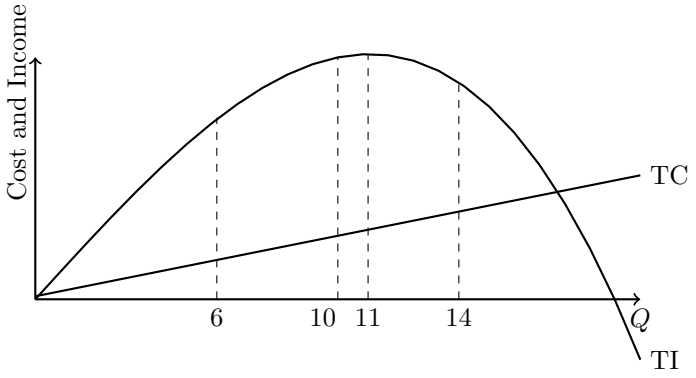
Income, Costs, and Profits

In the following graph, you can observe the total income (TI) and the total cost (TC) of a firm. At the same time, four possible production quantities (6, 10, 11, 14) are marked. Additionally, we have:

$$TC(6) = 13 \text{ and } TI(6) = 60$$
$$TC(10) = 21 \text{ and } TI(10) = 80$$
$$TC(11) = 23 \text{ and } TI(11) = 82$$
$$TC(14) = 29 \text{ and } TI(14) = 72$$



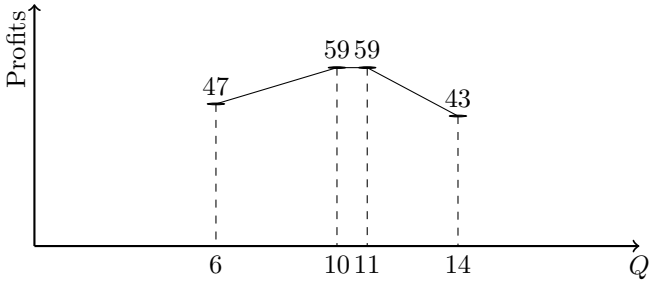
1. Graph the firm's profit function. Indicate which quantity the firm will produce and justify.
2. Now, assume that the firm experiences an increase in fixed costs, which increases by 5. Modify the graph and indicate the optimal production quantity.

Solution

1. The firm's profits for different quantities are:

   - $P(6) = 60 - 13 = 47$
   - $P(10) = 80 - 21 = 59$
   - $P(11) = 82 - 23 = 59$
   - $P(14) = 72 - 29 = 43$

   The firm will produce either 11 or 10 units since this will yield the maximum profit of 59. Graphically:



2. The optimal production quantity will remain 11 or 10 since the increase in fixed costs affects any of the points equally (as it does not depend on the quantities produced), and therefore, the maximum profits will be reached at the same points as before:

   - $P(6) = 60 - 18 = 42$
   - $P(10) = 80 - 26 = 54$
   - $P(11) = 82 - 28 = 54$
   - $P(14) = 72 - 34 = 38$