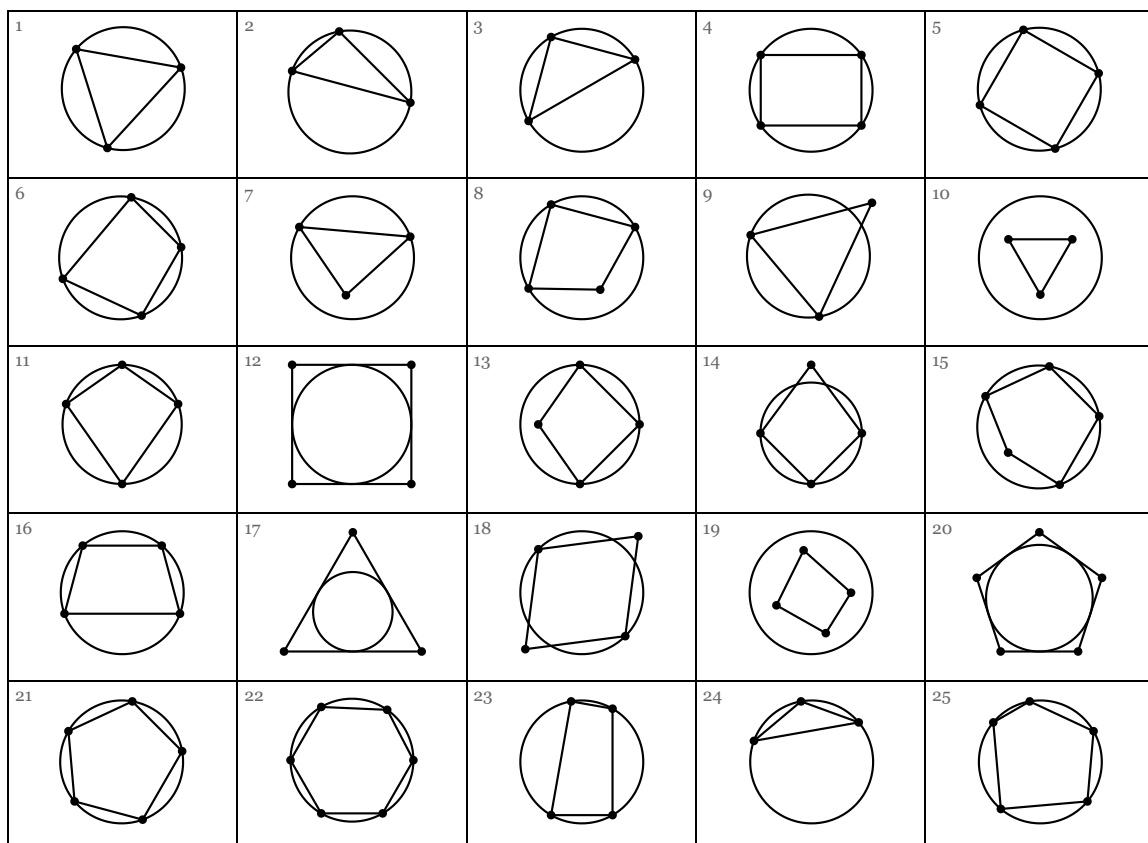


INSCRIBED ANGLES ON A DIAMETER AND INSCRIBED POLYGONS

Inscribed Polygons: Is Every Corner on the Circle?

25 circles · every vertex on the circle? · no calculator · a picture appears

FREE



Mystery Picture — how to run it

25–35 minutes

1. **Give each student page 3** and a pencil. No calculator is needed.
2. **Say this once:** *“Check every dot. If every corner of the polygon is on the circle, fill the square with slanted lines. If even one corner is off the circle, leave it white.”*
3. **Let them work.** The picture shows when they are right. Nothing else is needed.

Student sheet page 3, one per student. A box at the top gives the meaning of “inscribed” with a drawing.
Answers pages 4–5, for you.

This sheet uses one definition: a polygon is inscribed in a circle when every one of its vertices is on the circle. The same picture is also described the other way: the circle is circumscribed about the polygon. Some textbooks use other definitions, so tell the class which ones this sheet uses.

Thirteen squares are filled. The white squares are near misses. In six of them a vertex is inside the circle, sometimes with every other vertex on it. In three a vertex is outside. In three the circle is inside the polygon and touches its sides. That is a different figure, which students meet in a later lesson; the polygon there is not inscribed.

If part of a student’s picture looks wrong, the mistake is in that square. Ask: *“Put your pencil on each corner. Is it on the circle?”* Guessing does not work. Every simple guessing rule, such as filling every square where nothing sticks out of the circle, gets at least six 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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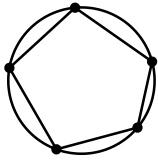
Mystery Picture — is it inscribed?

Inscribed polygons

Name _____

Period _____

Date _____



A polygon is **inscribed** in a circle when **every** vertex is on the circle. One picture, two sentences: *the pentagon is inscribed in the circle, and the circle is circumscribed about the pentagon.*

A circle inside a polygon, touching its sides, is a different figure. There the polygon is not inscribed.

Each square has a circle and a polygon. Check every corner of the polygon. **If every corner is on the circle, fill the square with slanted lines. If even one corner is off the circle, leave it white.** A picture appears. If part of it is missing, check that square again.

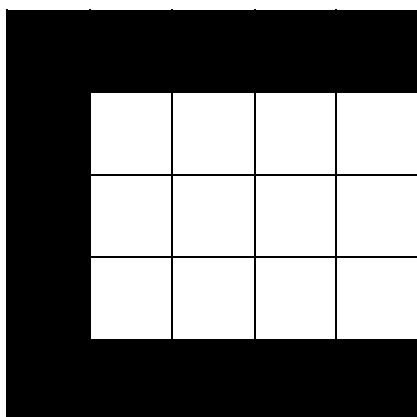
1 	2 	3 	4 	5
6 	7 	8 	9 	10
11 	12 	13 	14 	15
16 	17 	18 	19 	20
21 	22 	23 	24 	25



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Mystery Picture — answers

For the teacher



The finished picture is **the letter C**. Thirteen squares are filled.

To check a square, look at each dot. A square is filled only when every dot is on the circle. The table gives the reason for every square. It goes on over the page.

	The square	Answer	Why
1	A triangle.	fill	All three vertices are on the circle.
2	An obtuse triangle; the center is outside it.	fill	All three vertices are on the circle.
3	A right triangle; its longest side is a diameter.	fill	All three vertices are on the circle.
4	A rectangle; its diagonals are diameters.	fill	All four vertices are on the circle.
5	A square.	fill	All four vertices are on the circle.
6	A quadrilateral.	fill	All four vertices are on the circle.
7	A triangle with one vertex inside the circle.	white	Two of the three vertices are on the circle; one is inside it.
8	A quadrilateral with three vertices on the circle and one inside.	white	Three of the four vertices are on the circle; one is inside it.
9	A triangle with one vertex outside the circle.	white	Two of the three vertices are on the circle; one is outside it.
10	A triangle wholly inside the circle, no vertex on it.	white	Zero of the three vertices are on the circle; three are inside it.
11	A kite-shaped quadrilateral.	fill	All four vertices are on the circle.
12	A square around the circle, touching its sides: the circle is inside the polygon.	white	The circle is inside the polygon and touches its sides. The vertices are outside the circle.

Mystery Picture — answers, squares 13 to 25

For the teacher

	The square	Answer	Why
13	A quadrilateral with one vertex inside the circle.	white	Three of the four vertices are on the circle; one is inside it.
14	A quadrilateral with one vertex outside the circle.	white	Three of the four vertices are on the circle; one is outside it.
15	A pentagon with one vertex inside the circle.	white	Four of the five vertices are on the circle; one is inside it.
16	A quadrilateral.	fill	All four vertices are on the circle.
17	A triangle around the circle, touching its sides: the circle is inside the polygon.	white	The circle is inside the polygon and touches its sides. The vertices are outside the circle.
18	A quadrilateral with two vertices outside the circle.	white	Two of the four vertices are on the circle; two are outside it.
19	A quadrilateral wholly inside the circle, no vertex on it.	white	Zero of the four vertices are on the circle; four are inside it.
20	A pentagon around the circle, touching its sides: the circle is inside the polygon.	white	The circle is inside the polygon and touches its sides. The vertices are outside the circle.
21	A pentagon.	fill	All five vertices are on the circle.
22	A hexagon.	fill	All six vertices are on the circle.
23	A long, thin quadrilateral.	fill	All four vertices are on the circle.
24	A small triangle on one side; the center is outside it.	fill	All three vertices are on the circle.
25	A pentagon.	fill	All five vertices are on the circle.