Assignment 1 4. June 2009

Demand $p = -\frac{1}{1000}Q + 320$

$px = -\frac{1}{1000}Q^2 + 320Q$

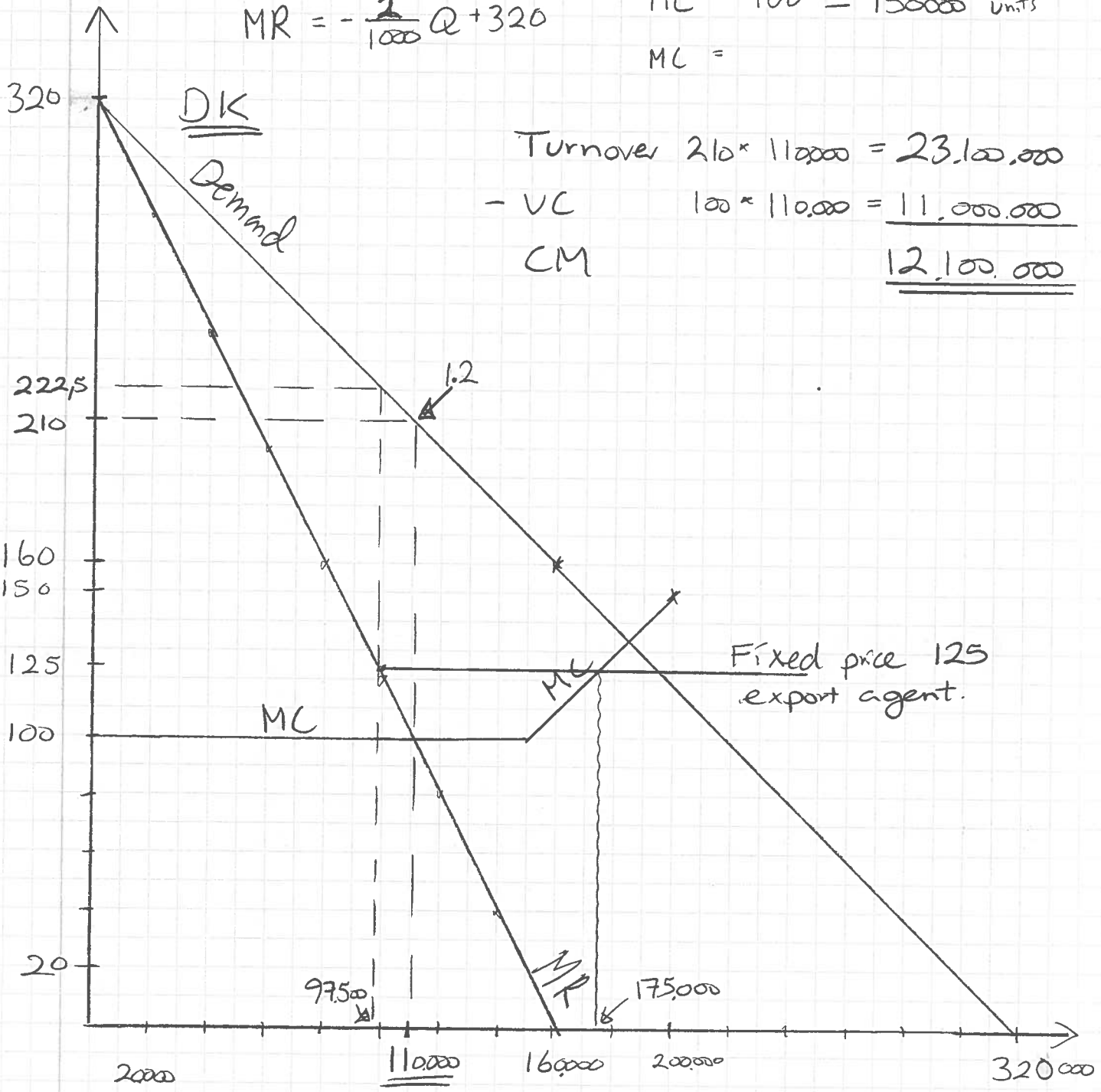
$MR = -\frac{2}{1000}Q + 320$

FC = 0

VC = 100 x ≤ 150.000 units

MC = 100 ≤ 150000 units

MC =



Turnover 210 × 110.000 = 23.100.000

− VC 100 × 110.000 = 11.000.000

CM 12.100.000

$MR = MC$

$-\frac{2}{1000}Q + 320 = 100$

$220 = \frac{2}{1000}Q$

$220.000 = 2Q$

$110.000 = Q$

$p = -\frac{1}{1000} \times 110.000 + 320$

$p = 210$

new optimum:

$MR = 125$

$-\frac{2}{1000}Q + 320 = 125$

$195 = \frac{2}{1000}Q$

$\underline{\underline{97500 = Q}}$

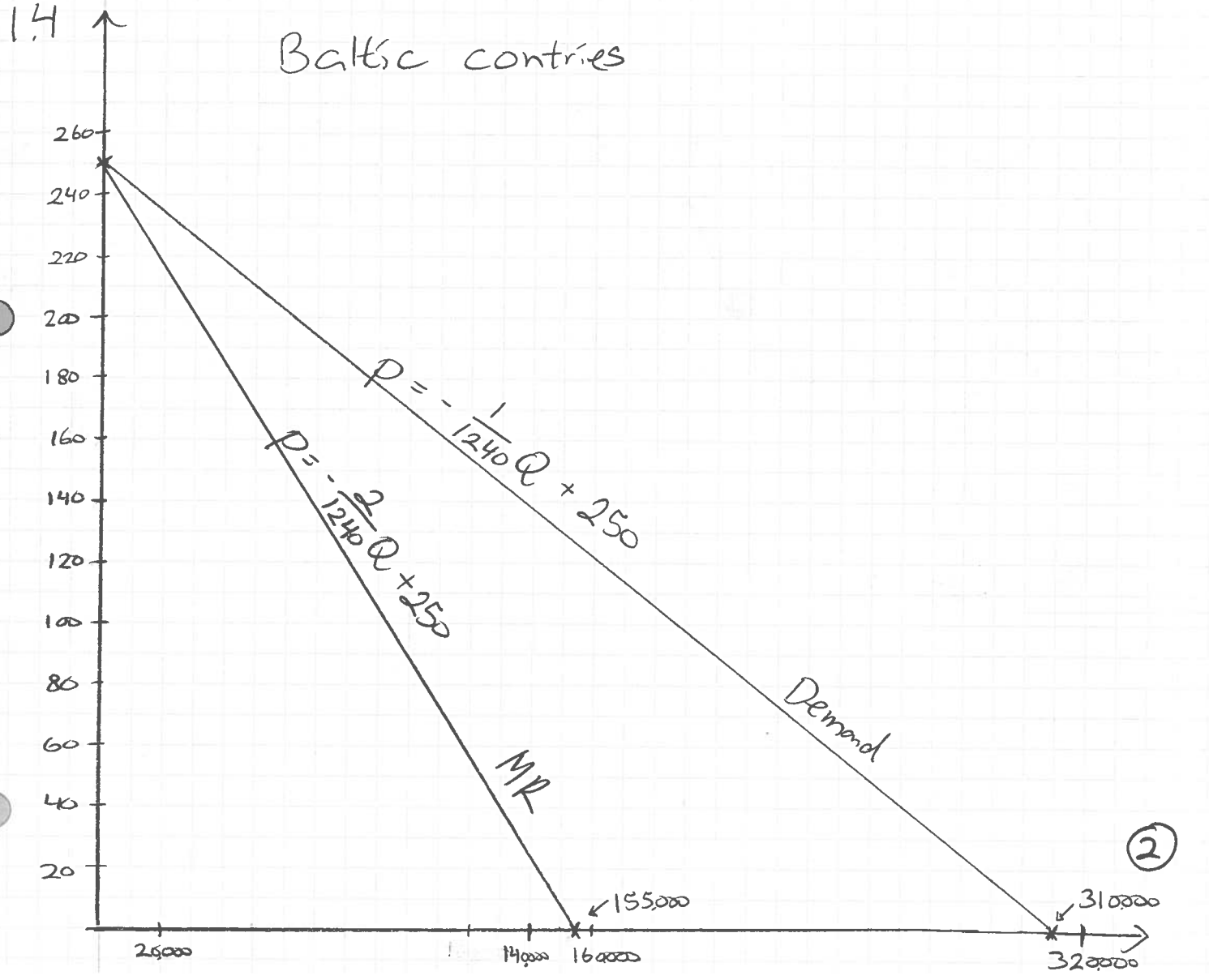
$price = -\frac{1}{1000}Q + 320$

$price = -\frac{1}{1000} \times 97500 + 320$

$price = -97,5 + 320$

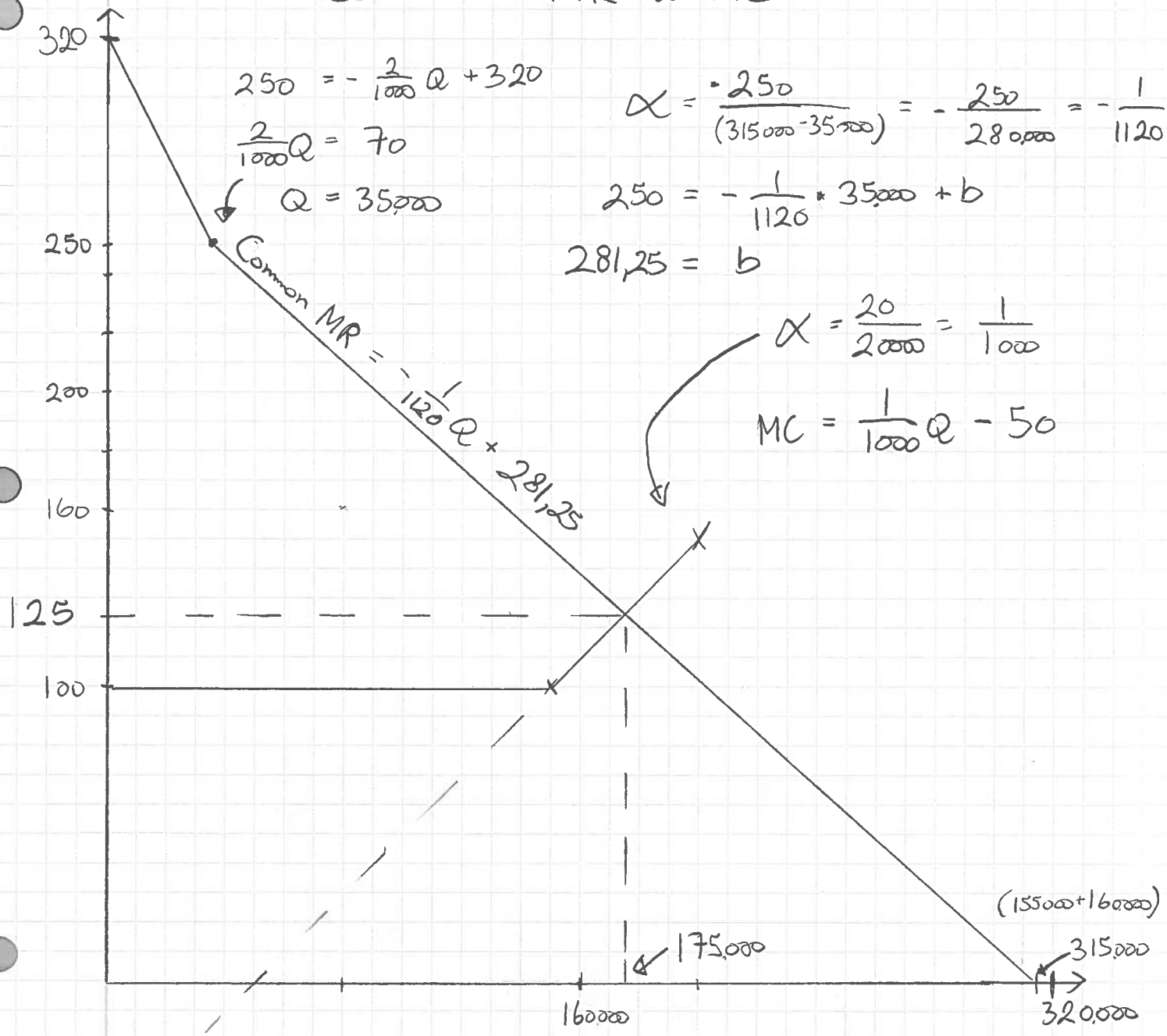
$\underline{\underline{price = 222,5}}$

Turnover	$\underbrace{222,5 \times 97.500}_{21.693.750}$	Turnover	$\underbrace{125 \times 7750}_{9.687.500} = 31.381.250$
- VC			
	$\underbrace{100 \times 150.000}_{15.000.000}$		$\underbrace{112,5 \times 25.000}_{2.812,500}$ 17.812.500
CM			13.568.750



Horisontal addition

Common MR & MC



$250 = -\frac{2}{1000}Q + 320$

$\frac{2}{1000}Q = 70$

$Q = 35{,}000$

$\alpha = \frac{-250}{(315000-35000)} = -\frac{250}{280{,}000} = -\frac{1}{1120}$

$250 = -\frac{1}{1120} * 35{,}000 + b$

$281{,}25 = b$

$\alpha = \frac{20}{2000} = \frac{1}{1000}$

$MC = \frac{1}{1000}Q - 50$

Common MR = Common MC

$-\frac{1}{1120}Q + 281{,}25 = \frac{1}{1000}Q - 50$

$331{,}25 = +\frac{1}{1120}Q + \frac{1}{1000}Q$

$331{,}25 = +\frac{1}{1120}Q + \frac{1{,}12}{1120}Q$

$331{,}25 = \frac{2{,}12}{1120}Q$

$371{,}000 = 2{,}12Q$

$175{,}000 = Q$

$P_{Level} =$

$P_L = \frac{1}{1000} \cdot 175{,}000 - 50$

$P_L = 125$

P_{Level} ⇒ Baltic MR to find Q_{Baltic}

$$125 = -\frac{2}{1240}Q + 250$$

$$\frac{2}{1240}Q = 125$$

$$2Q = 155{,}000$$

$$\underline{\underline{Q = 77{,}500}} \text{ Baltic}$$

$$\text{price} = -\frac{1}{1240} \times 77{,}500 + 250 \Rightarrow \text{price} = \underline{\underline{187{,}50}}$$

P_{Level} ⇒ DK MR to find Q_{DK}

$$125 = -\frac{2}{1000}Q + 320$$

$$\frac{2}{1000}Q = 195$$

$$\underline{\underline{Q = 97{,}500}} \text{ DK}$$

$$\text{price} = -\frac{1}{1000} \times 97500 + 320 \Rightarrow \text{price} = \underline{\underline{222{,}50}}$$

Turnover DK $\underbrace{97500 \times 222{,}5}_{21.693.750}$ Turnover Baltic $\underbrace{77500 \times 187{,}50}_{14.531.250}$

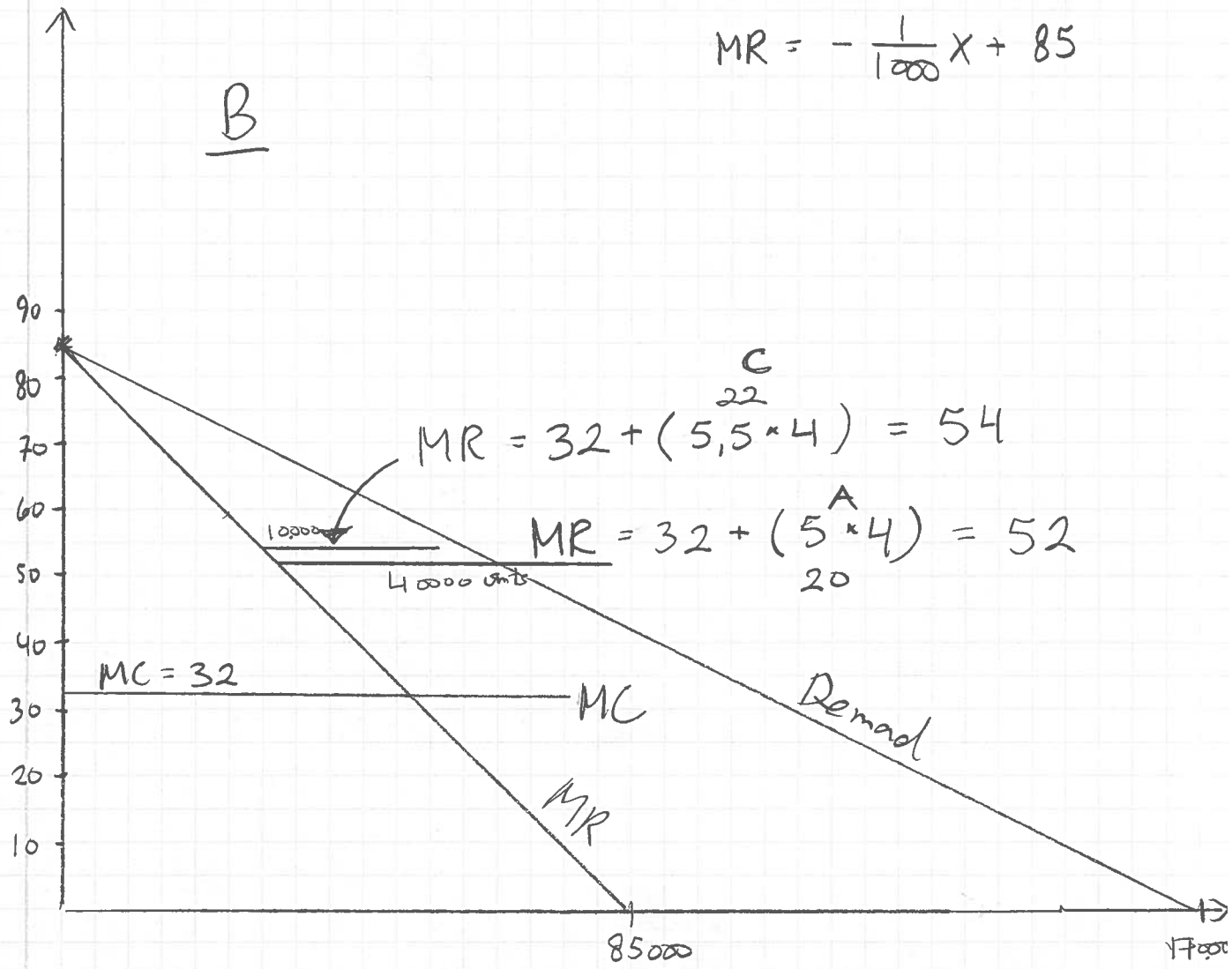
Total Turnover	36.225.000
-VC	17.812.500
CM	18.412.500

	A	B	C	D
Sales price	30	65	84	
-VC	15	32	40	
CM per unit	15	33	44	12
CM per hour	5	8,25	5,5	12
priority	(3)	(1)	(2)	

$$\alpha = -\frac{5}{10{,}000} = -\frac{1}{2000} \qquad p = -\frac{1}{2000}x + 85$$

$$MR = -\frac{1}{1000}x + 85$$

B



$MR = 54$

$$-\frac{1}{1000}x + 85 = 54$$

$$31 = \frac{1}{1000}x$$

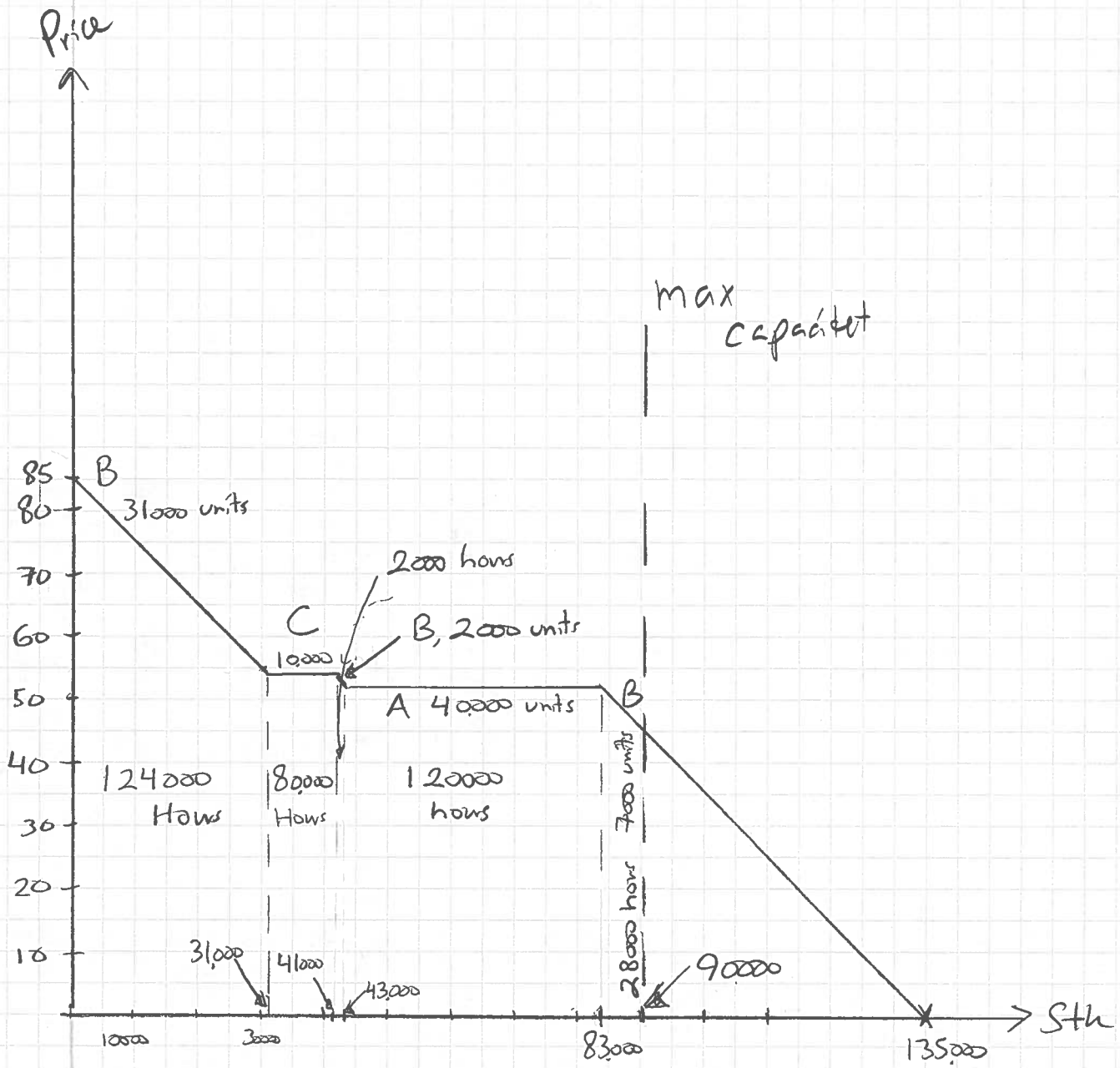
$$31000 = x$$

$MR = 52$

$$-\frac{1}{1000}x + 85 = 52$$

$$33 = \frac{1}{1000}x$$

$$33000 = x$$



The plan:

	units	Hours	CM
A	40,000	120,000	600,000
B	40,000	160,000	1,320,000
C	10,000	80,000	440,000
		360,000	2360,000

2.2

extra capacity

As before	2,360.000
+ D	60.000
- extra capacity	30.000
	2390.000

or:

D		60.000
B	40,000 - (5000/4) ↓ 38750 units ⇒ Price 65,625	1.302.968
A		600.000
C		440.000
Better than Before		2402.968

	X	Y	capacity	max X	max Y	α slope	function
Drilling	2	2	200	100	100	$-\frac{100}{100} = -1$	$Y = -1X + 100$
Hardening	4	6	480	120	80	$-\frac{80}{120} = -\frac{2}{3}$	$Y = -\frac{2}{3}X + 80$

price	600	1000
-VC	200	200
CM	400	800
Random CM = 40000	100 units	50 units

$$\alpha = \frac{50}{100} = \frac{1}{2} = \frac{CM \times 400}{CM\ 4\ 800}$$

Intersection:

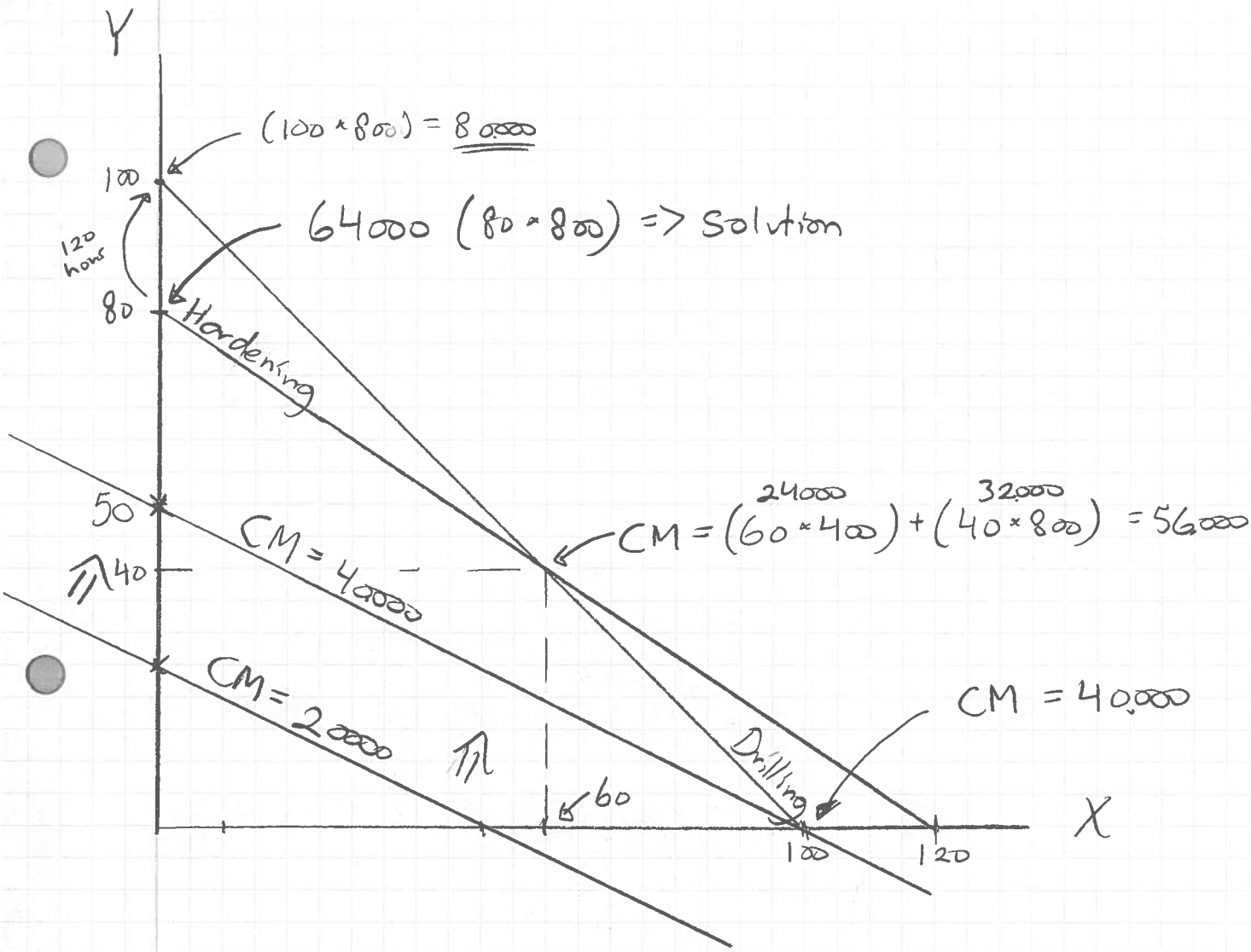
$$-1x + 100 = -\frac{2}{3}x + 80$$

$$20 = \frac{1}{3}x$$

$$60 = x$$

$$Y = 40$$

(9)



3.1 The optimal production programme is

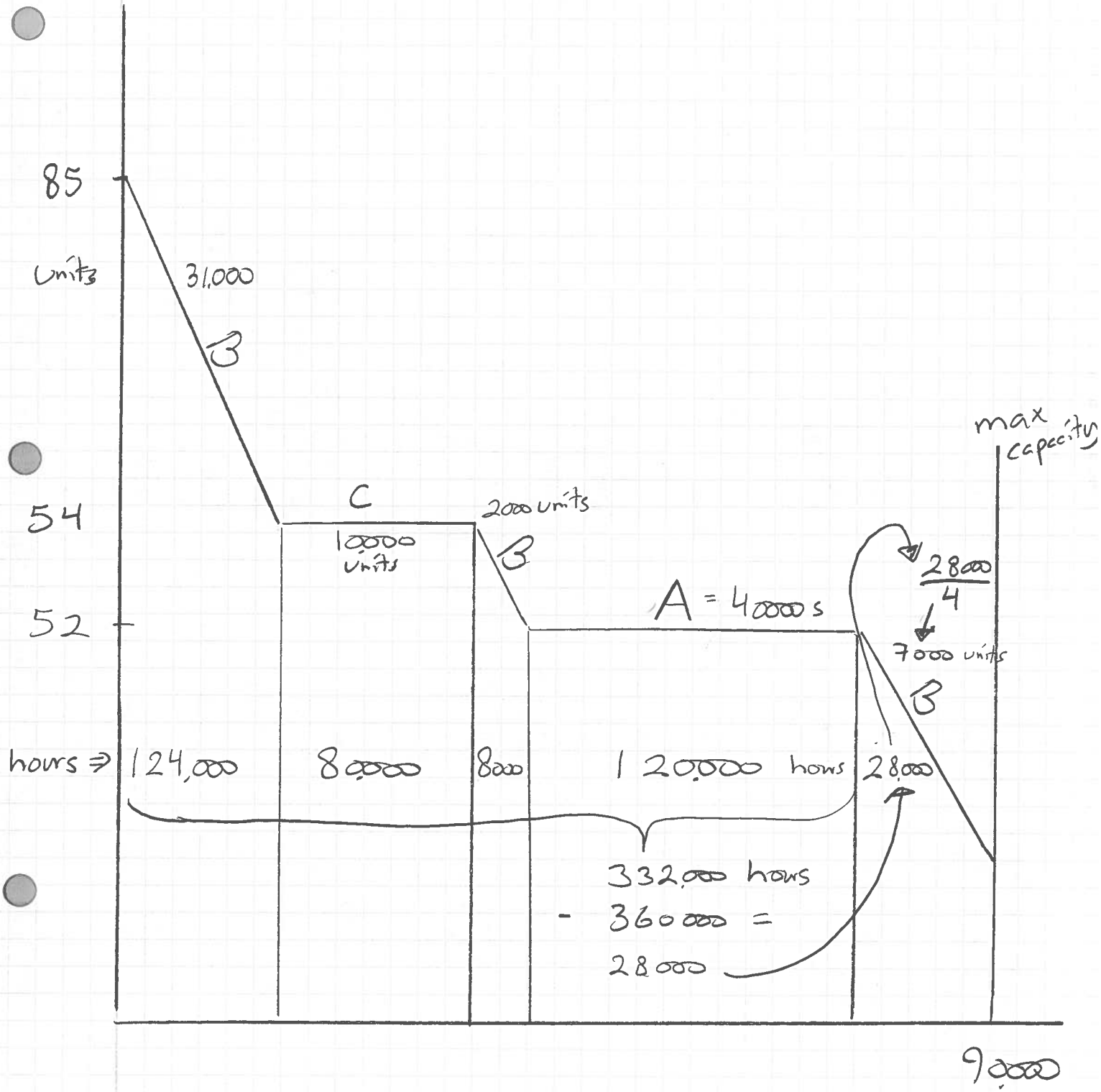
80 Y and 0 X => CM = 64.000

3,2

20 × 6 hours = 120 hours

If we can get 120 hours capacity of hardening CM will change from 64,000 to 80.000 = 16000 "extra earnings". Earnings per hour

$\frac{16.000}{120} = 133,\overline{3}$ maximum price per 1 hour extra capacity


85
units
31,000
B
54
C
10,000
units
2000 units
B
52
A = 40000 s
28000
4
7000 units
B
max
capacity
hours ⇒
124,000
80,000
8000
120,000 hours
28,000
332,000 hours
- 360 000 =
28 000
90,000