

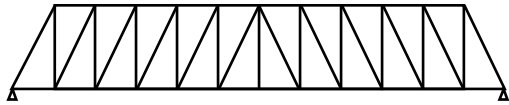
steel quiz

The theme of this month's quiz is "bridges." The answers can be found in the *AISC Specification*, *AISC Steel Construction Manual* and *AISC Steel Design Guides*, as well as on the AISC and MSC websites (www.aisc.org and www.modernsteel.com).

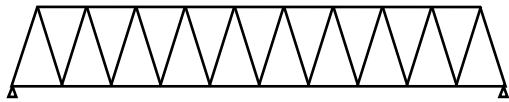
1–5 Match the truss configuration shown with the appropriate truss nomenclature.

- a) Warren Truss b) Pratt Truss c) King Post Truss
d) Queen Post Truss e) Howe Truss

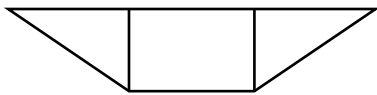
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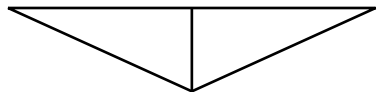
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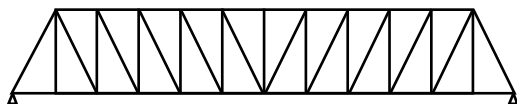
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6 What is the world's longest cantilever bridge? (Hint: It's in Canada.)

7 Which of the following decisions is usually the most important aspect of designing a cost-effective bridge?

- a) Which bridge type is right for the site
b) Whether weathering steel, galvanizing or painting should be used
c) Which steel grade should be used
d) Whether the connections are bolted or welded

8 True/False: The Direct Analysis Method for stability design does not apply to steel trusses used in pedestrian bridges and similar structures.

9 The Direct Analysis Method includes a provision to account for out-of-plumbness in the structure with notional loads. What alternative approach is also permitted?

10 True/False: The "hidden" weld in overlapped HSS truss connections often can be eliminated without reducing the strength of the joint.

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- 1 e) A Howe Truss has vertical and diagonal web members. The diagonal members slope down and away from the center of the truss. This is opposite to the slope of the diagonals in a Pratt Truss. Under uniform gravity loading, the diagonal web members are in compression and the vertical web members are in tension.
- 2 a) A Warren truss has alternately sloping diagonal web members along its length. A Warren Truss can also have vertical web members in addition to the diagonals.
- 3 d) A Queen Post truss has two vertical queen posts. The outside diagonals slope to the queen posts, which are connected by a horizontal member.
- 4 c) A King Post is one of the simplest truss styles. It consists of two outside diagonals that slope to a single vertical king post.
- 5 b) A Pratt Truss has vertical and diagonal web members. The diagonal members slope down and toward the center of the truss. This is opposite to the slope of the diagonals in a Howe Truss. Under uniform gravity loading, the diagonal web members are in tension and the vertical web members are in compression. A Pratt truss with a Vierendeel opening is a common configuration for a staggered truss system. See AISC *Steel Design Guide 14* for more information on the staggered truss system.
- 6 The Quebec Bridge or "Pont de Quebec" in French. This bridge appeared in the December 2012 news section as part of the SteelDay Student Photo Contest. To learn more about this steel bridge and the SteelDay Student Photo Contest, please visit www.aisc.org/content.aspx?id=20024.
- 7 a) There are various steel bridge types that provide efficient solutions for a range of bridge spans. Chapter 7 of the *Steel Bridge Handbook* provides guidance for selecting the right steel bridge for your project. You can download it from the NSBA website (www.steelbridges.org).
- 8 False. The Direct Analysis Method can be used in any stability design application. This is discussed in the Q1 2009 AISC *Engineering Journal* paper "A Model Specification for Stability Design by Direct Analysis" by Shankar Nair.
- 9 An alternative approach is to model the out-of-plumbness directly. This alternative is especially useful when the actual out-of-plumbness is known, such as when assessing an existing building.
- 10 True. When the forces in the branches normal to the chord balance each other and the welds develop the wall, the hidden weld can be tacked and not welded. See the Commentary to Section K2 of the AISC *Specification* (specifically, the last paragraph in that section on page 16.1-436).



Anyone is welcome to submit questions and answers for Steel Quiz. If you are interested in submitting one question or an entire quiz, contact AISC's Steel Solutions Center at 866.ASK.AISC or at solutions@aisc.org.