

Why Bridges Have Gaps

Name: _____

Read the passage all the way through before you start.

Walk across a long bridge and at some point you will step over a metal joint with a gap in it, often with interlocking teeth like a comb. It looks like a flaw. It is the opposite: without it the bridge would tear itself apart.

Steel and concrete expand when they warm and contract when they cool. The change is small — a steel beam grows by roughly one millimetre for every ten metres of length for each ten degrees of warming — but bridges are long. A three-hundred-metre span can be most of a hand's width longer on a hot afternoon in July than on a cold night in January.

That movement has to go somewhere. If both ends of the bridge were locked solid, the steel would still try to grow, and the force behind that growth is enormous. Something would give: the deck would buckle upward, or the supports would crack.

So engineers design the movement in rather than fight it. One end of the span usually sits on a bearing that is free to slide. The expansion joints in the deck open in winter and close in summer. On a very cold day you can sometimes see daylight through them.

The same thinking shows up in railway track, in concrete pavement, and in the gaps between the tiles of a long floor. The rule is the same everywhere: materials move, and a design that pretends they do not will fail.

Non-fiction · 244 words

Before you turn over

1. Underline any word you are not sure of. Work out what you can from the sentence around it.

2. In one sentence, what is this passage about?

3. Write down one question you still have.

The questions are on the next page. →

Why Bridges Have Gaps

Answer in complete sentences. Look back at the passage as often as you need to.

1. What is the gap in a bridge joint for?

2. Why does a small rate of expansion still matter on a bridge?

3. What would happen if both ends of a bridge were locked solid?

4. The writer says the gap "looks like a flaw. It is the opposite." Why start there?

5. State the rule in the last paragraph in your own words.

Why Bridges Have Gaps — Answer Key

1. To give the deck room to expand and contract with temperature without buckling or cracking. *(Main idea)*
2. Because bridges are very long, so a tiny change per metre adds up to several centimetres across a whole span. *(Cause and effect)*
3. The steel would still try to expand, and something would fail — the deck buckling upward or the supports cracking. *(Inference)*
4. Answers will vary. It names what the reader already thinks, then overturns it, which makes the explanation land. *(Author's craft)*
5. Answers will vary. Materials change size, so good design allows for the movement instead of trying to prevent it. *(Summarizing)*