# MATH Assessment Practice Item Answer Key

## Algebra 2 – Paper

The following pages include the answer key for all machine-scored items, followed by a sample response for the hand-scored item.

- The rubrics show sample student responses. Student responses other than that shown in the rubric may earn full or partial credit.
- Which responses to hand-scored items receive full or partial credit will be confirmed during range-finding (reviewing sets of real student work)
- If students make a computation error, they can still earn points for reasoning or modeling.

| Item Number | Answer Key |
|---|---|
| 1. | **Part A: B**<br>**Part B: D** |
| 2. | **Part A: Student response is 272 or 273.**<br>**Part B: Student response is 9 or 10.** |
| 3. | **C** |
| 4. | **See rubric** |
| 5. | **C** |
| 6. | **A** |
| 7. | **B** |
| 8. | **Student response is -11.** |
| 9. | **See rubric** |
| 10. | **B, E** |
| 11. | **A** |
| 12. | **A** |

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| 13. | **Part A: D**<br>**Part B: B, E** |
| 14. | **Part A: D**<br>**Part B: C** |
| 15. | **See rubric** |
| 16. | **Student response is 1.68.** |
| 17. | **Part A: A**<br>**Part B: Student response is 248.** |
| 18. | **Student response is 0.** |
| 19. | **See rubric** |
| 20. | **See rubric** |
| 21. | **Student response is 4/3.** |
| 22. | **D** |
| 23. | **C** |
| 24. | **C** |
| 25. | **C** |
| 26. | B |
| 27. | **Part A: D**<br>**Part B: B** |
| 28. | **See rubric** |

| **#4 Rubric** | |
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| **6 Point Constructed Response Rubric** | |
| **Score** | **Description** |
| **6** | Student response includes the following elements.<br>• **Modeling component 1** = 1 point: Correct equation to determine the number of medium shirts Rose can buy when Rose buys 6 hats |

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| | • **Computation component 1** = 1 point: Correct number of medium shirts Rose can buy when Rose buys 6 hats<br><br>• **Modeling component 2** = 1 point: Correct equation to determine the number of hats Rose can buy when Rose buys 6 small shirts<br><br>• **Computation component 2** = 1 point: Correct number of hats Rose can buy when Rose buys 6 small shirts<br><br>• **Computation component 3** = 1 point: Reasonable estimate for the amount of revenue if the vendor sells all of the hats and all of the shirts<br><br>• **Reasoning component 1** = 1 point: Explains that an estimate must be made for the price of a large shirt<br><br>Sample Student Response: Let $x$ represent the number of hats Rose can buy and let $y$ represent the number of medium shirts Rose can buy. Hats cost \$18.75 each. Medium shirts cost \$12.50 each. Rose has \$150 to spend. So, the model $18.75x + 12.50y = 150$ represents the number of hats and medium shirts Rose can buy.<br><br>Substitute 6 for $x$ to represent Rose buying 6 hats: $18.75(6) + 12.50y = 150$. Solving for $y$ gives $y = 3$. So, Rose can buy 3 medium shirts if she buys 6 hats.<br><br>Let $x$ represent the number of hats Rose can buy and let $y$ represent the number of small shirts Rose can buy. Hats cost \$18.75 each. Small shirts cost \$10.50 each. Rose has \$150 to spend. So, the model $18.75x + 10.50y = 150$ represents the number of hats and small shirts Rose can buy.<br><br>Substitute 6 for $y$ to represent Rose buying 6 small shirts: $18.75x + 10.50(6) = 150$. Solving for $x$ gives $x = 4.64$. Rose cannot buy part of a hat, so she can buy 4 hats if she buys 6 small shirts.<br><br>Small shirts cost \$10.50. Medium shirts cost \$12.50 each. The price went up \$2 from a small shirt to a medium shirt. So, a good estimate for the price of a large shirt is \$12.50 + \$2, or \$14.50. There are 20 small shirts, 50 medium shirts, and 50 large shirts. Hats cost \$18.75 each. There are 80 hats. If the vendor sells all of the hats and all of the shirts, about $20(\$10.50) + 50(\$12.50) + 50(\$14.50) + 80(\$18.75) = \$3060$ in revenue will be made.<br><br>Or other valid approaches are acceptable. |
| **5** | Student response includes 5 of the 6 elements. |

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| **4** | Student response includes 4 of the 6 elements. |
| **3** | Student response includes 3 of the 6 elements. |
| **2** | Student response includes 2 of the 6 elements. |
| **1** | Student response includes 1 of the 6 elements. |
| **0** | Student response is incorrect or irrelevant. |

**#9 Rubric**

## 3 Point Constructed Response Rubric

| Score | Description |
|---|---|
| **3** | Student response includes the following elements.<br><br>• **Computation component** = 1 point: Correct number of negative solutions<br>• **Reasoning component** = 2 points: Valid explanation<br><br>Sample Student Response: Use a graphing calculator to graph an equation for each side of the equation. Graph $y = e^{2x}$ and $y = x + 3$. There are two intersections, or solutions. One solution is negative and one solution is positive.<br><br>Or other valid approaches are acceptable. |
| **2** | Student response includes 2 of the 3 elements. |
| **1** | Student response includes 1 of the 3 elements. |
| **0** | Student response is incorrect or irrelevant. |

**#15 Rubric**

## 3 Point Constructed Response Rubric

| Score | Description |
|---|---|
| **3** | Student response includes the following elements. |

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| | • **Computation component** = 1 point: Correct type of method the students use to collect the data<br>• **Reasoning component** = 1 point: Explains which population conclusions can be drawn from based on the method used to collect data<br>• **Reasoning component** = 1 point: Explains whether the method for collecting data is biased<br><br>Sample Student Response: Since every fifth person entering a movie theater was asked about their preferred movie genre, the students used a systematic sampling method to collect the data.<br><br>Only people entering a movie theater are surveyed, so the population conclusions can be drawn from is people in the city that go to a movie.<br><br>Bias occurs when a sampling method is not representative of a target population. In this case, the target population is all people in the city. Only people entering a movie theater are surveyed, so some people of the target population are not represented by the sampling method. Therefore, thIs method for collecting data is biased.<br><br>Or other valid approaches are acceptable. |
| **2** | Student response includes 2 of the 3 elements. |
| **1** | Student response includes 1 of the 3 elements. |
| **0** | Student response is incorrect or irrelevant. |

| **#19 Rubric** | |
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| **2 Point Constructed Response Rubric – Part A** | |
| **Score** | **Description** |
| **3** | Student response includes the following elements.<br>• **Reasoning/Modeling component** = 1 point: The student correctly identifies and records the relevant data from the survey results, demonstrating understanding of the task and information given.<br>• **Computation component** = 1 point: Correct counting and recording of the number of students who prefer each start time and those who have no preference, demonstrating basic data handling skills<br>Sample Student Response: |

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| | The relevant data from the survey results are as follows:<br>- 200 students prefer the start time to remain at 8:00 AM<br>- 350 students prefer the start time to change to 8:30 AM<br>- 100 students have no preference<br>Or other valid approaches are acceptable. |
| **2** | Student response includes 1 of the 2 elements. |
| 1 | Student response is incorrect or irrelevant. |

## 2 Point Constructed Response Rubric – Part B

| Score | Description |
|---|---|
| **2** | Student response includes the following elements.<br>• **Reasoning/Modeling component** = 1 point: The student accurately compares the calculated percentages and correctly determines which start time is most preferred by the students, demonstrating logical reasoning and critical thinking skills.<br>• **Computation component** = 1 point: Correct calculation of the percentage of students who prefer each start time and those who have no preference, demonstrating understanding of percentage calculation and its application in data analysis.<br>Sample Student Response:<br>The total number of students surveyed was 650. The percentage of students who prefer each start time and those who have no preference is calculated as follows:<br>- The percentage of students preferring the start time to remain at 8:00 AM is (200/650) x 100 = 30.77%<br>- The percentage of students preferring the start time to change to 8:30 AM is (350/650) x 100 = 53.85%<br>- The percentage of students with no preference is (100/650) x 100 = 15.38%<br>From these calculations, it is clear that the majority of students (53.85%) prefer the start time to change to 8:30 AM.<br>Or other valid approaches are acceptable. |
| **1** | Student response includes 1 of the 2 elements. |
| **0** | Student response is incorrect or irrelevant. |

## 2 Point Constructed Response Rubric – Part C

| Score | Description |
|---|---|
| **2** | Student response includes the following elements. |

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| | • **Reasoning/Modeling component** = 1 point: The student makes a clear and justified recommendation on whether the school start time should be changed to 8:30 AM, demonstrating understanding of how to use data to inform decision-making.<br>• **Computation component** = 1 point: Correct use of the data from the survey to justify their recommendation, demonstrating the ability to interpret and apply data in a real-world context.<br>Sample student response:<br>Based on the analysis of the data, I would recommend that the school start time be changed to 8:30 AM. This recommendation is based on the fact that a majority of the students (53.85%) prefer this start time. It is important for the school to take into account the preferences of its students, as this can impact their satisfaction and performance. Furthermore, the students who have no preference (15.38%) would not be negatively affected by this change. Therefore, changing the start time to 8:30 AM would be in the best interest of the majority of students.<br>Or other valid approaches are acceptable. |
| **1** | Student response includes 1 of the 2 elements. |
| **0** | Student response is incorrect or irrelevant. |

**#20 Rubric**

## 4 Point Constructed Response Rubric

| Score | Description |
|---|---|
| **4** | Student response includes the following elements.<br>• **Reasoning/Modeling component 1 =** 1 point: Correct interpretation of 12t<br>• **Reasoning/Modeling component 2** = 1 point: Correct interpretation of 1 + 0.03/12<br>• **Computation component 1** = 1 point: Correct balance after 10 years<br>• **Reasoning/Modeling component 3** = 1 point: Correct justification of each step when evaluating the equation |

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| | Sample Student Response: There are 12 months in a year. So, 12t represents the number of months that have passed after *t* years. The account earns 3% interest compounded monthly. So, 0.03/12 represents the monthly interest rate and 1 + 0.03/12 represents the growth factor.<br><br>To determine the balance of the account after 10 years, substitute 10 for *t* in the equation: $B = 200(1 + 0.03/12)^{12(10)}$. Then, multiply: $B = 200(1 + 0.03/12)^{120}$. Next, simplify inside parentheses by first dividing and then adding: $B = 200(1 + 0.0025)^{120} = 200(1.0025)^{120}$. Then, evaluate the exponent: $B \approx 200(1.3494)$. Finally, multiply $B \approx 269.88$. So, after 10 years there will be about $269.88 in the account.<br><br>Or other valid approaches are acceptable. |
| **3** | Student response includes 3 of the 4 elements. |
| **2** | Student response includes 2 of the 4 elements. |
| **1** | Student response includes 1 of the 4 elements. |
| **0** | Student response is incorrect or irrelevant. |

**#28 Rubric**

## 3 Point Constructed Response Rubric

| Score | Description |
|---|---|
| **3** | Student response includes the following elements.<br><br>• **Reasoning/Modeling component** = 1 point: Correct comparison of the medians<br><br>• **Reasoning/Modeling component** = 1 point: Correct comparison of the ranges<br><br>• **Reasoning/Modeling component** = 1 point: Correct interpretation of what the shapes of the box plots show<br><br>Sample Student Response: The median height of the basketball players is 70 inches. The median height of the volleyball players is 69 inches. The median |

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| | height of the basketball players is 1 inch higher than the median height of the volleyball players.<br><br>The range of the heights of the basketball players is 76 – 62, or 14 inches. The range of the heights of the volleyball players is 74 – 66, or 8 inches. So, the range of the heights of the basketball players is greater than the range of the heights of the volleyball players.<br><br>There is more data on the left side of the box plot for the height of the basketball players, so the data is skewed right. The data in the box plot for the height of the volleyball players is evenly distributed, so the data is normally distributed.<br><br>Or other valid approaches are acceptable. |
| **2** | Student response includes 2 of the 3 elements. |
| **1** | Student response includes 1 of the 3 elements. |
| **0** | Student response is incorrect or irrelevant. |