## Algebra of Supply and Demand: Practice problems

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## 1. Finding equilibrium price and quantity

Suppose a market can be represented by the following equations:
Demand: P=100-5Q
Supply: P = $51+2 \mathrm{Q}_{\mathrm{s}}$
Identify the $y$-intercept $\qquad$ and slope $\qquad$ of the demand function.

Identify the $y$-intercept $\qquad$ and slope $\qquad$ of the supply function.

Solve for the market equilibrium quantity ( $Q^{*}$ ) and market equilibrium price ( $\mathrm{P}^{*}$ ):

Fill in the blanks for the graph at right:
( $A=$ demand curve $y$-intercept. $B=P^{*}, C=$ supply curve $y$-intercept, $D=Q^{*}, E=$ Demand curve $x$-intercept -- found by setting $P=0$ in the demand function).

## 2. Shift in demand

Our supply function remains the same: $\mathrm{P}=51+2 \mathrm{Q}_{s}$ Our new demand function is $P=86-5 Q_{D}$

Identify the $y$-intercept $\qquad$ and slope $\qquad$ of the demand function.

Has demand increased or decreased? How can you tell?
Solve for the new market equilibrium $\mathrm{P}^{*}$ and $\mathrm{Q}^{*}$ :

Sketch the change in demand on the graph at right. Use correct numbers to label the $y$-intercepts and old and new prices and quantities.

## 3. Shift in supply

Our demand function is the original $P=100-5 Q_{\text {o }}$
Our new supply function is $\mathrm{P}=\mathbf{2 8}+\mathbf{3 0}$
Identify the $y$-intercept $\qquad$ and slope $\qquad$ of the supply function.

Has supply increased or decreased? How can you tell?
Solve for the new market equilibrium $\mathrm{P}^{*}$ and $\mathrm{Q}^{*}$ :


## ANSWERS!!

1. Finding equilibrium price and quantity

Demand: $P=100-5 Q_{D}$
Supply: $\mathrm{P}=51+2 \mathrm{Q}_{\mathrm{s}}$

Demand function $Y$-intercept= 100 and slope $=\mathbf{- 5}$ Supply function $y$ intercept $=51$ and slope $=2$.

Market equilibrium quantity ( $\mathrm{Q}^{*}$ ) and market equilibrium price ( $\mathrm{P}^{*}$ ):
$100-5 Q=51+2 Q$
$49=7 Q$
Q = 7
$P=100-5(7)=65$


## 2. Shift in demand

Supply: $P=51+2 Q s$
New demand $P=86-5 Q_{D}$

Demand function $\mathbf{y}$-intercept $=86$ and slope $=\mathbf{- 5}$
Demand has decreased because the $y$-intercept is lower.
Solve for the new market equilibrium $P^{*}$ and $Q^{*}$ :
$51+2 Q=86-5 Q$
$7 \mathrm{Q}=35$
Q = 5
$P=51+2(5)=61$


## 3. Shift in supply

Demand is the original $P=100-5 Q_{D}$
New supply function is $P=\mathbf{2 8}+\mathbf{3 Q}$
Supply $y$-intercept $=28$ and slope $=3$ (notice that the slope got steeper).
Supply has increased - the lower y-intercept indicates a rightward shift of the quantity supplied at any price.
$100-5 Q=28+3 Q$
$72=8 Q$
Q = 9
$\mathbf{P}=100-5(9)=55$


