Name *Period* *Date*

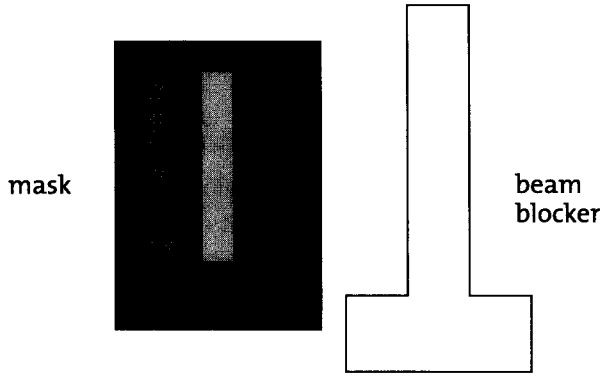
STUDENT SHEET 7

Combining colored light

When you use a filter to make colored light out of white light, the filter subtracts something from the spectrum, letting only certain wavelengths pass through. Now let's explore the opposite of subtracting light. What happens when you combine light beams of different colors?

MATERIALS

- 1 light station
- 1 three-color filter mask
- 1 upright white viewing screen with stands
- 3 mirrors
- 4 mirror holders
- 1 beam blocker



WHAT TO DO

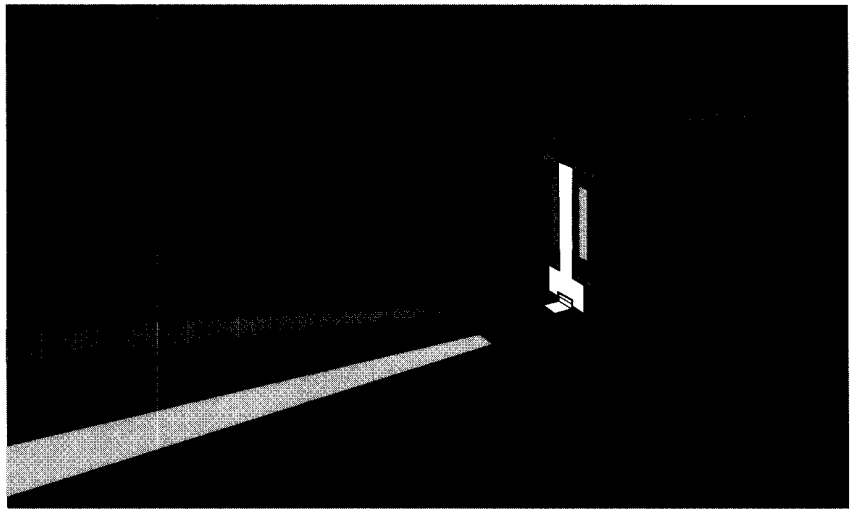
Here is one way to combine colored light beams.

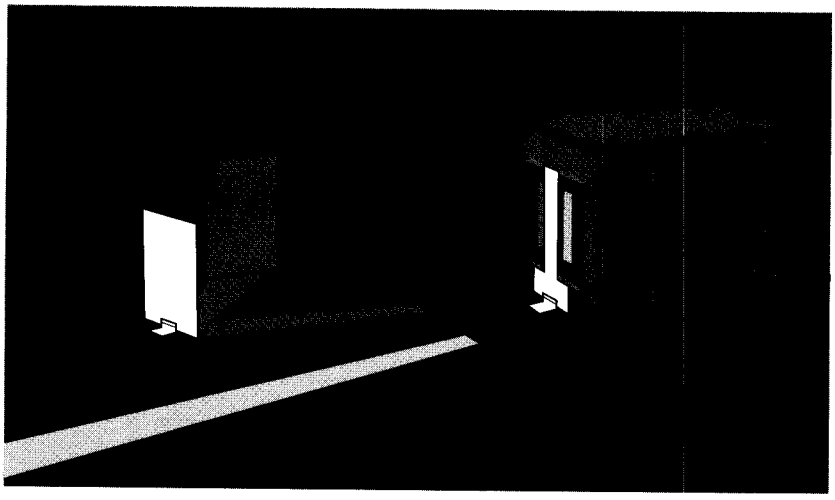
- Slide the three-color mask over the front of the light station. It will make three colored light beams, the three primary colors of light.
- Stand the viewing screen off to one side as shown.
- Place the beam blocker (in a mirror holder) near the light station so that it blocks one beam.

SAFETY

Improper use of the light station can result in burns from the hot bulb or electric shock from the wiring. Follow your teacher's instructions at all times.

You should now have only two light beams that do not yet reach the screen.





Using one mirror per beam, you can reflect each beam to the screen.

Working with the room lights off

1. Adjust the mirrors to make the two beams overlap on the screen. What happens when you combine these two colors of light? *Discuss what you see with your group, and write a description in the appropriate box in the table.*

Table 7.1 Results of combining two different primary colors of light

Colors of light that are combined	Description and observations
Red and blue	
Blue and green	
Green and red	

2. Move the beam blocker and mirrors to investigate the other combinations of two different colors of light. *Discuss your observations, and record them in Table 7.1 too.*

3. What happens when you use three mirrors to combine all three beams in the same place on the screen? *Discuss what you observe and describe it in the following table.*

Table 7.2 Result of combining the three primary colors of light

Colors of light that are combined	Description and observations
Red and blue and green	

SUMMARY

4. Journal question. *Summarize what happens when you add different colors of light together.*

COLORED SHADOWS

Shine red, blue and green light beams on the same place on the white screen, making an area of white light. Stand a small object (a pen cap, a pencil held vertically, an eraser) a few centimeters in front of the screen where all the light beams come together so that it casts colored shadows on the screen.

Answer the following questions to explain the shadows.

5. *What are all the colors you see?*

6. *Why is there more than one shadow?*

7. *Why are the shadows in different places?*

8. *Explain why each shadow has the color that it does and why all the shadows aren't the same color.*