WAGE WAR

lesson guide

Driving Question	Total Time
How much should companies pay their employees?	120 minutes

Real-World Takeaways

- As an hourly wage increases, more people want the job, but companies are willing to hire fewer employees.
- The federal minimum wage is currently $7.25. At this wage, though, some companies may not be able to hire as many employees as they need. In this case, they will pay a higher-than-minimum wage.
- Many people working at or near minimum wage still require additional government assistance. As a result, many have called for a higher minimum wage, e.g. $15/hour. While this would benefit people who earn the higher wage, it might harm workers who lose their jobs because of layoffs.
- Economists disagree about the consequences of raising the minimum wage.

Math Objectives

- Given a table of values, calculate the change in y per change in x (i.e. the slope); interpret the slope in context
- Solve a system of linear equations to determine the point at which y = x
- For a given context, interpret what it means for the value of x to be below, above, and equal to the intersection value

Lesson at a Glance

Preview		Watch a Wendy's training video and discuss how many students would be willing to work at different hourly wages	10 minutes
Act One	1	Use a table of values to discuss how supply of and demand for labor change as the hourly wage increases. Calculate change in supply and demand for each dollar increase of wage	25 minutes
	2	Use a table, graph, or equation to predict supply and demand at minimum wage. Recognize that $7.25/hour is not high enough for restaurant to hire as many workers as it wants	25 minutes
	3	Solve a system of linear equations to find the wage at which supply = demand	20 minutes
Act Two	4	Consider the impact a $15/hour minimum wage would have on supply and demand for labor. Recognize that increasing the minimum wage helps some workers and harms others	20 minutes
	5	Discuss possible outcomes of increasing the minimum wage on companies, workers, and consumers	20 minutes

P Ask students whether they've ever had a job and whether they received any special training beforehand. Some may have worked as a lifeguard over the summer, while others may work at a fast-food restaurant after school. Once students have discussed their work experiences, explain that companies often use videos to train new employees, and that you're going to share with them a 1980s rap video that Wendy's used to teach employees how to properly pour cold drinks:

Soft drinks, lemonade, water, cold tea: It's up to you, it's up to me.
Cold drinks, come in for a cup. Gotta know the size before you fill it up.
Biggie, medium, small, kids' meal. Keep it straight; it's a good deal.
Use the scoop to fill with ice. Never use the cup. Take my advice!...

After students watch the video, give them a minute or two to write down as many drink-pouring requirements as they can remember. Once everyone shares their responses, ask them to consider how much Wendy's would have to pay per hour for *them* to be willing to work there.

Ask students to raise their hands if they'd be willing to work for some crazy-high wage, say $40/hour. Next, start lowering the wage – *$39/hour, $38/hour, etc.* – and tell students to keep their hands raised until you reach a wage that would be too low. When the last person puts his/her hand down, have students discuss what they noticed about the relationship between the wage and the number of people willing to work.

Discussion Questions

1. *Have you ever had a job after school? If so, did you receive any special training?*
2. *(After watching the Wendy's video): As a class, how many drink-pouring requirements can you remember?*
3. *On a piece of paper, write down how much would Wendy's have to pay per hour for you to be willing to work there. Raise your hand if you'd be willing to work for $40/hour. $39? $38?...$0?*
4. *As the wage went down, what happened to the number of students were willing to work?*

Key Takeaway(s)

- People's willingness to work depends in part on how much they get paid. The more a company pays, the greater the number of people who will want the job.

1 Companies from McDonald's to Walmart rely on hourly workers to prepare food, work as cashiers, etc. Imagine a business opens in a new city and is hiring. The following table shows how many people would want to work at three different hourly wages (supply), and how many the company would want to hire (demand).

As the wage increases, how do the supply and demand change, and will the restaurant be able to hire as many workers as it wants at each hourly wage?

		$3/hour	$5/hour	$12/hour
Supply:	# individuals who want job	72 people	120 people	288 people
Demand:	# employees company wants to hire	256 people	240 people	184 people

As the wage goes up, more people want the job, but the restaurant is willing to hire fewer workers. More specifically, when the wage increases from $3 to $5, supply increases by 48 workers and demand decreases by 16 workers. This implies that for every dollar the wage increases, supply increases by 24 workers (+24 workers/dollar) and demand decreases by 8 workers (–8 workers/dollar).

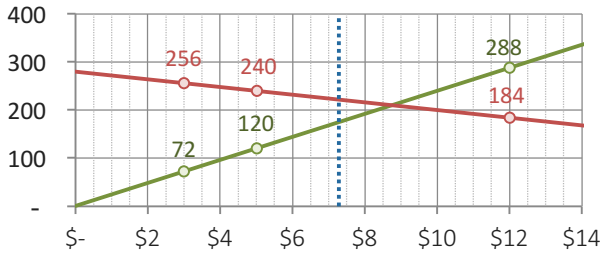
At $3/hour, the restaurant wants 256 workers but only 72 people are willing to apply for the job. This means the restaurant won't be able to hire as many workers as it wants. The same is true at $5/hour. However, at $12/hour, the company will be able to hire enough workers. In fact, at this wage more people will apply for a job than the company wants.

Key Insights & Guiding Questions

- As the wage increases, more people want the job, but the restaurant wants to hire fewer workers.
  In your groups, look at the table. Even before calculating anything, what do you notice? Write down as many observations as you can.
- At lower wages, the restaurant can't hire enough workers. At higher wages, more people apply than are needed.
  If you were the restaurant manager, would you be able to hire enough workers at each wage?
- For every $1 that the wage increases, 24 more people want to work, and the restaurant wants 8 fewer workers.
  When the wage jumps from $3/hour to $5/hour, how many more people are willing to work? How many people seem to be added per hour?
  When the wage jumps from $3/hour to $5/hour, how many more people does the company want to hire? How does it change per hour?
  If the restaurant increased the hourly wage by $1, how would that affect supply and demand?

2 In the United States, the federal minimum wage is $7.25/hour; this is the lowest amount an employer can legally pay its workers each hour. If the company only pays minimum wage, can it hire as many workers as it wants?

Approach 1: Estimate from Graph



At $7.25/hour, it looks like the supply is below the demand. I don't think it'll be able to hire as many workers as it wants.

Approach 2: Extend Table in $1 Increments

When wage increases by $1, supply increases by 24 workers and demand decreases by 8 workers.

Wage	$3	$5	$6	$7	$8	$9
Supply	72	120	144	168	192	216
Demand	256	240	232	224	216	208

At $8, supply < demand. If the restaurant can't hire enough workers at $8/hour, it definitely can't at $7.25/hour. (It can at $9, though, so the right wage is somewhere between $8 and $9.)

Approach 3: Extend Table to $7.25

When wage increases by $1, supply increases by 24 workers and demand decreases by 8. When wage increases by $0.25, supply increases by 6 workers and demand decreases by 2.

Wage	$3	$5	$7	$7.25	$7.50
Supply	72	120	168	174	180
Demand	256	240	224	222	220

At $7.25/hour, the restaurant can't hire enough workers.

Approach 4: Write and Evaluate Linear Equations

Supply = mx + b
m = +24 workers per $1
b = supply at wage of $0

$3: supply = 72 workers
$2: supply = 48 workers
$1: supply = 24 workers
$0: supply = 0 workers

Supply = 24x
Supply @ $7.25/hr.
24(7.25) = 174 workers

Demand = mx + b
m = −8 workers per $1
b = demand at wage of $0

$3: demand = 256 workers
$2: demand = 264 workers
$1: demand = 272 workers
$0: demand = 280 workers

D = 280 − 8x
Demand @ $7.25/hr.
280 −8(7.25) = 222 workers

Teaching Tips

Instead of prescribing a specific approach, consider allowing students to come up with their own. As you move around the room, look for the representations/strategies above and have students present them to the class. This will help them recognize the connections between graphs, tables, and equations.

Key Insights & Guiding Questions

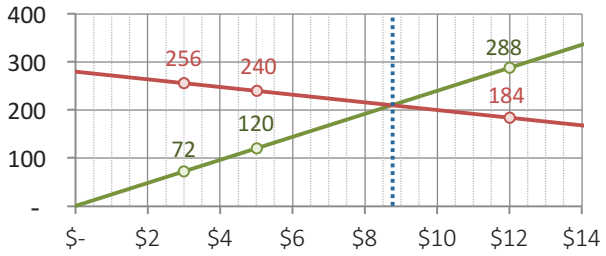
- From before, we know that when the wage increases by $1, supply increases by 24 workers and demand decreases by 8 workers. We can use this to find the supply and demand at (or near) $7.25/hour.
  Based on what you know from before, how can you determine whether $7.25 is a high enough wage to offer?
- At $7.25/hour, supply < demand. This means the restaurant will not be able to attract as many workers as it wants. We can use a graph to compare the height of the lines at $7.25, or use the table or equation to find the exact values.
  At $7.25/hour, how many people are willing to take the job, and is this enough from the restaurant's perspective?

Deeper Understanding Questions

- *How many different ways can you come up with to demonstrate that $7.25/hour isn't a high enough wage?*

3 Find the lowest wage at which the restaurant will be able to attract as many employees as it wants. Do you think this is the amount the restaurant should pay its employees? Why or why not?

Approach 1: Estimate from Graph



It looks like the supply and demand lines intersect around $8.75/hour. At this wage, supply appears to equal demand.

Approach 2: Use Table to Find When Supply = Demand

Wage	$7	$8	$8.25	$8.50	$8.75	$9
Supply	168	192	198	204	210	216
Demand	224	216	214	212	210	208

At $8.75, supply = demand.

Approach 3: Solve Linear Equations

Supply = Demand
$24d = 280 - 8d$
$32d = 280$
$d = 8.75$

Check:
Supply at $8.75/hour: $24(8.75) = 210$ workers
Demand at $8.75/hour: $280 - 8(8.75) = 210$ workers

Answers will vary about whether the restaurant should pay $8.75/hour. Possible response:

At $8.75, the number of people who want the job is exactly the same as the number of workers the restaurant wants to hire. At this wage, the restaurant won't spend more than it needs to, and 210 people will get jobs. On the other hand, it might be difficult for workers to survive on $8.75. In this case, maybe it would be better to pay a higher wage.

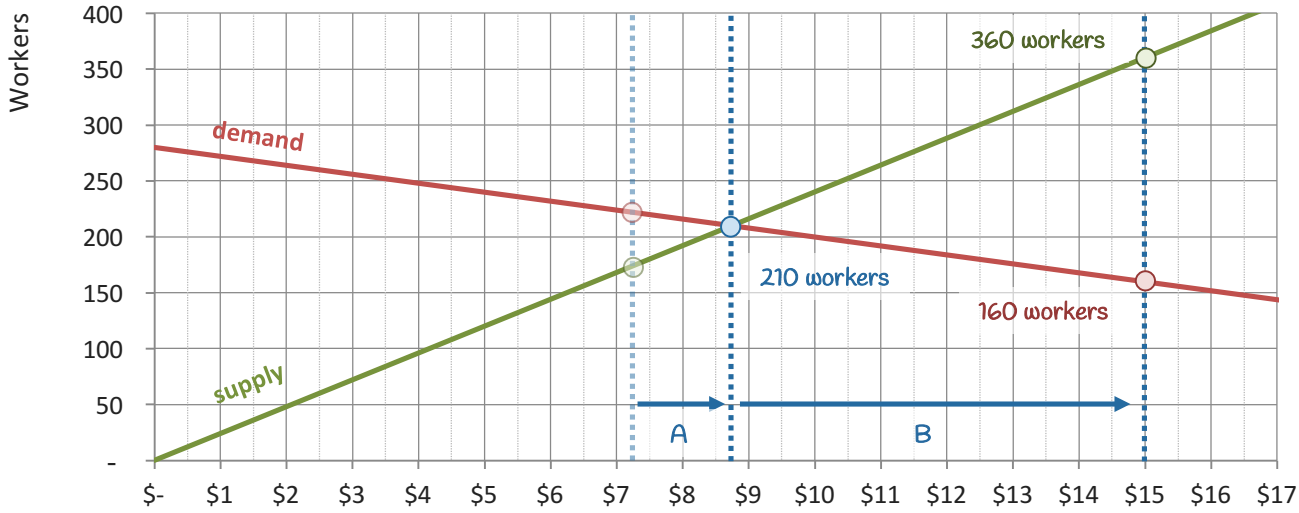
Key Insights & Guiding Questions

- The wage at which supply = demand represents the least a restaurant can pay and still hire the workers it wants. On the graph, this is the price where the lines intersect. In the table, it's where supply and demand are the same. Using equations, it's where the expression or supply equals the expression describing demand.
  To determine the lowest wage the company could pay and still hire enough workers, what would you look for?
- $8.75 is the lowest wage at which the restaurant can attract as many workers it wants.
  When does supply = demand?
- In deciding how much to pay, though, it might take into account other factors, as well, such as whether $8.75 is enough for its workers to live on.
  If you were the manager of the restaurant, how would you decide what wage to pay? Would you offer $8.75/hour?

Deeper Understanding Questions

- *How many different ways can you come up with for finding the wage at which supply = demand?*
- *In the second step of the equation, $32d = 280$, what does the 280 represent? What does the 32 represent?*
  At $0/hour, the company would want to hire 280 workers, but nobody would be willing to work. The 280 represents the initial difference in workers. For each additional dollar of wage, the supply increases by 24 workers and the demand decreases by 8 workers. The 32 represents the net change with each additional dollar; in other words, it's effectively how fast the supply is "catching up" to the demand. If demand starts 280 workers ahead and supply closes the gape by 32 workers with each dollar, it'll take 8.75 dollars for supply to fully "catch up" to demand.

4 Millions of Americans work full-time at or near minimum wage. Still, many of them struggle to afford rent, childcare, and other expenses, and rely on public assistance programs such as food stamps and Medicaid. To help these "working poor," some people think the government should raise the minimum wage from $7.25/hour to $15/hour. If this happened, how do you expect it would impact workers at the restaurant?



When the minimum wage is $7.25/hour, the restaurant can't hire enough employees so will raise the wage to $8.75 by itself (A). In this case, since the minimum wage is below the "market" wage, it doesn't really have much of an impact on employment.

However, when the minimum wage is above the market wage, it does have an impact. At $8.75/hour, 210 people want the job and the restaurant hires all 210 of them. When the wage increases to $15/hour (B), the number of people who want to work increases to 360 ...but the number the restaurant wants decreases to 160. For the people who keep their job, the minimum wage increase is helpful; they make much more money than they did before. For the 50 who lose their jobs, though, it's a different story. Unless they can find work elsewhere, the minimum wage increase may be harmful.

Key Insights & Guiding Questions

- Even though the restaurant is only legally required to pay $7.25/hour, it will offer more than this – $8.75 – to attract enough workers. At this wage (commonly referred to as the "**market wage**"), supply = demand = 210 workers. When the minimum wage is higher than the **market wage**, the restaurant will respond by hiring fewer workers.
  When the minimum wage is $7.25/hour, how many people will work at the restaurant and how much will they earn?
- At $15/hour, 360 workers would want employment, but the restaurant will hire only 160.
  If the government increases the minimum wage to $15/hour, how will this affect supply and demand?
- According to the model, increasing the minimum wage has both positive and negative consequences. It's beneficial for employees who make the higher wage, but harmful to those who lose their jobs because of layoffs.
  Is an increase in the minimum wage good for everyone? If not, whom might it be bad for?

5 Watch the *PBS NewsHour* clip in which two economists debate the impact of raising the minimum wage. Then circle the effect you think a higher wage would have on each outcome below: *increase*, *decrease*, *no change*, or *not sure*. How would you summarize the upsides and downsides of increasing the minimum wage?

Restaurant 	Skill-level/productivity of average employee	⬆	⬇	🔄	?
	No. of months employees stay at restaurant	⬆	⬇	🔄	?
	Use of technology (e.g. self-serve kiosks) to replace workers	⬆	⬇	🔄	?
Workers 	Likelihood of finding a job	⬆	⬇	🔄	?
	If employed, ability to afford living expenses	⬆	⬇	🔄	?
	If unemployed, ability to afford living expenses	⬆	⬇	🔄	?
Society 	Average price of item at store (e.g. hamburger, shirt, etc.)	⬆	⬇	🔄	?
	Total amount government spends on benefits	⬆	⬇	🔄	?
	Income inequality in United States	⬆	⬇	🔄	?

Answers about effects will vary.

Teaching Tips

In addition to the substance of the economists' arguments, encourage students to pay attention to their style, too. While they clearly disagree, the economists are very respectful of one another; they take one another's arguments seriously, and they disagree with the *point* rather than the *person*. Given the coarseness of modern media, this video serves as a good example of thoughtful, civil debate.

Key Insights & Guiding Questions

- Even after decades of research, economists disagree about the effects of increasing the minimum wage. For instance, some believe increasing the wage will cause employment to go down, while others believe higher wages cause workers to buy more goods…which in turn causes employment to go up.
  In the PBS video, are there areas on which the economists agree? Where do they disagree?

- Anyone – professor, politician, pundit, etc. – who says the consequences of increasing the minimum wage are "clear" is mistaken. Economists have been studying it for decades, and they still disagree. The issue is complicated!
  Many people think the question about whether or not to raise the minimum wage is easy. Do you agree?