12. Long-stem roses cost $4.25 each. Delivery costs $10. Do not include tax. How many roses can be delivered for $30? Will there be any money left over?

<table>
<thead>
<tr>
<th># roses</th>
<th>Cost $</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>4.25</td>
</tr>
<tr>
<td>2</td>
<td>8.50</td>
</tr>
<tr>
<td>3</td>
<td>12.75</td>
</tr>
</tbody>
</table>

\[ C = 4.25n + 10 \]
\[ \Rightarrow 50 = 4.25n + 10 \]
\[ 50 - 10 = 4.25n + 10 - 10 \]
\[ 40 = 4.25n \]
\[ \frac{40}{4.25} = n \]
\[ 9.417... = n \]
\[ \Rightarrow 9 \text{ roses} \]

\[ C = 4.25(9) + 10 \]
\[ C = 38.25 + 10 \]
\[ C = 48.25 \]

\[ \text{Charge} = 50 - 48.25 = 1.75 \]

Some rides have height restrictions for safety. A sign beside this ride states, “Riders must be at least 135 cm tall.” How can you show this mathematically?

1. Mira is 140 cm tall. Can she go on the ride? Write an inequality comparing Mira’s height to the height restriction.

Yes she can.

\[ 140 \text{ cm} > 135 \text{ cm} \]

2. Lucas is 130 cm tall. Can he go on the ride? Write an inequality comparing Lucas’s height to the height restriction.

No he can’t.

\[ 130 \text{ cm} < 135 \text{ cm} \]

3. Write an inequality comparing Lucas’s and Mira’s heights.

\[ 130 < 140 \]
\[ 140 > 130 \]
4. The symbol $\geq$ means “is greater than or equal to.” How might you use this symbol to model the statement, “Riders must be at least 135 cm tall”?

$$h \geq 135\text{cm}$$

5. **a)** What **whole number** solutions make your statement from step 4 true?

   **b)** How would your answer change if you used the symbol $>$?

   a) $135, 136, 137, 138, \ldots$

   b) $136, 137, 138, \ldots$ can’t include $135\text{cm}$

---

**Example 1: Model Inequalities**

Model each sentence. Define your variables. Then, write a mathematical statement using the proper symbol.

a) The mass is less than 8 kg.

b) John gets at least 70 marks on the test.

c) Twelve dollars is more than the cost of the lunch box.

d) Diane takes no more than four cookies.

\[a) \quad m < 8\text{kg} \quad \text{where } m=\text{mass in kg}\]

\[b) \quad x \geq 70 \quad \text{where } x=\text{John’s mark}\]

\[c) \quad 12 > b \quad \text{where } b=\text{cost of lunch box}\]

\[d) \quad n \leq 4 \quad \text{where } n=\#\text{ of cookies}\]
Example 2: Find the Solution Set for < and > Statements
Model each inequality. Then, write the whole number solution set.

a) $x < 3$

b) $72 < h$

\[ a) \quad x = 0, 1, 2 \]

\[ b) \quad h = 73, 74, 75, \ldots \]

Example 3: Find the Solution Set for $\geq$ and $\leq$ Statements
Model each mathematical statement. Then, write the whole number solution set.

a) $3 \geq x$

b) $h \geq 72$

\[ a) \quad 3, 2, 1, 0 \]

\[ b) \quad 72, 73, 74, 75, \ldots \]
Example 4: CD Sales
A local music band is having trouble selling its newest CD.
a) Model the situation with an inequality.
b) Find how many CDs have been sold.

Even if the sales double, the band will still sell fewer than 100,000 CDs.

Let \( j \) = \# of CDs

\[
2j < 100,000
\]

\[
\frac{2j}{2} < \frac{100,000}{2}
\]

\[
j < 50,000
\]

\( \Rightarrow \) Sold fewer than 50,000 CDs.

---

### Key Ideas

- An inequality uses a symbol to compare numbers or expressions.

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Meaning</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;</td>
<td>less than</td>
<td>5 &lt; 8</td>
</tr>
<tr>
<td>&gt;</td>
<td>greater than</td>
<td>8 &gt; 5</td>
</tr>
<tr>
<td>≤</td>
<td>less than or equal to</td>
<td>5 ≤ 8, 11 ≤ 11</td>
</tr>
<tr>
<td>≥</td>
<td>greater than or equal to</td>
<td>8 ≥ 3, 2 ≥ 2</td>
</tr>
</tbody>
</table>

- An inequality can involve a variable.

  - The variable represents all the numbers that make the inequality true.

  \( 9 > m + 5 \)

  \[ m = 0 \quad 9 > 0 + 5 \quad 9 > 5 \]
  \[ m = 1 \quad 9 > 1 + 5 \quad 9 > 6 \]
  \[ m = 2 \quad 9 > 2 + 5 \quad 9 > 7 \]
  \[ m = 3 \quad 9 > 3 + 5 \quad 9 > 8 \]

  \[ m = 4 \quad 9 > 4 + 5 \quad \text{not in solution set} \]

  \( 9 > 9 \text{ is not true. So, } m = 4 \text{ is not in the solution set.} \)

  \( 9 > 9 \text{ is not true. So, } m = 4 \text{ is not in the solution set.} \)

  \( m = 0, 1, 2, 3 \)

- The list of numbers is called the solution set.