1.2.4 Quiz: Interpreting Projection Graphs

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Question 1

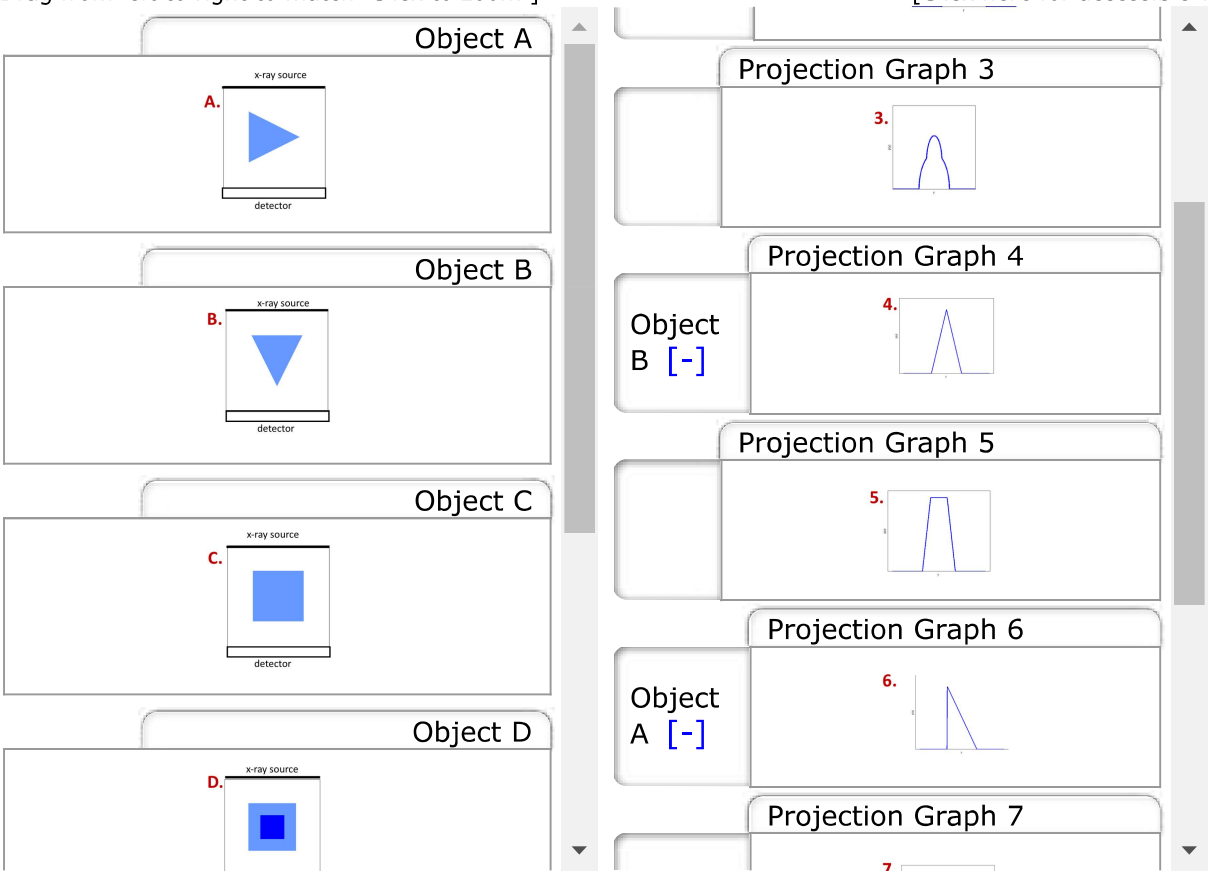
1.0/1 point (graded)

Here are six objects. For each, imagine x-rays passing through the object from an x-ray source, and choose the most plausible projection graph. We'll assume that:

- The x-ray source is positioned along the top edge of the square and the detector below, as in the example Margo showed. In other words, x-rays are being sent vertically through the region.
- The white regions correspond to air, which has zero attenuation.
- The blue corresponds to objects made of a material with a non-zero attenuation coefficient (like bone) with darker blue corresponding to a higher attenuation coefficient.

This is a matching exercise. Drag the elements on the left into the ones on the right to create a match. Each object only matches with one graph. Select each image for a better view if you need it, or use the "accessible version" for a checkbox version. To remove a choice use the blue minus sign in brackets. "[-]"

[Drag from left to right to match. Click to zoom.] [Click here for accessible version.]



✔

6 correct out of 6, 0 wrong.

Submit You have used 2 of 4 attempts

In the next three questions, we'll look at when we can distinguish between objects based on their projection graphs.

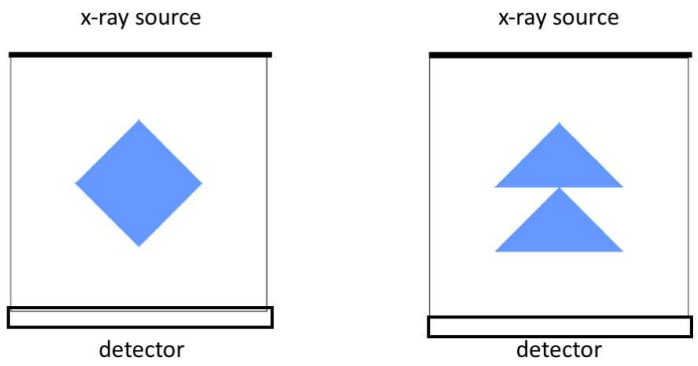
As before, assume that:

- The x-ray source is positioned along the top edge of the outer square and the detector below, as in the example Margo Levine showed. In other words, x-rays are being sent vertically through the square.
- The white region corresponds to air, which has zero attenuation.
- The blue corresponds to objects made of a material with a non-zero attenuation coefficient with darker blue corresponding to a higher attenuation coefficient.

Question 2

0/1 point (graded)

Consider the following pair of objects. If you were shown the projection graph of only one of the objects, could you determine which of the two objects it belonged too? (Why or why not?)



View Larger Image
Image Description

- Yes, the projection graphs of the two objects will have qualitatively different shapes (eg: different features like constant portions, peaks, curves, etc.).
- No, the projection graphs of the two objects will be exactly the same. ✔
- No, the projection graphs of the two objects could be exactly the same or could have the same qualitative shape (eg: the same features in the same locations). ✖

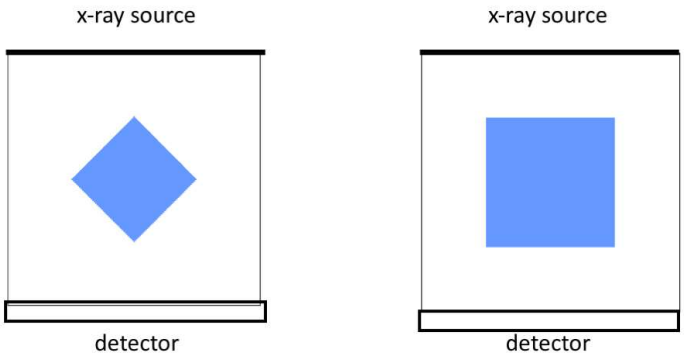
Explanation
Choice 2). We would not be able to distinguish which object produced the graph because the projection graphs would be identical. This is since the stacked triangles can be rearranged to make the square in such a way that when an x-ray passes through at any point, it passes through the same thickness of material.

Submit You have used 1 of 1 attempt

Answers are displayed within the problem

Question 3

1.0/1.0 point (graded)



View Larger Image
Image Description

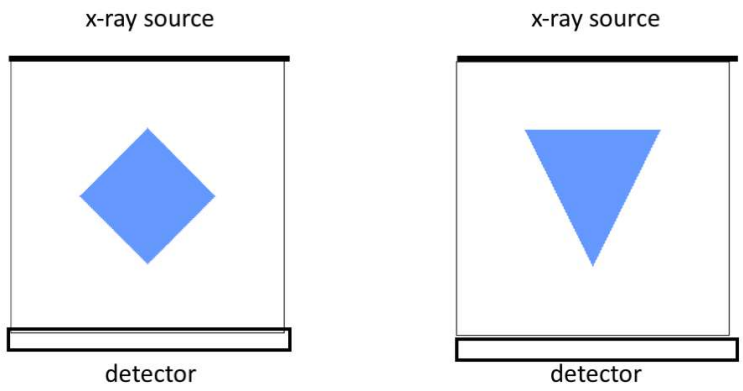
Consider the following pair of objects. If you were shown the projection graph of only one of the objects, could you determine which of the two objects it belonged too? (Why or why not?)

- (•) Yes, the projection graphs of the two objects will have qualitatively different shapes (eg: different features like constant portions, peaks, curves, etc.). ✔
- ( ) No, the projection graphs of the two objects will be exactly the same.
- ( ) No, the projection graphs of the two objects could be exactly the same or could have the same qualitative shape (eg: the same features in the same locations).

Submit You have used 1 of 1 attempt

Question 4

1/1 point (graded)
Consider the following pair of objects. If you were shown the projection graph of only one of the objects, could you determine which of the two objects it belonged too? (Why or why not?)



View Larger Image
Image Description

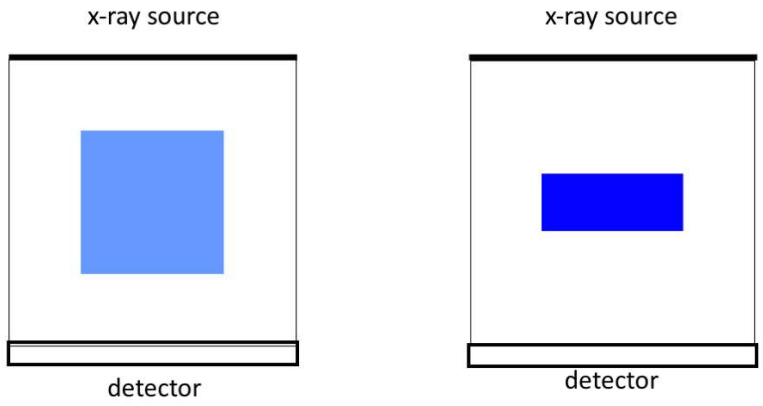
- Yes, the projection graphs of the two objects will have qualitatively different shapes (eg: different features like constant portions, peaks, curves, etc.).
- No, the projection graphs of the two objects will be exactly the same.
- No, the projection graphs of the two objects could be exactly the same or could have the same qualitative shape (eg: the same features in the same locations). ✔

Submit You have used 1 of 1 attempt

Question 5

1/1 point (graded)

Consider the following pair of objects. If you were shown the projection graph of only one of the objects, could you determine which of the two objects it belonged too? (Why or why not?)



View Larger Image
Image Description

- Yes, the projection graphs of the two objects will have different shapes (eg: different features like constant portions, peaks, curves, etc.).
- No, the projection graphs of the two objects will be exactly the same.
- No, the projection graphs of the two objects could be exactly the same or could have the same qualitative shape (eg: the same features in the same locations). ✔

Submit You have used 1 of 1 attempt

Question 6

1.0/1 point (graded)

Now consider the following object: a circle with five smaller circles embedded inside. Assume the material of the smaller circles has a greater attenuation coefficient than that of the big circle. Suppose we rotate the object to view it from different sides. For each, choose the most plausible projection graph. As before, assume that:

- The x-ray source is positioned along the top edge of the square and the detector below, as in the example Margo showed. In other words, x-rays are being sent vertically through the region.
- The white regions correspond to air, which has zero attenuation.
- The blue corresponds to objects made of a material with a non-zero attenuation coefficient (like bone) with darker blue corresponding to a higher attenuation coefficient.

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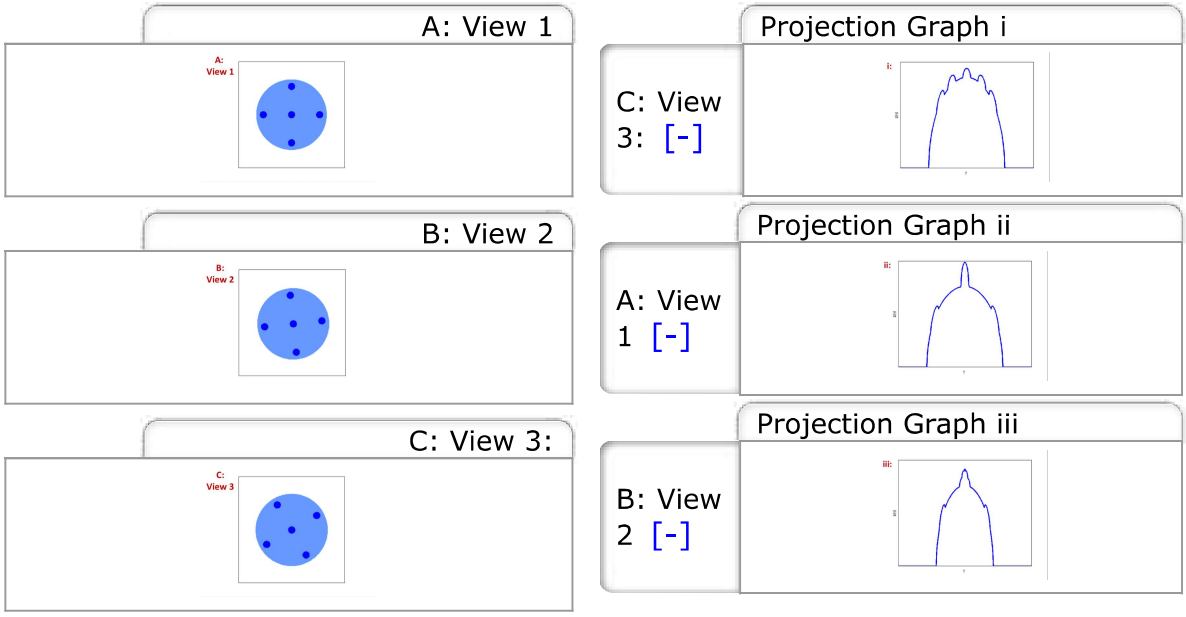
[Drag from left to right to match. Click to zoom.] [Click here for accessible version.]



✔ 3 correct out of 3, 0 wrong.

Submit You have used 1 of 2 attempts

Question 7

1/1 point (graded)

Based on the problems above, do you think you can you uniquely identify a two-dimensional object from its projection graph?

Why or why not?

Not with a single projection graph, because different 2D objects may have same projection graph.

✔ Thank you for your response.

Submit You have used 1 of 1 attempt

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