

MYSTERY PICTURE

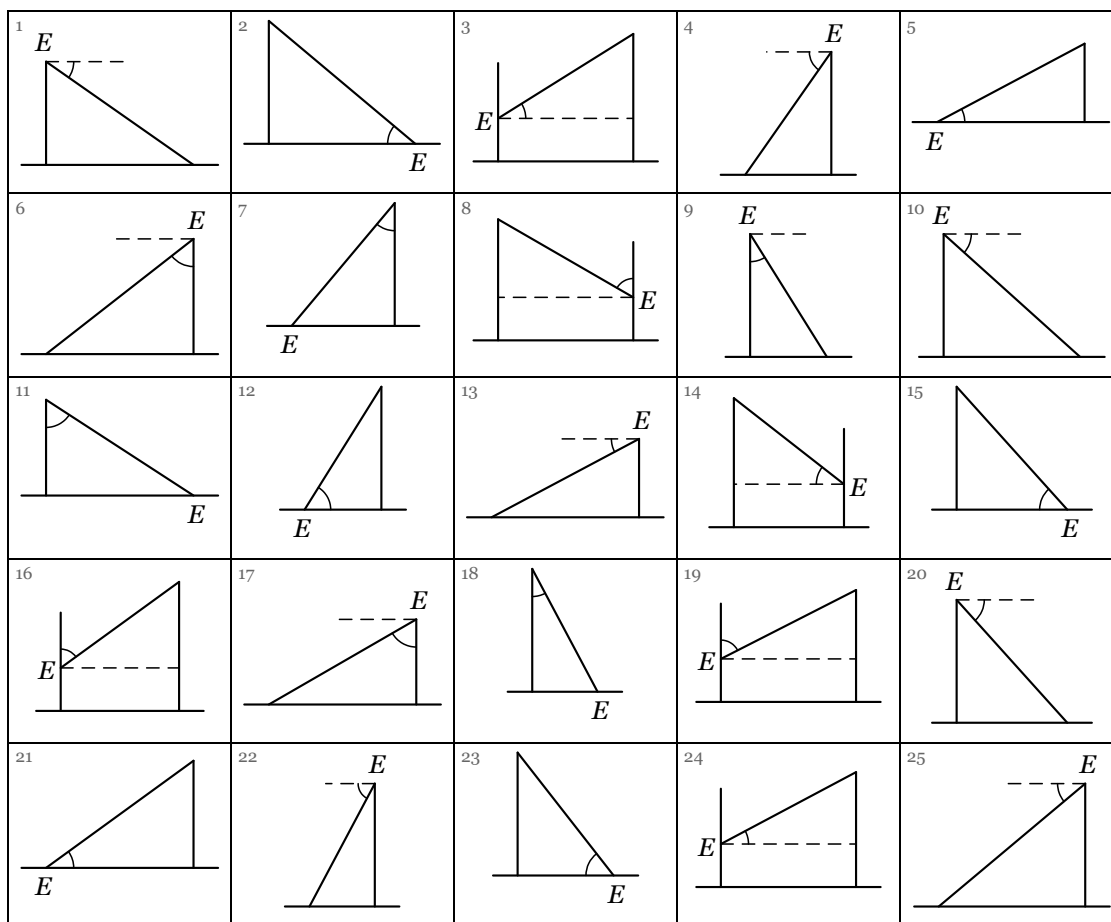


ANGLES OF ELEVATION AND DEPRESSION

Elevation or Depression?

25 sightings · is the angle measured from the horizontal? · 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:** *“Each square shows an eye E and a line of sight, with one angle marked. Is the marked angle the angle of elevation or depression, measured at E from the horizontal line? If yes, fill the square with slanted lines. If not, 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 strip at the top shows both angles as drawings.
Answers pages 4–5, for you.

No square has a number. Each square is a drawing of a sighting with one arc. The student decides one thing: is the arc at E, between the horizontal line and the line of sight? Where E is above the ground, the horizontal line at E is drawn dashed. Where E is on the ground, the ground is that line. Sixteen squares are filled. The other nine stay white.

The white squares are the common mistake of this lesson. In three of them the arc is at E but between the cliff and the line of sight. Many students think the angle of depression is this angle inside the triangle, against the cliff. It is not: it is measured from the horizontal line, and the two angles add up to 90° . In three the arc is between the wall above E and the line of sight. In three the arc is at the top of the tower, against the tower.

If part of a student’s picture looks wrong, the mistake is in that square. Ask: *“Where is the horizontal line at E? Does the arc touch it?”* Guessing does not work. Every simple guessing rule, such as filling every square where the arc is at E, 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.

chooseyourlesson.com — 135 free geometry lessons.

Mystery Picture — elevation or depression?

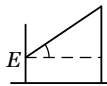
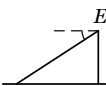
Elevation and depression

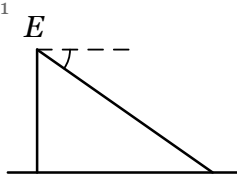
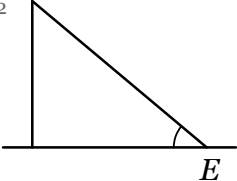
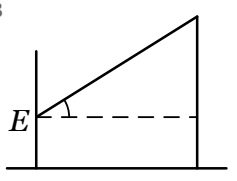
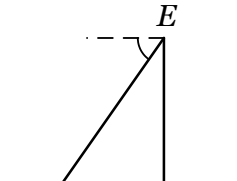
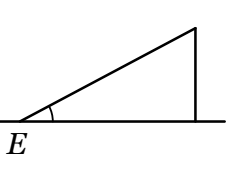
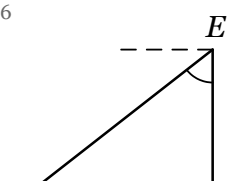
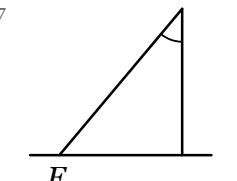
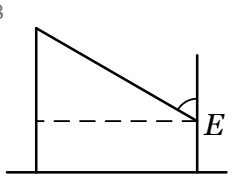
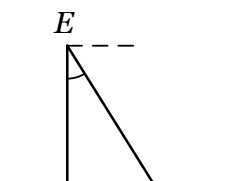
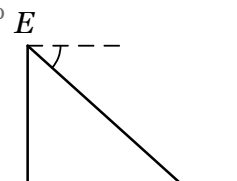
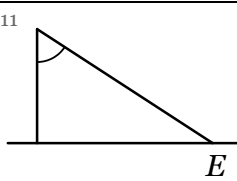
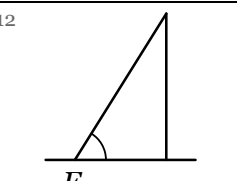
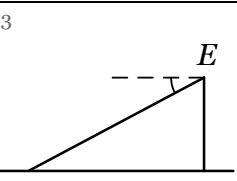
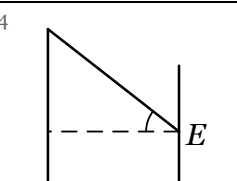
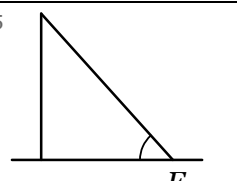
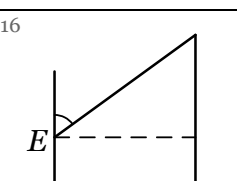
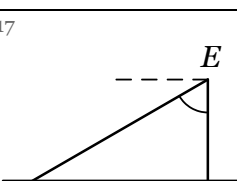
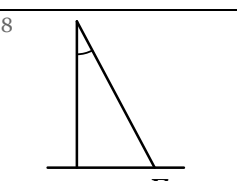
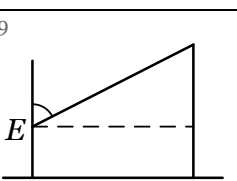
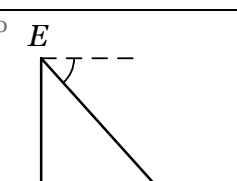
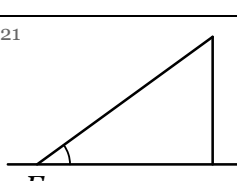
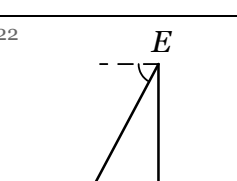
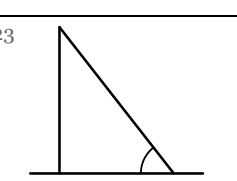
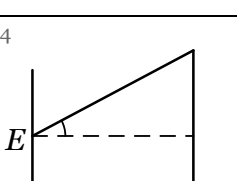
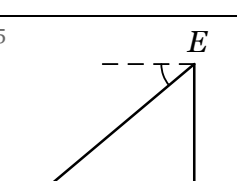
Name _____

Period _____

Date _____

Each square shows an eye E, a line of sight and one marked angle. **Is the marked angle the angle of elevation or the angle of depression from E? If yes, fill the square with slanted lines. If no, leave it white.** Do not measure anything. A picture appears. If part of it is missing, or one square does not fit, check that square again.

 Angle of elevation: from the horizontal line at the eye E up to the line of sight.	 Angle of depression: from the horizontal line at the eye E down to the line of sight.
The dashed line is the horizontal line at the eye. If the eye is on level ground, the ground is that line. The line of sight runs from the eye to the thing seen. It is always the hypotenuse. Ground is level. Cliffs, towers, poles and walls stand straight up.	

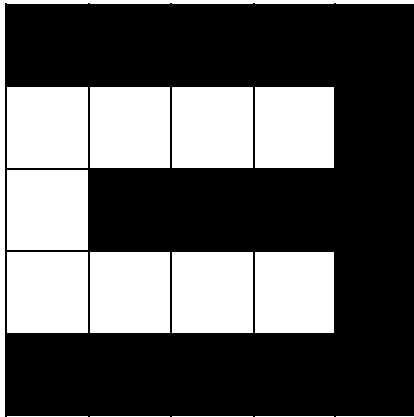
1 	2 	3 	4 	5 
6 	7 	8 	9 	10 
11 	12 	13 	14 	15 
16 	17 	18 	19 	20 
21 	22 	23 	24 	25 



135 free geometry lessons — worksheets, worked answers and lesson plans.
chooseyourlesson.com

Mystery Picture — answers

For the teacher



The finished picture is **the number 3**. Sixteen squares are filled.

To check a square, find E and the horizontal line at E: the dashed line, or the ground when E is on the ground. The square is filled only when the arc is at E, between that horizontal line and the line of sight.

	Answer	Why
1	fill	The arc is at E, between the dashed horizontal line and the line of sight going down. That is the angle of depression.
2	fill	The arc is at E, between the level ground and the line of sight going up. E is on the ground, so the ground is the horizontal line. That is the angle of elevation.
3	fill	The arc is at E, between the dashed horizontal line and the line of sight going up. That is the angle of elevation.
4	fill	The arc is at E, between the dashed horizontal line and the line of sight going down. That is the angle of depression.
5	fill	The arc is at E, between the level ground and the line of sight going up. E is on the ground, so the ground is the horizontal line. That is the angle of elevation.
6	white	The arc is at E, but between the cliff and the line of sight. The cliff is vertical. The angle of depression is measured from the dashed horizontal line.
7	white	The arc is at the top of the tower, between the tower and the line of sight. The angle of elevation is measured at the eye E, from the horizontal line there. This arc is at the other end of the line of sight, against the vertical tower.
8	white	The arc is at E, but between the wall above E and the line of sight. The wall is vertical. The angle of elevation is measured from the dashed horizontal line.
9	white	The arc is at E, but between the cliff and the line of sight. The cliff is vertical. The angle of depression is measured from the dashed horizontal line.
10	fill	The arc is at E, between the dashed horizontal line and the line of sight going down. That is the angle of depression.
11	white	The arc is at the top of the tower, between the tower and the line of sight. The angle of elevation is measured at the eye E, from the horizontal line there. This arc is at the other end of the line of sight, against the vertical tower.
12	fill	The arc is at E, between the level ground and the line of sight going up. E is on the ground, so the ground is the horizontal line. That is the angle of elevation.

Mystery Picture — answers, squares 13 to 25

For the teacher

	Answer	Why
13	fill	The arc is at E, between the dashed horizontal line and the line of sight going down. That is the angle of depression.
14	fill	The arc is at E, between the dashed horizontal line and the line of sight going up. That is the angle of elevation.
15	fill	The arc is at E, between the level ground and the line of sight going up. E is on the ground, so the ground is the horizontal line. That is the angle of elevation.
16	white	The arc is at E, but between the wall above E and the line of sight. The wall is vertical. The angle of elevation is measured from the dashed horizontal line.
17	white	The arc is at E, but between the cliff and the line of sight. The cliff is vertical. The angle of depression is measured from the dashed horizontal line.
18	white	The arc is at the top of the tower, between the tower and the line of sight. The angle of elevation is measured at the eye E, from the horizontal line there. This arc is at the other end of the line of sight, against the vertical tower.
19	white	The arc is at E, but between the wall above E and the line of sight. The wall is vertical. The angle of elevation is measured from the dashed horizontal line.
20	fill	The arc is at E, between the dashed horizontal line and the line of sight going down. That is the angle of depression.
21	fill	The arc is at E, between the level ground and the line of sight going up. E is on the ground, so the ground is the horizontal line. That is the angle of elevation.
22	fill	The arc is at E, between the dashed horizontal line and the line of sight going down. That is the angle of depression.
23	fill	The arc is at E, between the level ground and the line of sight going up. E is on the ground, so the ground is the horizontal line. That is the angle of elevation.
24	fill	The arc is at E, between the dashed horizontal line and the line of sight going up. That is the angle of elevation.
25	fill	The arc is at E, between the dashed horizontal line and the line of sight going down. That is the angle of depression.