Name:_____

Lightness and Darkness in Space

1. How does turning the pencil in a different direction change the size of its shadow on the paper? Draw and explain how this works in your science notebook.

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2. What happens to the shadow on the paper when it is moved farther behind the pencil? Draw and explain how this happens in your science notebook. Include in your drawings the light source, the pencil, the paper, and the paths of some light rays from the lamp to the paper.

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3. What happens behind the pencil when no white paper there? Is there a shadow when there is no screen? How would you find it?

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4. Replace the black paper with the white paper. How does the pencil's appearance change? Can you see the pencil's shadow on the black paper? Does it look different from the shadow on the white paper?

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5. What does the shadow on the ball tell you about the shape of your hand? How does the part of the ball in the shadow look different from the part of the ball outside the shadow? How would this change if you really were doing the experiment in space?

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6. How many different shadow shapes could you create with your hand? What does the shape of the ball's shadow on your hand tell you about the shape of the ball?

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7. Look again at the picture from space. Is the astronaut in light? In darkness? Can he see what he is doing? Why is the sky behind him dark? Looking closely, can you find which direction the Sun would be in in this picture?

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