**Drawing a New Bond From a Lone Pair**

Base your answers on the information provided and your knowledge of chemistry. Use the 2025 Chemistry Reference Tables as needed.

A molecular display compares ammonia, $NH_3$, with boron trifluoride, $BF_3$. In the model the nitrogen in $NH_3$ has three N–H bonds and one lone pair. The boron in $BF_3$ has three B–F bonds and room for another shared pair. The display can use the nitrogen lone pair to form a new bond to boron. No atoms or electrons leave.

| Center | Atoms bonded before the change | Lone pairs before the change |
|---|---|---|
| N | 3 H | 1 |
| B | 3 F | 0 |

**1** Which pair of atoms becomes newly connected in the model?

(1) H and F

(2) N and F

(3) N and B

(4) B and H

**2** Draw the product connections. Show the N–B bond and keep the three H atoms attached to N and the three F atoms attached to B. [1]

Draw your molecular model

The display uses this shape rule for the boron center: three bonded neighbors give a flat arrangement, while four give an arrangement that extends out of that plane.

**3** Use the new neighbor count to explain why the boron center no longer fits the original flat model. [1]

Answer and work

**4** A student says that if nitrogen loses its lone pair, the full product must have lost two electrons. Evaluate the claim using the electron-pair model. [1]

Answer and work