SUPPLY & DEMAND - NOTES

Unit 4 – Modeling a Business

# HOW DO MANUFACTURERS DECIDE THE QUANTITY OF A PRODUCT THEY WILL PRODUCE?

- Economists often call a new, unnamed product a **widget**. If a business develops a new product, the number of items they need to manufacture is a key question they need to address.
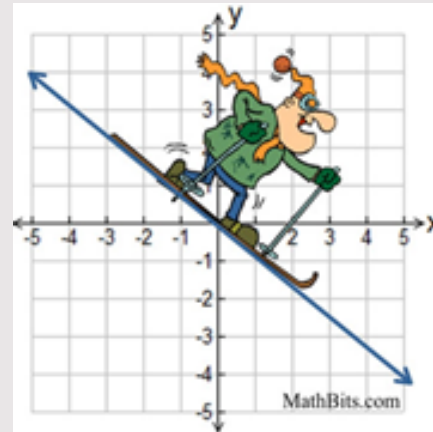

- To answer this question, graphs that compare **the price of the item (p) and the quantity sold (q)** are used.

- A **demand function** shows that the lower the price, the larger the quantity of items are needed to meet the demand. As the price increases, the quantity of items needed decreases.
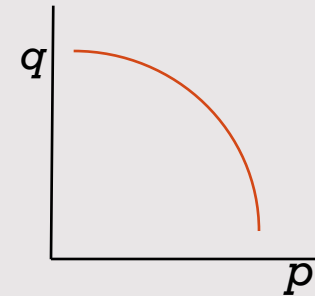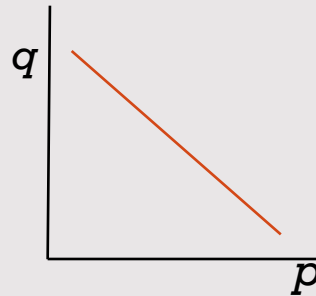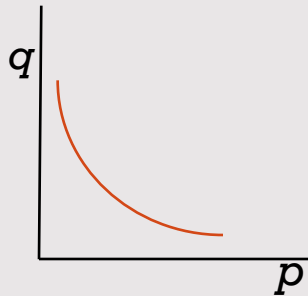
- The slopes of demand functions are **negative**.

- A **supply function** shows that when a widget sells for a high price, manufacturers may produce more items to maximize profit. If it sells for a lower price, manufacturers may produce less.
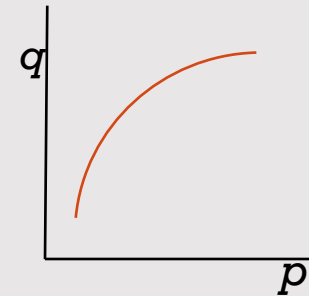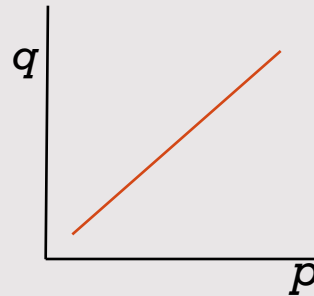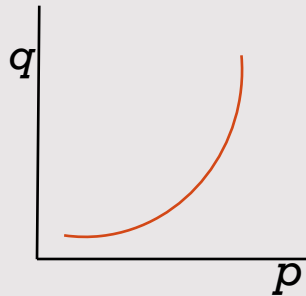
- The slopes of supply functions are **positive**.

Positive Slope

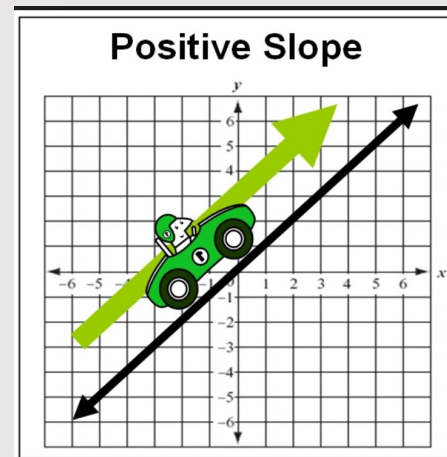- Remember that manufacturers sell their items to retailers, not to the general public. The price the manufacturer charges the retailer is the **wholesale price**.

- Retailers increase the price a certain amount, called **markup**, so the retailer can make a profit. The price the retailer sells the item to the public for is the **retail price**.

▪ The supply and demand functions are often graphed together on the same graph to help determine the price of an item and how much of the item to make.

Situation #1: Price = $3
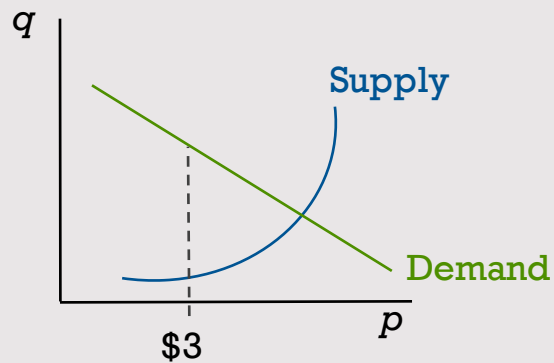
If an item is priced too low, manufacturers won't be able to meet the demand. (This is bad because they're not making as much money as they could be making. This is called a **shortage**.

- The supply and demand functions are often graphed together on the same graph to help determine the price of an item and how much of the item to make.

Situation #2: Price = $7

q

Supply

Demand

$7 p
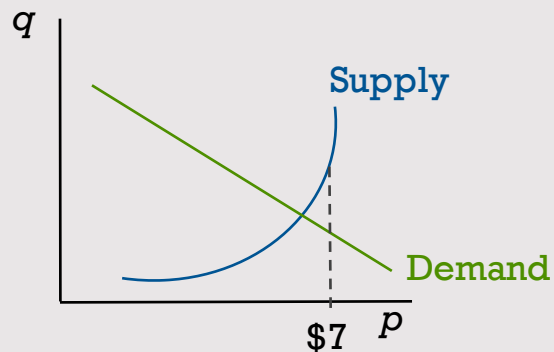
If an item is priced too high, manufacturers will have too much of that item and will not be able to sell it. (This is bad because they wasted money creating unwanted products). This is called a **surplus**.

- The supply and demand functions are often graphed together on the same graph to help determine the price of an item and how much of the item to make.
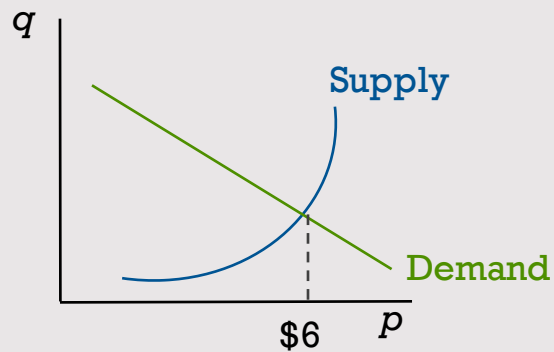
Situation #3: Price = $6

When the supply and demand functions intersect, everyone is happy. ☺ This is called **equilibrium**.

EXAMPLES

1) A company sells teddy bears at a wholesale price of $23.00. If a store marks this up at 110%, what is the retail price?

Step 1: Find the markup amount

markup = wholesale price x markup rate

markup = $23.00 x 1.10

markup = $25.30

Step 2: Find the retail price

retail price = wholesale price + markup

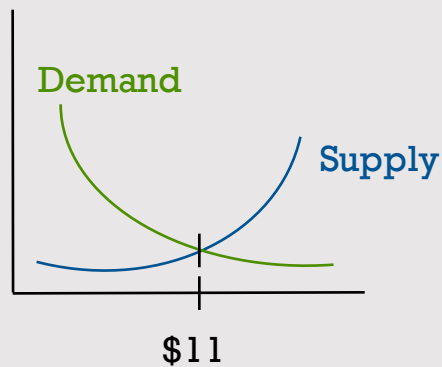retail price = $23.00 + $25.30

retail price = $48.30

EXAMPLES

2) The graph below shows the supply and demand curves for a widget. Explain what happens if the price is set at $9.00

Demand

Supply

$11

Since $9.00 is less than the equilibrium price, demand will exceed supply. There will be a shortage.
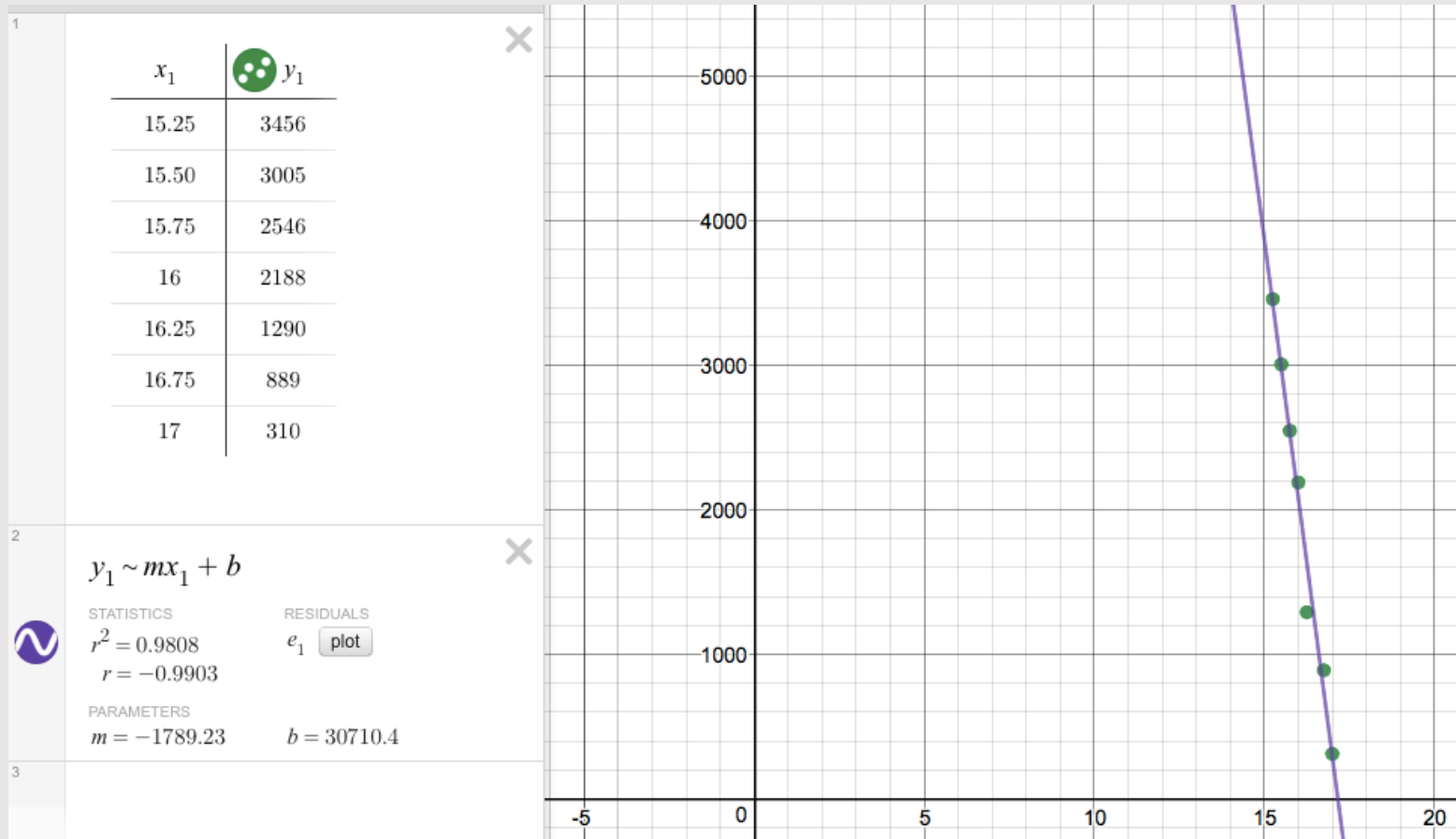
EXAMPLES

3) A company wants to base the price of its product on the demand for that product, as well as the expenses to make it. It takes a poll of several of its current retailers to find out how many widgets they would buy at different wholesale prices. The results are shown in the table. The company wants to use linear regression to create a demand function. What is the equation of the demand function?

Wholesale Price ($) ($p$)	Quantity Demanded by Retailers (in hundreds) (q)
13.00	744
13.50	690
14.00	630
14.50	554
15.00	511
15.50	456
16.00	400
16.50	300
17.00	207
17.50	113

Using desmos...

x_1	y_1
15.25	3456
15.50	3005
15.75	2546
16	2188
16.25	1290
16.75	889
17	310

$$y_1 \sim mx_1 + b$$

STATISTICS

$r^2 = 0.9808$

$r = -0.9903$

RESIDUALS

e_1 [plot]

PARAMETERS

$m = -1789.23$ $b = 30710.4$

Our equation is: $y = -1789.23x + 30{,}710.4$