

Arch 463
ECS
Fall 2000

Name _____

Quiz #4

"The Glass Shading Device"

For this problem you are the shading device designer for Redfish Lake Lodge near Stanley, Idaho. The lodge is building a new retreat center that will have several public rooms with 5' x 5' windows that face south-east and view the lake and the Sawtooth Mountains. Your assignment is to design an elegant shading device that admits winter sun and blocks summer sun while preserving the great view and demonstrating the utility and beauty of advanced glazing products.



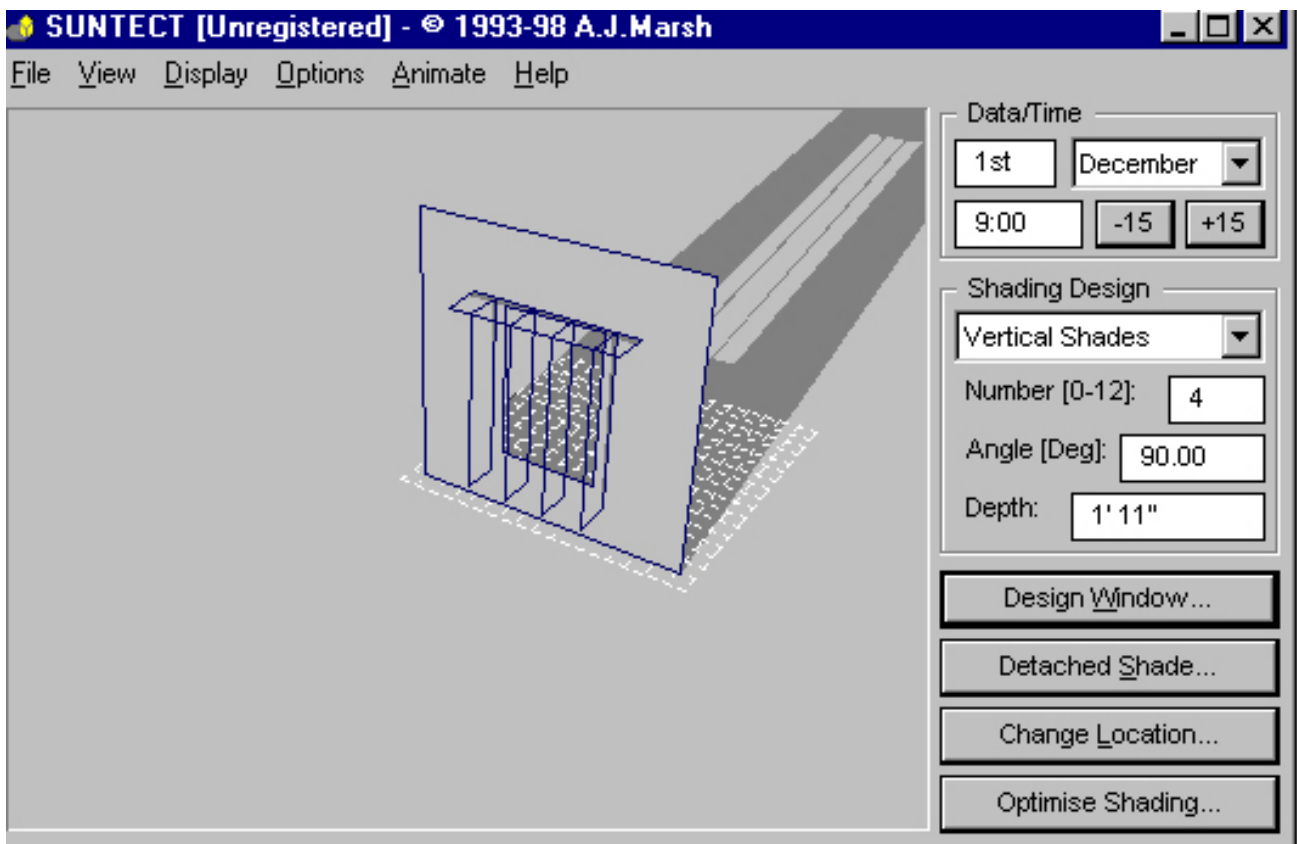
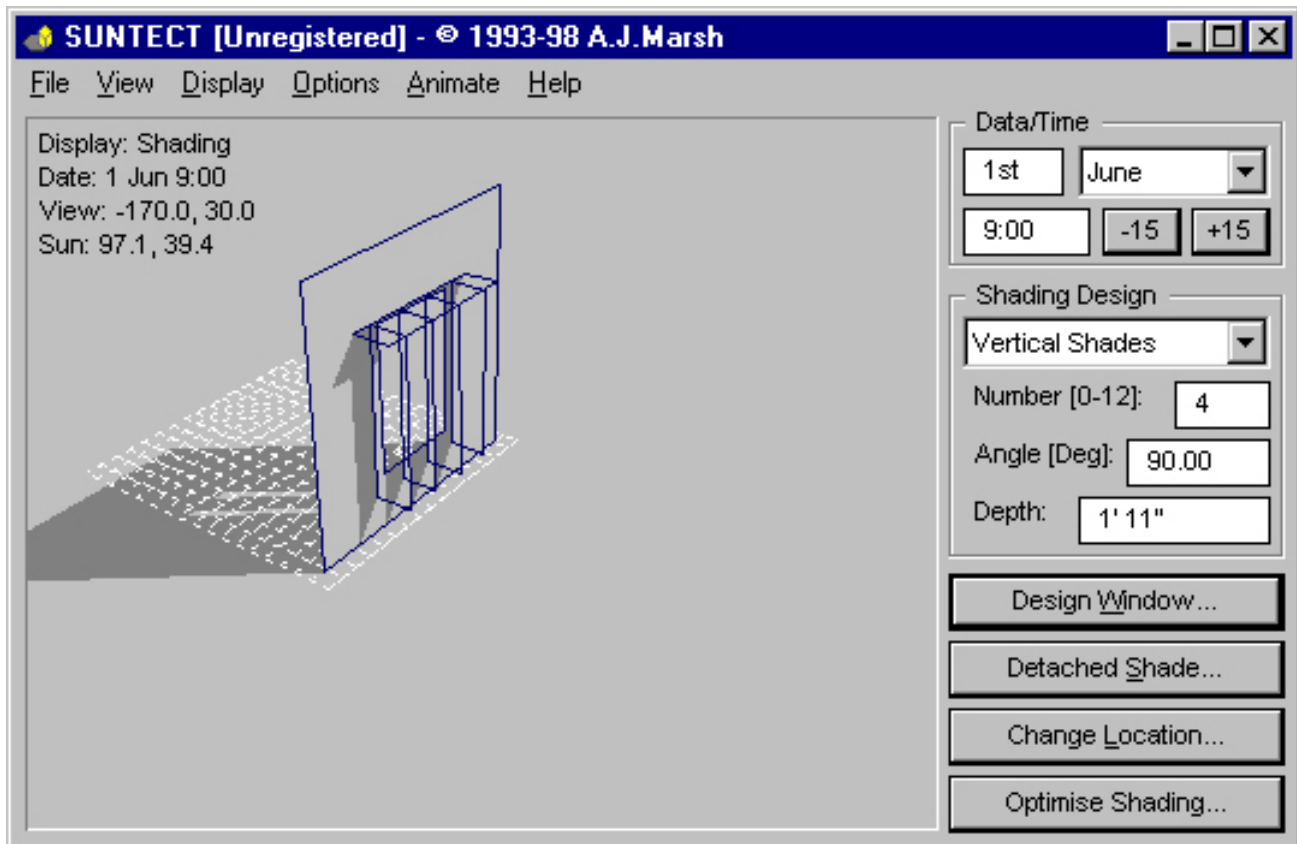
View from the southeast-facing window.

Redfish Lake is located at 44° NL and at 6500' altitude. It's climate is your basic mountain climate—intense sun and low humidity in the summer and a mix of clear, cold days and overcast or stormy days in the winter. Prevailing winds are from the southwest year-round and thermal winds blow to and from the lake and the valley it sits in. The lake and valley have an elongated east-west axis.

The shading devices can be constructed of modular 2' x 6' glazing units that are mounted either horizontally or vertically, or both. You may specify up to five glazing units for each window. Each glazing unit on a single window must be made of a different glazing material. Additionally, you may select the window glazing from the kit-of-parts—the default glazing is clear, double pane glass.

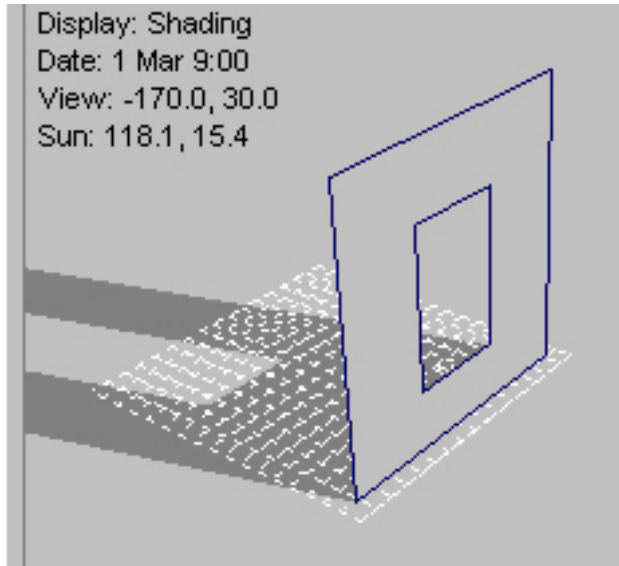
Kit-of-parts—chose one of the following for each of the five glazed parts of your shading device design and another for the window. You **must** use a different glazing for each element of the design.

Glazing Unit	Visual Transmittance (VT)	Solar Transmittance (SHGF)
Blue-Green Low-E	.7	.43
Silica Aero-Gel	.85	.65
Kalwall, white R=5	.1	.09
Evacuated	.79	.62
Single-Pane Blue	.58	.65
Single-Pane Bronze	.06	.14
Photovoltaic	.04	.10
Fritted 80% opaque	.18	.16



2 pts 1. You've been handed some preliminary *Suntech* studies of the shading device design. See screen copies on page two. **Critique** the preliminary design based on the program specifications and your knowledge of sunpaths. **Explain** what's successful about the design and what the design weaknesses are.

4 pts 2. **Design** an improved device. **Call-out** the type of glazing used for each panel and for the window in your design. **Explain** why you chose each panel.



Blue-Green Low-E
 Silica Aero-Gel
 Kalwall, white R=5
 Evacuated
 Single-Pane Blue
 Single-Pane Bronze
 Photovoltaic
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3 pts 3. Given that 160 btuh/ft^2 of near infrared solar radiation falls on an unshaded SE-facing window at 44° NL at 9 a.m. on June 21, **calculate** how much of the radiation passes through both your shading device and your window under those conditions. At that time the sun is at 48° above the horizon and 15° south of east. **Illustrate** your calculation with a ray diagram of the solar radiation's interaction with your shading device and the window.

1 pt 4. **Draw** the resultant view through your window. **Explain** your aesthetic intention.

