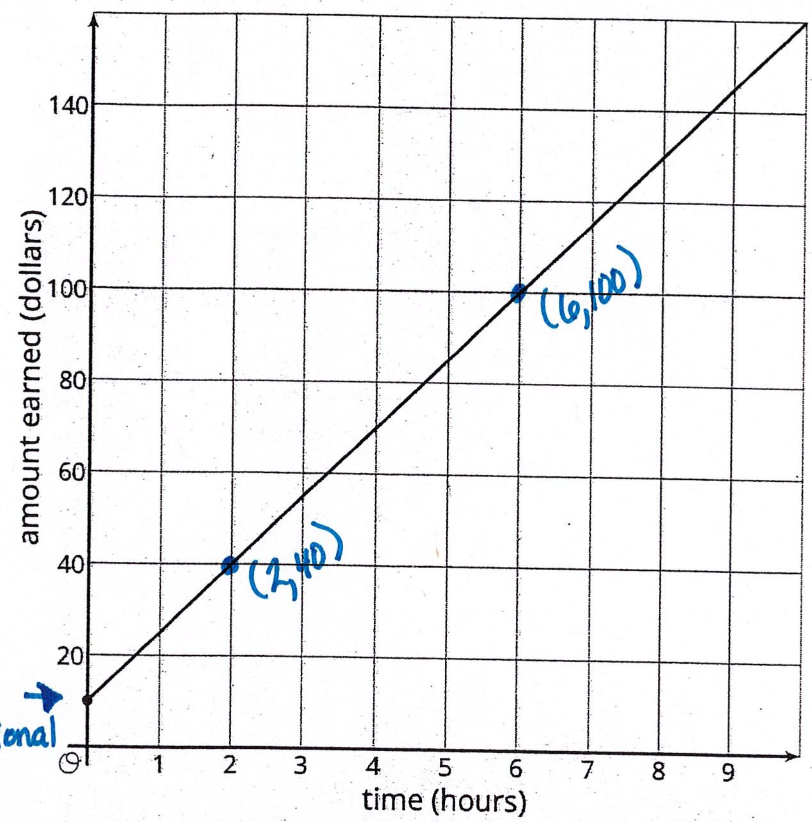
Unit 3

Lesson 5 Summary

Andre starts babysitting and charges \$10 for traveling to and from the job, and \$15 per hour. For every additional hour he works he charges another \$15. If we graph Andre's earnings based on how long he works, we have a line that starts at \$10 on the vertical axis and then increases by \$15 each hour. A **linear relationship** is any relationship between two quantities where one quantity has a constant **rate of change** with respect to the other.

how much for 1 on the x axis

$m = \frac{y}{x}$ $x=1$



Line Not starting @ (0,0) ∴ not a proportional relationship

We can figure out the rate of change using the graph. Because the rate of change is constant, we can take any two points on the graph and divide the amount of vertical change by the amount of horizontal change. For example, take the points $(2, 40)$ and $(6, 100)$. They mean that Andre earns \$40 for working 2 hours and \$100 for working 6 hours. The rate of change is $\frac{100-40}{6-2} = \frac{60}{4} = 15$ dollars per hour. Andre's earnings go up \$15 for each hour of babysitting. Notice that this is the same way we calculate the **slope** of the line. That's why the graph is a line, and why we call this a linear relationship. The rate of change of a linear relationship is the same as the slope of its graph.

With proportional relationships we are used to graphs that contain the point $(0, 0)$. But proportional relationships are just one type of linear relationship. In the following lessons, we will continue to explore the other type of linear relationship where the quantities are not both 0 at the same time.

* How to check if linear relationship is a proportional relationship

a) does (0,0) make sense in the context

b) does (0,0) make sense in the table

c) does the graph of the line go through (0,0)

if yes it is a proportional relationship