Problem 14-44

Given the following information:

- Current inventory: 110 units
- current capacity 820 units/month
- Average salary of production workers: \$1,600 per month
- Material cost: \$180/unit
- Production worker producing 20 units per month.
- Overtime: time and a half
- Rate change: \$45/unit
- Inventory-holding costs: \$39 per unit per month.
- Lost sales valued at \$60 per unit.

We need to do some additional work to find the production cost and overtime cost to fill in our excel sheet. To find the production cost, we need to find the cost for the worker and add that to our material cost of \$180/unit. Thus, we have,

$$Worker\ cost = \frac{average\ salary}{units\ per\ month} = \frac{\$1600}{20\ units} = \$80$$

$$Production\ cost = \$180 + \$80 = \$260.$$

For the overtime cost, we have:

$$Overtime\ cost = Worker\ cost \cdot overtime\ rate = \$80 \cdot 1.5 = \$120$$

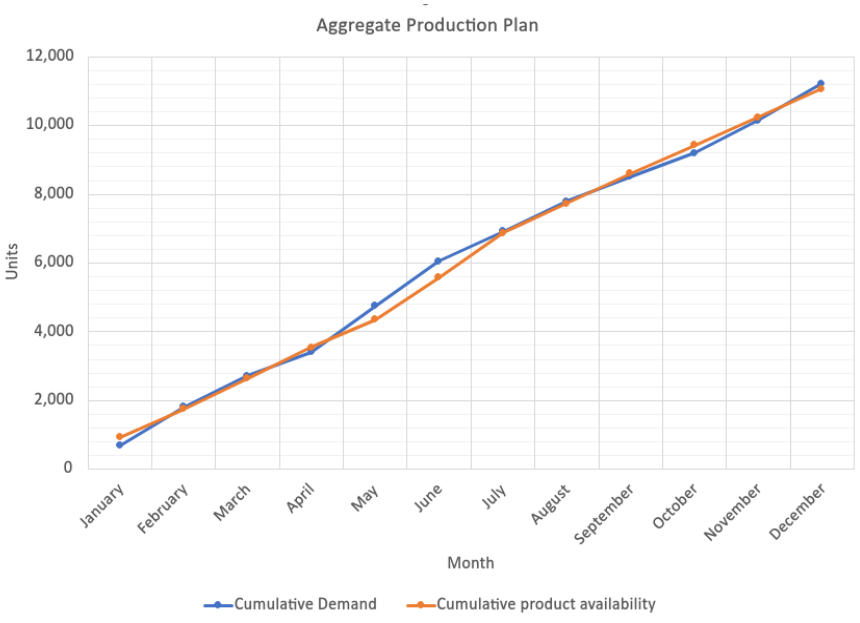
At this point, we have all the neccessary information to fill in our excel sheet, giving us:

Production cost ($/unit)	$260.00
Inventory holding cost ($/unit/month)	$39.00
Lost sales cost ($/unit)	$60.00
Overtime cost ($/unit)	$120.00
Undertime cost ($/unit)	$0.00
Rate change cost ($/unit)	$45.00
Normal production rate (units)	820
Ending inventory (previous Dec.)	110
Level Production Rate	820

Month	Demand	Cumulative Demand	Production	Cumulative Product Availability	Ending Inventory	Lost Sales
January	680	680	820	930	250	0
February	1140	1,820	820	1,750	0	70
March	900	2,720	820	2,640	0	80
April	690	3,410	820	3,540	130	0
May	1350	4,760	820	4,360	0	400
June	1300	6,060	820	5,580	0	480
July	860	6,920	820	6,880	0	40
August	870	7,790	820	7,740	0	50
September	720	8,510	820	8,610	100	0
October	700	9,210	820	9,430	220	0
November	940	10,150	820	10,250	100	0
December	1070	11,220	820	11,070	0	150
Average	935.00			Maximum	250	

Month	Production Cost	Inventory Cost	Lost Sales Cost	Overtime Cost	Undertime Cost	Rate Change Cost
January	$213,200.00	$9,750.00	$0.00	$0.00	$0.00	$0.00
February	$213,200.00	$0.00	$4,200.00	$0.00	$0.00	$0.00
March	$213,200.00	$0.00	$4,800.00	$0.00	$0.00	$0.00
April	$213,200.00	$5,070.00	$0.00	$0.00	$0.00	$0.00
May	$213,200.00	$0.00	$24,000.00	$0.00	$0.00	$0.00
June	$213,200.00	$0.00	$28,800.00	$0.00	$0.00	$0.00
July	$213,200.00	$0.00	$2,400.00	$0.00	$0.00	$0.00
August	$213,200.00	$0.00	$3,000.00	$0.00	$0.00	$0.00
September	$213,200.00	$3,900.00	$0.00	$0.00	$0.00	$0.00
October	$213,200.00	$8,580.00	$0.00	$0.00	$0.00	$0.00
November	$213,200.00	$3,900.00	$0.00	$0.00	$0.00	$0.00
December	$213,200.00	$0.00	$9,000.00	$0.00	$0.00	$0.00
Totals	$2,558,400.00	$31,200.00	$76,200.00	$0.00	$0.00	$0.00

Total cost	$2,665,800.00

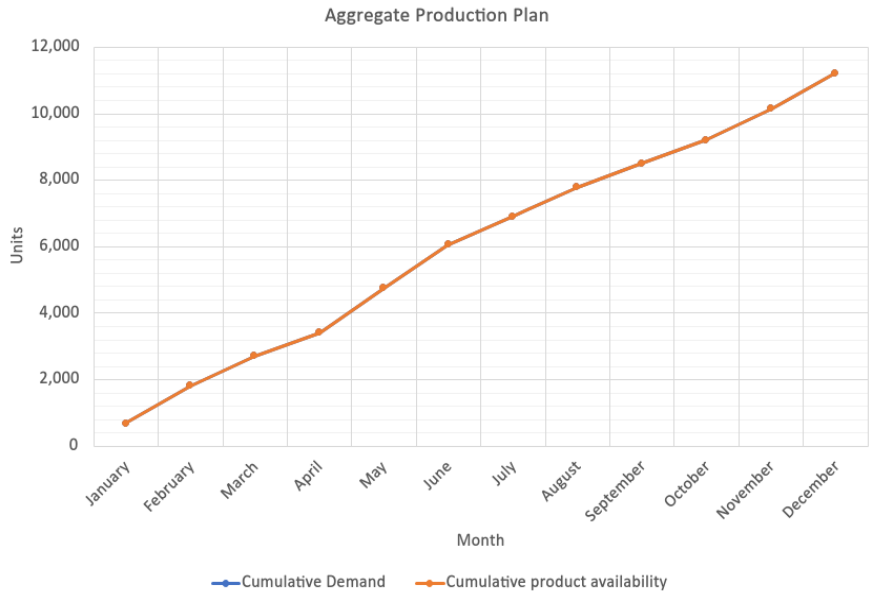


For chase demand:

Month	Demand	Cumulative Demand	Production	Cumulative Product Availability	Ending Inventory	Lost Sales
January	680	680	570	680	0	0
February	1140	1,820	1,140	1,820	0	0
March	900	2,720	900	2,720	0	0
April	690	3,410	690	3,410	0	0
May	1350	4,760	1,350	4,760	0	0
June	1300	6,060	1,300	6,060	0	0
July	860	6,920	860	6,920	0	0
August	870	7,790	870	7,790	0	0
September	720	8,510	720	8,510	0	0
October	700	9,210	700	9,210	0	0
November	940	10,150	940	10,150	0	0
December	1070	11,220	1,070	11,220	0	0
Average	935.00			Maximum	0	

Month	Production Cost	Inventory Cost	Lost Sales Cost	Overtime Cost	Undertime Cost	Rate Change Cost
January	$148,200.00	$0.00	$0.00	$0.00	$0.00	$11,250.00
February	$296,400.00	$0.00	$0.00	$38,400.00	$0.00	$25,650.00
March	$234,000.00	$0.00	$0.00	$9,600.00	$0.00	$10,800.00
April	$179,400.00	$0.00	$0.00	$0.00	$0.00	$9,450.00
May	$351,000.00	$0.00	$0.00	$63,600.00	$0.00	$29,700.00
June	$338,000.00	$0.00	$0.00	$57,600.00	$0.00	$2,250.00
July	$223,600.00	$0.00	$0.00	$4,800.00	$0.00	$19,800.00
August	$226,200.00	$0.00	$0.00	$6,000.00	$0.00	$450.00
September	$187,200.00	$0.00	$0.00	$0.00	$0.00	$6,750.00
October	$182,000.00	$0.00	$0.00	$0.00	$0.00	$900.00
November	$244,400.00	$0.00	$0.00	$14,400.00	$0.00	$10,800.00
December	$278,200.00	$0.00	$0.00	$30,000.00	$0.00	$5,850.00
Totals	$2,888,600.00	$0.00	$0.00	$224,400.00	$0.00	$133,650.00

Total cost	$3,246,650.00



We can see that the cost for level strategy is ***lower*** than the total cost for chase strategy.

To compare the normal production rate of 820 units per month with the average demand, we need to compute the average demand by summing all the demands for each month and dividing by the number of months:

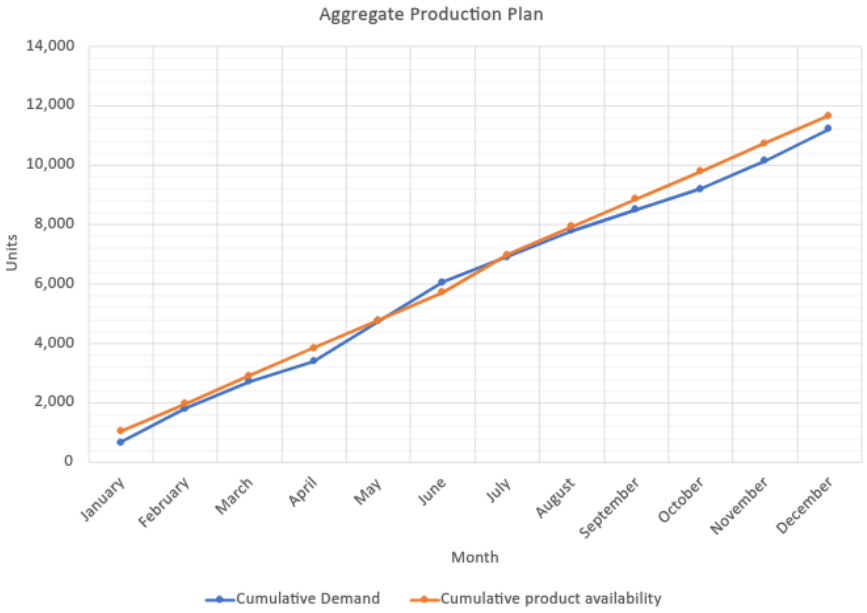
$$\frac{680 + 1140 + 900 + 690 + 1350 + 1300 + 860 + 870 + 720 + 700 + 940 + 1070}{12} = 935$$

This gives us:

Month	Demand	Cumulative Demand	Production	Cumulative Product Availability	Ending Inventory	Lost Sales
January	680	680	935	1,045	365	0
February	1140	1,820	935	1,980	160	0
March	900	2,720	935	2,915	195	0
April	690	3,410	935	3,850	440	0
May	1350	4,760	935	4,785	25	0
June	1300	6,060	935	5,720	0	340
July	860	6,920	935	6,995	75	0
August	870	7,790	935	7,930	140	0
September	720	8,510	935	8,865	355	0
October	700	9,210	935	9,800	590	0
November	940	10,150	935	10,735	585	0
December	1070	11,220	935	11,670	450	0
Average	935.00			Maximum	590	

Month	Production Cost	Inventory Cost	Lost Sales Cost	Overtime Cost	Undertime Cost	Rate Change Cost
January	$243,100.00	$14,235.00	$0.00	$0.00	$0.00	$5,175.00
February	$243,100.00	$6,240.00	$0.00	$0.00	$0.00	$0.00
March	$243,100.00	$7,605.00	$0.00	$0.00	$0.00	$0.00
April	$243,100.00	$17,160.00	$0.00	$0.00	$0.00	$0.00
May	$243,100.00	$975.00	$0.00	$0.00	$0.00	$0.00
June	$243,100.00	$0.00	$20,400.00	$0.00	$0.00	$0.00
July	$243,100.00	$2,925.00	$0.00	$0.00	$0.00	$0.00
August	$243,100.00	$5,460.00	$0.00	$0.00	$0.00	$0.00
September	$243,100.00	$13,845.00	$0.00	$0.00	$0.00	$0.00
October	$243,100.00	$23,010.00	$0.00	$0.00	$0.00	$0.00
November	$243,100.00	$22,815.00	$0.00	$0.00	$0.00	$0.00
December	$243,100.00	$17,550.00	$0.00	$0.00	$0.00	$0.00
Totals	$2,917,200.00	$131,820.00	$20,400.00	$0.00	$0.00	$5,175.00

Total cost	$3,074,595.00



We can see that the total cost for level strategy with the average demand is ***more*** than the one using the normal production capacity.