Quiz 1: Optics

PHY131
Mesa Community College

2 June 2016

Name: _____

by writing my name I swear by the honor code

Read all of the following information before starting the exam:

- **Calculators are allowed.**
- **Draw a diagram for every problem.**
- **Show your work.**
- **Don't panic.**

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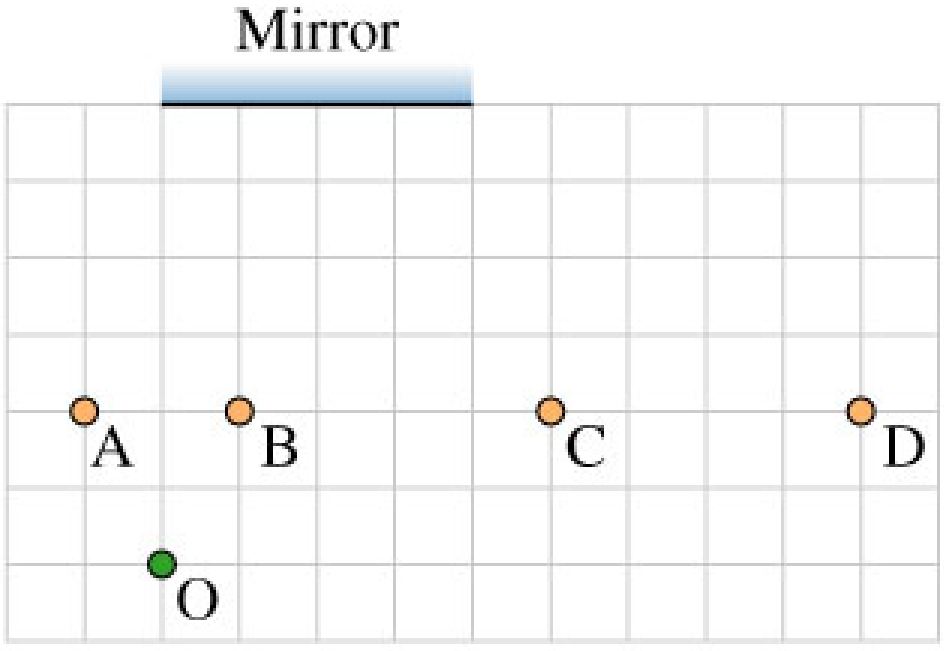
1. (*3 points*) **The figure shows an object O in front of a plane mirror. Use ray tracing to determine from which locations A-D the object's image is visible.**



2. (*4 points*) **A laser beam in air is incident on a liquid at an angle of** 36.0° **with respect to the normal. The laser beam's angle in the liquid is** 22.0°**.**

a. (*2 pts*) **Sketch the incident and refracted rays. Indicate and label the angles given above on your diagram.**

b. (*2 pts*) **Find the liquid's index of refraction.**

3. (*4 points*) **An underwater diver sees the sun** 60° **above horizontal.**

a. (*2 pts*) **Sketch the situation, including incident and refracted rays. Indicate and label the angle of incidence and the angle of refraction.**

b. (*2 pts*) **How high is the sun above the horizon to a fisherman in a boat above the diver? (The index of refraction for water is approximately** 1.33**.)**