

## Supplementary content 1 (for HKDSE 2028 and onwards)

### Relationship between marginal cost curve and average cost curve

The following figure shows how marginal cost and average cost change with output:

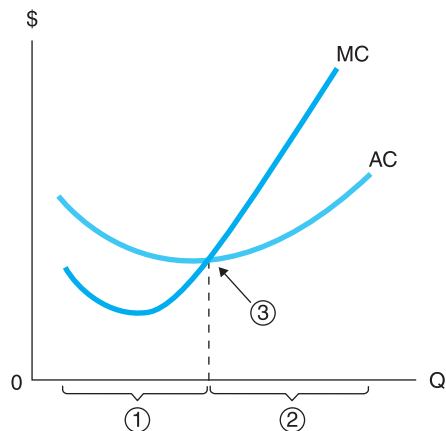


Fig. 1

As shown in the above figure, the MC and AC curves typically have the following features:

#### Feature 1: Both curves are U-shaped

When output increases, MC decreases initially. After a certain point, MC eventually increases because of the law of diminishing marginal returns. Hence, the MC curve is U-shaped.

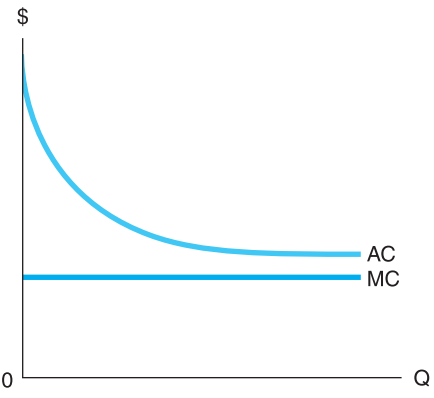
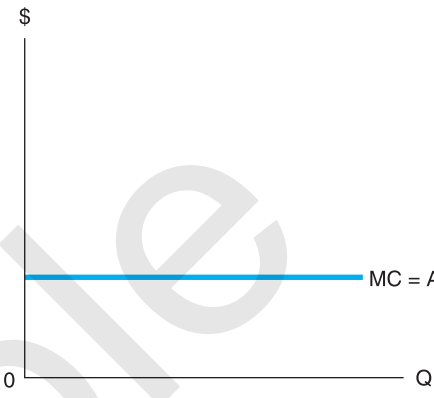
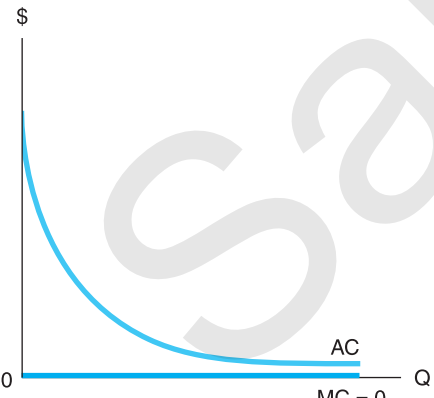
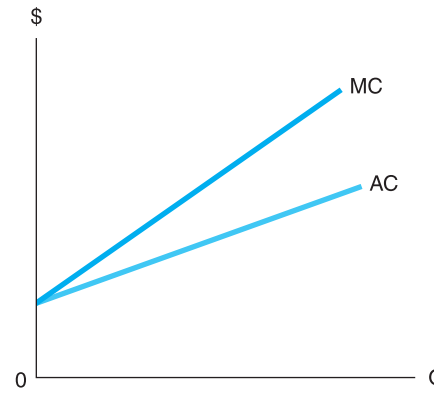
When output increases, AC decreases initially because the fixed cost is spread among more output. However, after a certain output level, the fall in average fixed cost is outweighed by the rise in average variable cost caused by diminishing marginal returns. Hence, AC rises eventually and the curve is U-shaped.

#### Feature 2: MC curve passes through the minimum point of the AC curve

This is because:

Output on Fig. 1	Relationship between MC and AC	Explanation
①	$MC < AC$	Producing an additional unit of output will lower AC. Hence, AC is falling.
②	$MC > AC$	Producing an additional unit of output will increase AC. Hence, AC is increasing.
③	$MC = AC$	Since AC decreases before this point and AC increases after this point, AC must be at the minimum level at this point.

There are other shapes of MC and AC curves:

Situation	Graphical representation
<p><b>Constant MC and positive fixed cost:</b></p> <p>When output increases, the fixed cost is spread over more units of output. Hence, AC decreases with output and approaches MC.</p>  <p>The graph shows a vertical axis labeled '\$' and a horizontal axis labeled 'Q'. A horizontal blue line represents the Marginal Cost (MC) curve. A blue curve representing the Average Cost (AC) starts high on the vertical axis and slopes downwards, asymptotically approaching the horizontal MC line as output (Q) increases.</p>	<p><b>Constant MC and no fixed cost:</b></p> <p>AC is also constant and equal to MC. Hence, the MC and AC curves are the same horizontal lines.</p>  <p>The graph shows a vertical axis labeled '\$' and a horizontal axis labeled 'Q'. A single horizontal blue line represents both the Marginal Cost (MC) and Average Cost (AC) curves, indicating they are equal and constant.</p>
<p><b>Zero MC and positive fixed cost:</b></p> <p>When MC is zero, total cost is equal to fixed cost. Hence, when output increases, AC decreases and approaches zero.</p>  <p>The graph shows a vertical axis labeled '\$' and a horizontal axis labeled 'Q'. A horizontal blue line on the horizontal axis represents the Marginal Cost (MC) curve, labeled 'MC = 0'. A blue curve representing the Average Cost (AC) starts high on the vertical axis and slopes downwards, asymptotically approaching the horizontal MC line as output (Q) increases.</p>	<p><b>Increasing MC and no fixed cost:</b></p> <p>When MC increases at a constant rate, AC increases at a lower constant rate. Hence, both curves are upward sloping and the MC curve lies above the AC curve.</p>  <p>The graph shows a vertical axis labeled '\$' and a horizontal axis labeled 'Q'. Two upward-sloping blue lines originate from the vertical axis. The steeper line is labeled 'MC' and the shallower line is labeled 'AC', showing that MC is always greater than AC when both are positive.</p>