

olympic Medal count

Task

On day 12 of the 2002 Winter Olympics, here was the medal count:

	Gold	Silver	Bronze
Germany	8	13	7
USA	6	8	7
Norway	9	6	2
Russia	5	5	3
Austria	1	3	9
Italy	3	2	4
France	3	3	1
Canada	2	1	4
Finland	3	2	1
Switzerland	3	1	2

If a bronze medal is valued half as much as a silver medal,
and a silver medal is valued half as much as a gold medal...

Rank the countries above in order of their accomplishment as of day 12 of the Olympic games.

Olympic Medal Count

Suggested Grade Span

Grades 3–5

Grade(s) in Which Task Was Piloted

Grades 3 and 4

Task

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Canada	2	1	4
Finland	3	2	1
Switzerland	3	1	2

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Alternative Versions of Task

More Accessible Version:

On day 12 of the 2002 Winter Olympics, here was the medal count:

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Russia	5	5	3
Austria	1	3	9
Italy	3	2	4
France	3	3	1
Canada	2	1	4
Finland	3	2	1
Switzerland	3	1	2

If a gold medal is valued twice as much as a silver medal, and bronze aren't valued at all, rank the countries above in order of their accomplishment as of day 12 of the Olympic games.

More Challenging Version:

On day 12 of the 2002 Winter Olympics, here was the medal count:

	Gold	Silver	Bronze
Germany	8	13	7
USA	6	8	7
Norway	9	6	2
Russia	5	5	3
Austria	1	3	9
Italy	3	2	4
France	3	3	1
Canada	2	1	4
Finland	3	2	1
Switzerland	3	1	2

Determine a method for ranking the countries above in order of their accomplishment as of day 12 of the Olympic games, and then rank them. Support your ranking with mathematical reasoning and justification.

NCTM Content Standards and Evidence

Number and Operation Standard for Grades 3–5

Instructional programs from Pre–Kindergarten through grade 12 should enable students to...

- Compute fluently and make reasonable estimates.
 - *NCTM Evidence:* Develop fluency in adding, subtracting, multiplying, and dividing whole numbers.
 - *Exemplars Task Specific Evidence:* This task requires students to determine the total medal value of each country, and then to rank the countries against each other. This will require multiplication or division, and addition skills.

Time/Context/Qualifiers/Tip(s) From Piloting Teacher

This is a medium length task. It was given to my students during the past winter Olympic games.

Links

This task could accompany a study of the Olympics. For more information about the Olympics, go to <http://www.olympic.org>.

Common Strategies Used to Solve This Task

Most students will multiply the number of gold, silver and bronze medals by a number that reflects task requirements. Total scores are obtained, and then the countries are ranked accordingly.

Possible Solutions

Original Version:

Students can assign values to each of the medals in relation to their worth. When done, the countries can be ranked as shown below.

	Gold	x4	Silver	x2	Bronze	Total
Germany	8	32	13	26	7	65
Norway	9	36	6	12	2	50
USA	6	24	8	16	7	47
Russia	5	20	5	10	3	33
Italy	3	12	2	4	4	20
Austria	1	4	3	6	9	19
France	3	12	3	6	1	19
Finland	3	12	2	4	1	17
Switzerland	3	12	1	2	2	16
Canada	2	8	1	2	4	14

More Accessible Version:

	Gold	x4	Silver	x2	Total
Germany	8	32	13	26	58
Norway	9	36	6	12	48
USA	6	24	8	16	40
Russia	5	20	5	10	30
France	3	12	3	6	18
Finland	3	12	2	4	16
Italy	3	12	2	4	16
Switzerland	3	12	1	2	14
Austria	1	4	3	6	10
Canada	2	8	1	2	10

More Challenging Version:

Answers will vary. Assess correctness based on the method the student creates for ranking the countries. Also assess the mathematical reasoning behind the method created.

Task Specific Assessment Notes

General Notes: It will be important for the student to document reasoning and computation to obtain the practitioner level.

Novice: The novice will demonstrate little or no understanding of the task. No attempt to rank the countries will be evident, or ranking will be totally random, totally incorrect, and unsubstantiated.

Apprentice: The apprentice will have a partially correct solution with a strategy that will work for solving part of the task. The apprentice may be able to rank some but not all of the countries, or some of the country rankings will be incorrect. Any correct rankings should be substantiated.

Practitioner: The practitioner will achieve a correct solution to the task. All rankings will be listed, and supporting computation will accompany the solution. The student may make relevant observations about the solution, but will not use that information to extend the solution.

Expert: The expert will not only achieve a correct solution, but will also utilize other good problem solving strategies such as verifying the solution, or going above and beyond the task requirements. Students may also create a rule for solving the task, or will make and use mathematically relevant observations to extend the solution, such as making predictions about the final outcome of the games based on mathematical analysis.

Author

Carol McNair teaches at the Camels Hump Middle School in Richmond, Vermont. She has a master's degree in curriculum and instruction from the University of Vermont. She has worked as a mathematics consultant to the Vermont Department of Education, as an item writer for the New Standards Reference Exam, and is an editor for Exemplars.

Novice

On day 12 of the 2002 Winter Olympics, here is the medal count:

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If a bronze medal is valued half as much as a silver medal, and a silver medal is valued half as much as a gold medal...

rank the countries above in order of their accomplishment so far in the Olympic games.

- Approach and Reasoning: ____/4
- Connections: ____/4
- Solution: ____/3
- Mathematical Language: ____/3
- Mathematical Representation: ____/3
- Documentation: ____/3



The student has no approach to solving the task. No engagement in the task is demonstrated.

Apprentice

On day 12 of the 2002 Winter Olympics, here is the medal count:

	Gold	Silver	Bronze	
Germany	8	13	7	138
USA	6	8	7	94
Norway	9	6	2	100
Russia	5	5	3	66
Austria	1	3	9	30
Italy	3	8	4	40
France	3	2	1	32
Canada	2	1	4	28
Finland	3	2	1	34
Switzerland	3	1	2	36

An incorrect solution is achieved due to computation errors. The student also doesn't address with reasoning why France beats Austria when their totals are equal.

If a bronze medal is valued half as much as a silver medal, and a silver medal is valued half as much as a gold medal...

rank the countries above in order of their accomplishment so far in the Olympic games.

1. Germany
2. Norway
3. USA
4. Russia
5. Italy
6. France
7. Austria
8. Switzerland
9. Finland
10. Canada

I found this answer by multiplying the number of gold by 8 and then the number of silver and multiply that by 4 and the number of bronze and multiply that by 2 and at the totles up and then put them in Greatest totle to lowest totle. To be side between France I bid it by the number of gold medals

Practitioner

On day 12 of the 2002 Winter Olympics, here is the medal count:

	Gold	Silver	Bronze	
Germany	8	13	7	130
USA	6	8	7	130 94
Norway	9	6	2	100
Russia	5	5	3	66
Austria	1	3	9	38
Italy	3	2	4	70
France	3	3	1	38
Canada	2	1	4	28
Finland	3	2	1	39
Switzerland	3	1	2	30

If a bronze medal is valued half as much as a silver medal, and a silver medal is valued half as much as a gold medal..

rank the countries above in order of their accomplishment so far in the Olympic games.

- 1 Germany
 - 2 Norway
 - 3 USA
 - 4 Russia
 - 5 Italy
 - 6 France
 - 7 Austria
 - 8 Switzerland
 - 9 Finland
 - 10 Canada
- oopsie* → (pointing to Switzerland)

I found these answers by multiplying by 8, 4, 2 for gold, silver, bronze. Then ordered them from greatest to least.

A correct answer with correct reasoning is used. Work is shown to support the solution.

Expert

On day 12 of the 2002 Winter Olympics, here is the medal count:

	Gold	Silver	Bronze	
28	Germany 8	13	7	= 130
21	USA 6	8	7	= 94
11	Norway 9	6	2	= 101
13	Russia 5	5	3	= 66
13	Austria 1	3	9	= 40
9	Italy 3	2	4	= 38
7	France 3	3	1	= 38
7	Canada 2	1	4	= 28
6	Finland 3	2	1	= 34
6	Switzerland 3	1	2	= 32

A correct solution is achieved with supporting work. The approach and reasoning are explained. The student extends the solution by analyzing the order of the chart presented in the task.

If a bronze medal is valued half as much as a silver medal, and a silver medal is valued half as much as a gold medal..

rank the countries above in order of their accomplishment so far in the Olympic games.

Germany - 130
 Norway - 100
 USA - 94
 Russia - 66
 Italy - 40
 France - 38
 Finland - 34
 Switzerland - 32
 Canada - 28
 Austria - 38

I found this out by Gold x 8 Silver x 4 and Bronze x 2 to get the answers I got. And the numbers on top had to be half 2 half 4 half 8

I think the chart was in order of total medals. If they had the same total then whoever got more gold came first. If they had the same total Gold then whoever got more silver came next first.