

Assignment 1

Date: _____

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02103

$$\begin{aligned}
 1 \text{ a) } F_m + Q V_m &= F_b + Q V_b \\
 Q V_m - Q V_b &= F_b - F_m \\
 Q &= \frac{F_b - F_m}{V_b - V_m} \\
 &= \frac{5000 - 125000}{15 - 17} = 60,000 \text{ units}
 \end{aligned}$$

$$\text{Total cost at breakeven} \rightarrow 125000 + 15(60000) = \$1025000$$

b) As 150,000 is beyond the breakeven quantity i.e. 60,000 make option will be preferred.

$$\begin{aligned}
 - \text{Total cost for make option} &= 125000 + (15 \times 150000) \\
 &= \$2375000
 \end{aligned}$$

$$\begin{aligned}
 - \text{Total cost for buy option} &= 5000 + (17 \times 150000) \\
 &= \$2555000
 \end{aligned}$$

$$\text{Cost savings} = \$180000/-$$

2)		Make	Buy	Total units = 20000
	fixed	50000	1000	
	variable	25	12	

$$\text{Make cost} = 50000 + 25(20000) = \$550000$$

$$\text{Buy cost} = 1000 + 12(20000) = \$250000$$

$$\begin{aligned}
 1000 + 12000n &< 550000 \\
 n &< 27.45
 \end{aligned}$$

The minimum variable cost that she should be willing to pay must be less than \$27.45. which is the only possibility to make her minimum purchase price to be less than \$50000 to make her buy decision preferable over the inhouse approach. Additional features that she should negotiate include payment terms, on time delivery & quality standards.

3) Total park $\Rightarrow 20000$

	Make	Buy
Fixed	50000	600
Variable	8	10

Using the same formulae as used in Question 1:-

$$Q = \frac{F_m - F_b}{V_b - V_m} = \frac{50000 - 600}{10 - 8} = 24700 \text{ units.}$$

break-even quantity $\Rightarrow 24700$.

$$\text{Cost at break-even point} = 50000 + 8(24700) = \$247600$$

b) $20000 < 24700$; better option would be to buy.
lets check.

$$\text{Buy cost} = 600 + 10(20000) = \$200600$$

$$\text{Make cost} = 50000 + 8(20000) = \$210000$$

$$\text{Cost savings for choosing buy} \Rightarrow \$9400$$

Cost Heads	supplier 1	Cost \$	Supplier 2	Cost \$
total engine cost	$120000 \cdot 49$	5,880,000	$120000 \cdot 48.5$	5,820,000
discount				
1%	$5880000 \cdot 10\% \cdot 30/360$	49,000	$5820000 \cdot 10\% \cdot 30/360$	48500
2%	$5880000(10\% \cdot 10/360 + 2\%)$	-133933.3333	$5820000(10\% \cdot 10/360 + 1\%)$	-74366.66667
Tooling Cost	12000	12000	10000	10000
Transportation Cost	$125 \cdot 120000 \cdot 22 \cdot 1.1 / 2000$	181500	$100 \cdot 120000 \cdot 22 \cdot 1.1 / 2000$	145200
Ordering cost	$(120000/1000) \cdot 125$	15000	$(120000/1000) \cdot 125$	15000
Carrying Cost	$(1000/2) \cdot 49 \cdot 20\%$	4900	$(1000/2) \cdot 48.5 \cdot 20\%$	4850
Quality Cost	$5880000 \cdot 2\%$	117600	$5820000 \cdot 2\%$	116400
Delivery Rating				
Back Orders (40%)	$120000 \cdot 1\% \cdot 40\% \cdot 15$	7200	$120000 \cdot 2\% \cdot 40\% \cdot 15$	14400
Lost Sales (60%)	$120000 \cdot 1\% \cdot 60\% \cdot 4500 \cdot 15\%$	486000	$120000 \cdot 2\% \cdot 60\% \cdot 4500 \cdot 15\%$	972000
Total Cost of Ownership	supplier 1	6,619,267	Supplier 2	7,071,983

Cost Heads	supplier 1	Cost \$	Supplier 2	Cost \$	Supplier 3	Cost \$
total engine cost	240000 *195	46,800,000	240000 *190	45,600,000	240000 *192	46,080,000
discount						
	4680000 * 10% * 30/360	390,000	45600000 * 10% * 30/360	380000	46080000 * 10% * 20/360	256000
1%						
2%	46800000(10% * 10/360 + 2%)	-1066000	45600000(10% * 15/360 + 1%)	-646000	46080000(10% * 10/360 + 1%)	-588800
Tooling Cost	12000	12000	10000	10000	15000	15000
Transportation Cost	120 * 240000 * 40 *0.95 / 2000	547200	100 * 240000 * 40 *0.95 / 2000	456000	150 * 240000 * 40 *0.95 / 2000	684000
Ordering cost	(240000/2000) * 200	24000	(240000/2000) * 200	24000	(240000/2000) * 200	24000
Carrying Cost	(2000/2) * 195 * 20%	39000	(2000/2) * 190 * 20%	38000	(2000/2) * 192 * 20%	38400
Quality Cost	46800000 * 2%	936000	45600000 * 1%	456000	46080000* 2%	921600
Delivery Rating						
Back Orders (30%)	240000 * 1% * 30% * 120	86400	240000 * 1% * 30% * 120	86400	240000 * 2% * 30% * 120	172800
Lost Sales (70%)	240000 * 1%* 70%* 10500 * 15%	2646000	240000 * 1%* 70%* 10500 * 15%	2646000	240000 * 2%* 70%* 10500 * 15%	5292000
Total Cost of Ownership	supplier 1	50,414,600	Supplier 2	49,050,400	Supplier 3	52,895,000