ECONOMICS

MICROECONOMICS

- Basic Economic concepts
- Supply, Demand and Market
- Elasticity
- Supply, Demand & Government Policies
- **Production and Cost**
- Market structures

MACROECONOMICS

- National Income accounting
- ASAD
- Inflation and Unemployment
- Financial, Monetary and Banking system
- Macroeconomics Policies

Learning outcomes

Identify and analyze production behavior and cost structure of producers

L.O.4.1 Differentiate between fixed costs and variable costs. Describe, draw, and work with Marginal, Average, and Total Costs curves for a firm.

L.O.4.2 Differentiate between Accounting cost, economic cost, Accounting profit, economic profit.

L.O.4.3 Distinguish the long run from the short run.

L.O.4.4 Use these cost curves to graphically conduct short and long-run analyses. Be able to distinguish significant differences between long and short-run analyses.

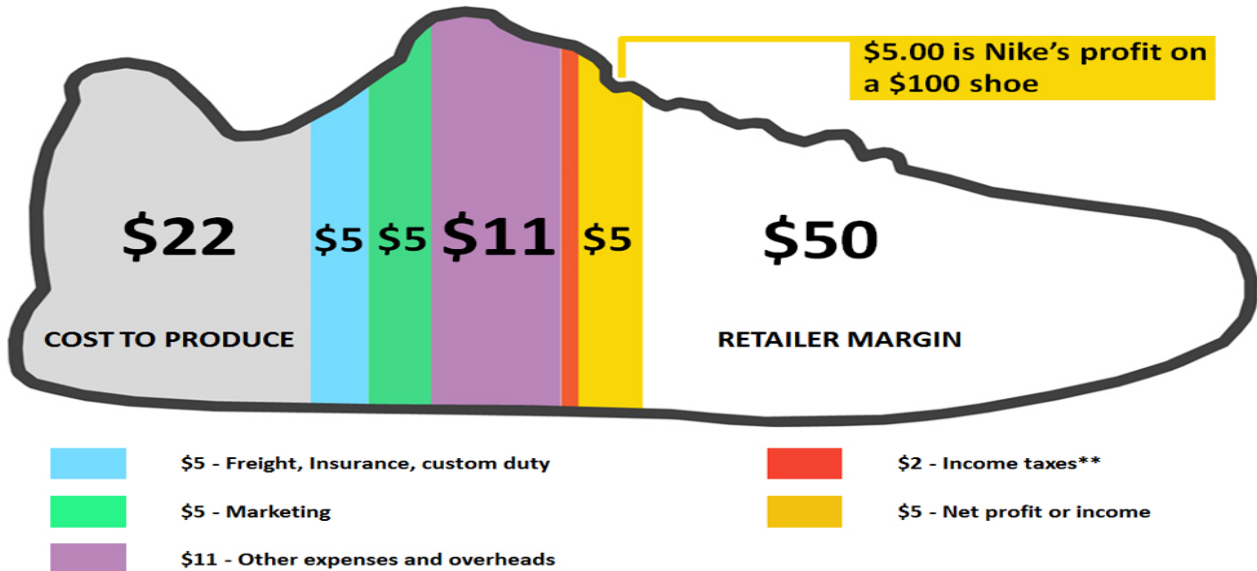L.O.4.5 Write down and explain the equation used to compute profit.

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Production and Costs

- Production function and Diminishing return
- Explicit and Implicit costs
- Accounting cost, economic cost
- Accounting profit and economic profit
- Sunk costs
- Fixed, Variable costs, Marginal cost
- Different kind of Cost curves
- Economy of scale, economy of scope

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The financial anatomy of a $ 100 Nike shoe*

$5.00 is Nike's profit on a $100 shoe

$22

COST TO PRODUCE

$5 **$5** **$11** **$5**

$50

RETAILER MARGIN

- ▇ $5 - Freight, Insurance, custom duty
- ▇ $5 - Marketing
- ▇ $11 - Other expenses and overheads
- ▇ $2 - Income taxes**
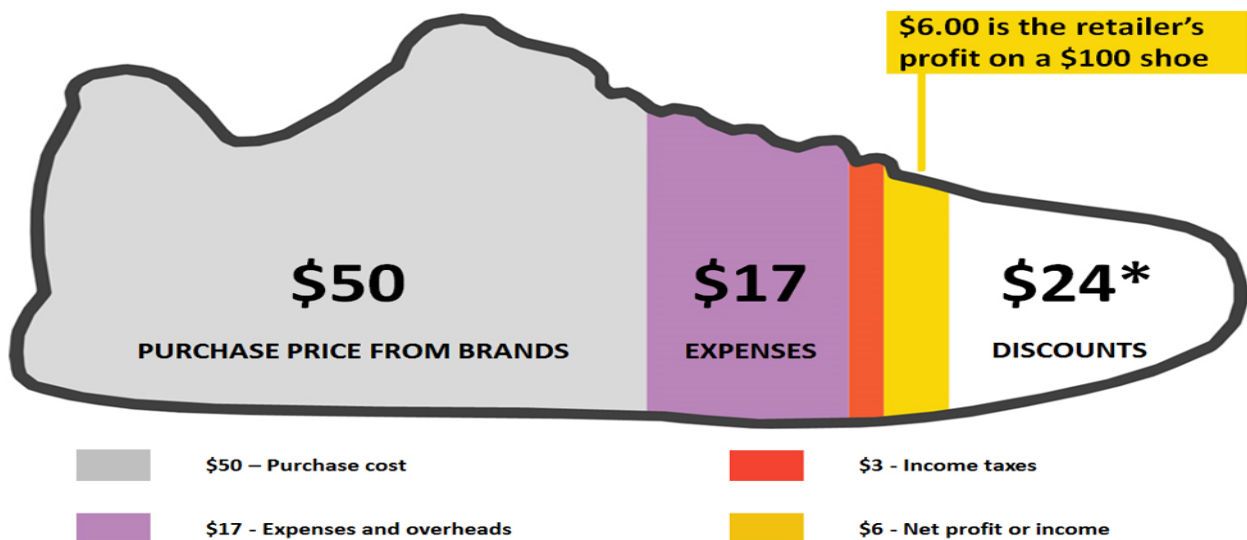- ▇ $5 - Net profit or income

* Based on overall cost of sales as per 2015 Nike income statement. Freight+insurance+duties are assumptions.
** Taxes are calculated on the gross income, which is 7% of the retail price.

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Retailer profit on a pair of $100 shoes?

$6.00 is the retailer's profit on a $100 shoe

$50

PURCHASE PRICE FROM BRANDS

$17

EXPENSES

$24*

DISCOUNTS

- ▇ $50 – Purchase cost
- ▇ $17 - Expenses and overheads
- ▇ $3 - Income taxes
- ▇ $6 - Net profit or income

Based on Footlocker's (FTL) 2015 income statement/10K filing. Assumption: Cost of sales = Full retail /2, and hence grossed up.
*Based on the assumption that the difference between the full retail price and reported net sales is discount.

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What are Costs?

- Total revenue
  - Amount a firm receives for the sale of its output
- Total cost
  - Market value of the inputs a firm uses in production
- Profit
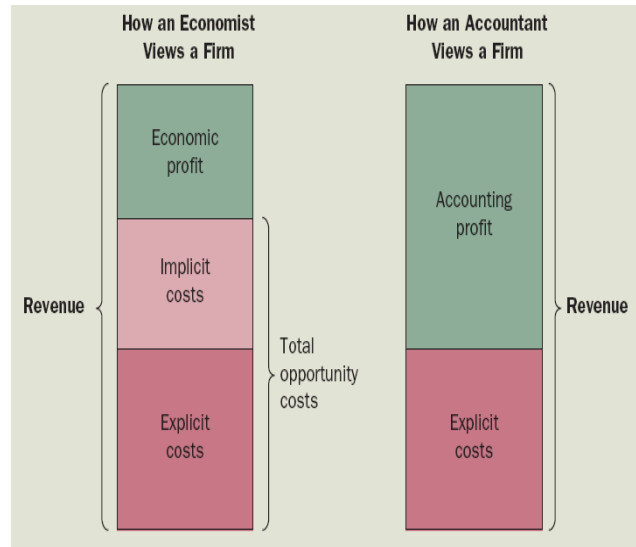 - Total revenue minus total cost

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What are Costs?

- Costs as Economic costs
- Explicit costs
  - Input costs that require an outlay of money by the firm
- Implicit costs
  - Input costs that do not require an outlay of money by the firm
  - Interest income not earned
    - On financial capital
      - Owned as saving
      - Invested in business
    - Not shown as cost by an accountant
- Sunk cost: (*retrospective* cost) a cost that has already been incurred and cannot be recovered

What are Costs?

Economists versus accountants

- Accounting profit:
  - Total revenue - total explicit cost

- Economic profit:
  - Total revenue - total cost
    - Including both explicit and implicit costs

How an Economist Views a Firm — Revenue: Economic profit, Implicit costs, Explicit costs (Total opportunity costs)

How an Accountant Views a Firm — Revenue: Accounting profit, Explicit costs

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1. **The difference between economic profit and accounting profit is that economic profit is calculated based on both implicit and explicit costs whereas accounting profit is calculated based on explicit costs only.**
   a. True
   b. False

2. **Anna borrows $5,000 from a bank and withdraws $1,000 from her personal savings to start a coffee shop. The interest rate is 5 percent for both the bank loan and her personal savings. Her Economic cost of capital is $300.**
   a. True
   b. False

3. **A firm's economic costs of production are equal to its**
   a. explicit costs only.
   b. implicit costs only.
   c. explicit costs + implicit costs.
   d. explicit costs + implicit costs + profit.

4. **Kelly has decided to start his own business giving sailing lessons. To purchase equipment for the business, Kelly withdrew $1,000 from his savings account, which was earning 3% interest, and borrowed an additional $2,000 from the bank at an interest rate of 7%. What is Kelly's annual opportunity cost of the financial capital that has been invested in the business?**
   a. $30
   b. $140   Explicit cost = 2000*7%=140
   c. $170   Implicit cost= 1000*3%= 30
   d. $300

5. **Which of the following is an example of an implicit cost?**
   (i) the owner of a firm forgoing an opportunity to earn a large salary working for a Wall Street brokerage firm
   (ii) interest paid on the firm's debt
   (iii) rent paid by the firm to lease office space
   a. (i) only
   b. (ii) only
   c. (ii) and (iii) only
   d. (i) and (iii) only

6. **Jacqui decides to open her own business and earns $50,000 in accounting profit the first year. When deciding to open her own business, she withdrew $20,000 from her savings, which earned 5 percent interest. She also turned down three separate job offers with annual salaries of $30,000, $40,000, and $45,000. What is Jacqui's economic profit from running her own business?**
   a. $-56,000
   b. $-6,000
   c. $19,000
   d. $4,000

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Production and Costs

- **Production function:** Relationship between
  - Quantity of inputs used to make a good (Q)
  - And the quantity of output of that good (K, L)

$$Q = K^{\alpha}L^{\beta}$$
1. $Q = KL$
2. $Q = \sqrt{KL}$
3. $Q = \sqrt[3]{KL}$

- **Marginal product**
  - Increase in output: Arising from an additional unit of input
  - Marginal Product of Labor: $MP_L = \Delta Q/\Delta L$

- **Diminishing marginal product**
  - Marginal product of an input declines as the quantity of the input increases

- **Total-cost curve**
  - Relationship between quantity produced and total costs
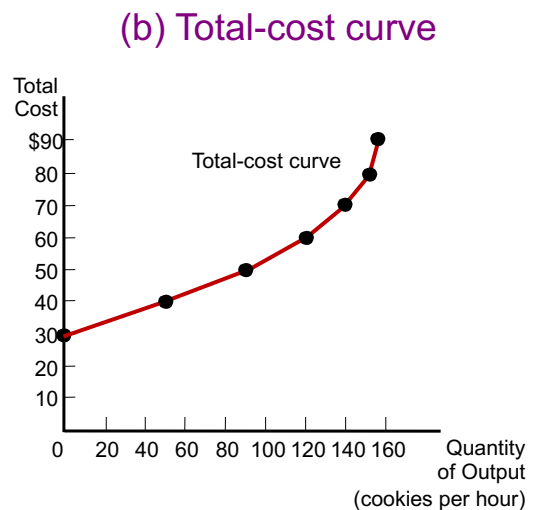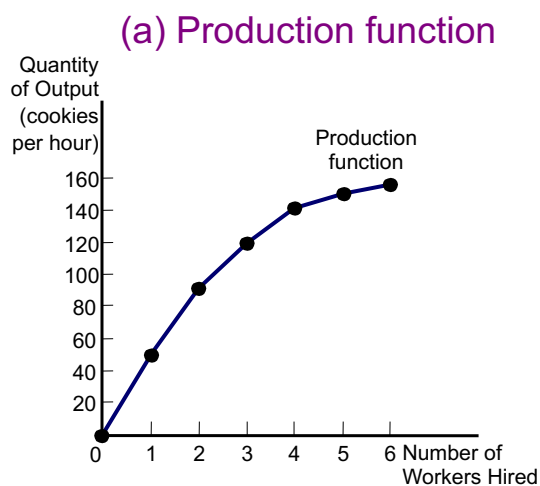 - Gets steeper as the amount produced rises

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A production function and total cost: cookie factory

Number of workers (L)	Output (Q)	Marginal product of labor (MPL)	Cost of factory	Cost of workers	Total cost of inputs (cost of factory + cost of workers)
0	0		$30	$0	$30
		50			
1	50		30	10	40
		40			
2	90		30	20	50
		30			
3	120		30	30	60
		20			
4	140		30	40	70
		10			
5	150		30	50	80
		5			
6	155		30	60	90

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Caroline's production function and total-cost curve

(a) Production function

Quantity of Output (cookies per hour)

Production function

(b) Total-cost curve

Total Cost

Total-cost curve

Number of Workers Hired

Quantity of Output (cookies per hour)

MPL = Slope of Prod Function

L (no. of workers)	Q (bushels of wheat)	MPL
0	0	
		1000
1	1000	
		800
2	1800	
		600
3	2400	
		400
4	2800	
		200
5	3000	

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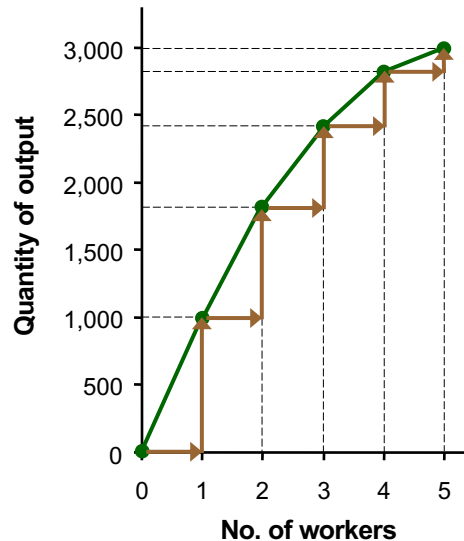
7. The marginal product of an input in the production process is the increase in
a. total revenue obtained from an additional unit of that input.
b. profit obtained from an additional unit of that input.
c. total revenue obtained from an additional unit of that input.
d. quantity of output obtained from an additional unit of that input.

8. When a factory is operating in the short run,
a. it cannot alter variable costs.
b. total cost and variable cost are usually the same.
c. average fixed cost rises as output increases.
d. it cannot adjust the quantity of fixed inputs.

9. Diminishing marginal product exists when the production function becomes flatter as inputs increase.
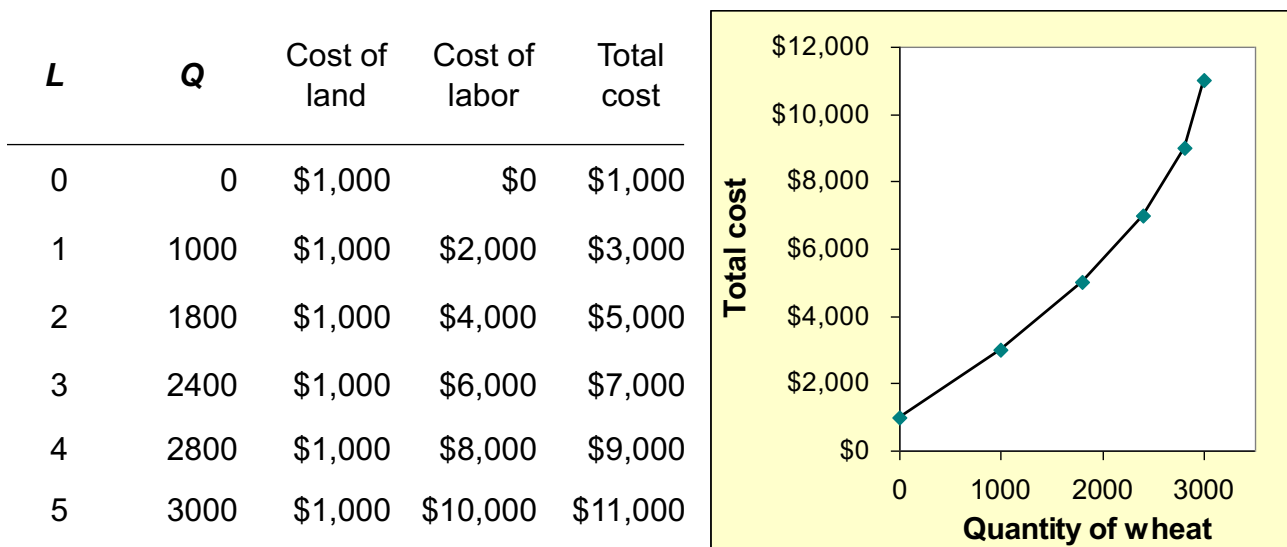a. True
b. False

10. Let L represent the number of workers hired by a firm, and let Q represent that firm's quantity of output. Assume two points on the firm's production function are (L = 5, Q = 125) and (L = 6, Q = 152). Then the marginal product of the 6th worker is
a. 25 units of output.
b. 27 units of output.
c. 37 units of output.
d. 162 units of output.

11. When adding another unit of labor leads to an increase in output that is smaller than the increases in output that resulted from adding previous units of labor, the firm is experiencing
a. diminishing labor.
b. diminishing output.
c. diminishing marginal product.
d. negative marginal product.

The Various Measures of Cost

- Total cost (TC) = Total Fixed costs + Total Variable costs
- Fixed costs (TFC)
  - Do not vary with the quantity of output produced
- Variable costs (TVC)
  - Vary with the quantity of output produced
- Average fixed cost (AFC) = TFC/Q
  - Fixed cost divided by the quantity of output
- Average variable cost (AVC) = TVC/Q
  - Variable cost divided by the quantity of output
- Marginal cost (MC) MC = ΔTC / ΔQ
  - Increase in total cost arising from an extra unit of production
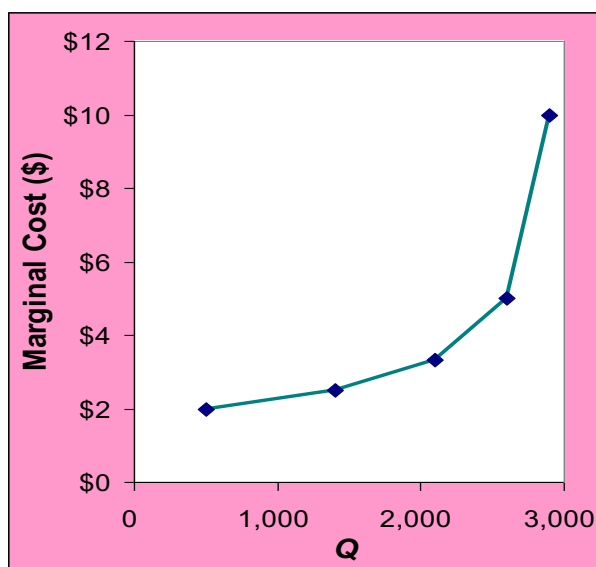 - Marginal cost = Change in total cost / Change in quantity

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L	Q	Cost of land	Cost of labor	Total cost
0	0	$1,000	$0	$1,000
1	1000	$1,000	$2,000	$3,000
2	1800	$1,000	$4,000	$5,000
3	2400	$1,000	$6,000	$7,000
4	2800	$1,000	$8,000	$9,000
5	3000	$1,000	$10,000	$11,000

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The Marginal Cost Curve

Q (bushels of wheat)	TC	MC
0	$1,000	
		$2.00
1000	$3,000	
		$2.50
1800	$5,000	
		$3.33
2400	$7,000	
		$5.00
2800	$9,000	
		$10.00
3000	$11,000	

Total Costs: TC = FC + VC

Q	FC	VC	TC
0	$100	$0	$100
1	100	70	170
2	100	120	220
3	100	160	260
4	100	210	310
5	100	280	380
6	100	380	480
7	100	520	620
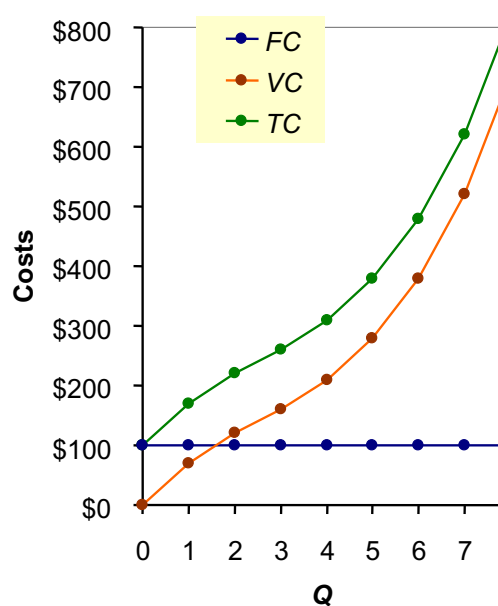
Marginal Cost

Q	TC	MC
0	$100	
		$70
1	170	
		50
2	220	
		40
3	260	
		50
4	310	
		70
5	380	
		100
6	480	
		140
7	620	

$$MC = \frac{\Delta TC}{\Delta Q}$$
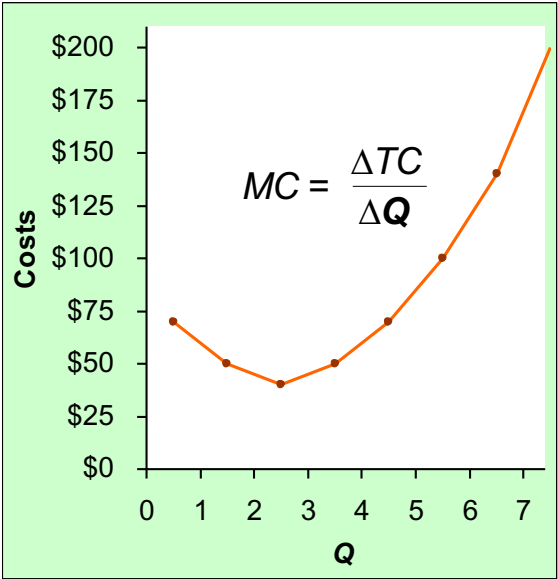
Average Fixed Cost, AFC

Q	FC	AFC
0	$100	n/a
1	100	$100
2	100	50
3	100	33.33
4	100	25
5	100	20
6	100	16.67
7	100	14.29
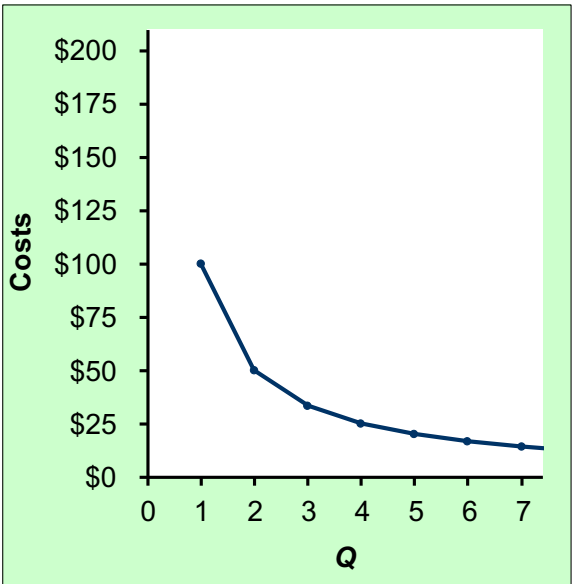
EXAMPLE 2: Average Variable Cost, AVC

Q	VC	AVC
0	$0	n/a
1	70	$70
2	120	60
3	160	53.33
4	210	52.50
5	280	56.00
6	380	63.33
7	520	74.29
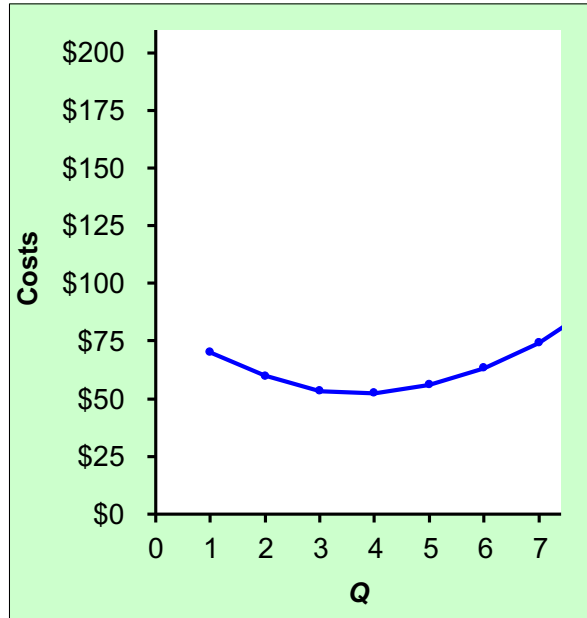
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Average Total Cost, usually U-shaped

Q	TC	ATC
0	$100	n/a
1	170	$170
2	220	110
3	260	86.67
4	310	77.50
5	380	76
6	480	80
7	620	88.57

As Q rises: initially, falling AFC pulls ATC down.

Eventually, rising AVC pulls ATC up.

Efficient scale
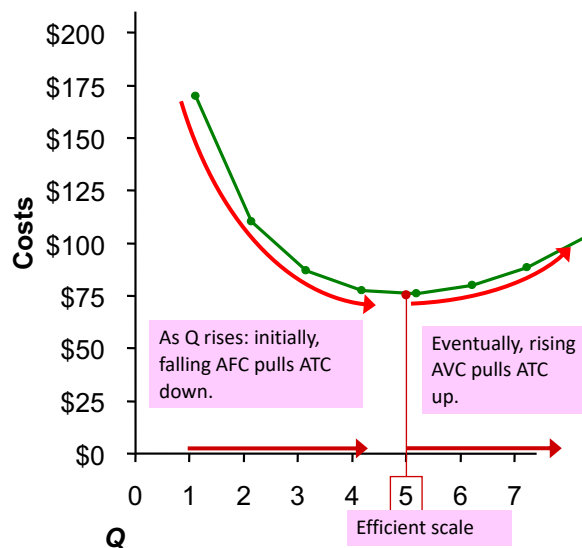
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The Various Cost Curves Together

Q	TC	ATC	AFC	AVC
0	$100	n/a	n/a	n/a
1	170	$170	$100	$70
2	220	110	50	60
3	260	86.67	33.33	53.33
4	310	77.50	25	52.50
5	380	76	20	56.00
6	480	80	16.67	63.33
7	620	88.57	14.29	74.29
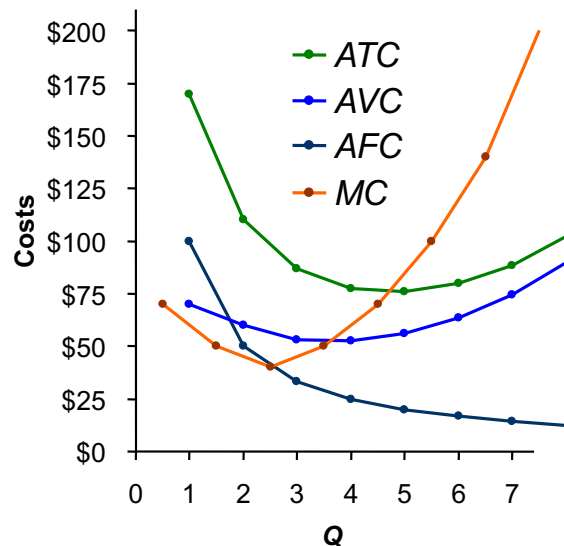
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ATC and MC

- When MC < ATC, ATC is falling.

- When MC > ATC, ATC is rising.

- The MC curve crosses the ATC curve at the ATC curve's minimum.
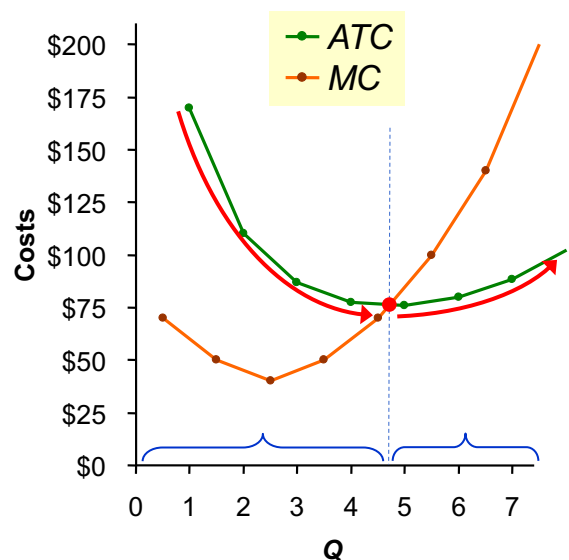
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The many types of cost: A summary

Term	Definition	Mathematical Description
Explicit costs	Costs that require an outlay of money by the firm	
Implicit costs	Costs that do not require an outlay of money by the firm	
Fixed costs	Costs that do not vary with the quantity of output produced	TFC
Variable costs	Costs that vary with the quantity of output produced	TVC
Total cost	The market value of all the inputs that a firm uses	$TC = FC + VC$
Average fixed cost	Fixed cost divided by the quantity of output	$AFC = FC / Q$
Average variable cost	Variable cost divided by the quantity of output	$AVC = VC / Q$
Average total cost	Total cost divided by the quantity of output	$ATC = TC / Q$
Marginal cost	The increase in total cost that arises from an extra unit of production	$MC = \Delta TC / \Delta Q$

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12. A firm's total profit equals its marginal revenue minus its marginal cost
a. True
b. False

13. The cost of producing an additional unit of a good is not the same as the average cost of the good.
a. True
b. False

14. The average-total-cost curve reflects the shape of both the average-fixed-cost and average-variable-cost curves.
a. True
b. False

15. If the marginal cost of producing the tenth unit of output is $3, and if the average total cost of producing the tenth unit of output is $2, then at ten units of output, average total cost is rising.
a. True
b. False

16. The marginal-cost curve intersects the average-total-cost curve at the minimum point of the average-total-cost curve.
a. True
b. False

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17. **If marginal cost is greater than average total cost, then**
   a. profits are increasing.
   b. economies of scale are becoming greater.
   c. average total cost remains constant.
   d. average total cost is increasing.

18. **For a firm, the production function represents the relationship between**
   a. implicit costs and explicit costs.
   b. quantity of inputs and total cost.
   c. quantity of inputs and quantity of output.
   d. quantity of output and total cost.

19. **The minimum points of the average variable cost and average total cost curves occur where the**
   a. marginal cost curve lies below the average variable cost and average total cost curves.
   b. marginal cost curve intersects those curves.
   c. average variable cost and average total cost curves intersect.
   d. slope of total cost is the smallest.

20. **Suppose that a firm has only one variable input, labor, and firm output is zero when labor is zero. When the firm hires 6 workers it produces 90 units of output. Fixed cost of production are $6 and the variable cost per unit of labor is $10. The marginal product of the seventh unit of labor is 4. Given this information, what is the total cost of production when the firm hires 7 workers?**
   a. $66
   b. $76
   c. $906
   d. $946

The Various Measures of Cost

- Cost curves and their shapes
- Rising marginal cost
  - Because of diminishing marginal product
- U-shaped average total cost: ATC = AVC + AFC
  - AFC – always declines as output rises
  - AVC – typically rises as output increases
    - Diminishing marginal product
  - The bottom of the U-shape
    - At quantity that minimizes average total cost
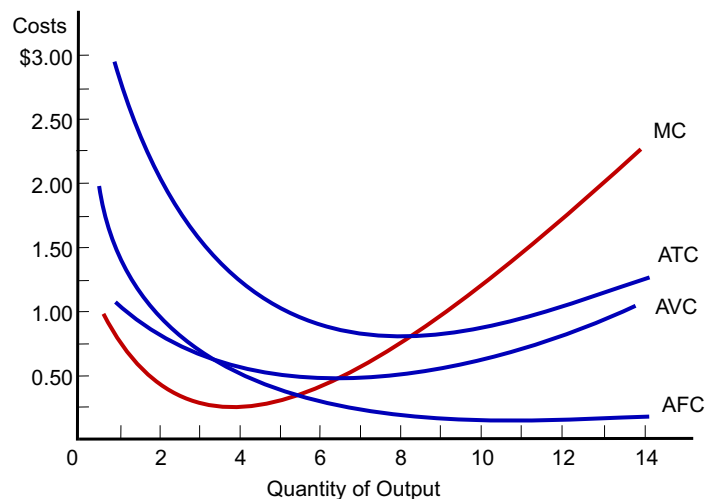
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The Various Measures of Cost

- Cost curves and their shapes
- Efficient scale
  - Quantity of output that minimizes average total cost
- Relationship between MC and ATC
  - When MC < ATC: average total cost is falling
  - When MC > ATC: average total cost is rising
  - The marginal-cost curve crosses the average-total-cost curve at its minimum

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Cost curves for a typical firm

Many firms experience increasing marginal product before diminishing marginal product. As a result, they have cost curves shaped like those in this figure. Notice that marginal cost and average variable cost fall for a while before starting to rise.
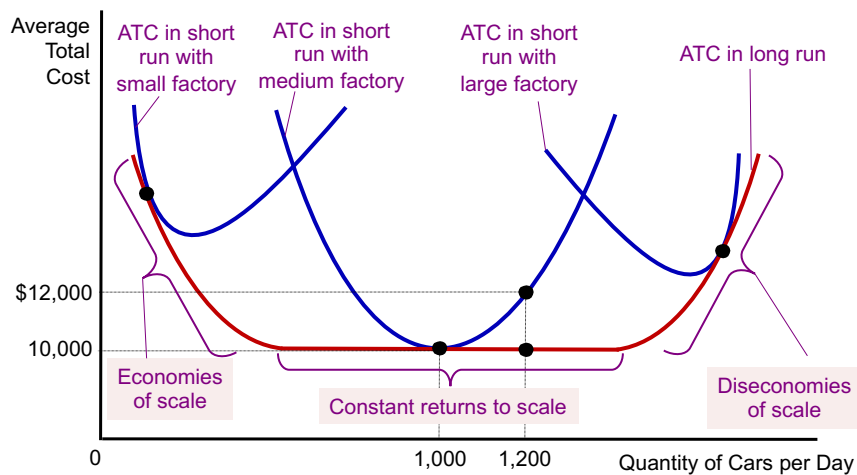
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Costs in Short Run and in Long Run

- Many decisions
  - Fixed in the short run
  - Variable in the long run,
- Firms – greater flexibility in the long-run
  - Long-run cost curves
    - Differ from short-run cost curves
    - Much flatter than short-run cost curves
  - Short-run cost curves
    - Lie on or above the long-run cost curves

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Average total cost in the short and long runs

Because fixed costs are variable in the long run, the average-total-cost curve in the short run differs from the average-total-cost curve in the long run.

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Costs in Short Run and in Long Run

- Economies of scale
  - Long-run average total cost falls as the quantity of output increases
  - Increasing specialization
- Constant returns to scale
  - Long-run average total cost stays the same as the quantity of output changes
- Diseconomies of scale
  - Long-run average total cost rises as the quantity of output increases
  - Increasing coordination problems

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Listed in the table are the long-run *total* costs for three different firms.

Quantity	1	2	3	4	5
Firm A	100	100	100	100	100
Firm B	100	200	300	400	500
Firm C	100	300	600	1,000	1,500

21. Which firm is experiencing constant returns to scale?
a. Firm A only
b. Firm B only
c. Firm C only
d. Firm A and Firm B only

22. Which firm is experiencing diseconomies of scale?
a. Firm A only
b. Firm B only
c. Firm C only
d. Firm A and Firm B only

23. Since the 1980s, Wal-Mart stores have appeared in almost every community in America. Wal-Mart buys its goods in large quantities and, therefore, at cheaper prices. Wal-Mart also locates its stores where land prices are low, usually outside of the community business district. Many customers shop at Wal-Mart because of low prices. Local retailers, like the neighborhood drug store, often go out of business because they lose customers. This story demonstrates that
a. consumers do not react to changing prices.
b. there are diseconomies of scale in retail sales.
c. there are economies of scale in retail sales.
d. there are diminishing returns to producing and selling retail goods.

24. Diseconomies of scale occur when a firm's
a. marginal costs are constant as output increases.
b. long-run average total costs are decreasing as output increases.
c. long-run average total costs are increasing as output increases.
d. marginal costs are equal to average total costs for all levels of output.