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| About this Lesson |
| Students will be able to use ratios and line graphs to compare relative values of housing over time. |

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| **Grade Level** | **Course(s)/subject(s)** | **Learning Goal(s)** | **Suggested**  **Timing** |
| 7 | Mathematics | I can create line graphs that change over time using housing and rental data. I can interpret the data and use it to defend my opinions regarding renting versus buying  a place to live. | 3 x 40-minute –  50-minute periods = 120–150 minutes |

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| Curriculum Links |
| Grade 7 Mathematics  Data Management and Probability  **Overall**   * Make and evaluate convincing arguments, based on the analysis of data   Overall   * Collect and organize categorical, discrete or continuous primary data and secondary data and display the data using charts and graphs, including relative frequency tables and circle graphs   **Specific**   * Collect data by conducting a survey or an experiment to do with themselves, their environment, issues in their school or community, or content from another subject and record observations or measurements   **Number Sense and Numeration**  **Overall**   * Demonstrate an understanding of proportional relationships using per cent, ratio and rate |

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| Inquiry Question |
| Using the ratio of house price to rental income, are houses today cheaper or more expensive than they were at other periods in the past? |

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| Materials List |
| * Appendix A: Chart Paper * Appendix B: Line Graph * Appendix C: Questions * Appendix D: Rubric * Appendix E: Suggested Research Websites * Poster Paper * Markers * Sticky Notes * Ratio Review Worksheets |

| **Timing**  (Mins.) | **Lesson Sequence** | **Assessment for and as Learning Opportunities** (self/peer/teacher) |
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| MINDS ON | | |
| 10–20 minutes | * How do we determine whether a house is expensive or cheap? The problem is, without a way to compare renting versus buying at a given point in time, it can be hard to determine whether something is expensive or cheap. * Ratios can be used to compare values * Review ratios with students. Give examples of common ratios and have students practise calculating ratios. * Examples of ratios:   + Any sports team (wins: losses) Baseball ratios  (walk-to-strike, ground out-to-air out)   + Class demographics (girls-to-boys, 13-year olds-to-14-year-olds) | Assessment for Learning – Observations/Anecdotal Notes |
| ACTION | | |
| 40–60 minutes | 1. Mention to the students that it is often useful to determine the “relative value” of something to decide whether it is better to buy or to rent. 2. To compare two different values, we use something called ratios. | Assessment for Learning – Observations |

| **Timing**  (Mins.) | | **Lesson Sequence** | | **Assessment for and as Learning Opportunities** (self/peer/teacher) |
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| ACTION (cont’d.) | | | | |
| 40–60 minutes | 1. Define Ratio – the quantitative relation between two amounts showing the number of times one value contains or is contained within the other. 2. One ratio that is used to decide if a house is expensive or cheap is called the “Price to Rent Ratio.” The Price to Rent Ratio is the current price of a house divided by the annual rental cost of the same house. 3. One way to determine if houses are cheap or expensive is to compare ratios over time using a line graph. 4. Students use one of the sample websites (see Appendix E) or find their own to gather data of AVERAGE home prices and AVERAGE rental prices over time. 5. Provide the students with the chart (Appendix A). Do the following:    * Students fill out the year column    * Have the students fill out the average rental price and average home price columns from the websites 6. In the Ratio column, have the students calculate the ratio for each year.  * Students fill out the line graph (Appendix B) * Answer the following series of questions  (Appendix C):   + What trend(s) do you see in the data?   + According to the graph, when do you think would be the best time to buy? When would be the best time to rent?   + Describe the trend in the ratio over time.   + Why do you think the trend is happening? What do you think will happen with home prices in the future?   + What does this mean for you? Is it worth buying a house right now, or would you rather rent? Explain using data from the chart and graph to support your response.   + (Advanced) Why might using a ratio be a better way to compare affordability than using dollar value prices? | |  | |

| **Timing**  (Mins.) | | **Lesson Sequence** | | **Assessment for and as Learning Opportunities** (self/peer/teacher) |
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| CONSOLIDATION/DEBRIEF | | | | |
| 20–30 minutes | Two options:  **1. Presentations**   1. Use either technology or chart paper to create a presentation of the data and the questions. 2. Randomly choose groups to present to the class. 3. After the presentations are complete, have a large group discussion with the students. Based on the data presented, have a whole-class debate about whether it would be a better long-term decision to buy or rent. (**NOTE:** This does not have to be a formal debate. Instead, just have a class discussion on different opinions about their decision to buy versus rent.) 4. What other consequences would there be if you choose to either (a) buy or (b) rent   **2. Gallery Walk**  Use either technology or chart paper to create a presentation of the data and the questions.  Post or display the posters around the room. Have each group start at their own poster and then rotate clockwise to the next group.   1. Each group will have two minutes at each poster to comment and add sticky notes to the posters. Continue rotating to each poster until the groups return to their home poster. 2. After the gallery walk is complete, have a large group discussion with the students. Based on the data presented in the gallery walk, debate whether it would be a better long-term decision to buy or rent. 3. What other consequences would there be if you choose to either (a) buy or (b) rent?   **3. (Optional) Rubric** (Appendix D)  Use the optional rubric to grade the project  (Appendices A–C). | | Assessment as Learning – Rubric (Appendix D) | |

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| Chart |
| |  |  |  |  | | --- | --- | --- | --- | | **Year** | **Price** | **Rent** | **Price to Rent Ratio** | |  |  |  |  | |  |  |  |  | |  |  |  |  | |  |  |  |  | |  |  |  |  | |  |  |  |  | |  |  |  |  | |  |  |  |  | |  |  |  |  | |  |  |  |  | |  |  |  |  | |  |  |  |  | |  |  |  |  | |  |  |  |  | |  |  |  |  | |  |  |  |  | |  |  |  |  | |  |  |  |  | |  |  |  |  | |  |  |  |  | |  |  |  |  | |  |  |  |  | |

**APPENDIX A**

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| Line Graph |
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**APPENDIX B**

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| Review Questions |
| **Using Ratios to Compare Renting versus Buying over Time**  **Student Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**  A. What trend(s) do you see in the data?  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  B. According to the graph, when do you think would be the best time to buy? When would be the  best time to rent?  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  C. Describe the trend in the ratio over time.  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  D. Why do you think the trend is happening? What do you think will happen with home prices in  the future?  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |

**APPENDIX C**

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| Review Questions (cont’d.) |
| E. If you were old enough to move out of your house, what would this information mean for you?  Based on the data, do you think it is worth buying a house right now, or would you rather rent?  Explain using data from the chart and graph to support your response.  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  F. (Advanced) Why might using a ratio be a better way to compare affordability than simply using dollar values of home prices?  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |

**APPENDIX C**

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| Rubric |
| **Using Ratios to Compare Renting versus Buying over Time**  Student Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_   |  |  |  |  |  | | --- | --- | --- | --- | --- | | **DATA MANAGEMENT** | | | | | |  | 1 | 2 | 3 | 4 | | Student is able to construct a line graph using secondary data | Demonstrates limited ability to construct a line graph using secondary data | Demonstrates some ability to construct a line graph using secondary data | Demonstrates considerable ability to construct a line graph using secondary data | Demonstrates thorough ability to construct a line graph using secondary data | | Student is able to analyze data and draw conclusions | Demonstrates limited ability to analyze data and draw conclusions | Demonstrates some ability to analyze data and draw conclusions | Demonstrates considerable ability to analyze data and draw conclusions | Demonstrates thorough ability to analyze data and draw conclusions | | Student is able to make and evaluate convincing arguments, based on the analysis of data | Demonstrates limited ability to make and evaluate convincing arguments, based on the analysis of data | Demonstrates some ability to make and evaluate convincing arguments, based on the analysis of data | Demonstrates considerable ability to make and evaluate convincing arguments, based on the analysis of data | Demonstrates thorough ability to make and evaluate convincing arguments, based on the analysis of data | | **NUMBER SENSE AND NUMERATION** | | | | | |  | 1 | 2 | 3 | 4 | | Student is able to calculate ratios from secondary data | Demonstrates limited ability to calculate ratios from secondary data | Demonstrates some ability to calculate ratios from secondary data | Demonstrates considerable ability to calculate ratios from secondary data | Demonstrates thorough ability to calculate ratios from secondary data | |

**APPENDIX D**

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| Suggested Research Websites |
| **Housing and Rental Historical Price Websites**   1. A website that provides data for a number of years for the Toronto housing market.   <https://toronto.listing.ca/real-estate-price-history.htm>   1. A website that provides data for a number of years for the Toronto rental market.   <https://www.torontorentals.com/blog/average-rent-in-toronto-since-2000> |

**APPENDIX E**