COST CURVE FUNDAMENTALS

(Given TFC, w and columns of L and Q. Use $TVC = w \times L$.)

Basic definitions

$$AVC = \left(\frac{TVC}{Q}\right) \qquad AFC = \left(\frac{TFC}{Q}\right) \qquad ATC = \left(\frac{TC}{Q}\right) \qquad MC = \left(\frac{\Delta TC}{\Delta Q}\right)$$

Plot MC mid-way between outputs used.

Useful alternative calculating methods	The logic for each:
An alternative for ATC: $ATC = AFC + AVC$	$\rightarrow$ recall that: $TC = TFC + TVC$ divide both sides by Q: $\left(\frac{TC}{Q}\right) = \left(\frac{TFC}{Q}\right) + \left(\frac{TVC}{Q}\right)$
Two alternatives for MC: $MC = \left(\frac{\Delta TVC}{\Delta Q}\right)$	$\rightarrow$ all changes to TC must be through TVC because TFC cannot change in the short run–so $\Delta TC = \Delta TVC$
$MC = \left(\frac{w}{MP}\right)$	$\rightarrow MC = \left(\frac{\Delta TVC}{\Delta Q}\right) = \left(\frac{w\Delta L}{\Delta Q}\right) = \left(\frac{w}{(\Delta Q/\Delta L)}\right) = \left(\frac{w}{MP}\right)$

SHAPES OF SHORT RUN COST CURVES

1. AFC always falls as output rises, steeply at low output, very gently at high output.
2. AVC must eventually rise (due to diminishing returns). It usually falls at low output, but not always.
3. Since $ATC = AFC + AVC$, ATC is determined by the combined shapes of AFC and AVC.
   (a) ATC must fall at low output because: AFC is high and falls rapidly at low output; AVC is falling or level at low output
   (b) ATC must rise at high output because: AFC is small and falls gently at high output; AVC is rising at high output
4. ATC must be U-shaped (due to (a) and (b) above)
5. MC must fall and then rise because MP rises and then falls. (Recall that MC is inversely related to MP.)

The relationships between MC, AVC and ATC (short run):

6. Marginal cost is what is added to total cost (and total variable cost) when one more unit of output is produced (because fixed costs don't influence the changes in TC or TVC). Therefore, there must be an exact relationship between MC and ATC (as well as between MC and AVC).
7. MC crosses AVC at the low point on the AVC curve
   (a) When MC is below AVC, AVC must be falling
   (b) When MC is above AVC, AVC must be rising
   (c) When MC equals AVC, AVC is horizontal
8. Everything in (7) is true for ATC (just substitute "ATC" for "AVC" above)

L	Q	MP	TVC	AVC	AFC	ATC	MC
0	0		0.00	–	–	–	
		0.80					25.00
2.5	2		50.00	25.00	30.00	55.00	
		1.41					14.20
3.92	4		78.40	19.60	15.00	34.60	
		2.86					7.00
4.62	6		92.40	15.40	10.00	25.40	
		5.88					3.40
4.96	8		99.20	12.40	7.50	19.90	
		5.88					3.40
5.3	10		106.00	10.60	6.00	16.60	
		2.86					7.00
6	12		120.00	10.00	5.00	15.00	
		1.41					14.20
7.42	14		148.40	10.60	4.29	14.89	
		0.80					25.00
9.92	16		198.40	12.40	3.75	16.15	
		0.51					39.40
13.9	18		277.20	15.40	3.33	18.73	

TFC=\$60
w=\$20