In gymnastics a perfect score used to be a 10. A young Rumanian woman, Nadia Comaneci, was the first Olympic gymnast to score a 10 on any event in gymnastics. She competed in 1976 and her routine was flawless. (We have a video of her performance at our site: http://www.yummymath.com/2012/perfect-10/)

In 2005 the scoring of gymnastics was changed and in 2009 that scoring was revised. Ten is no longer a perfect score. So how will gymnasts be scored at this year’s Olympics?

_Beware; this is a very simplified summary of the new scoring for women’s artistic gymnastics._

Each contestant will receive 2 scores for each routine ... a D-score and an E-score.

- **The D-score** (or Difficulty score) evaluates the content of the exercise on three criteria: the Difficulty Value (DV), Composition Requirements (CR) and Connection Value (CV).
  - **DV**: The difficulty value of the eight highest value elements of the routine, including the dismount, is added together. Elements are ranked depending on their difficulty. Each element in a routine has a point value based on its difficulty, starting at zero and increasing by one-tenth for each subsequent level. Therefore, an “A” level skill is given a point value of one-tenth whereas an “E” level skill has a point value of five-tenths.
  - **CR**: Gymnasts must demonstrate skills from five required Element Groups on each apparatus. A gymnast may use skills to fulfill the DV and the CR simultaneously. For each CR presented, 0.5 points are awarded. A maximum score of 2.50 points may be earned here.
  - **CV**: Additional points are given for connections of two or more elements of specific value, with 0.1 or 0.2 points apiece.

Difficulty is unlimited. The most competitive athletes have “D-scores” in the high 6 to low 7 range. With increased difficulty comes the risk of falling. The penalty for falling is quite costly. 1.0 is deducted from the score for each fall.

**Example:** Calculate the D-score for a gymnast that completed;

- 3 C elements, 3 D elements and 2 E elements
- Completed all 5 of the composition requirements
- and achieved a connection point value of .6.

**Answer:**

\[
\begin{align*}
\text{DV} &= 3.1 \text{ points.} \\
\text{CR} &= \text{Competition requirements get .5 points each. Completing all 5 of the requirements = 2.5 points.}
\end{align*}
\]

\[
\begin{align*}
\text{CV} &= .6 \\
\text{Total D score} &= 3.1 + 2.5 + .6 = 6.1
\end{align*}
\]
1. Calculate the D-score for a gymnast who completes 2 C elements, 3 D elements, and 3 F elements. Completes all of the 5 composition requirements and gets a connection point value of .8 points.

2. Calculate the D-score for a gymnast who completed 3 C elements, 1 D element, 1 F, and 1 G elements. Her routine was very difficulty for her and she was unable to completes all 5 of the competition requirements. She only completed 4 of them successfully. She got a connection point value of .5.

- **The E-score** (or Execution score) evaluates the performance: the execution and artistry of the routine.
  
  The base score is 10.0. Judges do not add to this, but rather, take away points for errors in form, artistry, execution, technique and routine composition. There is a 1.0 mark deduction for falling off an apparatus. Errors are judged to be small, medium or large and respective 0.1, 0.3 and 0.5 deductions are applied.

3. Calculate the execution score for a gymnast that made 2 small errors and 1 large error.

4. In 1976, Nadia Comaneci completed a perfect uneven bars routine. What would her E-score have been?

There are also **Neutral Deductions**. Neutral errors include those for stepping out of bounds or violating time requirements, as well as attire or podium violations.

For each contestant's routine in a gymnastic event there will be eight judges.

- Two judges will determine the elements and difficulty of the routine (D value = difficulty score).
- Six judges will determine the execution and artistic value of the performance (E value = execution score).

To determine the final score, each judge on the D Panel independently reaches his/her Difficulty Score and then the two compare and reach a consensus.

Each judge on the E Panel independently determines his/her score. The highest and lowest scores are dropped, and the gymnast's execution score is the average of the remaining four judges' scores.

5. For a gymnast's execution score, the six judges came up with these values:
   8.4  8.2  8.8  7.6  8.0  7.8
   What would those judges combined score become?
6. In the 2008 Olympics, Chinese gymnast He Kexin received a D score of 7.7 and an E score of 9.025. Her final score was 16.725 and she won the gold medal for her uneven parallel bars routine. What could her performance have consisted of?

7. What do you think is the highest score that a gymnast could receive with this new scoring? Please explain your reasoning.

8. Do a little research about the highest score any gymnast has received and what might be humanly possible.

When to watch

Artistic Gymnastics

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<tr>
<th>Event</th>
<th>Date</th>
<th>Sat 28</th>
<th>Sun 29</th>
<th>Mon 30</th>
<th>Tue 31</th>
<th>Wed 1</th>
<th>Thu 2</th>
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<th>Sat 4</th>
<th>Sun 5</th>
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Rhythmic Gymnastics

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<tr>
<td>Group all-around</td>
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Trampoline

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<tbody>
<tr>
<td>Women</td>
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Who to watch

Jordyn Wieber (USA) was the 2008 US junior national champion and in 2011, she became both the US and world all-around champion -- in just her first year on the senior level.

Viktoria Komova (Russia) was the runner-up to Wieber in 2011, and many, especially in the Russian camp, thought she should have won. She was still healing from an ankle injury at worlds, so could be even better at the Olympics.
Aliya Mustafina (Russia) won the 2010 world all-around title before injuring her ACL at the European Championships in 2011. With a full recovery she will challenge Komova and Wieber for the Olympic all-around gold.

Yao Jinnan (China) was the all-around bronze medalist at the 2011 worlds, and shows fewer nerves under pressure than many of her Chinese teammates. She could be a medal threat in the all-around again, as well as on bars and beam.

Rebecca Bross (USA) had a heartbreaking injury at the 2011 US nationals, when she dislocated her kneecap on a Yurchenko double vault. If she's fully healed, the six-time world medalist could challenge for some Olympic hardware, especially in the all-around, bars, and beam.

Huang Qiushuang (China) Her best event is bars, where she won a bronze medal at the 2011 worlds, and has one of the highest start values in the world. She's an all-around threat as well: She was the all-around silver medalist at the 2010 Asian Games, and has won two World Cup titles.

McKayla Maroney (USA) won the vault gold at 2011 worlds, and could easily win vault again in London. Though she’s not a lock for the US team, should she be named to the squad, she’ll also help the team on floor, where she mounts with a super-difficult back 3.5 twist.

Catalina Ponor (Romania) led the Romanian team to gold in 2004, then won beam and floor in event finals, too. This three-event specialist will be counted on to help Romania get back on the podium in London – at the 2011 worlds, the country -- a former powerhouse -- earned no medals.


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