



Theory of the Firm II:

Various Measures of Cost

BECO-3310 Fall 2025

Cost

- We developed a **theoretical** understanding of cost regarding the firm last class,...
- ...today, we're going to **apply** costs using different measures used by the firm.

Fixed, Variable, & Total Costs

Fixed, Variable, & Total Costs

- Fixed Costs, FC
 - Costs that do not vary with the quantity of output produced.
 - Ex: Pizza Oven
- Variable Costs, VC
 - Costs that vary with the quantity of output produced.
 - Ex: Pizza Ingredients
- Total Costs, TC
 - Fixed Costs plus Variable Costs, $TC=FC+VC$

Ex: Julia's Cupcake Company

- Julia owns a small cupcake business that has been expanding production by 1,000 cupcakes each month.
- Let's help Julia track & calculate her cost's each month by filling in the missing Fixed, Variable, & Total Cost values in her cost table...





Julia's Production Costs

Cupcakes Produced (units)	Total Fixed Cost (dollars)	Total Variable Cost (dollars)	Total Cost (dollars)
0	\$1,500		
1,000		1,000	
2,000		1,500	
3,000			4,500
4,000			7,500





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1,000	1,500	1,000	≡ 2,500
2,000	1,500	1,500	≡ 3,000
3,000	1,500	3,000	≡ 4,500
4,000	1,500	6,000	≡ 7,500

**FC do not vary
with output!**

**VC do vary
with output!**

**TC are the sum
of FC & VC!**



Fixed & Variable Costs

- Why do we distinguish between Fixed & Variable Costs?
 - They have very different effects on individual & firm behavior!
- Ex: Consider the fees & expenses you pay here at Texas Tech.
 - Maybe you pay a flat registration fee that is the same for all students regardless of the number of classes (Fixed Cost).
 - Maybe you pay a tuition fee based on the number of classes/credits you take (Variable Cost).
 - In either scenario, how does adding an additional course affect your decision? Costs & benefits?

Average Costs

Average Costs

- Average Fixed Costs, AFC
 - Fixed cost divided by the quantity of output.

- $AFC = \frac{FC}{Q}$

- Average Variable Costs, AVC
 - Variable cost divided by the quantity of output.

- $AVC = \frac{VC}{Q}$

Average Costs

- Average Total Cost, ATC
 - Total cost divided by output.
 - Cost of a typical unit of output.

- $ATC = \frac{TC}{Q}$

Ex: Julia's Cupcake Company

- Julia owns a small cupcake business that has been expanding production by 1,000 cupcakes each month.
- Let's help Julia track & calculate her cost's each month by filling in the missing Fixed, Variable, & Total Cost values in her cost table...



Julia's Production Costs

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1,000	1,500	1,000	2,500			
2,000	1,500	1,500	3,000			
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1,000	1,500	1,000	2,500	\$1.50		
2,000	1,500	1,500	3,000			
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1,000	1,500	1,000	2,500	\$1.50	\$1.00	\$2.50
2,000	1,500	1,500	3,000	0.75	0.75	1.50
3,000	1,500	3,000	4,500			
4,000	1,500	6,000	7,500			

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1,000	1,500	1,000	2,500	\$1.50	\$1.00	\$2.50
2,000	1,500	1,500	3,000	0.75	0.75	1.50
3,000	1,500	3,000	4,500	0.50	1.00	1.50
4,000	1,500	6,000	7,500			

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1,000	1,500	1,000	2,500	\$1.50	\$1.00	\$2.50
2,000	1,500	1,500	3,000	0.75	0.75	1.50
3,000	1,500	3,000	4,500	0.50	1.00	1.50
4,000	1,500	6,000	7,500	0.38	1.50	1.88

Average Costs

- Why do we use **average costs**? Aren't total costs enough?
- One reason, is average costs use numbers that are more manageable (easier to understand and interpret).
- Another reason is we can compare average costs directly to the price a firm receives for the sale of its product. Profitable production or not?

Average Costs

- Why do we separate ATC into two components, AFC & AVC?
- First, AFC by itself shows us it is an ever-decreasing function of output. The more output a firm produces, the more is “spreads out” fixed costs.

Julia's Production Costs

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1,000	1,500	1,000	2,500	\$1.50	\$1.00	\$2.50
2,000	1,500	1,500	3,000	0.75	0.75	1.50
3,000	1,500	3,000	4,500	0.50	1.00	1.50
4,000	1,500	6,000	7,500	0.38	1.50	1.88

- Why do we separate ATC into two components, AFC & AVC?
- First, AFC by itself shows us it is an ever-decreasing function of output. The more output a firm produces, the more is “spreads out” fixed costs.
- Second, AVC is an essential component in a firm’s decision to operate or shut down in the short-run. We will discuss this next class.

Marginal Costs

Marginal Cost

- Increase in total cost arising from an extra unit of production.
- Increase in total cost from producing an additional unit of output.
- Marginal Cost is equal to the change in total cost divided by the change in output (total quantity).

$$MC = \frac{\Delta TC}{\Delta Q}$$

Why Do Marginal Costs Matter?

- When trying to determine to produce more, need to keep MC in mind. People think & act **on the margin!**
- If the marginal revenue from producing an additional product is more than marginal cost, then you produce more!
- If the marginal revenue from producing an additional product is less than marginal costs, then you produce less.

The Special Significance of MC

- Marginal Cost is the additional cost incurred by producing one additional unit of a good, activity, or service.
- Costs, particularly marginal costs, are a significant component to decision making.
- Marginal benefits, however, are critical to production and consumption decisions.

Ex: Caleb's Coffee Shop



(1) Output (cups of coffee per hour)	(2) Total Cost	(3) Fixed Cost	(4) Variable Cost	(5) Average Fixed Cost	(6) Average Variable Cost	(7) Average Total Cost	(8) Marginal Cost
0	\$3.00	\$3.00	\$0.00				
1	3.30	3.00	0.30	\$3.00	\$0.30	\$3.30	\$0.30
2	3.80	3.00	0.80	1.50	0.40	1.90	0.50
3	4.50	3.00	1.50	1.00	0.50	1.50	0.70
4	5.40	3.00	2.40	0.75	0.60	1.35	0.90
5	6.50	3.00	3.50	0.60	0.70	1.30	1.10
6	7.80	3.00	4.80	0.50	0.80	1.30	1.30
7	9.30	3.00	6.30	0.43	0.90	1.33	1.50
8	11.00	3.00	8.00	0.38	1.00	1.38	1.70
9	12.90	3.00	9.90	0.33	1.10	1.43	1.90
10	15.00	3.00	12.00	0.30	1.20	1.50	2.10

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0	\$3.00	\$3.00	\$0.00				
1	3.30	3.00	0.30	\$3.00	\$0.30	\$3.30	\$0.30
2	3.80	3.00	0.80	1.50	0.40	1.90	0.50
3	4.50	3.00	1.50	1.00	0.50	1.50	0.70
4	5.40	3.00	2.40	0.75	0.60	1.35	0.90
5	6.50	3.00	3.50	0.60	0.70	1.30	1.10
6	7.80	3.00	4.80	0.50	0.80	1.30	1.30
7	9.30	3.00	6.30	0.43	0.90	1.33	1.50
8	11.00	3.00	8.00	0.38	1.00	1.38	1.70
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Ex: Caleb's Coffee Shop



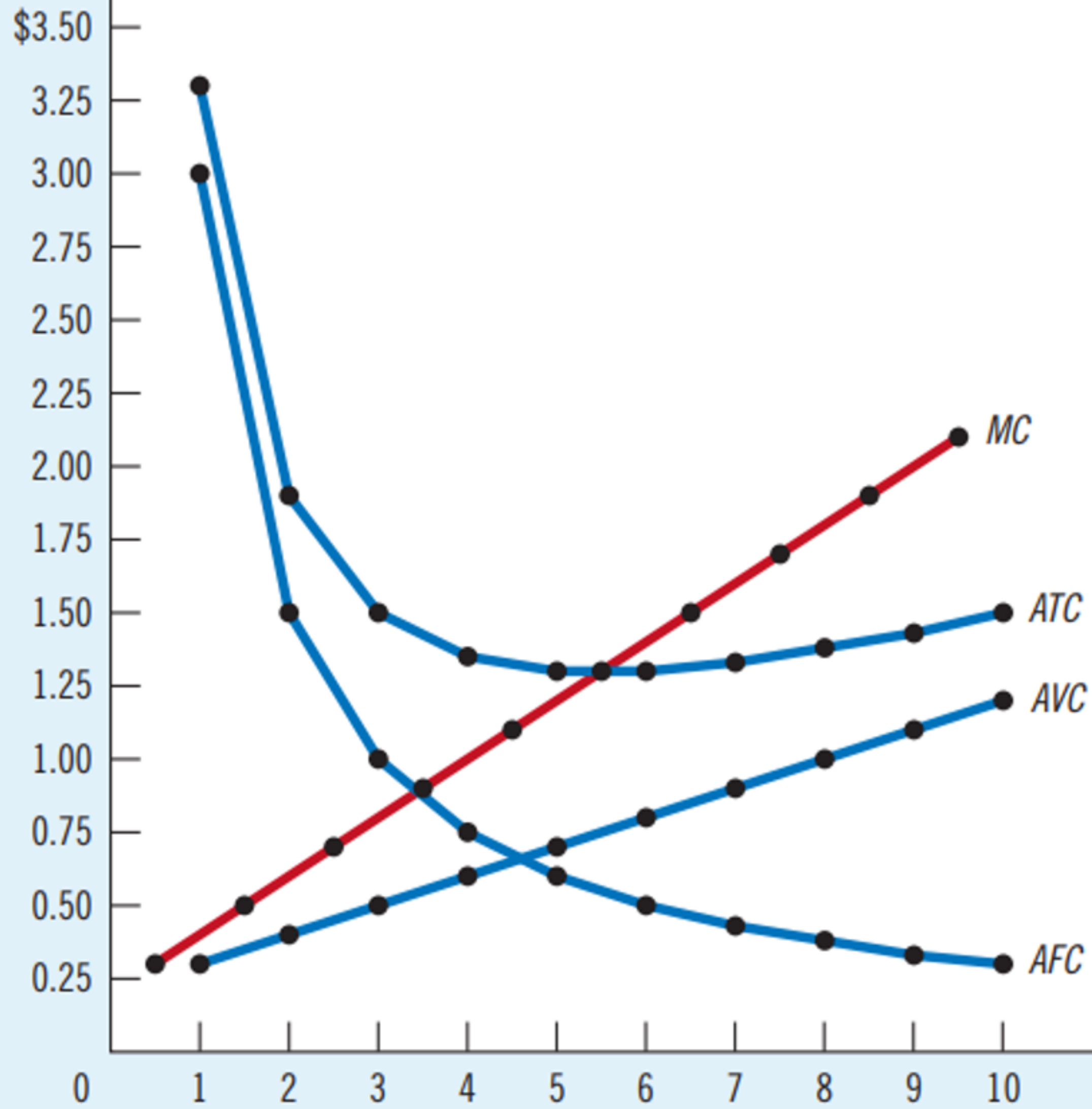
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1	3.30	3.00	0.30	\$3.00	\$0.30	\$3.30	\$0.30
2	3.80	3.00	0.80	1.50	0.40	1.90	0.50
3	4.50	3.00	1.50	1.00	0.50	1.50	0.70
4	5.40	3.00	2.40	0.75	0.60	1.35	0.90
5	6.50	3.00	3.50	0.60	0.70	1.30	1.10
6	7.80	3.00	4.80	0.50	0.80	1.30	1.30
7	9.30	3.00	6.30	0.43	0.90	1.33	1.50
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**MC is increasing
with each
additional unit
of output!**

The Special Significance of MC

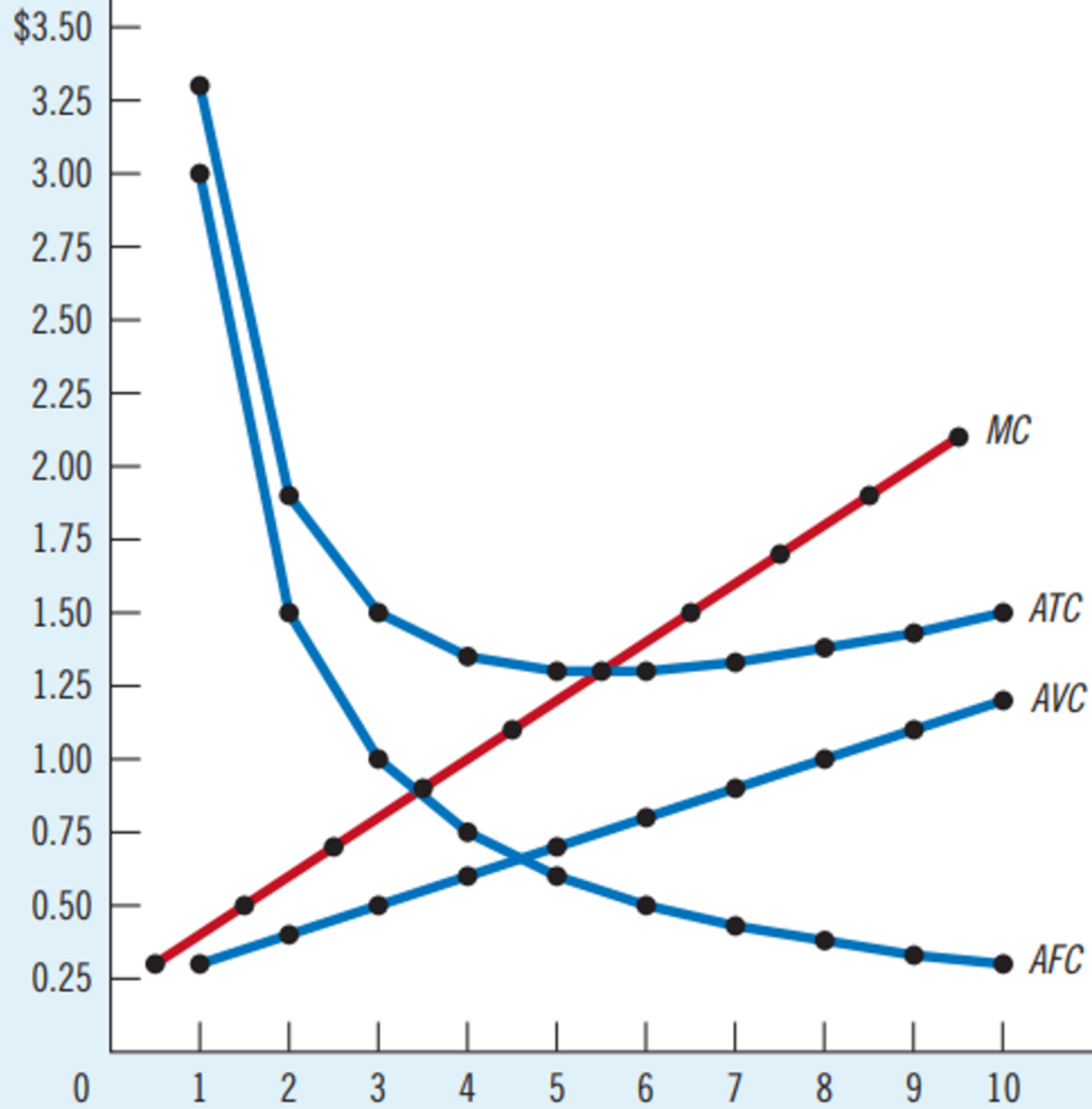
- Marginal benefits, however, are critical to production and consumption decisions. Why?
- The Rule of Rational Life!
- $MB = MC$
- MC is half the rule!

Costs



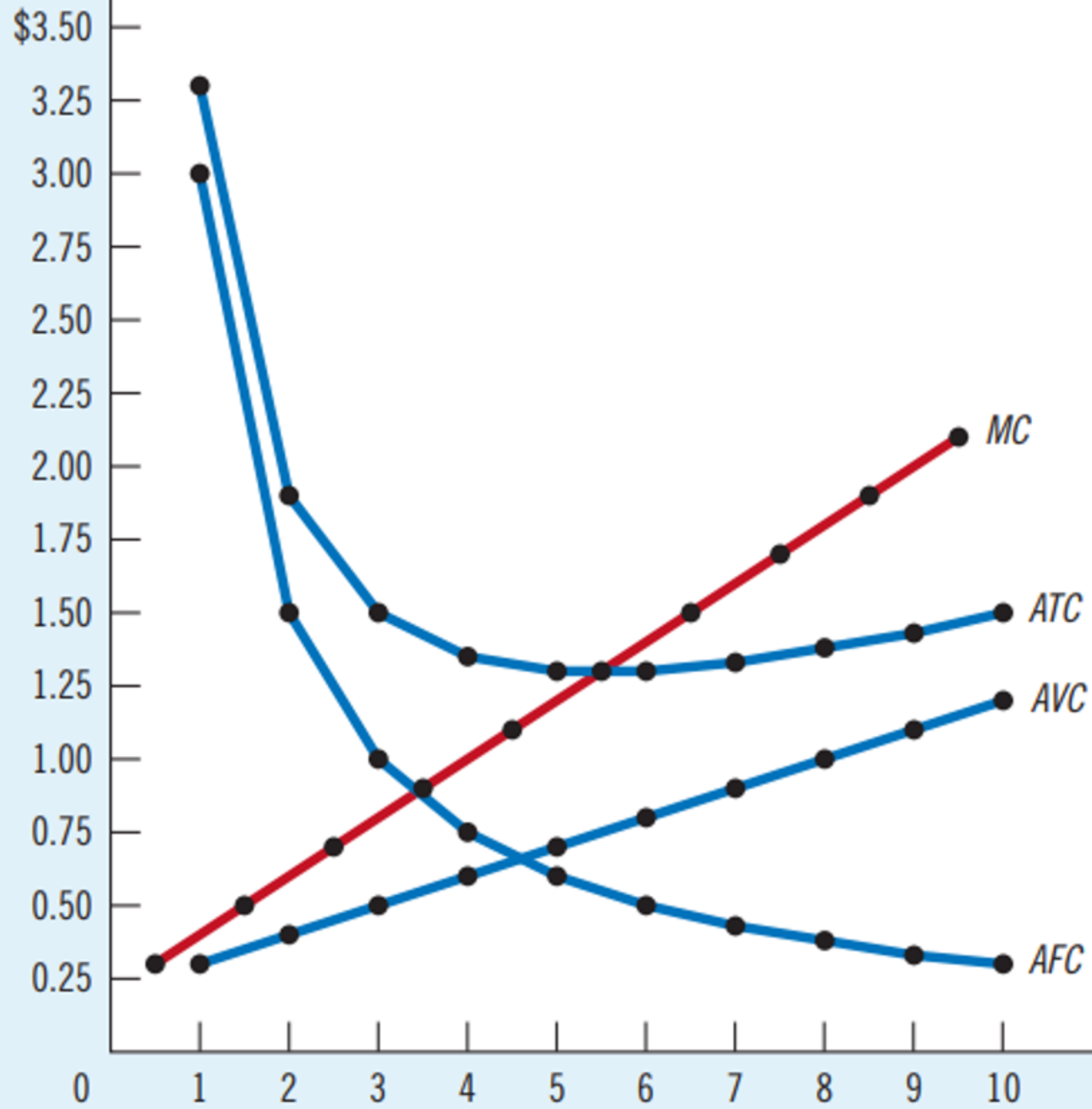
Quantity of Output
(cups of coffee per hour)

Costs

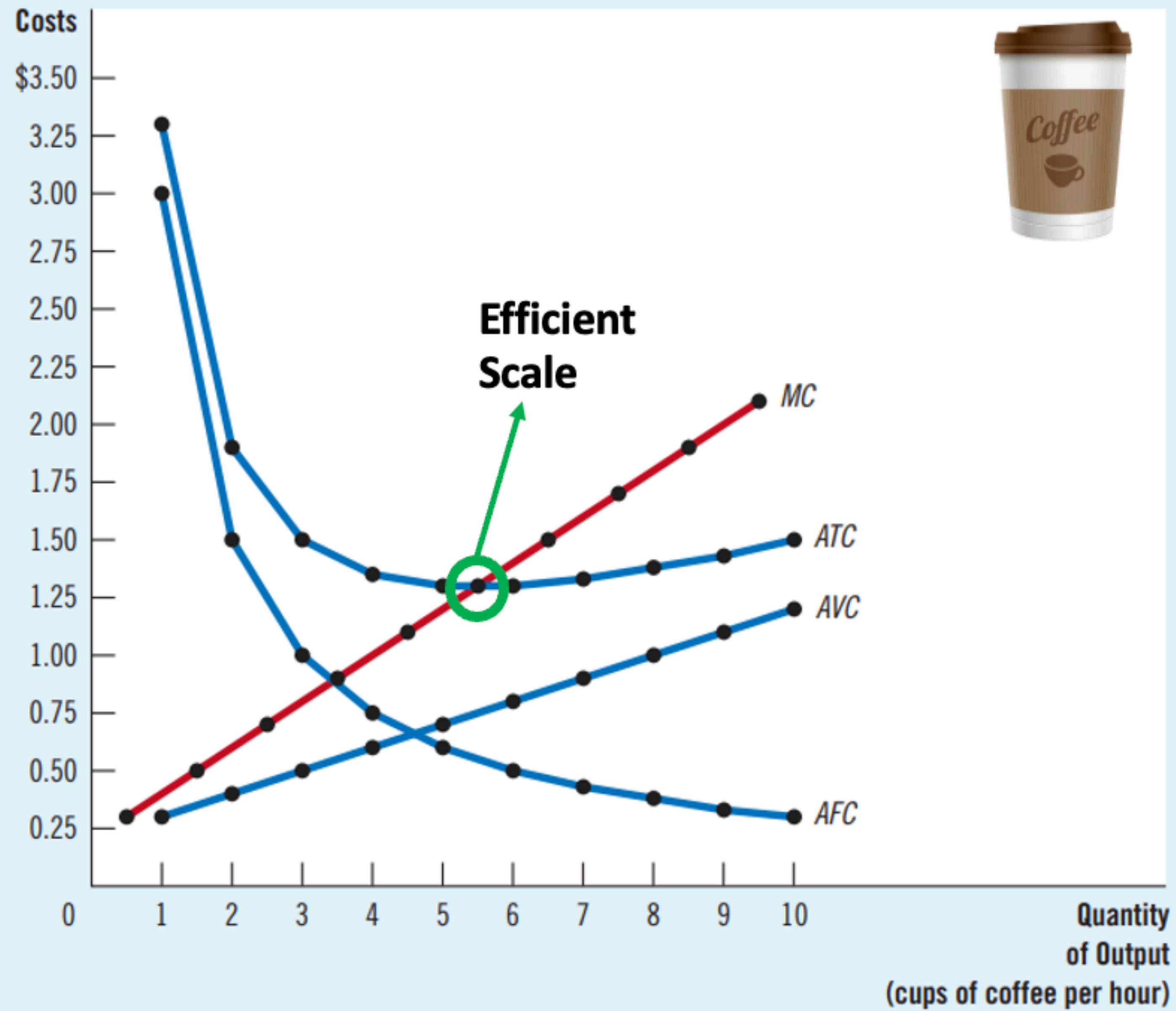


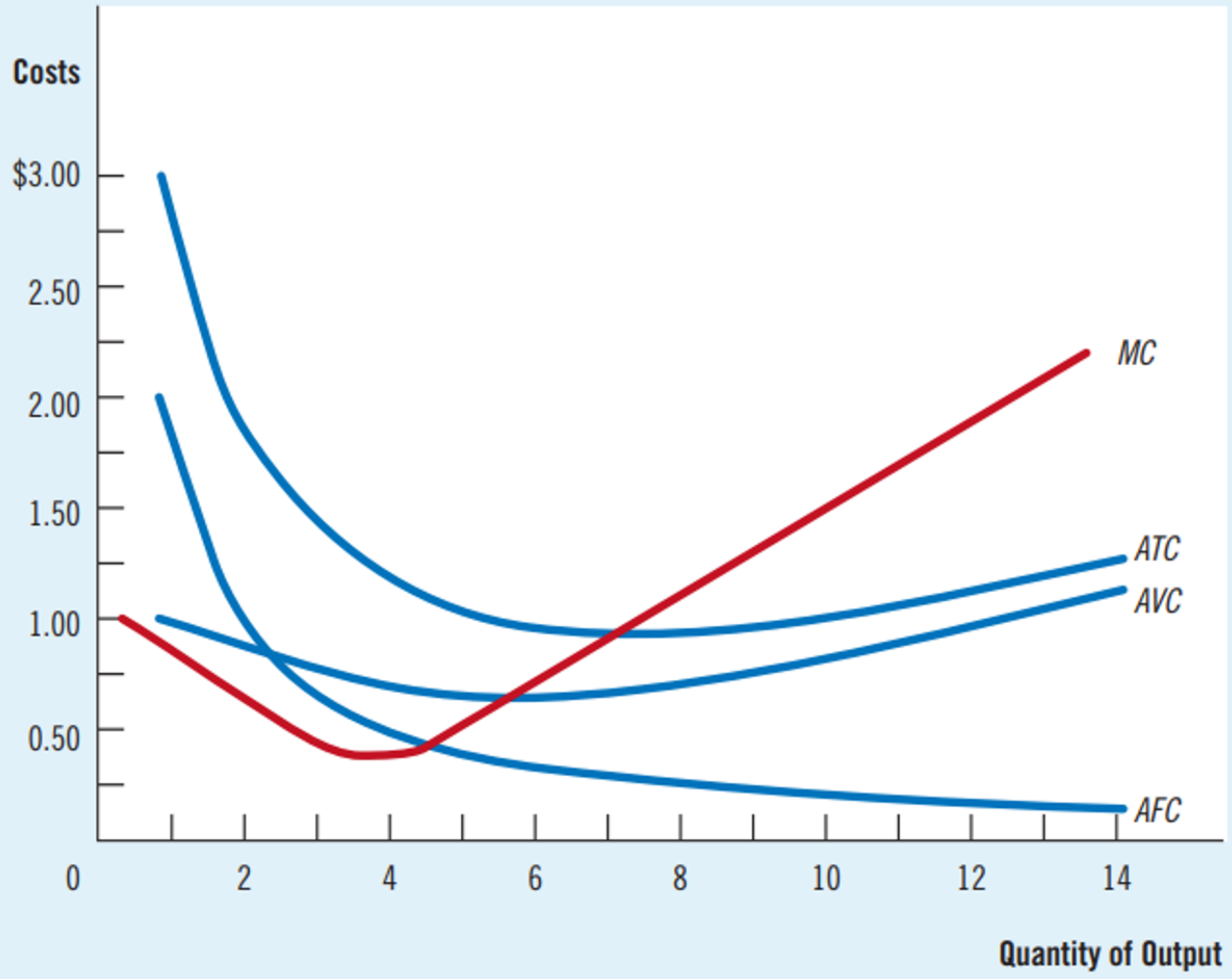
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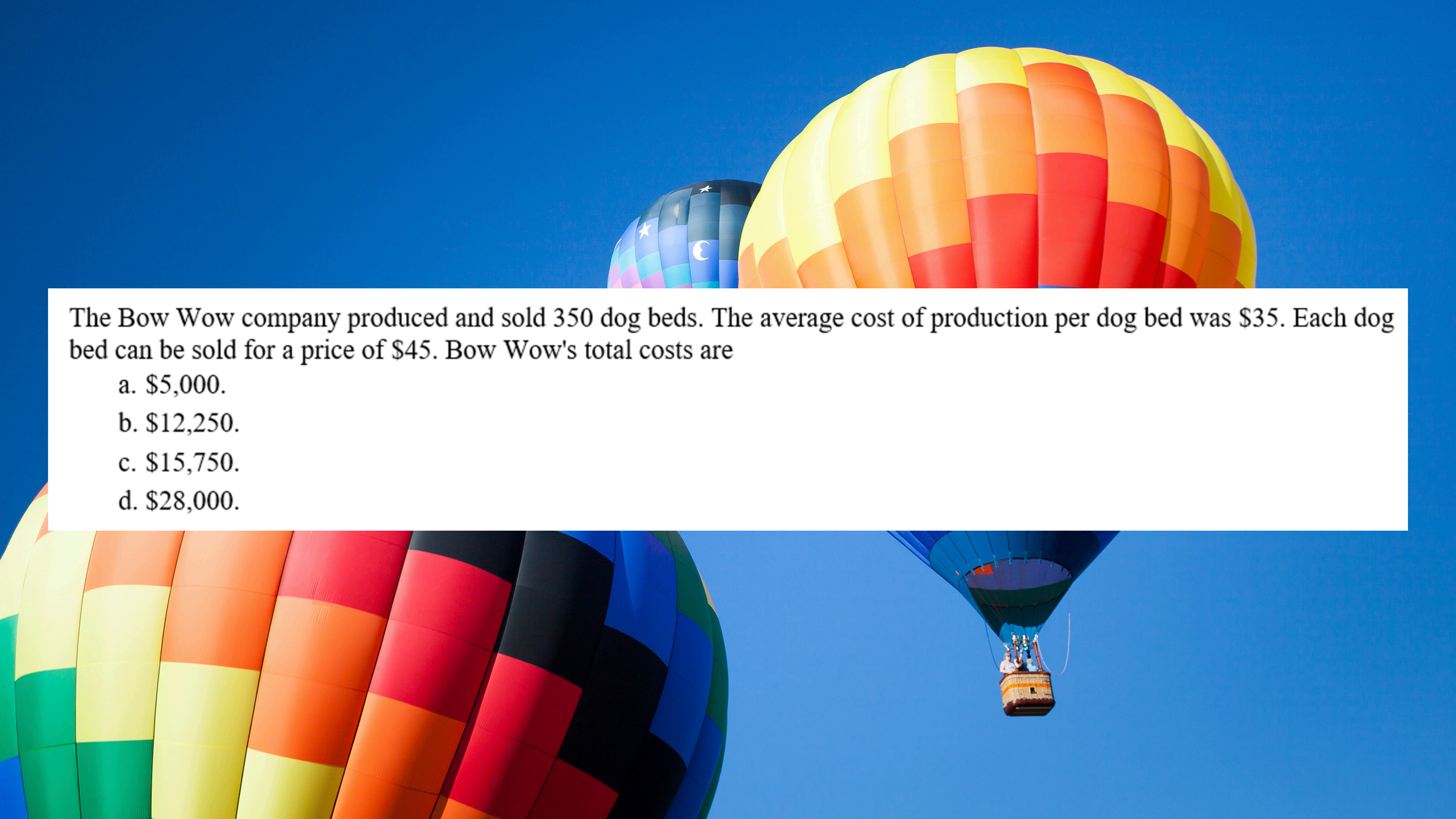
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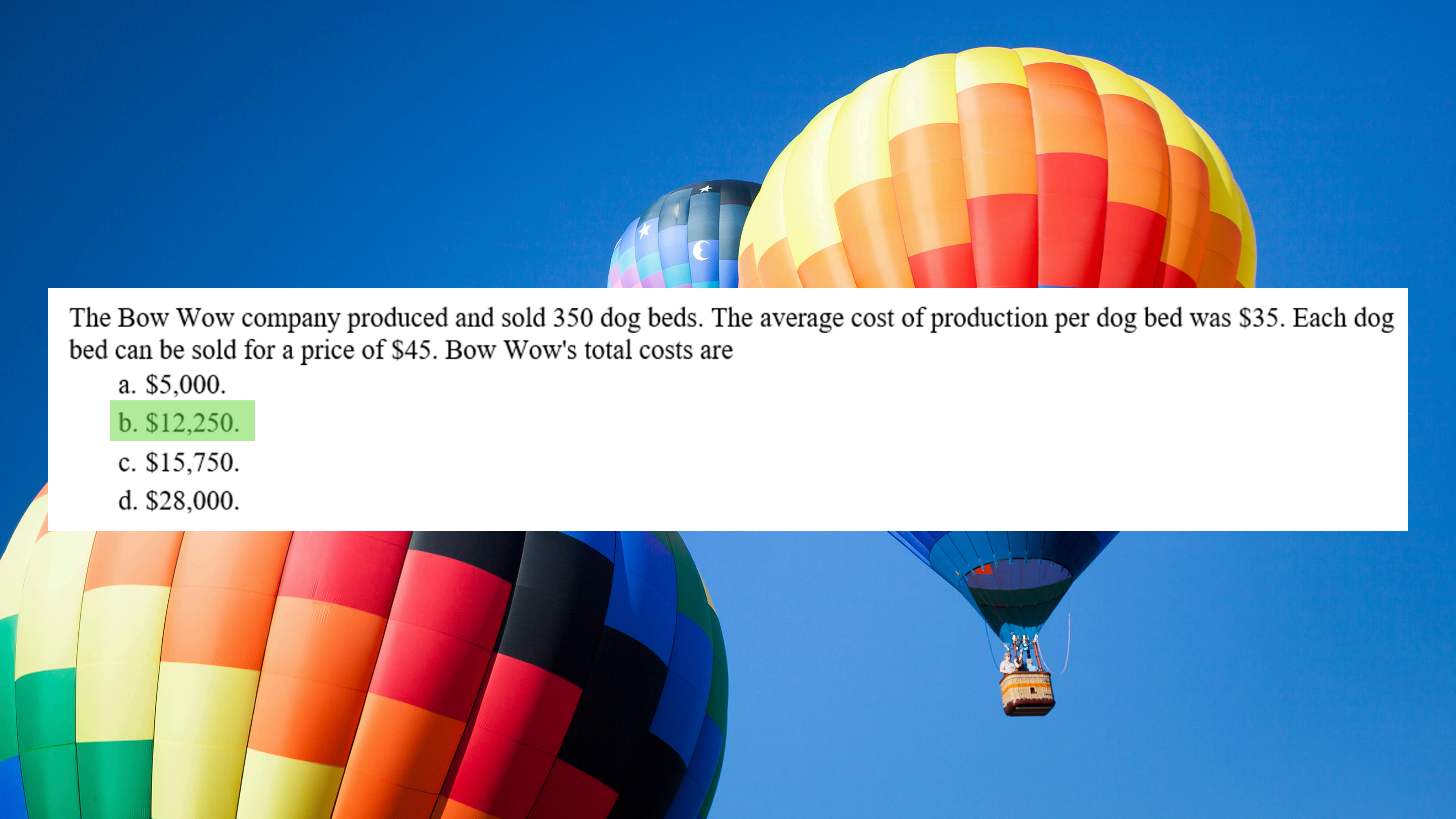
Term	Definition	Mathematical Description
Explicit costs	Costs that require an outlay of money by the firm	
Implicit costs	Costs that do not require an outlay of money by the firm	
Fixed costs	Costs that do not vary with the quantity of output produced	FC
Variable costs	Costs that vary with the quantity of output produced	VC
Total cost	The market value of all the inputs that a firm uses in production	$TC = FC + VC$
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	$MC = \Delta TC / \Delta Q$

Practice!




The Bow Wow company produced and sold 350 dog beds. The average cost of production per dog bed was \$35. Each dog bed can be sold for a price of \$45. Bow Wow's total costs are

- a. \$5,000.
- b. \$12,250.
- c. \$15,750.
- d. \$28,000.





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- a. \$5,000.
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- d. \$28,000.



Jack's Car Wash has average variable costs of \$2 and average fixed costs of \$3 when it produces 300 units of output (car washes). The firm's total cost is

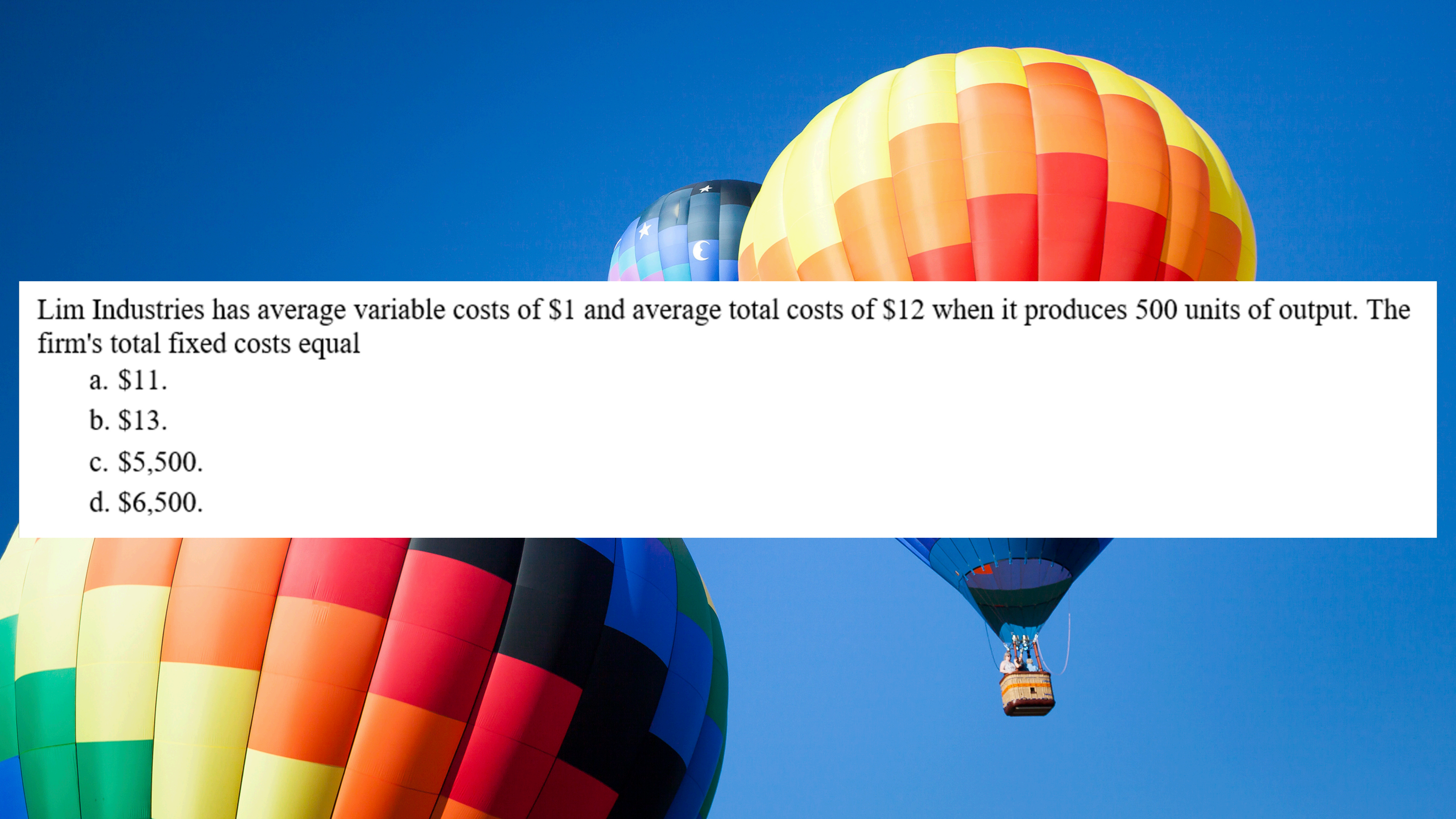
- a. \$600.
 - b. \$900.
 - c. \$300.
 - d. \$1,500.
- 



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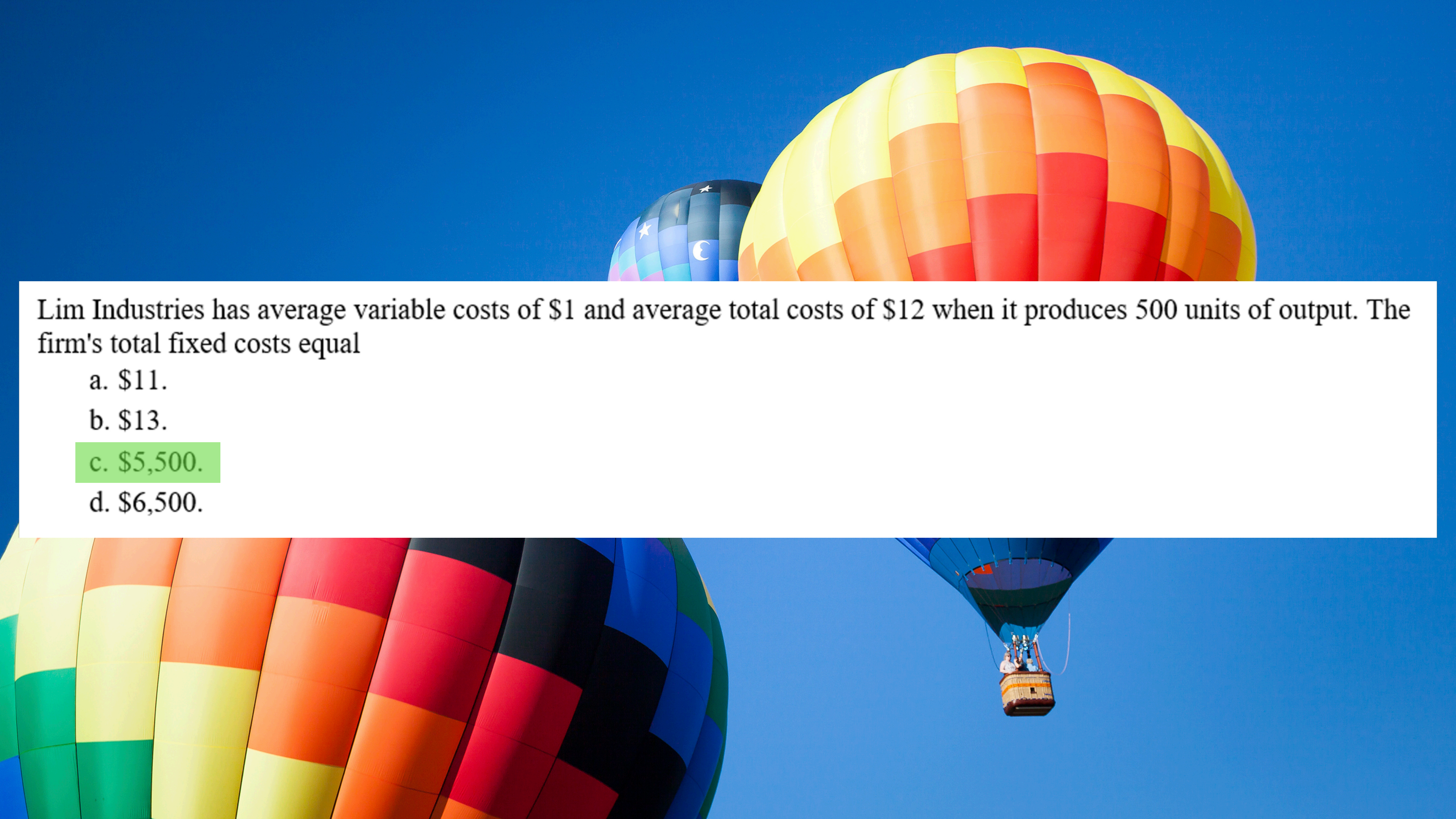
- a. \$600.
- b. \$900.
- c. \$300.
- d. \$1,500.





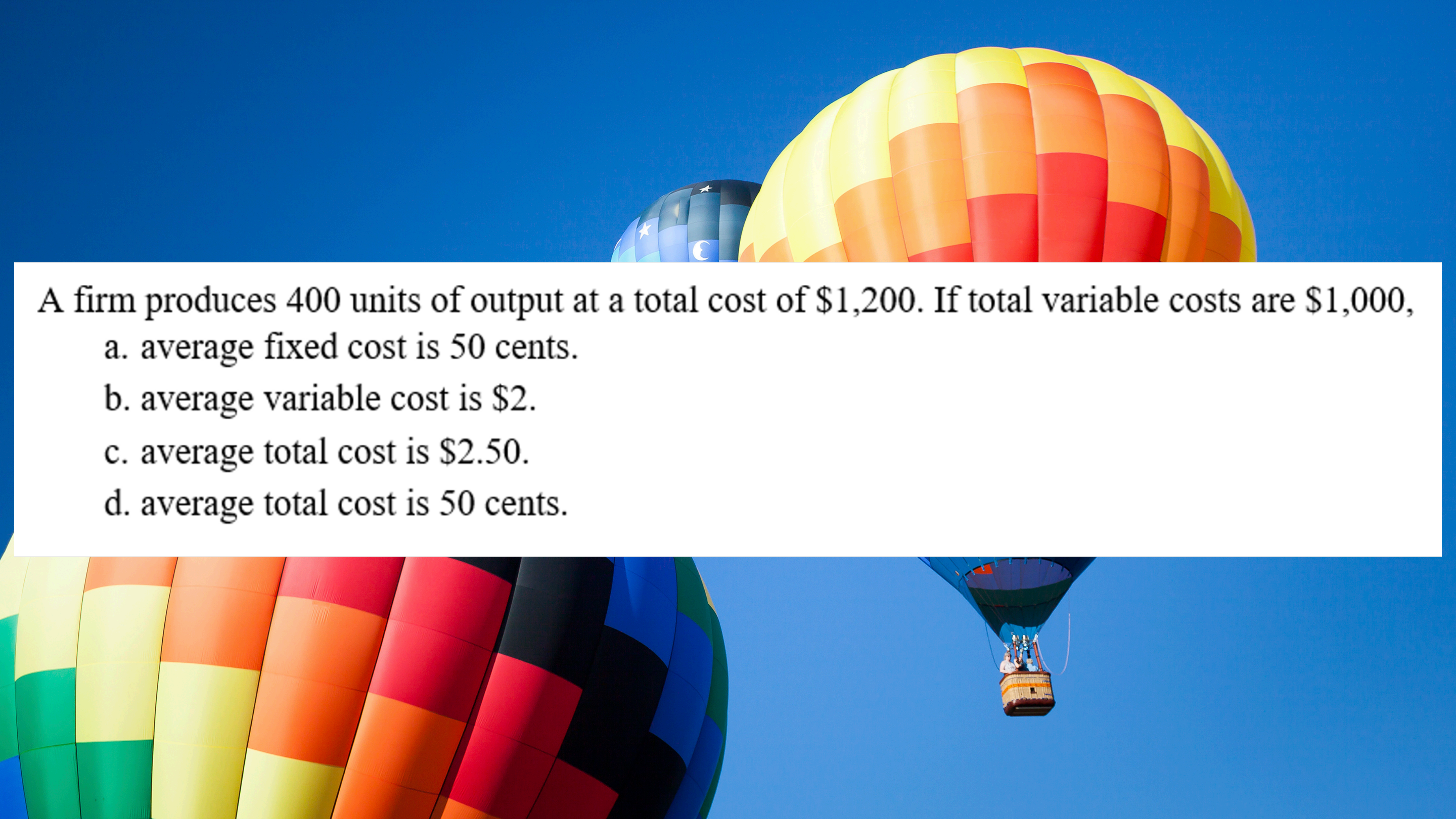
Lim Industries has average variable costs of \$1 and average total costs of \$12 when it produces 500 units of output. The firm's total fixed costs equal

- a. \$11.
- b. \$13.
- c. \$5,500.
- d. \$6,500.




Lim Industries has average variable costs of \$1 and average total costs of \$12 when it produces 500 units of output. The firm's total fixed costs equal

- a. \$11.
- b. \$13.
- c. \$5,500.
- d. \$6,500.



A firm produces 400 units of output at a total cost of \$1,200. If total variable costs are \$1,000,

- a. average fixed cost is 50 cents.
- b. average variable cost is \$2.
- c. average total cost is \$2.50.
- d. average total cost is 50 cents.





A firm produces 400 units of output at a total cost of \$1,200. If total variable costs are \$1,000,

a. average fixed cost is 50 cents.

b. average variable cost is \$2.

c. average total cost is \$2.50.

d. average total cost is 50 cents.



**Thanks for your attention.
End of class.**