Exercise 6-16: Part 1

Break-even point in units = Fixed expenses ÷ Unit contribution margin.

Break-even point in units = $216,000 ÷ $18 = 12,000 units

Break-even point in sales = 12,000 x $30 = $360,000

Part 1 – Alternative Solution

Sales = Variable Cost + Fixed Cost + Profit

Let X = Number of units to break even

$30X = $12X + $216,000 + $0

$18X = $216,000

X = $216,000 ÷ $18 = 12,000 units

Break-even point in sales = 12,000 x $30 = $360,000

Part 2

At the break-even point, the contribution margin equals the fixed costs or $216,000.
Part 3

Units sold to attain target profit =
(Fixed expenses + Target profit) ÷ Unit contribution margin
Units sold to attain target profit = ($216,000 + $90,000) ÷ $18/unit = 17,000 units

Part 3 - Proof

<table>
<thead>
<tr>
<th></th>
<th>Total</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales (17,000 units x $30/unit)</td>
<td>$510,000</td>
<td>$30</td>
</tr>
<tr>
<td>Less variable expenses (17,000 x $12/unit)</td>
<td>$204,000</td>
<td>$12</td>
</tr>
<tr>
<td>Contribution margin</td>
<td>$306,000</td>
<td>$18</td>
</tr>
<tr>
<td>Less fixed expenses</td>
<td>$216,000</td>
<td></td>
</tr>
<tr>
<td>Net Income</td>
<td>$ 90,000</td>
<td></td>
</tr>
</tbody>
</table>

Part 4 – Margin of Safety

$Margin of safety = Total sales – Break-even sales
$Margin of safety = $450,000 - $360,000 = $90,000
% Margin of safety = $margin of safety ÷ Total sales
% Margin of safety = $90,000 ÷ $450,000 = 20%
Part 5 - Contribution Margin Ratio

Contribution margin ratio = Unit contribution margin ÷ Unit sales price
Contribution margin ratio = $18 ÷ $30 = 60%
$50,000 additional sales x 60% = $30,000 increased contribution.