

Rich Mathematical Task – Grade 1 – *Comparing Points*

Task Overview/Description/Purpose:
<ul style="list-style-type: none"> The purpose of this task is for students to explore and deepen their understanding of <i>greater than</i> and <i>less than</i> number relationships. In this task, students will investigate relationships among numbers through the context of points earned during a game. Students will use words to describe their number comparisons.

Standards Alignment: Strand - <i>Computation and Estimation</i>

<p>Primary SOL: 1.2 The student, given up to 110 objects, will</p> <p style="padding-left: 40px;">b) compare two numbers between 0 and 110 represented pictorially or with concrete objects, using the words greater than, less than or equal to.</p> <p>Related SOL: K.4, 1.1, 2.1</p>

<p>Learning Intentions:</p> <ul style="list-style-type: none"> Content - I am learning to compare numbers to other numbers. Language - I am learning to explain my thinking and use comparison language such as <i>greater than</i>, <i>less than</i> and <i>equal to</i>. Social - I am learning to communicate my thinking, listen to the math ideas of others, and share feedback.
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<p>Success Criteria (Evidence of Student Learning):</p> <ul style="list-style-type: none"> I can compare sets of objects and determine which set is <i>greater than</i> or <i>less than</i> another set. I can model the problem using objects, pictures, representations, and/or numbers. I can communicate my thinking clearly to my classmates and describe number relationships.
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Mathematics Process Goals	
Problem Solving	<ul style="list-style-type: none"> Students will apply their understanding of comparison relationships to find solutions to the task.
Communication and Reasoning	<ul style="list-style-type: none"> Students will explain why their chosen numbers make sense for the criteria presented in the problem.
Connections and Representations	<ul style="list-style-type: none"> Students will create a representation to demonstrate the relationship between quantities.

Task Pre-Planning

<p>Approximate Length/Time Frame: 60 minutes</p>

<p>Grouping of Students: Begin with a whole class launch of the task. After introducing the task, students work individually to solve the task. If some students solve before group discussion time, encourage them to find other solutions and/or share their thinking with a classmate who has also completed the task.</p>
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<p>Materials and Technology:</p> <ul style="list-style-type: none"> counters or connecting cubes ten frames hundreds charts drawing tools copy of the task for each student 	<p>Vocabulary:</p> <ul style="list-style-type: none"> more, fewer greater than, less than, equal to compare sets
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Task Pre-Planning

Anticipate Responses: See the Planning for Mathematical Discourse Chart (columns 1-3).

Task Implementation (Before)

Task Launch:

- In a whole group setting, invite students to connect with the context and activate prior knowledge by asking “Have you ever played a game where you have kept track of points?” To activate prior knowledge, consider relating to a game that is familiar for students and review how points are earned. For example, video games, sports games, class points, etc.
 - How did you know who was winning?
 - How did you know who was losing?
- As the teacher, you want to elicit the ideas of *greater than*, *less than*, and/or *equal to* through student-shared ideas. For example, students could share ideas through a think/pair/share and then allow 4-5 students to share with the class.
- Explain that today’s problem is about three friends who are playing a game and keeping track of points earned by each player. The friends do not have the same or equal number of points. Your task is to listen to the clues in the story to figure out what is happening in the story problem.
- Introduce the task by reading the problem aloud to students. Ask a few students to restate the task in their own words to promote understanding and provide an opportunity to clarify any questions.
- Pass out the task to each student to think about and solve individually.
- After students have had some time to think and work on the problem, then they can discuss with a partner.

Make manipulatives and drawing tools available, as needed.

Task Implementation (During)

Directions for Supporting Implementation of the Task

- Monitor – The teacher will listen and observe students as they work on task and ask assessing or advancing questions (see potential ideas on the Planning for Mathematical Discourse Chart).
- Select – The teacher will decide which strategies or thinking that will be highlighted (after student task implementation) in order to advance mathematical ideas and support student learning.
- Sequence – The teacher will decide the order in which student ideas will be highlighted (following the student task implementation).
- Connect – The teacher will consider ways to facilitate connections between different student responses.

Suggestions For Additional Student Support

- Direct comparison by comparing models used by students. How do you know Jess has fewer points than Devon? How can you tell? How do you know Andy has more points? How can you tell? How do you know the children have more than 25 points?
- Ten frames or 110 charts would help students keep track of number quantities and can be used as a tool for counting or comparing sets to one another.
- Vocabulary development could be assisted by re-reading the problem and interpreting; **more than 25 points**, how many points could this be? If Jess has **fewer points than** Devon, will her number be larger or smaller than Devon’s? If Andy has **more points than** Devon, will his number be larger or smaller than Devon’s?
- Sentences frames can be used to support student thinking:
Jess could have ____ points. Devon could have ____ points. Andy could have ____ points. My answers make sense because _____.

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Task Implementation (During)

- To extend the task, add parameters such as: *if Andy had 10 more points than Devon, how would the number of points earned by Jess, Devon, and Andy change in your solution?*
- To extend the task, add parameters such as: *if Devon's number of points changed, how would the number of points that Jess and Andy have change?*

Task Implementation (After)

Connecting Student Responses (From Anticipating Student Response Chart) and Closure of the Task:

- Based on the actual student responses, sequence and select particular students to present their mathematical work during class discussion.
- Reflect on student solution strategies during a whole group discussion. Use this time to make connections between different student responses and connect the responses to the key mathematical ideas for comparing numbers.
- Consider ways to ensure that each student will have an equitable opportunity to share his/her thinking during the task discussion.
- Questions to promote student engagement and discourse:
 - How did you think about the problem?
 - How can you prove (convince us) this answer makes sense?
 - Do you agree or disagree? Why?
 - Did anyone think about it in a different way?
 - How is this strategy the same or different from another strategy?
 - How do you know your numbers will work?
 - Who can add onto this idea?
 - Is there just one solution to this problem or more than one? How do you know?
- Close the lesson by returning to the success criteria. Have students reflect on their progress toward meeting the success criteria.

Teacher Reflection About Student Learning:

- Use the rich mathematical task rubric to evaluate students' progress toward the process goals.
- How will the evidence provided through student work inform further instruction? Analyze student work to determine who was unable to demonstrate proficiency with the following mathematical ideas.
 - Who was unable to show Jess having a smaller number than Devon and Andy?
 - Who was unable to show Andy having a larger number than Jess and Devon?
 - Who was unable to complete the task, even when additional support was provided?
 - Who was able to use manipulatives to figure out and explain the relationships between numbers?
 - Who was able to think about numbers that represent less than and greater than without using ten frames or a 110 chart?
 - Who was able to find more than one solution for this problem?

Planning for Mathematical Discourse

Mathematical Task: Comparing Points

Content Standard(s): SOL 1.2

Teacher Completes Prior to Task Implementation			Teacher Completes During Task Implementation	
Anticipated Student Response/Strategy <i>Provide examples of possible correct student responses along with examples of student errors/misconceptions</i>	Assessing Questions – Teacher Stays to Hear Response <i>Teacher questioning that allows student to explain and clarify thinking</i>	Advancing Questions – Teacher Poses Question and Walks Away <i>Teacher questioning that moves thinking forward</i>	List of Students Providing Response <i>Who? Which students used this strategy?</i>	Discussion Order - sequencing student responses <ul style="list-style-type: none">• <i>Based on the actual student responses, sequence and select particular students to present their mathematical work during class discussion</i>• <i>Consider ways to ensure that each student will have an equitable opportunity to share his/her thinking during task discussion</i>
Anticipated Student Response: Student has difficulty getting started.	<ul style="list-style-type: none"> • Have you ever played a game for points? • How did you know who is winning? Who would be winning in this story? • Can you retell the problem to me? • What does more/fewer mean? • How many points could you give to Jess? Can you show me that amount with counters? 	<ul style="list-style-type: none"> • If you gave Jess __ points, how can this help you build the number of points for Devon and Andy? • How could you use manipulatives to help you solve this task? 		
Anticipated Student Response: Student has a solution that does not work for the parameters of the task (includes 25 or disregards 25).	<ul style="list-style-type: none"> • Tell me about your work. • What does more than 25 mean? • Which child did you start with? • How will you decide which child to do next? Why? • How did you choose the number of points for Jess? For Devon? For Andy? 	<ul style="list-style-type: none"> • How will you know when you have numbers that work for the problem? • How could you change your numbers so that you can show more than 25 points for each child? 		
Anticipated Student Response: Student does not understand that Jess has fewer points than Devon and that Andy has more	<ul style="list-style-type: none"> • What's happening in the problem? • What does more/fewer mean? • How many points shall we give 	<ul style="list-style-type: none"> • If you gave Jess __ points, how can this help you build the number of points for Devon and Andy? 		

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points than Devon. The student randomly selects the number of points for each child in the task.	<p>to Jess? Can you show me that amount with counters?</p> <ul style="list-style-type: none"> How can you show Jess has fewer points than Devon? How can you show Andy has more points than Devon? 	<ul style="list-style-type: none"> How could manipulatives help you solve this task? How will you know when your numbers match the problem? 		
Anticipated Student Response: Student has 2-digit solutions that work with the parameters of the task, using manipulatives/tools or just numbers to describe the number relationships.	<ul style="list-style-type: none"> Which child did you start with? Why? How did you decide on those numbers? Did you use a tool to help you? What did it sound like when you were counting the number of points? How do you know that your numbers match the problem? 	<ul style="list-style-type: none"> Are there other numbers that could be used to solve this problem? How do you know? What is a different number of points for Jess, Devon, and Andy that would make sense? What would happen if you change the number of points Devon has? 		
Anticipated Student Response: Student has 3-digit solutions that work with the parameters of the task, using manipulatives/tools or just numbers to describe the number relationships.	<ul style="list-style-type: none"> Which child did you start with? Why? How did you choose their number of points? How do you know those numbers work? Why did you choose those amounts? How did you choose the number 	<ul style="list-style-type: none"> Will this work with other numbers? How do you know? What is a different number of points for Jess, Devon, and Andy that would make sense? What would happen if you change the number of points Devon has? How does your understanding of 		

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	of points for Jess? For Devon? For Andy? <ul style="list-style-type: none"> • Did you use a tool to help you? • How do you know that your numbers match the problem? 	place value help you compare the number of points for each child in this task?		

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Name _____

Date _____

Comparing Points

Jess, Emily, and Andy are playing a game and keeping track of how many points they have earned.

- They each earned more than 25 points.
- Jess has less points than Emily.
- Andy has more points than Emily.

How many points could each have? Explain your thinking and show your work.

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Rich Mathematical Task Rubric

	Advanced	Proficient	Developing	Emerging
Mathematical Understanding	<p>Proficient Plus:</p> <ul style="list-style-type: none"> Uses relationships among mathematical concepts 	<ul style="list-style-type: none"> Demonstrates an understanding of concepts and skills associated with task Applies mathematical concepts and skills which lead to a valid and correct solution 	<ul style="list-style-type: none"> Demonstrates a partial understanding of concepts and skills associated with task Applies mathematical concepts and skills which lead to an incomplete or incorrect solution 	<ul style="list-style-type: none"> Demonstrates little or no understanding of concepts and skills associated with task Applies limited mathematical concepts and skills in an attempt to find a solution or provides no solution
Problem Solving	<p>Proficient Plus:</p> <ul style="list-style-type: none"> Problem solving strategy is efficient 	<ul style="list-style-type: none"> Problem solving strategy displays an understanding of the underlying mathematical concept Produces a solution relevant to the problem and confirms the reasonableness of the solution 	<ul style="list-style-type: none"> Chooses a problem solving strategy that does not display an understanding of the underlying mathematical concept Produces a solution relevant to the problem but does not confirm the reasonableness of the solution 	<ul style="list-style-type: none"> A problem solving strategy is not evident or is not complete Does not produce a solution that is relevant to the problem
Communication and Reasoning	<p>Proficient Plus:</p> <ul style="list-style-type: none"> Reasoning is organized and coherent Consistent use of precise mathematical language and accurate use of symbolic notation 	<ul style="list-style-type: none"> Communicates thinking process Demonstrates reasoning and/or justifies solution steps Supports arguments and claims with evidence Uses mathematical language to express ideas with precision 	<ul style="list-style-type: none"> Reasoning or justification of solution steps is limited or contains misconceptions Provides limited or inconsistent evidence to support arguments and claims Uses limited mathematical language to partially communicate thinking with some imprecision 	<ul style="list-style-type: none"> Provides little to no correct reasoning or justification Does not provide evidence to support arguments and claims Uses little or no mathematical language to communicate thinking
Representations and Connections	<p>Proficient Plus:</p> <ul style="list-style-type: none"> Uses representations to analyze relationships and extend thinking Uses mathematical connections to extend the solution to other mathematics or to deepen understanding 	<ul style="list-style-type: none"> Uses a representation or multiple representations, with accurate labels, to explore and model the problem Makes a mathematical connection that is relevant to the context of the problem 	<ul style="list-style-type: none"> Uses an incomplete or limited representation to model the problem Makes a partial mathematical connection or the connection is not relevant to the context of the problem 	<ul style="list-style-type: none"> Uses no representation or uses a representation that does not model the problem Makes no mathematical connections

Task Supporting Documents

110 Chart

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100
101	102	103	104	105	106	107	108	109	110

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Ten Frames

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Possible Sentence Frames for Supporting Learners

Jess could have _____ points.

Devon could have _____ points.

Andy could have _____ points.

My answers make sense because
