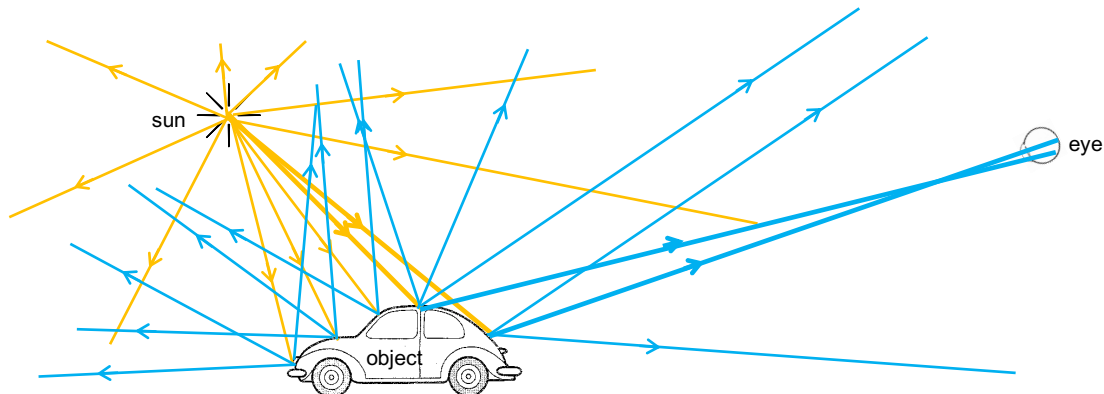
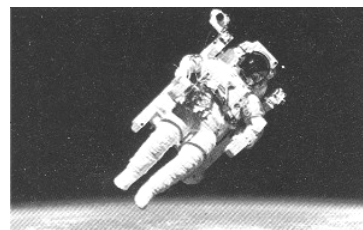


1. Light rays coming from the sun are incident on the surface of the car. From any point of the car's surface light is reflected in many directions (diffuse reflection). Because the light is reflected off every point of the car's surface in all directions, there will be a light ray coming from any portion of the car which is reflected directly towards the eye and will reach the eye. Thus we can see any point of the car's surface.



2. Light is reflected off the astronaut and the earth's surface and can thus reach our eyes. But in space there is nothing that would reflect light so that it will reach our eyes. If something's black it means that there is no light coming from there.



3. a) The distance between the lamp and the wall (image distance d_i) is double the distance between the lamp and the pencil (object distance d_o). Therefore the shadow (image height h_i) is double the size of the object (object height h_o):

$$h_i = 2 \cdot h_o = 2 \cdot 18 \text{ cm} = \underline{36 \text{ cm}}.$$

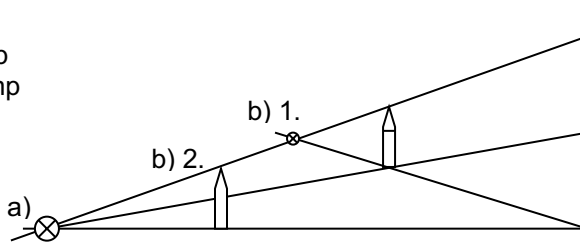
b) The distance between the lamp and the wall (image distance d_i) is triple the distance between the lamp and the pencil (object distance d_o). Therefore the shadow (image height h_i) is triple the size of the object (object height h_o):

$$h_i = 3 \cdot h_o = 3 \cdot 7.0 \text{ cm} = \underline{21 \text{ cm}}.$$

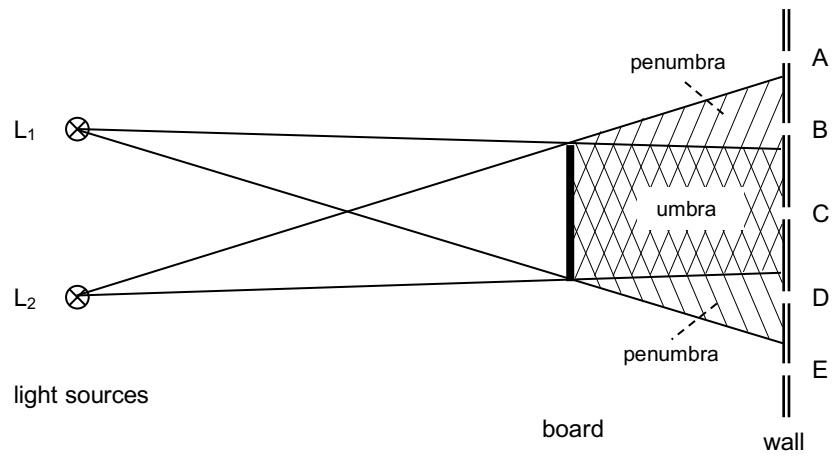
4. a) See picture

b) two possibilities:

1. move the lamp closer to the lamp
2. move the pencil closer to the lamp



5. a)



b) A: L_1 and L_2 , B: only L_1 C: none, D: only L_2 , E: L_1 and L_2