**Training Header Sheet with Change Log Form**

# Kentucky Math Operational

# Grade 10
# Line Graph Auto Repair Company
# MA1020185
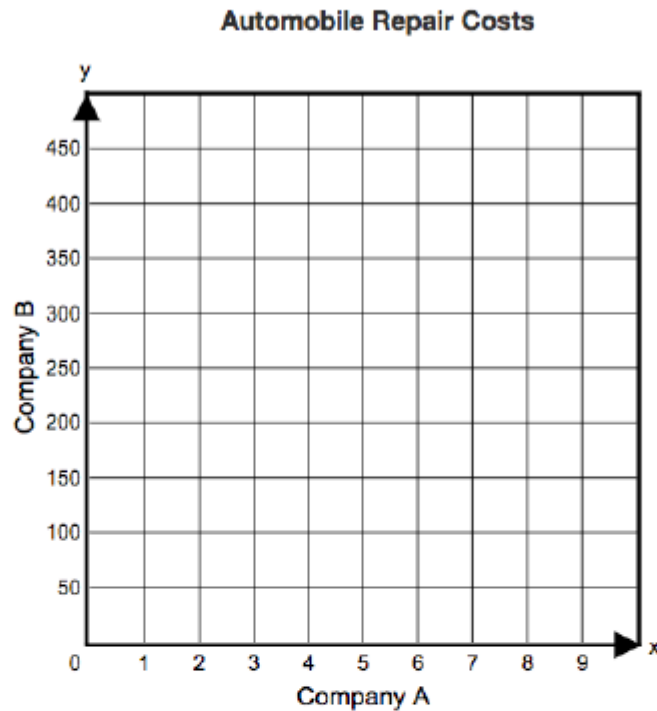
# Anchor Set

| Date | Comments | Version |
|---|---|---|
| 2.2022 | Initial Operational Training Set | Set A |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

# Prompt

## Part A

Cassidy compares the costs of two different automobile repair companies. Company A charges $200 for 2 hours of work and $275 for 5 hours of work. Company B charges $200 for 3 hours of work and $350 for 6 hours of work. Graph the system of equations that relates the hours of work, $x$, to the cost, $y$.

To graph each line, select two points on the coordinate plane. A line will be drawn through the points.

**Automobile Repair Costs**

Company A

Company B



## Part B

Describe how the equations of the lines on the graph relate to the situation. Include the equations in your descriptions.

Describe how the intersection of the lines on the graph relates to the situation. Include the intersection point in your description.

Enter your descriptions in the space provided.

- ▸ Math symbols
- ▸ Relations
- ▸ Geometry
- ▸ Groups
- ▸ Trigonometry
- ▸ Statistics
- ▸ Greek

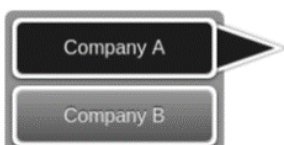| Rubric |
|---|
| The total item score is the sum of the points awarded in the Machine-scored and Human-scored parts. |
| **Machine Scoring** |

| | |
|---|---|
| **Score Point 1** | **Part A**<br><br>Student response is the graph of the equation y=25x+150 for Company A, and the graph of the equation y=50x+50 for Company B. |
| **Score Point 0** | Student response is incorrect. |

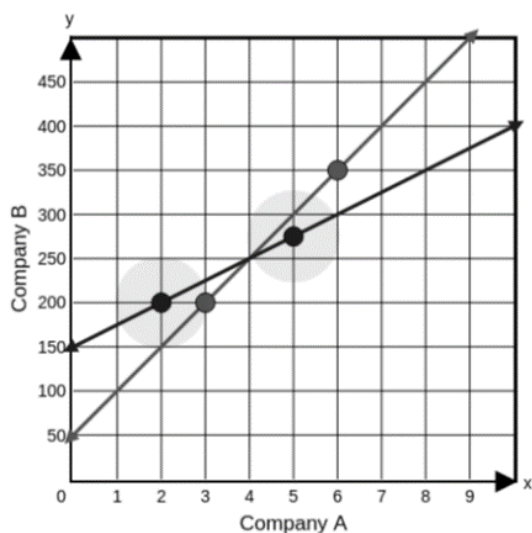| Human Scoring | |
|---|---|
| **Score Point 3** | Student scores a total combined score of 3 points. |
| **Score Point 2** | Student scores a total combined score of 2 points. |
| **Score Point 1** | Student demonstrates a minimal understanding of solving a word problem leading to an inequality and the graph of the solution system of equations and interpreting it in the context of the problem. |
| **Score Point 0** | Student response is insufficient to demonstrate a grade-appropriate, relevant understanding of the task. |
| **Score Points** | **Part B**<br><br>• Score 3 points:<br>  ○ Correct equations, point of intersections, and descriptions for the equations and point of intersection as it relates to the situation.<br><br>• Score 2 points:<br>  ○ Correct equations, point of intersection, and descriptions, however one of the descriptions may be vague or missing information.<br><br>  **OR**<br><br>  ○ A correct interpretation of the equations and point of intersection is shown in the description, but one of the equations or one coordinate of the intersection point contains an error.<br><br>• Score 1 point:<br>  ○ Correct equations and point of intersection with no description.<br><br>  **OR**<br><br>  ○ A correct interpretation of the equations and point of intersection is shown in the description, but the equations or the intersection point is incorrect. |
| **Correct Answer** | **Part B**<br><br>The equation $y=25x+150$ represents the cost, *y,* for *x* hours of work by Company A. The slope or coefficient of x, 25, represents the cost for each additional hour and the y-intercept or constant value represents the initial cost was $150. The equation $y=50x+50$ represents the cost, *y,* for x hours of work by Company B. The slope or coefficient of x, 50, represents the cost for each additional hour and the y-intercept or constant value represents the initial cost was $50<br><br>The intersection of the lines at (4, 250) is the point where both companies charge the same amount. |

**Part A**

Cassidy compares the costs of two different automobile repair companies. Company A charges $200 for 2 hours of work and $275 for 5 hours of work. Company B charges $200 for 3 hours of work and $350 for 6 hours of work. Graph the system of equations that relates the hours of work, $x$, to the cost, $y$.

To graph each line, select two points on the coordinate plane. A line will be drawn through the points.

Company A

Company B

**Automobile Repair Costs**



**Part B**

Describe how the equations of the lines on the graph relate to the situation. Include the equations in your descriptions.

Describe how the intersection of the lines on the graph relates to the situation. Include the intersection point in your description.
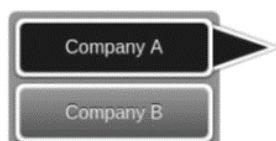
Enter your descriptions in the space provided.

Company A charges 25 dollars for every hour of work along with a 150 dollar initial fee. This is shown by the equation $y = 25x + 150$. Company B charges 50 dollars for every hour at work with a 50 dollar initial fee. The equation for this line on the graph is $y = 50x + 50$. The intersection point, (4, 250), shows when company A and company B charge the same amount of money for the same number of hours. This is known as a breakeven point. After this point, it is more expensive to hire company B.
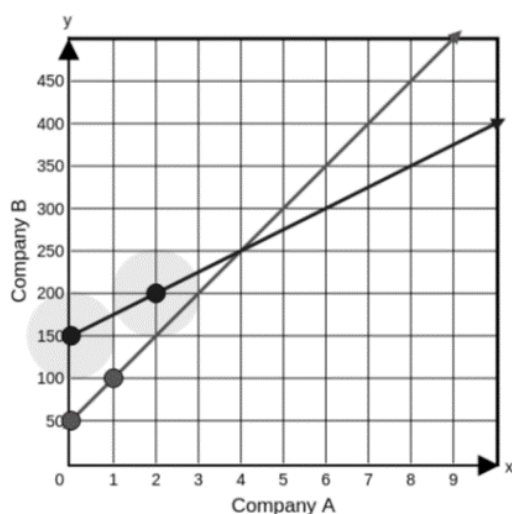
**Part A**

Cassidy compares the costs of two different automobile repair companies. Company A charges $200 for 2 hours of work and $275 for 5 hours of work. Company B charges $200 for 3 hours of work and $350 for 6 hours of work. Graph the system of equations that relates the hours of work, $x$, to the cost, $y$.

To graph each line, select two points on the coordinate plane. A line will be drawn through the points.

Company A
Company B

**Automobile Repair Costs**



**Part B**

Describe how the equations of the lines on the graph relate to the situation. Include the equations in your descriptions.

Describe how the intersection of the lines on the graph relates to the situation. Include the intersection point in your description.

Enter your descriptions in the space provided.

The equations of the lines on the graph are as follows: company A is $y = 25x + 150$, and company B is $y = 50x + 50$. In relation to the situation, they show that company A charges $150 up front and charges $25 per hours, while company B charges $50 up front and $50 per hour. The intersection of the lines is at (4,250), which relates to the situation in that both companies will be charging the same amount of money after 4 hours, but after that company A will be cheaper than company B, as the amount of money company B charges increases faster than company A, despite company A initially being more expensive.
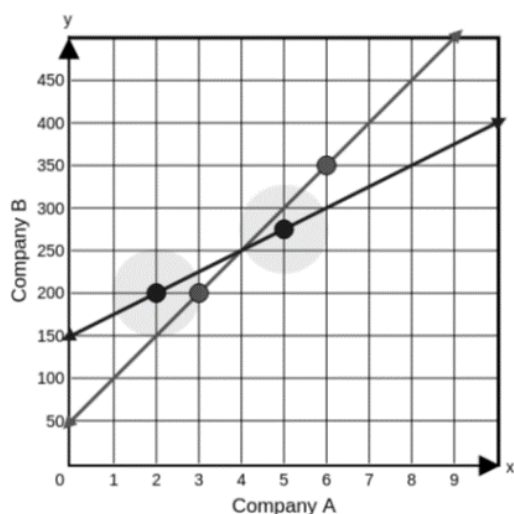
## Part A

Cassidy compares the costs of two different automobile repair companies. Company A charges $200 for 2 hours of work and $275 for 5 hours of work. Company B charges $200 for 3 hours of work and $350 for 6 hours of work. Graph the system of equations that relates the hours of work, $x$, to the cost, $y$.

To graph each line, select two points on the coordinate plane. A line will be drawn through the points.

Company A ►

Company B

**Automobile Repair Costs**



## Part B

Describe how the equations of the lines on the graph relate to the situation. Include the equations in your descriptions.

Describe how the intersection of the lines on the graph relates to the situation. Include the intersection point in your description.

Enter your descriptions in the space provided.

The line for Company A shows that there is a higher flat charge than there is for Company B, but Company B charges more per hour of labor. This can be seen in the equations, with Company A being represented by the equation $y = 25x + 150$, and Company B represented by the equation $y = 50x + 50$. The intersection at (4,250) shows that it would be cheaper to use Company B if the work takes less than 4 hours. If the work takes exactly 4 hours, the costs are the same, and if the work takes more than 4 hours, it would be cheaper to use Company A.
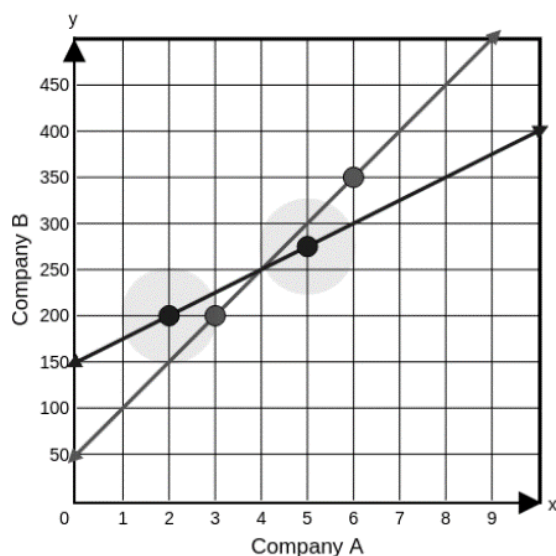
## Part A

Cassidy compares the costs of two different automobile repair companies. Company A charges $200 for 2 hours of work and $275 for 5 hours of work. Company B charges $200 for 3 hours of work and $350 for 6 hours of work. Graph the system of equations that relates the hours of work, $x$, to the cost, $y$.

To graph each line, select two points on the coordinate plane. A line will be drawn through the points.

Company A

Company B

**Automobile Repair Costs**



## Part B

Describe how the equations of the lines on the graph relate to the situation. Include the equations in your descriptions.

Describe how the intersection of the lines on the graph relates to the situation. Include the intersection point in your description.

Enter your descriptions in the space provided.

Company A charges more at first but once you hit 4 hours of work, Company B starts to have a higher rate than Company A because they are increasing at a faster rate for their sevices. Company charges $25 dollars per every hour with a fixed start of $150, aka $y = 25x + 150$. While Company B charges $50 dollars per hour with a fixed start of $50, aka $y = 50x + 50$.
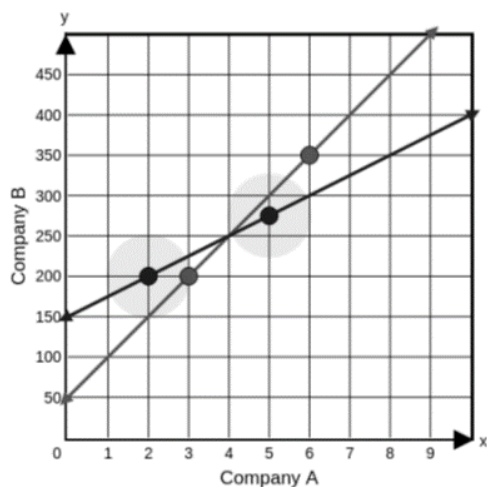
**Part A**

Cassidy compares the costs of two different automobile repair companies. Company A charges $200 for 2 hours of work and $275 for 5 hours of work. Company B charges $200 for 3 hours of work and $350 for 6 hours of work. Graph the system of equations that relates the hours of work, $x$, to the cost, $y$.

To graph each line, select two points on the coordinate plane. A line will be drawn through the points.

Company A

Company B

**Automobile Repair Costs**



**Part B**

Describe how the equations of the lines on the graph relate to the situation. Include the equations in your descriptions.

Describe how the intersection of the lines on the graph relates to the situation. Include the intersection point in your description.

Enter your descriptions in the space provided.

> The lines show how much it costs for each company regarding the number of hours they have worked. The equation of Company A is $y = 25x + 150$ and the equation for Company B is $y = 50x + 50$. So for every hour in company a, they charge 25 more dollars while company b charges 50. Company a has a baseline price of 150 while company b has a baseline price of 50.
>
> The intersection of the graph shows at how many hours do you pay the same for both companies. It also shows that before the intersection company b is cheaper and after the intersection company a is cheaper.
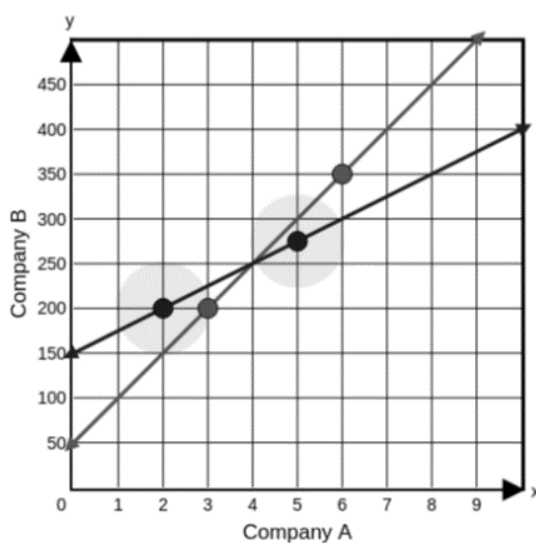
**Part A**

Cassidy compares the costs of two different automobile repair companies. Company A charges $200 for 2 hours of work and $275 for 5 hours of work. Company B charges $200 for 3 hours of work and $350 for 6 hours of work. Graph the system of equations that relates the hours of work, $x$, to the cost, $y$.

To graph each line, select two points on the coordinate plane. A line will be drawn through the points.

Company A

Company B

**Automobile Repair Costs**



**Part B**

Describe how the equations of the lines on the graph relate to the situation. Include the equations in your descriptions.

Describe how the intersection of the lines on the graph relates to the situation. Include the intersection point in your description.

Enter your descriptions in the space provided.

> The eqution for Company A is $y = 12.5x + 150$.
>
> The equation for Company B is $y = 50x + 50$.
>
> Company B is cheaper for less than 4 hours of work.
>
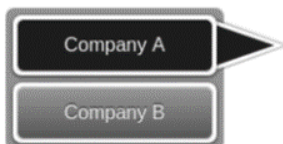> Company A is cheaper for more than 4 hours of work.
>
> Company A and B charge the same for 4 hours of work, which would cost $250.
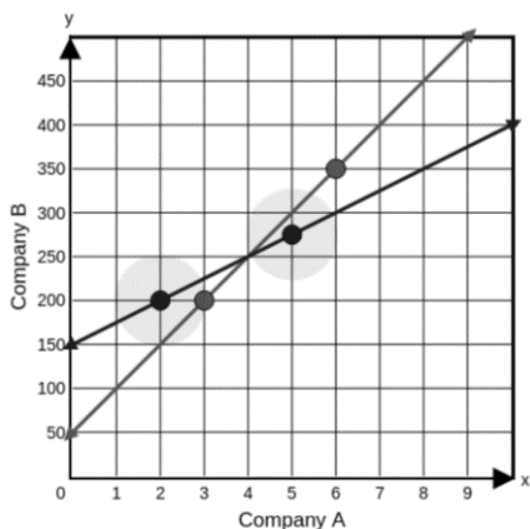>
> The lines intersect at (4, 250)

**Part A**

Cassidy compares the costs of two different automobile repair companies. Company A charges \$200 for 2 hours of work and \$275 for 5 hours of work. Company B charges \$200 for 3 hours of work and \$350 for 6 hours of work. Graph the system of equations that relates the hours of work, $x$, to the cost, $y$.

To graph each line, select two points on the coordinate plane. A line will be drawn through the points.

Company A

Company B

**Automobile Repair Costs**



**Part B**

Describe how the equations of the lines on the graph relate to the situation. Include the equations in your descriptions.

Describe how the intersection of the lines on the graph relates to the situation. Include the intersection point in your description.

Enter your descriptions in the space provided.

The equations relate to the situation by showing how much each company charges for working on a car. Company A charges $150 + 25x$ dollars, where $x = hours$, and Company B charges $50 + 50x$ dollars.

The intersection of the lines on the graph relates to the situation by helping Cassidy decide where to go. If the car repair takes less than 4 hours to do, she should go to Company B. If the repair takes more than 4 hours, she should go to Company A.
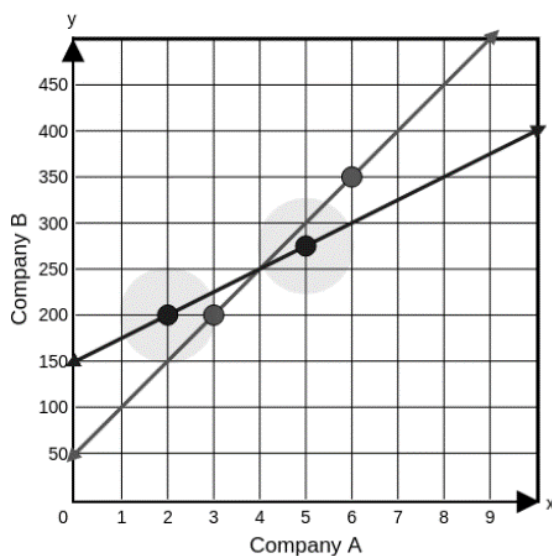
**Part A**

Cassidy compares the costs of two different automobile repair companies. Company A charges $200 for 2 hours of work and $275 for 5 hours of work. Company B charges $200 for 3 hours of work and $350 for 6 hours of work. Graph the system of equations that relates the hours of work, $x$, to the cost, $y$.

To graph each line, select two points on the coordinate plane. A line will be drawn through the points.

Company A

Company B

**Automobile Repair Costs**



**Part B**

Describe how the equations of the lines on the graph relate to the situation. Include the equations in your descriptions.

Describe how the intersection of the lines on the graph relates to the situation. Include the intersection point in your description.
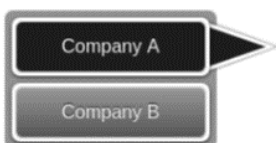
Enter your descriptions in the space provided.

Company A has a slope of $\frac{1}{2}$, while Company B has a slope of 1. These both show the gradual increase of how much is charged per hour of work.

The lines intersect at hour 4 at $250 showing where the two's prices overlap before Company B increases overtaking Company A in price.
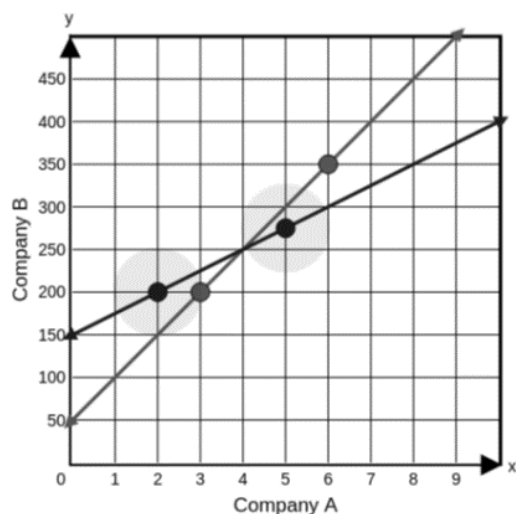
**Part A**

Cassidy compares the costs of two different automobile repair companies. Company A charges \$200 for 2 hours of work and \$275 for 5 hours of work. Company B charges \$200 for 3 hours of work and \$350 for 6 hours of work. Graph the system of equations that relates the hours of work, $x$, to the cost, $y$.

To graph each line, select two points on the coordinate plane. A line will be drawn through the points.

Company A

Company B

**Automobile Repair Costs**



**Part B**

Describe how the equations of the lines on the graph relate to the situation. Include the equations in your descriptions.

Describe how the intersection of the lines on the graph relates to the situation. Include the intersection point in your description.
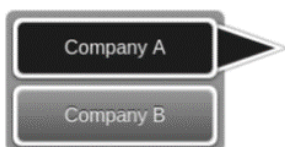
Enter your descriptions in the space provided.

> The lines intersect at (4,250), indicating that for 4 hours of work, both companies charge 250 dollars. From the graph you can tell that company A charges 175 dollars for one hour of work, while company B only charges 100. The graph the shows that for 6 hours of work, company A charges 300, and company B charges 350.  This indicates that Company A charges less then company B when you ask for less then 4 hours of work.The graph is also only shown in the first quadrant, showing that since this is a real word problem, the numbers cant be below zero for the domain or range.
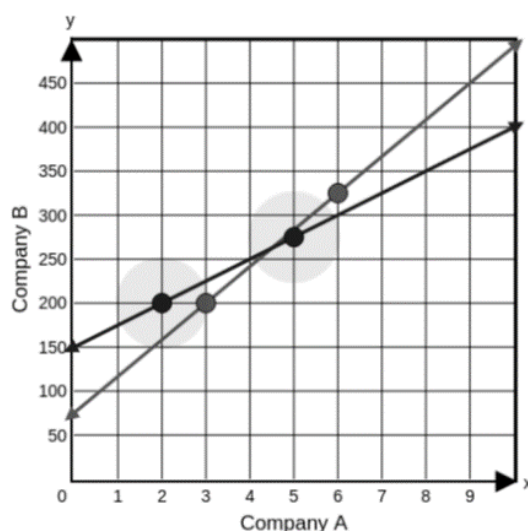
**Part A**

Cassidy compares the costs of two different automobile repair companies. Company A charges $200 for 2 hours of work and $275 for 5 hours of work. Company B charges $200 for 3 hours of work and $350 for 6 hours of work. Graph the system of equations that relates the hours of work, $x$, to the cost, $y$.

To graph each line, select two points on the coordinate plane. A line will be drawn through the points.

Company A

Company B

**Automobile Repair Costs**



**Part B**

Describe how the equations of the lines on the graph relate to the situation. Include the equations in your descriptions.

Describe how the intersection of the lines on the graph relates to the situation. Include the intersection point in your description.

Enter your descriptions in the space provided.

So, if you need 4 or less hours of work done to your car then go for Company B. But, if you need 4 or more hour of work done on your car then go with Company A. This is because as it shows on the graph, Company B is only going to cost you $200 for 3 hours of work, when Company A is foing to charge you $200 for an hour less! Also, if you are going to need exacatly 5 hours of work done, then you can choose either company, since that is the intersection on the graph.
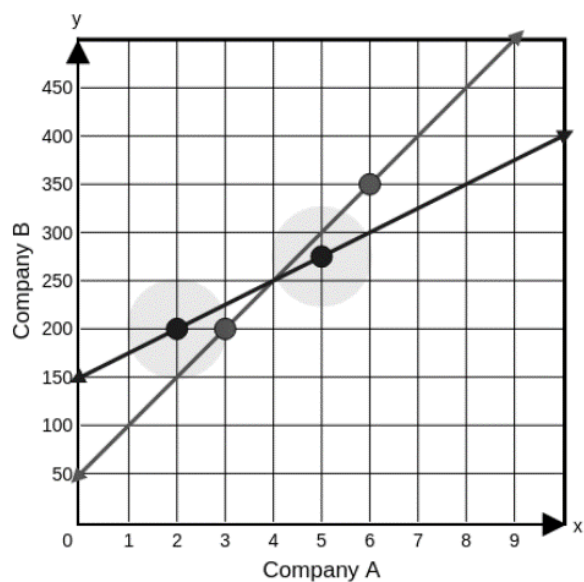
## Part A

Cassidy compares the costs of two different automobile repair companies. Company A charges $200 for 2 hours of work and $275 for 5 hours of work. Company B charges $200 for 3 hours of work and $350 for 6 hours of work. Graph the system of equations that relates the hours of work, $x$, to the cost, $y$.

To graph each line, select two points on the coordinate plane. A line will be drawn through the points.

Company A

Company B

**Automobile Repair Costs**



## Part B

Describe how the equations of the lines on the graph relate to the situation. Include the equations in your descriptions.

Describe how the intersection of the lines on the graph relates to the situation. Include the intersection point in your description.
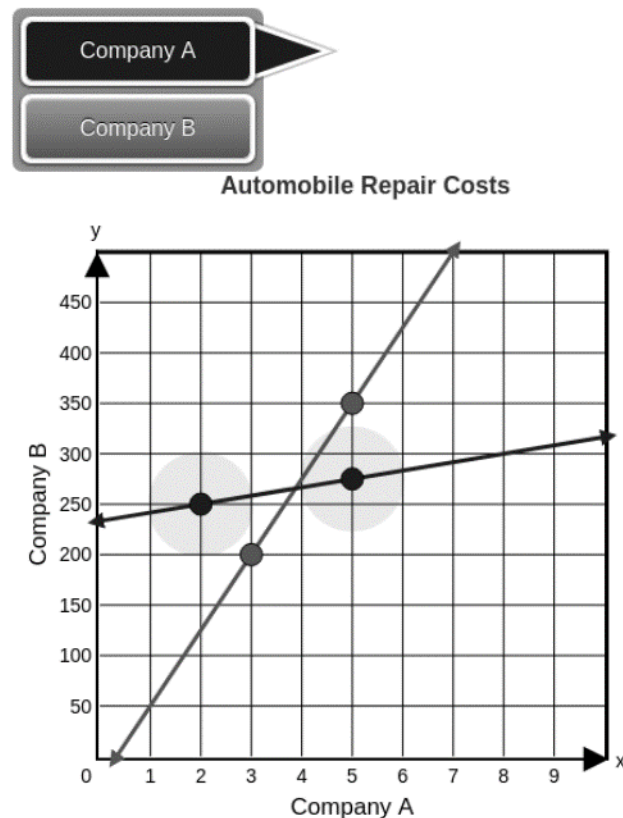
Enter your descriptions in the space provided.

company $a = 50x - 200$, company
$b = 25x - 200$

company a's employees are paid at a higher rate than company b.

## Part A

Cassidy compares the costs of two different automobile repair companies. Company A charges $200 for 2 hours of work and $275 for 5 hours of work. Company B charges $200 for 3 hours of work and $350 for 6 hours of work. Graph the system of equations that relates the hours of work, $x$, to the cost, $y$.

To graph each line, select two points on the coordinate plane. A line will be drawn through the points.

Company A

Company B

**Automobile Repair Costs**



## Part B

Describe how the equations of the lines on the graph relate to the situation. Include the equations in your descriptions.

Describe how the intersection of the lines on the graph relates to the situation. Include the intersection point in your description.

Enter your descriptions in the space provided.

The eauation of the line relates to the situation by the releationship between how much they charge depends on how long they work