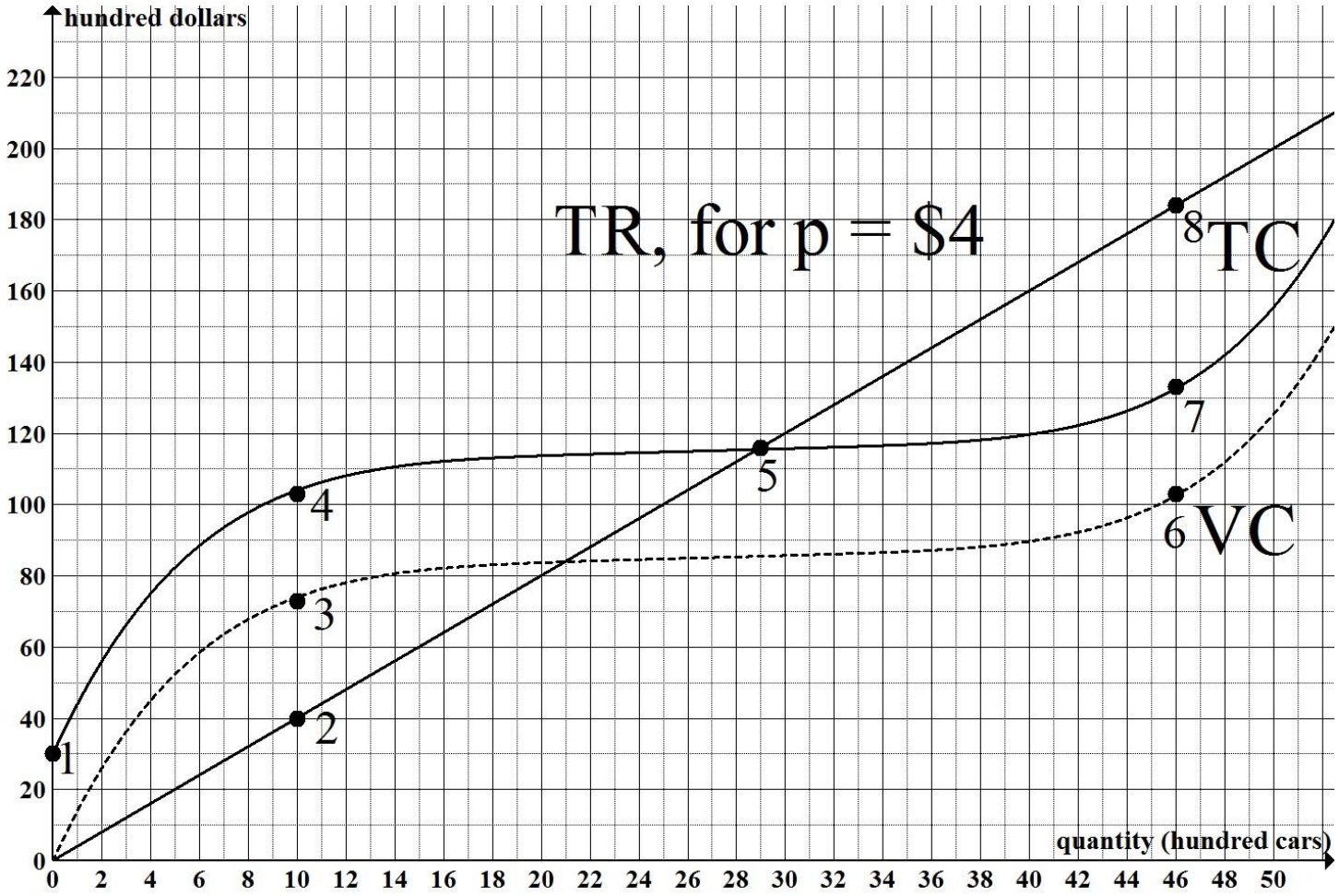
Business Graphs – TR/TC/VC and MR/MC Graphs Review/Quiz

The graph below gives Total Cost (TC) and Variable Cost (VC) in hundreds of dollars for producing *q* hundred toy cars. It also gives the Total Revenue (TR) line if the toy cars sell for $4.00 per car.



Quick quiz:

Read off each dot: what does each dot represent?

What can you say about profit…

… at q = 0?

… at q = 10?

… at q = 29?

… at q = 46?

Answers on next page.

Answers:

1. **FC = 30 hundred dollars**
   This is the fixed costs that you must pay at the beginning of the month even if you produce no items. Here it is $3000. This is the same as TC(0) = 30. Remember that TC(q) = FC + VC(q), so the vertical gap between VC and TC is always going to be 30 in this graph.
2. **TR(10) = 40.** If you sell 10 hundred toys cars (1000 cars), then you get 40 hundred dollars ($4000) in revenue. Revenue is money that comes in from sales (not taking into account costs).
   Remember TR = price*quantity = 4 * 10 = 40, so we didn't even need to the graph to compute this.
3. **VC(10) = 73.** It will cost 73 hundred dollars in actual production costs (not including FC) to make 10 hundred toy cars.
4. **TC(10) = 103.** In total, it will cost 103 hundred dollars to make 10 hundred cars.
   Again note that TC(10) = FC + VC(10) (103 = 30 + 73).
5. **TR(29) = 115. TC(29) = 115.**
6. **VC(46) = 103.**
7. **TC(46) = 133.** Again note that TC(46) = FC + VC(46) (133 = 30 + 103).
8. **TR(46) = 184**. Again note that TR(46) = price * quantity = 4 * 46 = 184.

Concerning Profit: Recall Profit is Total Revenue minus Total Cost. **P(q) = TR(q) – TC(q).**

At q = 0: **P(0) = TR(0) – TC(0) = 0 – 30 = -30 hundred dollars**.
You lose 3000 dollars if you produce and sell 0 cars.
In other words, if you "shutdown" production for this month, you will lose 30 dollars.

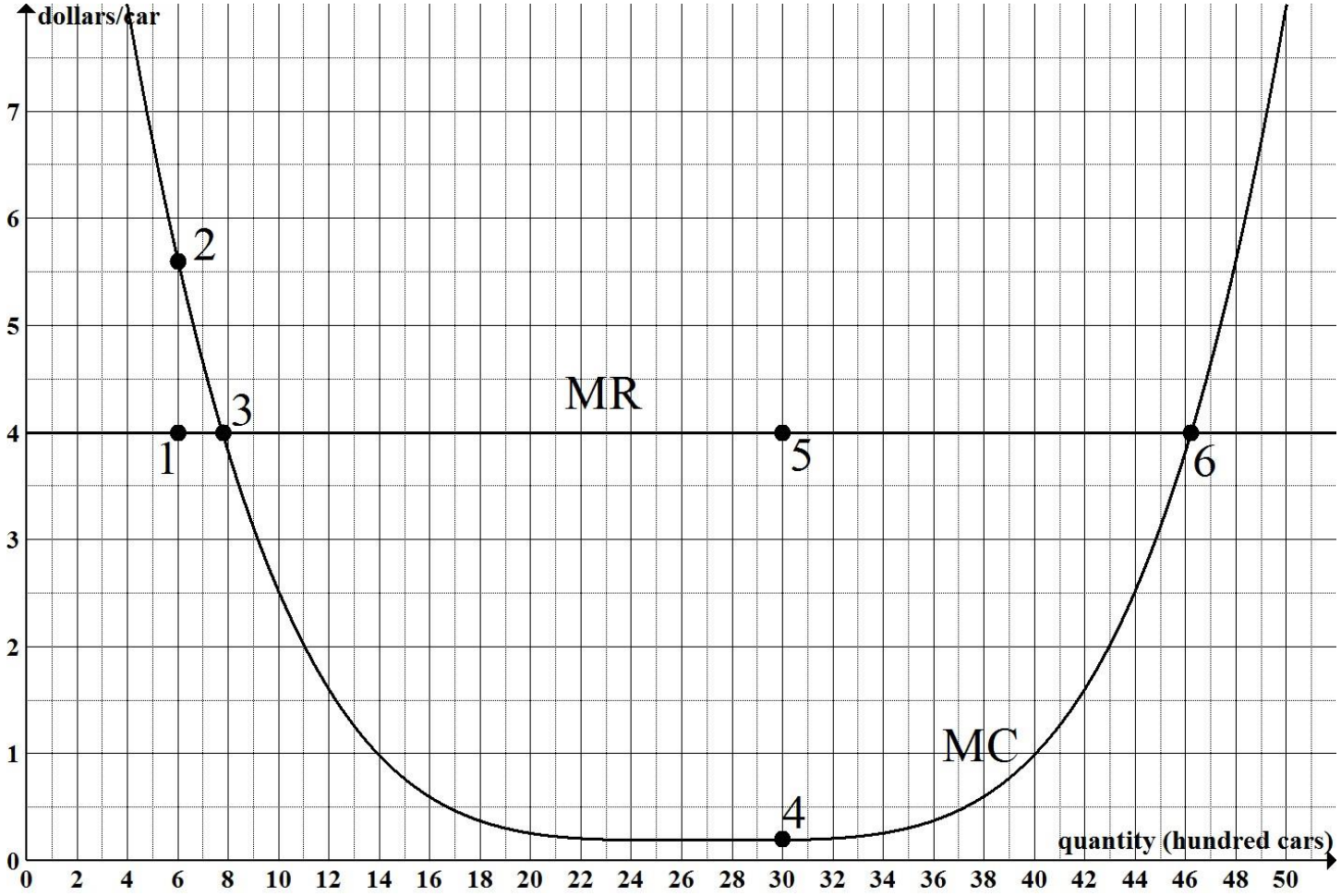
At q = 10: **P(10) = TR(10) – TC(10) =40 – 103 = -63 hundred dollars.**
You lose 6300 dollars if you produce and sell 1000 cars.
You are losing more than fixed costs, it would have been better to shutdown if you can only sell 1000 cars.

At q = 29: P(29) = TR(29) – TC(29) = 115 – 115 = 0 hundred dollars.
Profit is zero (you "break even") if you produce and sell 2900 cars.

At q = 46: P(46) = TR(46) – TC(46) = 184 – 133 = 51 hundred dollars.
You have a positive profit of $5100 if you produce and sell 4600 cars.
This appears to be the largest possible positive profit.
Note also at q = 46, the slope of the tangent to TR and the slope of the tangent to TC match!

Note that you can visually see the profit as the vertical gap that TR is above TC.

The graph below gives Marginal Cost (MC) in dollars per car for producing *q* hundred toy cars. It also gives the Marginal Revenue (MR) if the toy cars sell for $4.00 per car. This graph matches the graph from the previous page.



Quick quiz:

Read off each dot: what does each dot represent?

What can you say about profit…

… at q = 6?

… at q = 8?

… at q =30?

… at q = 46?

Answers on next page.

Remember these are the MR and MC graphs that match the TR and TC graphs from the previous page.
Hold them next to each other and practice seeing the connections.
So, for example, you already know what q = 46 represents.

Answers:

1. **MR(6) = 4 dollars/car.**
   There will be $4.00 in additional revenue in going from selling 600 cars to 601 cars.
   That is, the 601st car will bring in $4.00 in additional revenue.
2. **MC(6) = 5.6 dollars/car.**
   There will be $5.60 in additional revenue in going from producing 600 cars to 601 cars.
   That is, the 601st car will result in $5.60 in additional costs.
3. **MR(8) = 4 dollars/car. MC(8) = 4 dollars/car.**
   The 801st car will bring in $4.00 in additional revenue and it will cost $4.00 to produce.
4. **MC(30) = 0.2 dollars/car.**
   The 3001st car will result in $0.20 in additional costs.
5. **MR(30) = 4 dollars/car.**
   The 3001st car will bring in $4.00 in additional revenue.
6. **MR(46) = 4 dollars/car. MC(46) = 4 dollars/car.**
   The 4601st car will bring in $4.00 in additional revenue and it will cost $4.00 to produce.

Concerning Profit: Recall **MP(q) = MR(q) – MC(q).**

At q = 6: **MR(6) < MC(6), <u>profit will decrease</u> from 600 to 601 cars!**
Precisely, MP(6) = MR(6) – MC(6) =4 – 5.6 = -1.4 dollars/car.
If you go from producing and selling 600 cars to 601 cars, you will lose $1.40 in profit.
Profit is going down!

At q = 8: **MR(8) = MC(8), profit will stay the same from 800 to 801.**
Precisely, MP(8) = MR(8) – MC(8) =4 – 4 = 0 dollars/car.
If you go from producing and selling 600 cars to 601 cars, your profit will not change.
Since profit was decreasing before 8 and increasing after 8, that means that q = 8 corresponds to the **minimum profit (the worst loses)**. Go back and look at the first graph and you'll see this.

At q = 30: MR(30) > MC(30), <u>profit will increase</u> from 3000 to 3001 cars!
Precisely, MP(30) = MR(30) – MC(30) =4 – 0.2 = 3.8 dollars/car.
If you go from producing and selling 3000 cars to 3001 cars, your profit will go up $3.80.
Profit is going up!

At q = 46: MR(46) = MC(46), profit will stay the same from 4600 to 4601 cars.
If you go from producing and selling 4600 cars to 4601 cars, your profit will not change.
Since profit was increasing before 46 and decreasing after 46, that means that q = 46 corresponds to the **maximum profit.** Go back and look at the first graph and you'll see this.