What is an Optical Engineer?

Draw and label a picture of an optical engineer at work.

Explain your drawing of an optical engineer:

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Draw a picture of an optical engineer at work. Label your picture.
What is an Optical Engineer?

Which of the following would an optical engineer do for his or her job? Mark ALL that apply:

- [ ] construct bridges
- [ ] improve lenses for a telescope
- [ ] repair TV screens when they break
- [ ] design an obstacle course for race cars
- [ ] improve cameras
- [ ] fix headlights on trucks
- [ ] design optical illusions
- [ ] design something to help people see things better
- [ ] think about how light gets from one place to another
- [ ] think about where to put traffic lights
- [ ] think about where lightning comes from
Directions: Decide whether each statement below is TRUE ( ☑️  T) or FALSE ( ☑️  F) and circle your answer.

<table>
<thead>
<tr>
<th>Statement</th>
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The picture below shows flashlights shining on 3 different objects. Use this picture to answer questions 1 and 2.

1. On the picture above, CIRCLE the object that will be lit up with the MOST INTENSE light.

2. Put an X over the object that will have the LEAST INTENSE light shining on it.

3. Using the picture below, draw what happens to light when it shines on a mirror.
1. In which diagram will light from the flashlight be MOST INTENSE in the corner marked by the X? Circle your answer in the diagram below.

2. A student is trying to use a spotlight to light up a flag pole. The light is not intense enough. What can she do to make the light on the flag more intense? Circle the BEST choice below.

   A. move the spotlight closer to the flag
   B. move the spotlight to the left of the flag
   C. move the spotlight farther away from the flag
   D. you can’t make the light on the flag any more intense
Use the diagram below to answer questions 1-3.

1. On the diagram above, put a CIRCLE around the location where you should hold a flashlight so that it shines on the mirror and then on Position A.

2. If you hold a flashlight at Position D and shine it into the mirror, where would the reflected light appear? Mark the location with an X on the diagram above.

3. Explain why you chose the location that you marked with an X above.

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1. A student is designing a way to light a dark corner of her bedroom. The light is on the opposite side of the room from the dark corner. Her mom says that she can’t move the furniture or the light.

Describe 2 different things she could do to light up the dark corner.

(1) _________________________________________________________ 
_________________________________________________________ 
_________________________________________________________ 
_________________________________________________________ 
_________________________________________________________ 

(2) _________________________________________________________ 
_________________________________________________________ 
_________________________________________________________ 
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You want to use some mirrors and a flashlight to light up a sculpture in a room. Which of these set-ups would make the light on the sculpture the MOST INTENSE? Circle your choice below.

The light on the sculpture will be the same intensity in each of these set-ups.

- Set-up 1: Mirror 5 feet from sculpture, flashlight 7 feet from mirror and 5 feet from sculpture.
- Set-up 2: Mirror 6 feet from sculpture, flashlight 8 feet from mirror and 2 feet from sculpture.
- Set-up 3: Mirror 19 feet from sculpture, flashlight 9 feet from mirror and 19 feet from sculpture.

Circle your choice below.
An old castle is being turned into a museum. There are pictures hanging on the walls that need to be lit up so that visitors can see them, but it’s hard to get electricity for lights into the castle because it was built a long time ago.

The diagram below shows a top view of one room in the castle. Design a lighting system that will allow you to light up all of the pictures on the walls with the greatest intensity.

1. You have 1 spotlight and 1 mirror that you can place anywhere in the room. Draw your spotlight on the diagram below.

2. Draw your mirror on the diagram below. Be sure to show the angle of the mirror.

3. Draw the path the beam of light will take.
What is an Optical Engineer?

Draw and label a picture of an optical engineer at work.

A good picture would show someone designing or improving technologies that involve light or lenses.

Examples include: designing or improving a telescope, camera, CD player, etc.

Explain your drawing of an optical engineer:

Answers will vary, but may include: Someone who uses his or her knowledge of math and science, plus creativity, to solve problems involving light.
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   According to the law of reflection, the angle at which a beam of light hits a material is always equal to the angle at which the beam of light bounces off the material. So when light hits the mirror, the angle of incidence will be equal to the angle of reflection. This means the light will appear at Position B because B and D are the same distance from C.
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*Answers will vary, but may include: cover the walls with shiny wallpaper, paint the walls white to reflect more light to all parts of the room, use mirrors to reflect light into the corner or the room, etc.*
You want to use some mirrors and a flashlight to light up a sculpture in a room. Which of these set-ups would make the light on the sculpture the MOST INTENSE? Circle your choice below.

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Example:

- Spotlight
- Mirror