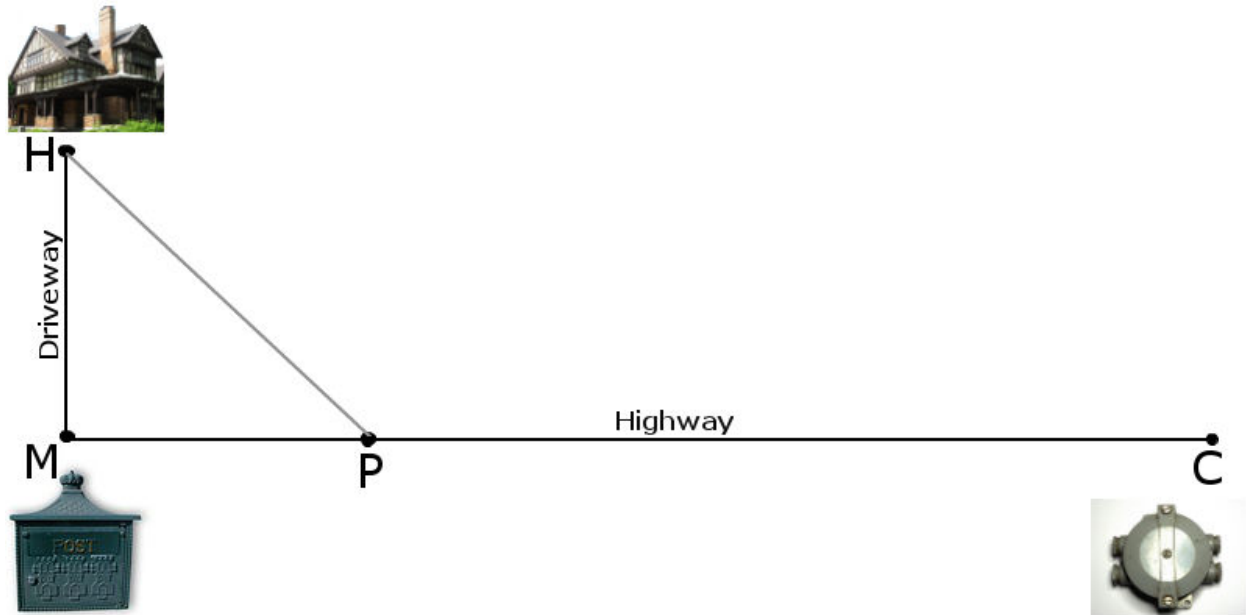


## The Least Expensive Cable

Better Cable Company must provide service to a customer whose house is located 2 miles from the main highway. The nearest connection box for the cable is located 5 miles down the highway from the customer's driveway. The installation from the house to the highway is **\$14 per mile**. The cost from any point on the highway to the connection box is **\$10 per mile**.

In this problem you will determine where the cable should be laid so that the installation cost is as low as possible.

1. How much will the customer have to pay if the cable is laid 5 miles along the highway and 2 miles along the drive to the house? Show your calculations. Do you think that this cable will be the least expensive possibility? Explain.



2. On the small grid paper model the situation with a sketch drawn to scale allowing four grid squares to represent one mile. Represent the house as H, the mailbox as M, and C as the connection box.

3. On your drawing, plot point P on the Highway that will be one half mile from the mailbox. The cable company is going to lay the cable from the connection box to this point P. Then cross the field to point H where the cable connects to the house. Carefully use your ruler to sketch the cable on your scale drawing. Have your teacher check your sketch.

4. Calculate the cost of the cable from the connection box to position P. Then find the cost of the cable from point P to the house. Enter your results in the chart provided and calculate the total cost.

5. Continue the steps from question 4 until the table is complete.

<b>Distance from mailbox to point P. (miles)</b>	<b>Length of cable along highway to connection box.</b>	<b><u>Cost</u> of cable along highway to connection box.</b>	<b>Length of cable from house to point P on the highway.</b>	<b><u>Cost</u> of cable from house to highway.</b>	<b>Total cost of cable installation.</b>
P <sub>1</sub> 0.5 mile					
P <sub>2</sub> 1.0 mile					
P <sub>3</sub> 1.5 miles					
P <sub>4</sub> 2 miles					
P <sub>5</sub> 2.5 miles					
P <sub>6</sub> 3 miles					
P <sub>7</sub> 3.5 miles					
P <sub>8</sub> 4.0 miles					
P <sub>9</sub> 4.5 miles					
P <sub>10</sub> 5 miles					

6. Based on your calculations, at what point P is the cable installation least expensive? Explain using complete sentences.

7. On the large grid paper, you will graph the total cost of the cable installation (y) as a function of the distance of P from the mailbox (x). Construct your x and y axes with labels and appropriate intervals. Before plotting points, have your teacher approve your set up.

8. Plot the x and y values. X is the distance P is from the mailbox and y is the total cost.

9. Use complete sentences, to explain how your graph shows the cheapest installation plan.

10. A worker is being sent out to install the cable. Please describe the installation for this worker. Include any diagram, calculations and a detailed bill for the customer.

