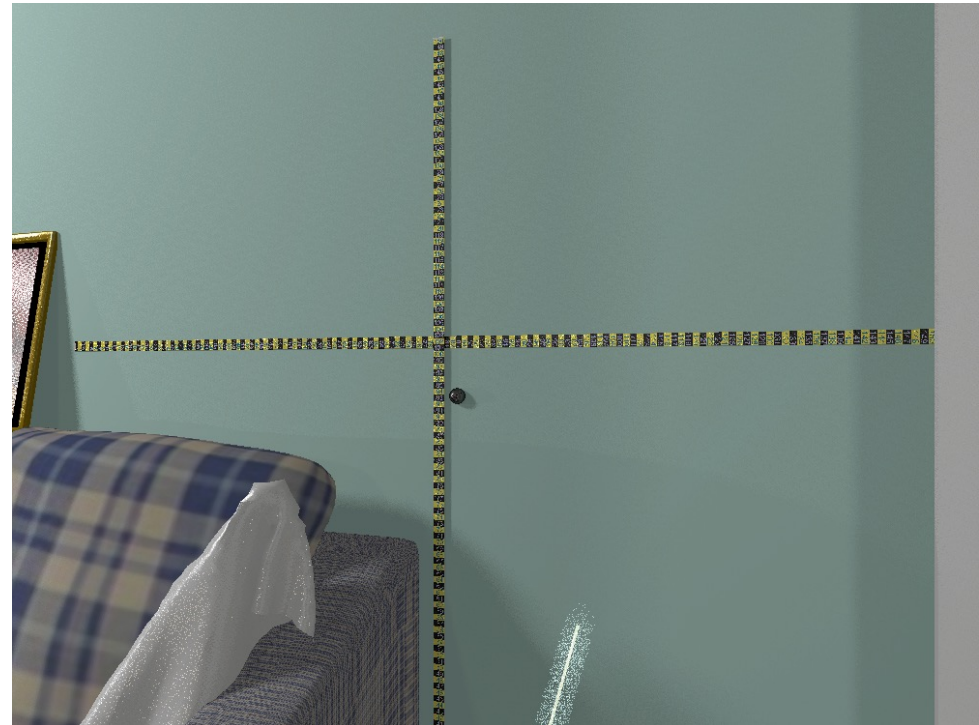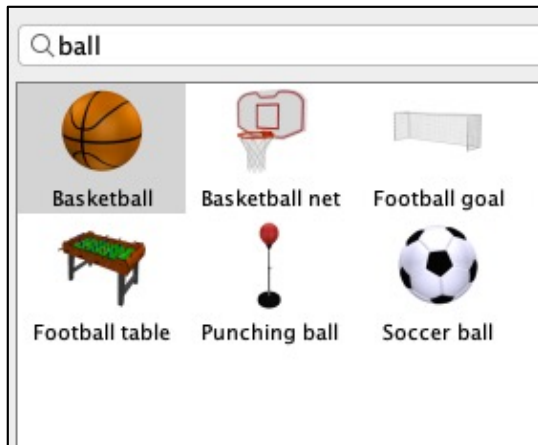# DEMONSTRATIVE
for
TRAJECTORY ANALYSIS

Using triangle models to demonstrate vertical and horizontal angles of trajectory.

Bullet defect horizontal 2'3"
from corner and 3' above floor.

Prepare the scene model
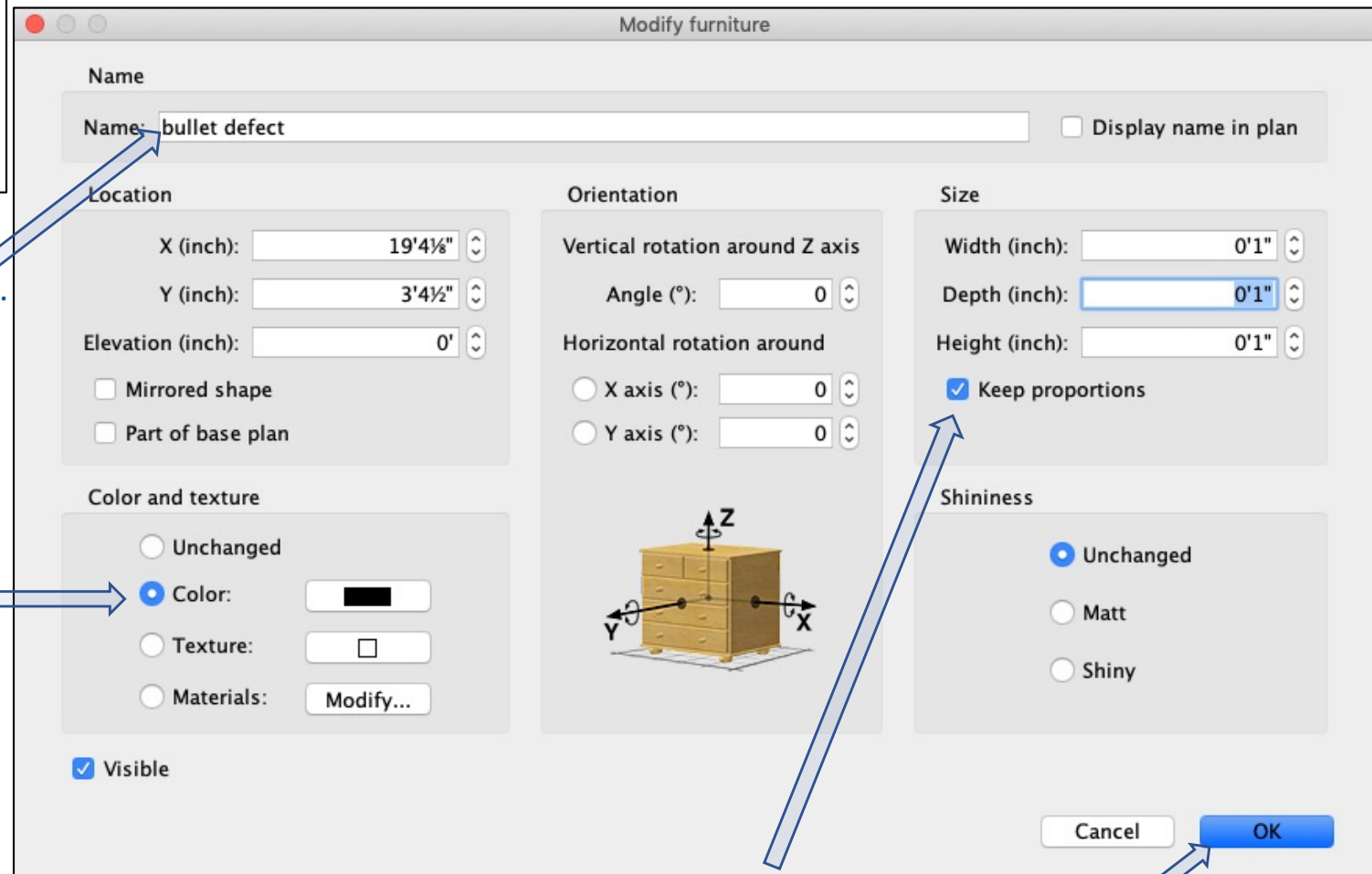Place a 'defect' at the measured location found in the scene.

Add a ball to your scene.
Double-click on the ball to open the
'Modify furniture' menu for the ball.

Modify furniture

Name

Name: bullet defect   ☐ Display name in plan

1. Change name to bullet defect.

Location

X (inch):   19'4⅛" ⟳
Y (inch):   3'4½" ⟳
Elevation (inch):   0' ⟳
☐ Mirrored shape
☐ Part of base plan

Orientation

Vertical rotation around Z axis
Angle (°):   0 ⟳
Horizontal rotation around
○ X axis (°):   0 ⟳
○ Y axis (°):   0 ⟳

Size

Width (inch):   0'1" ⟳
Depth (inch):   0'1" ⟳
Height (inch):   0'1" ⟳
☑ Keep proportions

Color and texture

○ Unchanged
2. Change color to solid color. ◉ Color: �
○ Texture: ☐
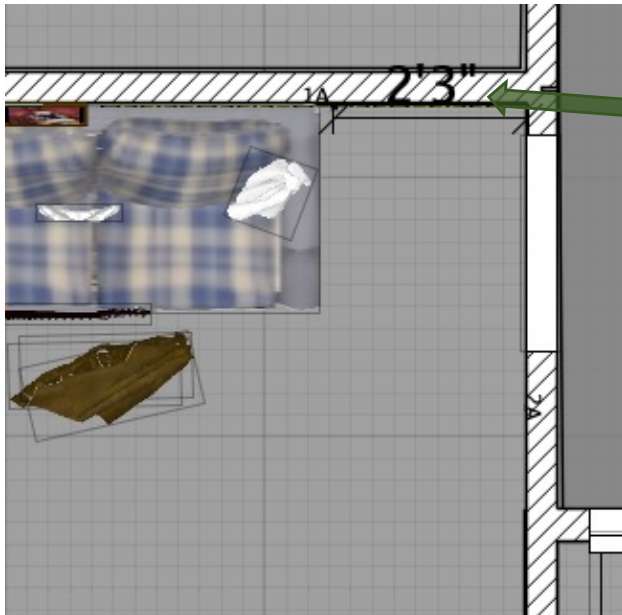○ Materials: Modify...

☑ Visible

Shininess

◉ Unchanged
○ Matt
○ Shiny

Cancel   OK

3. Check 'Keep proportions', then change size to 1".   4. Return to scene.

Position the 'bullet defect' using scene measurements.

2'3"

Use dimension line to locate horizontal distance to defect.

Set elevation to the vertical distance measured in the scene.

Modify furniture

Name

Name: bullet defect   ☐ Display name in plan

Location

X (inch):   18'9⅝" ↕

Y (inch):   2'2¼" ↕

Elevation (inch):   3' ↕

☐ Mirrored shape

☐ Part of base plan

Orientation

Vertical rotation around Z axis

Angle (°):   0 ↕

Horizontal rotation around

○ X axis (°):   0 ↕

○ Y axis (°):   0 ↕

Size

Width (inch):   0'1" ↕

Depth (inch):   0'1" ↕

Height (inch):   0'1" ↕

☑ Keep proportions

Color and texture

○ Unchanged

● Color: ▬▬

○ Texture: ☐

○ Materials: Modify...

Shininess

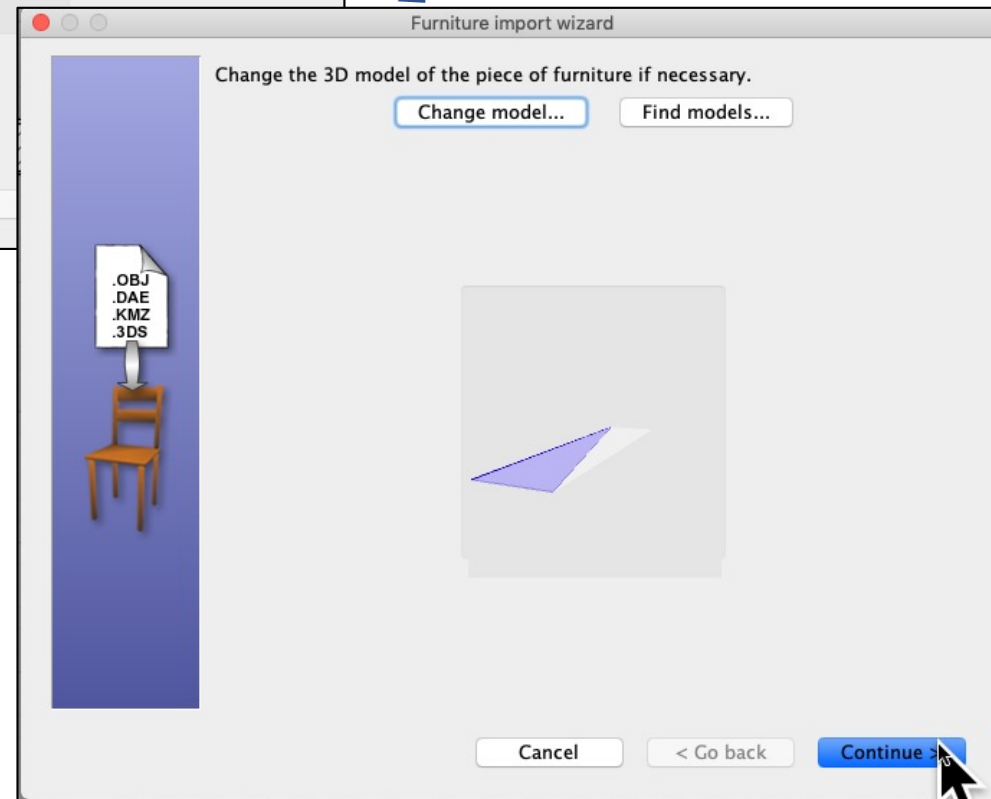● Unchanged

○ Matt

○ Shiny

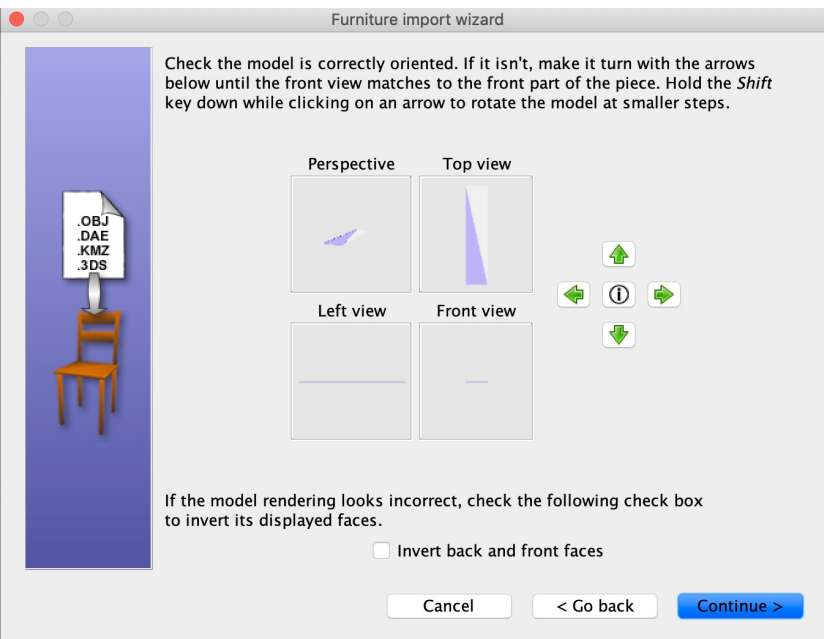☑ Visible

Cancel   OK

Return to scene.

Import horizontal and vertical triangles to furniture library.
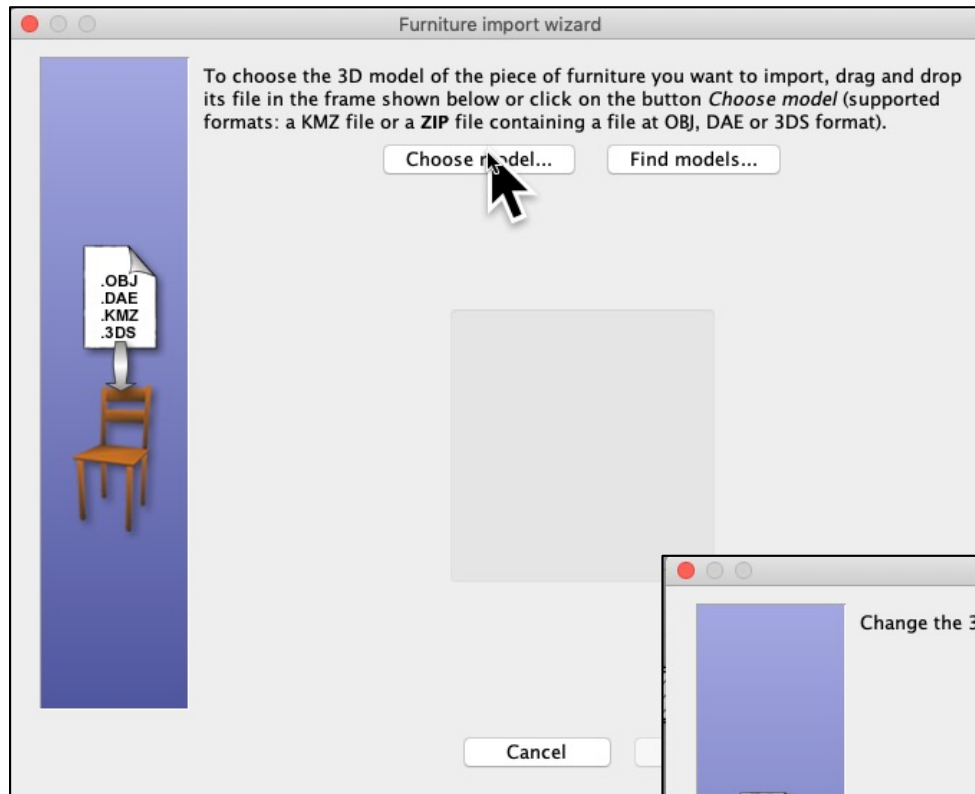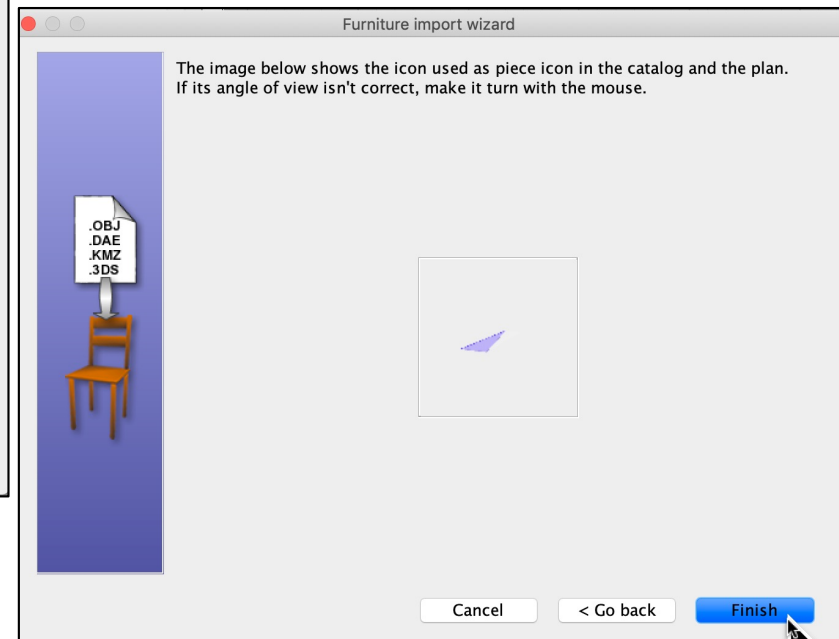
Locate the file:
Triangle trajectory horizontal.zip

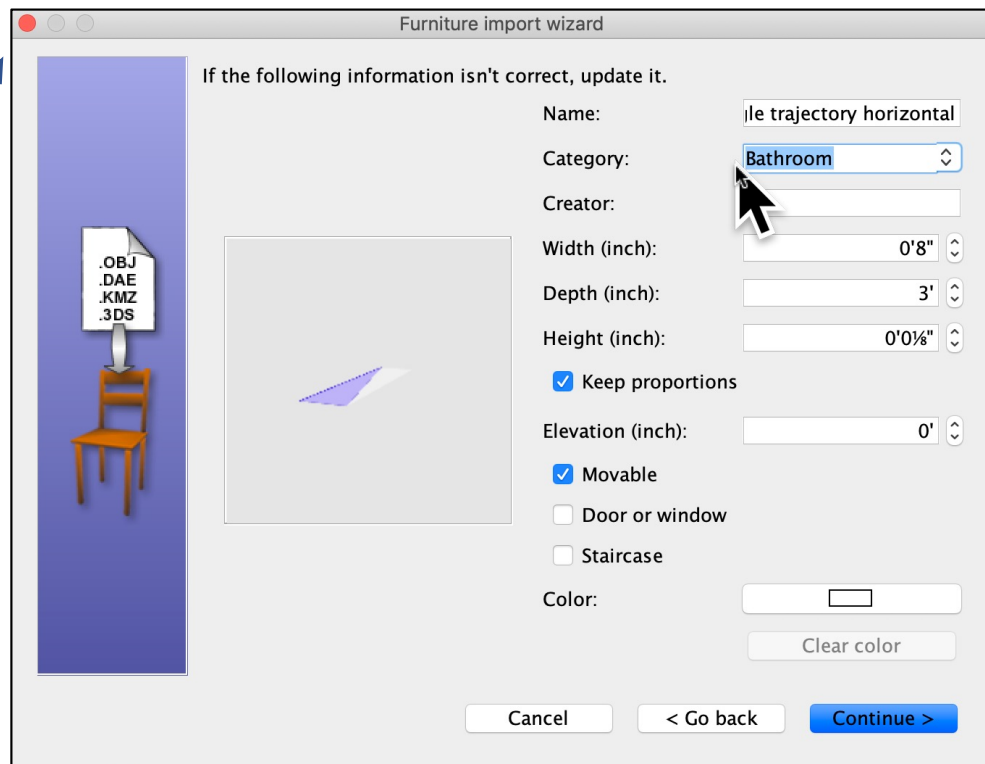The model will appear in the menu window.

Furniture import wizard

Check the model is correctly oriented. If it isn't, make it turn with the arrows below until the front view matches to the front part of the piece. Hold the *Shift* key down while clicking on an arrow to rotate the model at smaller steps.

Perspective   Top view

Left view   Front view

If the model rendering looks incorrect, check the following check box to invert its displayed faces.

☐ Invert back and front faces

Cancel   < Go back   Continue >

The model has been properly oriented; do not change this.

Use the arrows at the right end of the 'Category' window to scroll the existing furniture categories *or* type a new category name. This will add the new category to your furniture library. Adding your own category (e.g. CASEWORK) will make these models easier in your library.

Furniture import wizard

If the following information isn't correct, update it.

Name:	le trajectory horizontal
Category:	Bathroom
Creator:	
Width (inch):	0'8"
Depth (inch):	3'
Height (inch):	0'0⅛"

☑ Keep proportions

Elevation (inch): 0'

☑ Movable

☐ Door or window

☐ Staircase

Color:

Clear color

Cancel   < Go back   Continue >

Furniture import wizard

The image below shows the icon used as piece icon in the catalog and the plan. If its angle of view isn't correct, make it turn with the mouse.

Cancel   < Go back   **Finish**

Repeat the process for the Triangle trajectory vertical.zip model.

Drag-&-drop the horizontal triangle into the scene.

Position the triangle such that the angle is at the defect.
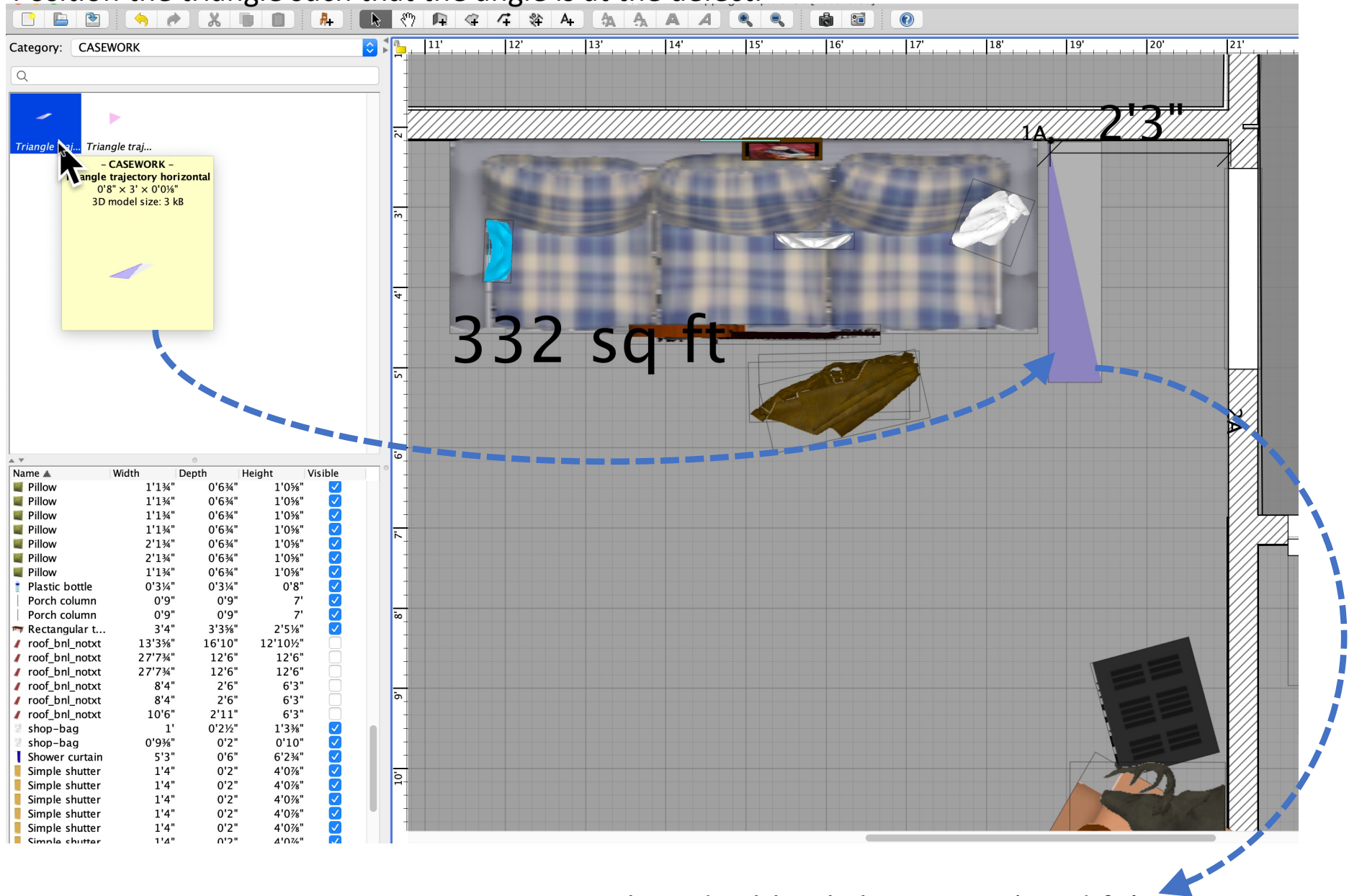
Then double-click to open 'Modify' menu

Modify furniture

Name

Name: Triangle trajectory horizontal   ☐ Display name in plan

Location

X (inch): 19'1¼"

Change elevation to height of defect. Y (inch): 3'8¼"

Elevation (inch): **3'**

☐ Mirrored shape

☐ Part of base plan

Orientation

Vertical rotation around Z axis

Angle (°): 0

Horizontal rotation around

○ X axis (°): 0

○ Y axis (°): **180**

Size

Width (inch): 0'**6"**

Depth (inch): 3'

Height (inch): 0'0⅛"

☐ Keep proportions

Color and texture

○ Unchanged

○ Color: [▭]

○ Texture: [▫]

○ Materials: [Modify...]

Shininess

● Unchanged

○ Matt

○ Shiny

☑ Visible

[Cancel] [**OK**]

To change right-to-left triangle direction to left-to-right: 180° Y axis

10° left-to-right

To use the measured horizontal angle, calculate the opposite side:

$$tan\theta = \frac{opposite}{adjacent}$$

opposite=tan10° x 3'= tan10° x 36"= 6"

NOTE: opposite side is *width* of horizontal triangle

Then "**OK**" to return to scene.

Drag to re-position as needed.

2'3"
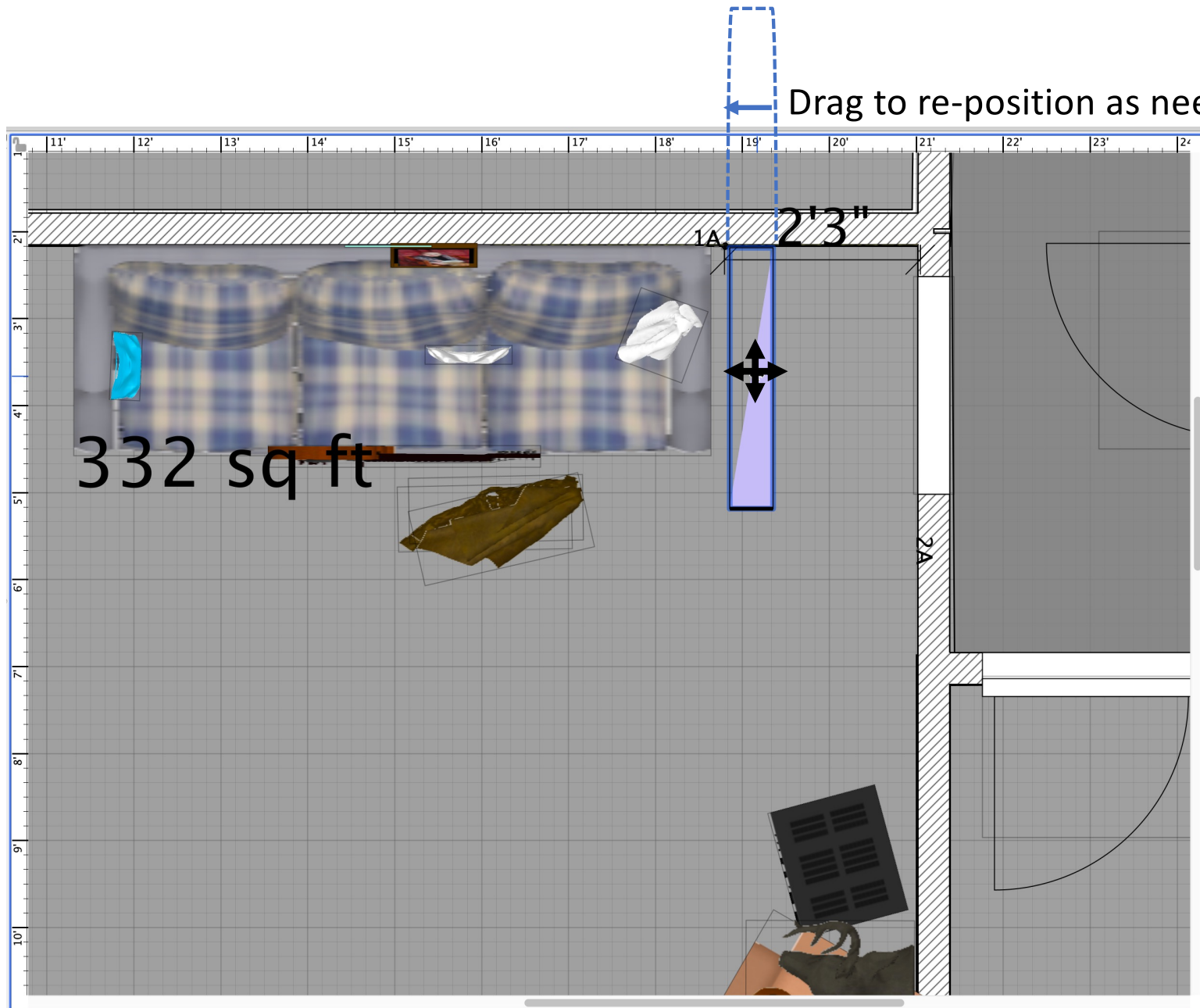
332 sq ft

Add a vertical triangle to scene.
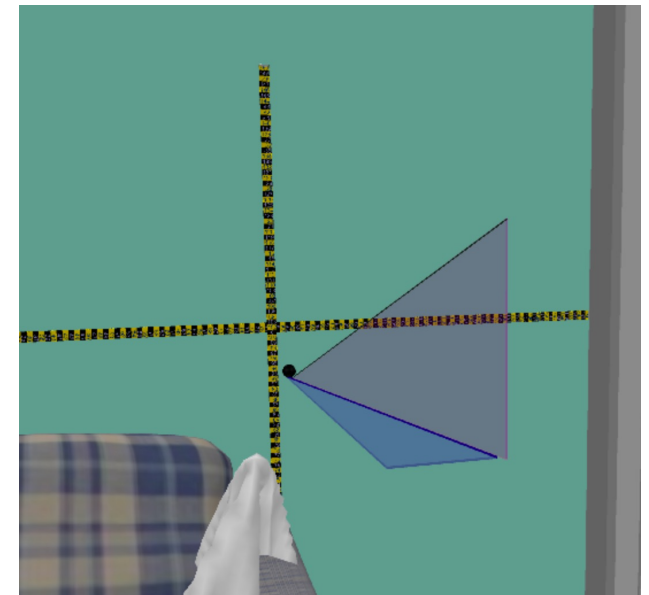Position the triangle to the bullet defect.

Double-click to open the "Modify' menu.
Set 'Elevation' to 3'.

The base (adjacent side) of the vertical triangle is along the base
(adjacent side) of the horizontal triangle.
To accurately depict the trajectory:
    Modify the vertical triangle to the measured angle.
    Position the vertical triangle along the hypotenuse of the
    horizontal triangle.

Modify furniture

Name

Name: Triangle trajectory vertical ☐ Display name in plan

Location

X (inch): 18'9¾"
Y (inch): 3'8¼"
Elevation (inch): 3'

Elevation to height of defect.

☐ Mirrored shape
☐ Part of base plan

Orientation

Vertical rotation around Z axis

Angle (°): 0

Horizontal rotation around

◯ X axis (°): 0
◯ Y axis (°): 0

Size

Width (inch): 0'0⅛"
Depth (inch): 3'
Height (inch): **10"**

☐ Keep proportions

Color and texture

◉ Unchanged
◯ Color: [ ]
◯ Texture: [ ]
◯ Materials: Modify...

☑ Visible

Shininess

◉ Unchanged
◯ Matt
◯ Shiny

Cancel   OK

15° downward

$$tan\boldsymbol{\theta} = \frac{opposite}{adjacent}$$

opposite=tan15° x 3'= tan15° x 36"= 10"
NOTE: opposite side is *height* of vertical triangle

Then "**OK**" to return to scene.
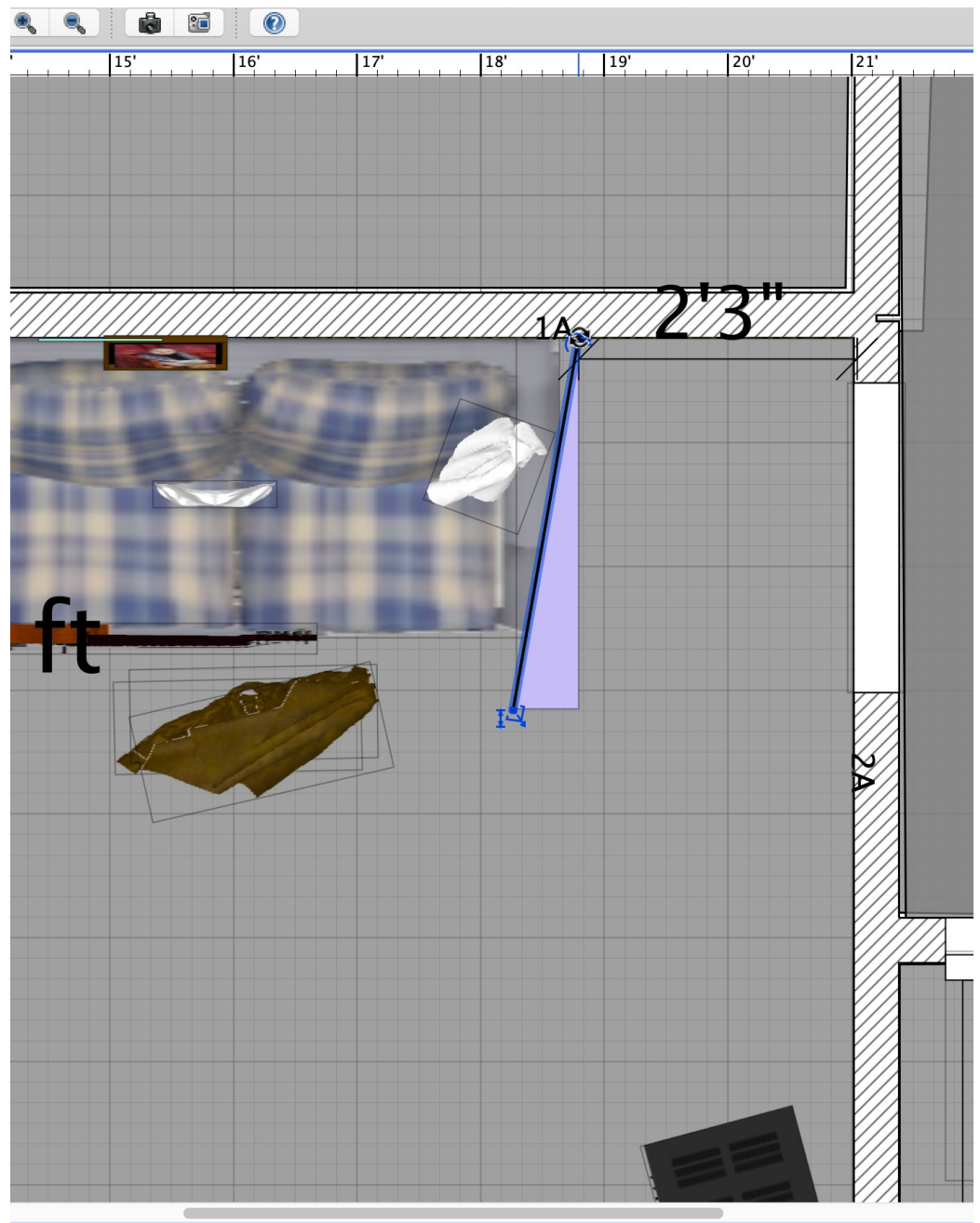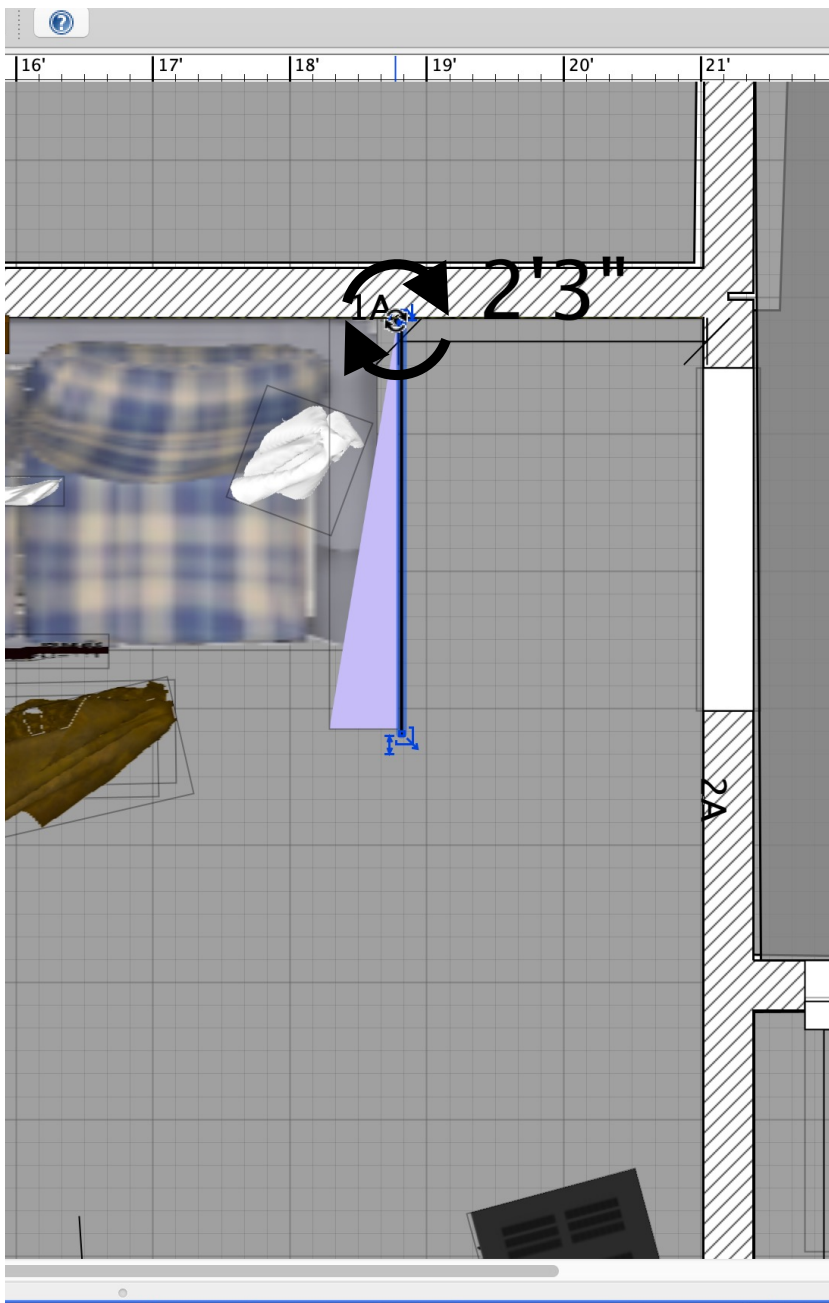
Rotate the vertical triangle to the hypotenuse of the horizontal angle.
Drag to re-position the triangle to the bullet defect.

Open the 'Modify' menu to adjust the rotation to the measured horizontal angle.

Modify furniture

Name

Name: Triangle trajectory vertical   ☐ Display name in plan

Location

X (inch):	18'6¼" ↕
Y (inch):	3'8¼" ↕
Elevation (inch):	3' ↕

☐ Mirrored shape

☐ Part of base plan

Orientation

Vertical rotation around Z axis

Angle (°):   10 ↕

Horizontal rotation around

◯ X axis (°):   0 ↕

◯ Y axis (°):   0 ↕

Size

Width (inch):	0'0⅛" ↕
Depth (inch):	3' ↕
Height (inch):	0'10" ↕

☐ Keep proportions

Color and texture

◉ Unchanged

◯ Color: ▭

◯ Texture: ☐

◯ Materials: Modify...

Shininess

◉ Unchanged

◯ Matt

◯ Shiny

☑ Visible
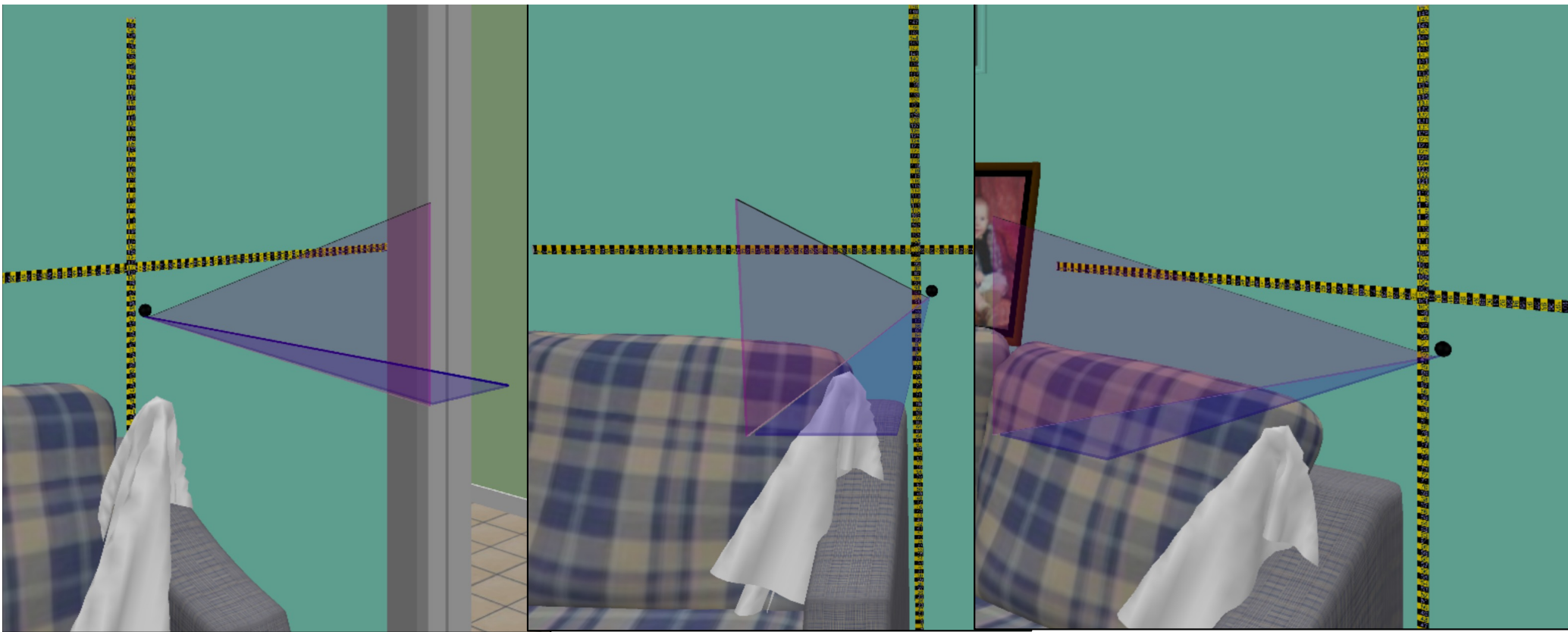
Cancel   OK

Return to scene and drag to re-position as needed.

Views of triangles from various angles.

Triangles can be used to depict the minimum and maximum distances.
Make duplicates of the vertical triangles, then modify the size while keeping the same proportions.

With the vertical triangle selected, edit / copy or right-click / copy.
Click off the triangle. Then paste on scene. A duplicate triangle will be on the original, and another triangle will appear in the scene inventory (lower left window).

Double-click on triangle to open 'Modify' menu.

Modify furniture

Name

Name: Triangle trajectory vertical ☐ Display name in plan

Location

X (inch): 18'6¼" ↕

Y (inch): 3'8¼" ↕

Elevation (inch): 3' ↕

☐ Mirrored shape

☐ Part of base plan

Color and texture

● Unchanged

○ Color: [▭]

○ Texture: [▫]

○ Materials: Modify...

☑ Visible

Orientation

Vertical rotation around Z axis

Angle (°): 10 ↕

Horizontal rotation around

○ X axis (°): 0 ↕

○ Y axis (°): 0 ↕

Size

Width (inch): 0'0⅜" ↕

Depth (inch): 10' ↕

Height (inch): 2'9⅜" ↕
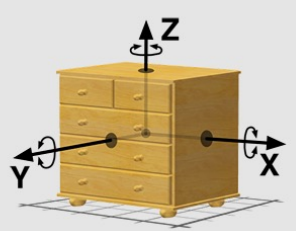
☑ Keep proportions

Shininess

● Unchanged

○ Matt

○ Shiny

Cancel   OK

First be sure the 'Keep proportions' is checked.
Then type in the new distance (Depth).
The width and height will change automatically to keep the proportions.

In this example the minimum was 3' and the maximum was 10'.
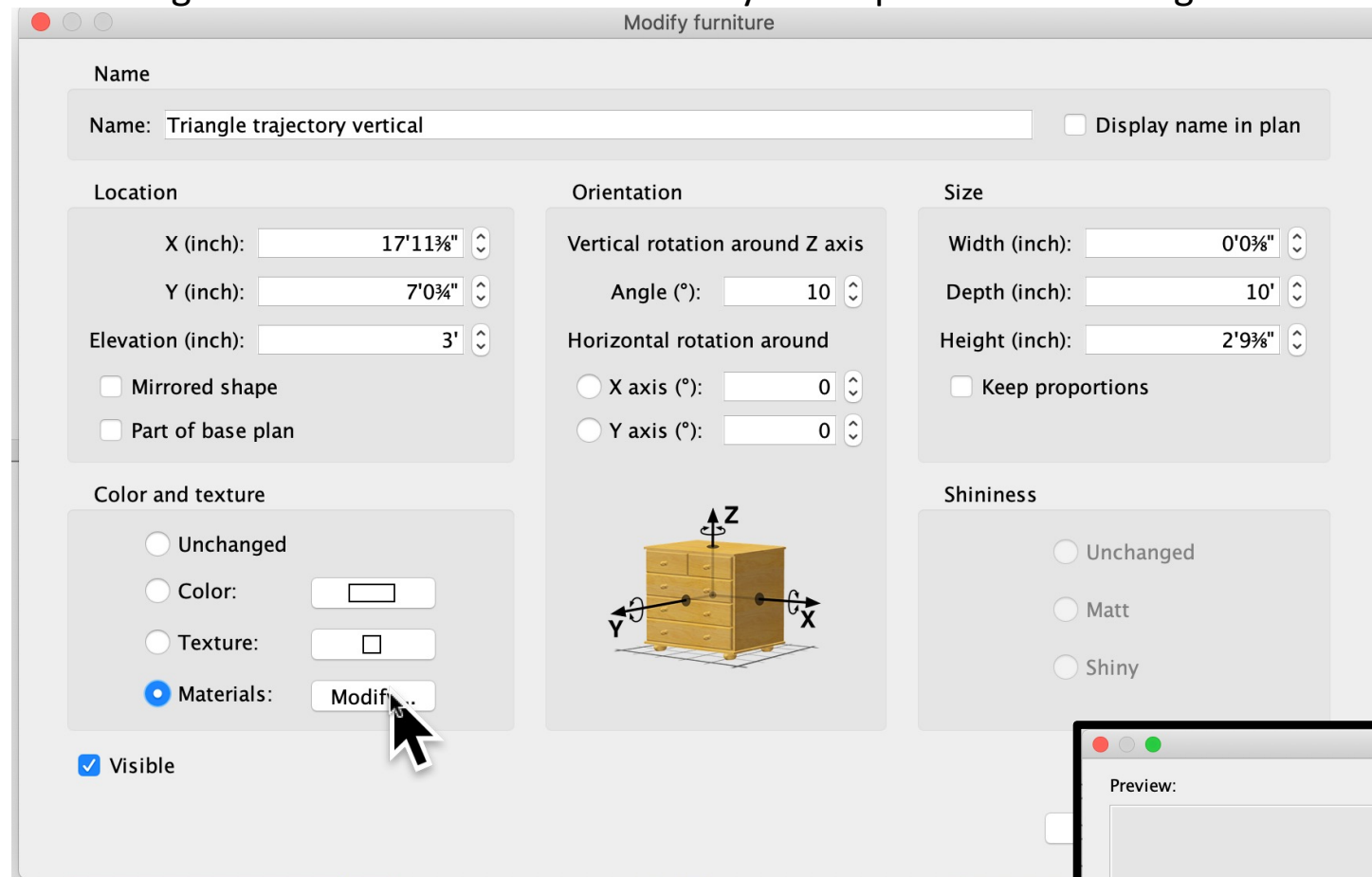
Then "**OK**" to return to scene.

The triangle size will expand in proportionally in all directions.
Drag the duplicate triangle to the bullet defect.


332 sq ft

2'3"

332 sq ft
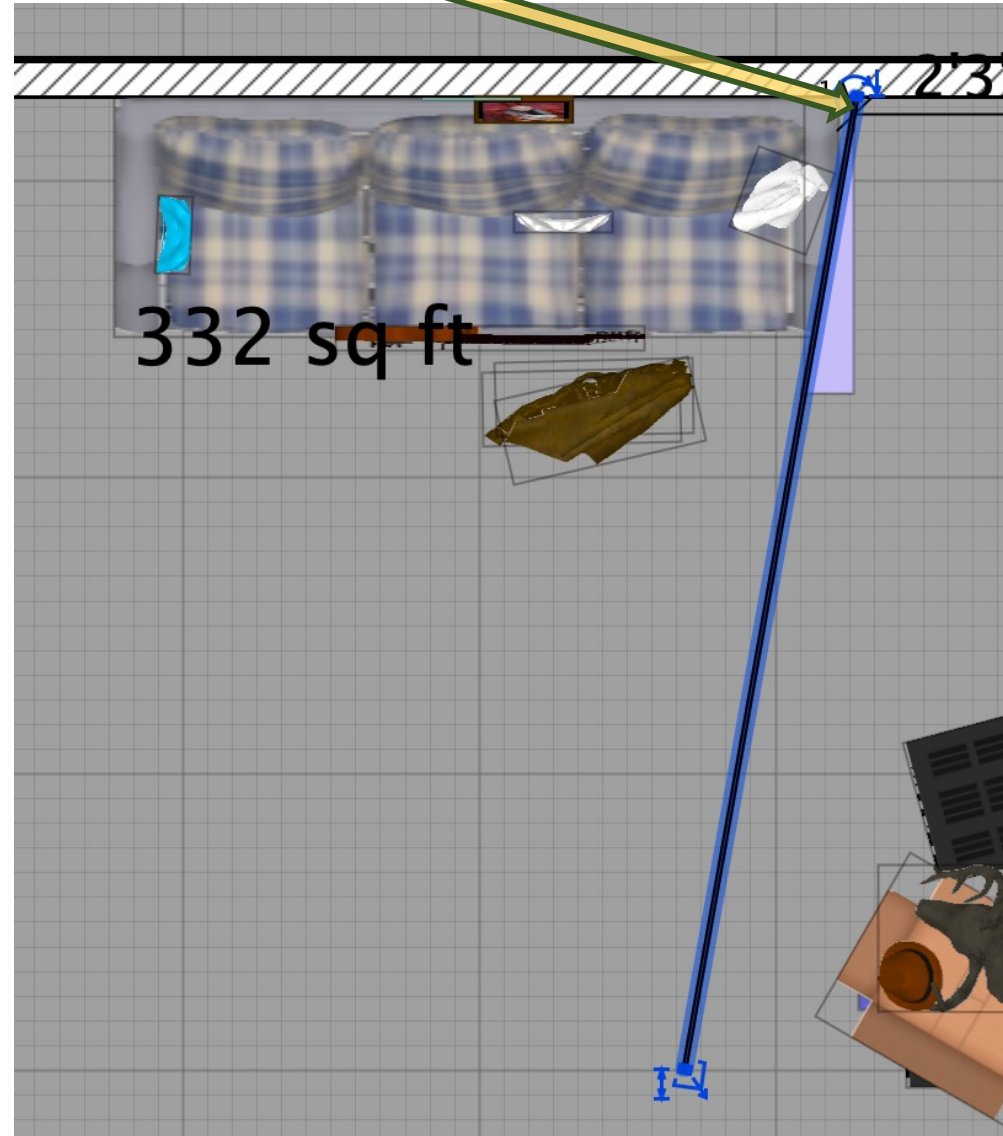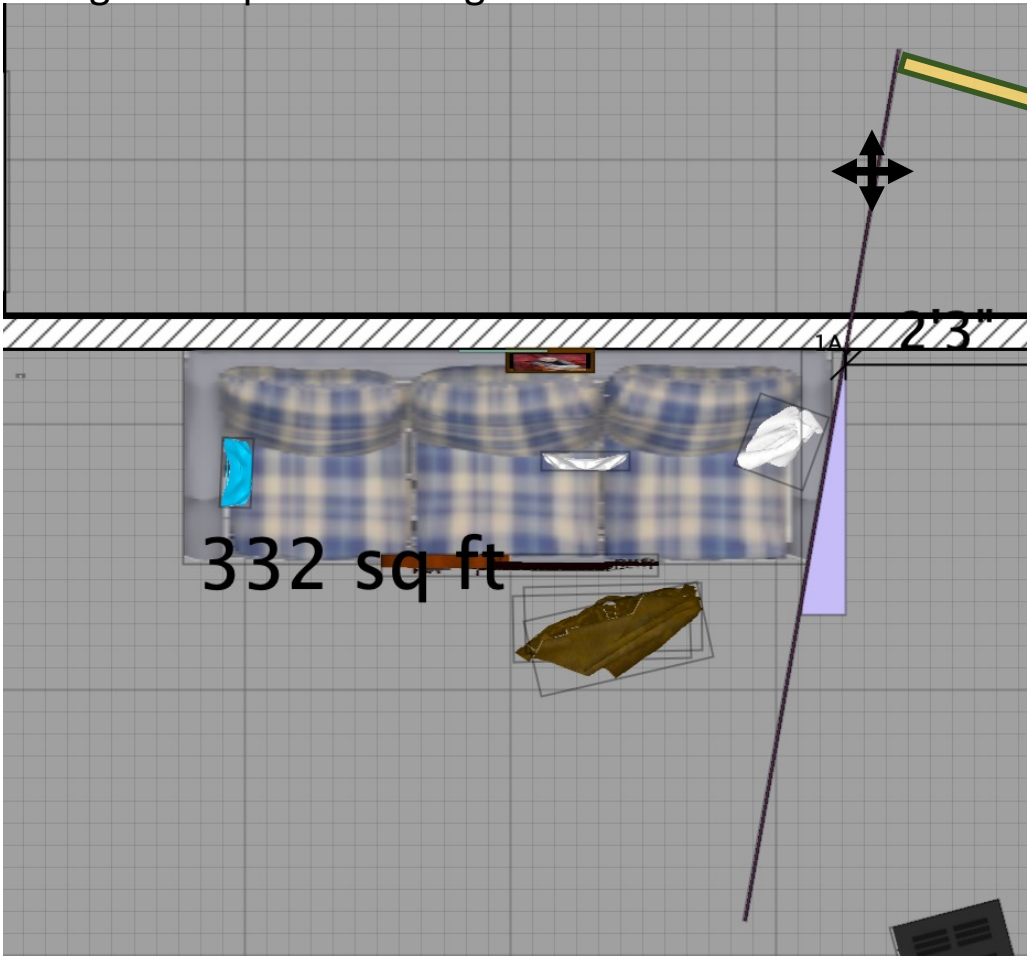
The lighter pink area indicates the minimum to maximum distances for this example.
Modifying the color of one of the triangles can make this more distinct.

The vertical triangle model is made with a colored edge over the hypotenuse.
The triangle can be modified to selectively make parts of the triangle invisible.

In the 'Modify materials' menu, select 'ground' and check invisible.
Then select 'wall' and check invisible.
Leave 'default' unchanged.
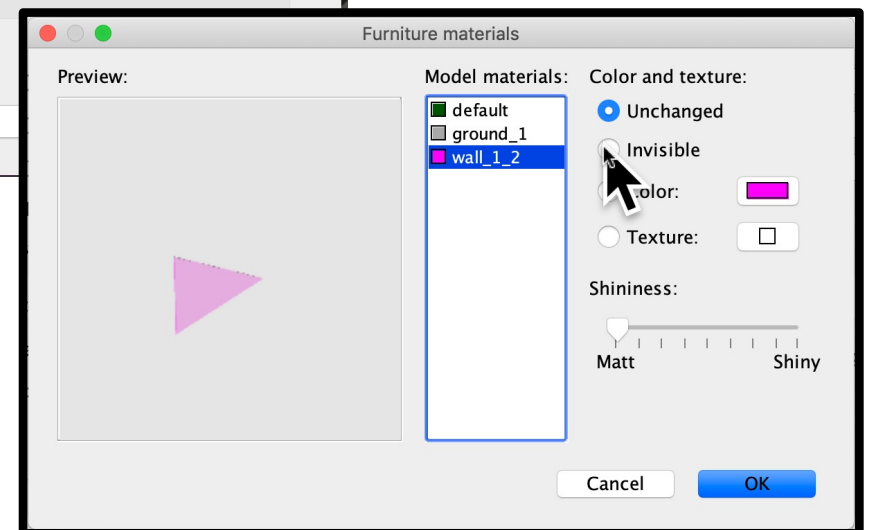
Repeat for all duplicates of vertical triangle.

Return to scene.

Optional: A rod can be added to scene and placed over the trajectory so that it is visible from all sides.