Teacher's Key

The Science of a Broken Heart: What Rejection Does to Us (Level B1)

Vocabulary Matching

1 distress = **N**
2 dopamine = **A**
3 reward = **H**
4 cortisol = **L**
5 trigger = **G**
6 rejection = **M**
7 activated = **I**
8 surge = **E**
9 temporary = **D**
10 craving = **O**
11 withdrawal = **J**
12 obsession = **K**
13 pattern = **B**
14 gradually = **C**
15 fades = **F**

Fill in the Blank

1 distress
2 dopamine
3 reward
4 cortisol
5 trigger
6 rejection
7 activated
8 surge
9 temporary
10 craving
11 withdrawal
12 obsession
13 pattern
14 fades

True or False

1 **False.** The reading suggests the pain can be both emotional and physical.
2 **True.** The reading says cortisol was measured in hair samples from 101 women.
3 **True.** The reading calls cortisol the body's main stress hormone.
4 **False.** It found that a brain region linked to physical pain was activated.
5 **True.** The reading names her as the lead researcher.
6 **False.** It was first identified in Japan, by Hikaru Sato.
7 **True.** This matches the reading.
8 **False.** It found the same general areas but different detailed activity.
9 **True.** This matches the reading.
10 **False.** The reading says scientists still do not agree on this.

Language Focus: Passive Voice

Example answer: The brains of fifteen rejected people **were scanned** by researchers.

Comprehension Questions: Model Answers

1 Open answer. Accept: the reading suggests it is both. It cites brain scans, a hormone study, and a heart condition as evidence of physical effects, while noting that some early findings are less certain than they first seemed.

2 Women who had recently separated had more cortisol than women in long relationships. However, single women and women newly in love also had more, so higher cortisol was not caused only by breakups.

3 Volunteers played Cyberball inside a brain scanner, and after a few throws the other two players stopped throwing the ball to them. The anterior cingulate cortex, a region linked to physical pain, was activated, and Eisenberger concluded that social and physical pain may share a warning system. The 2014 study found the same general areas but different detailed activity, so the two may not be the same kind of pain.

4 A condition in which a surge of stress hormones temporarily weakens part of the heart muscle, sometimes called 'broken heart syndrome.' It was first identified in Japan in 1990 by the cardiologist Hikaru Sato.

5 Most patients were women (83 percent), but men were about twice as likely to die from the condition.

6 It found that when recently rejected people looked at a photo of their former partner, brain regions linked to drug craving became active. Fisher's team argued that rejection can work like a kind of withdrawal.

7 Open answer. Accept: if rejection works like withdrawal, checking messages or photos may be a way of seeking what is missing, like a craving. The reading says this idea has not been proven.

8 Open answer. Accept: protest is a stage when a person refuses to accept a loss and searches for what is missing; it was originally about children separated from a parent, and some researchers have applied a similar pattern to adult breakups.

9 Open answer. Accept a summary that includes: loss of the reward linked to dopamine, possible rise in cortisol, pain-like and craving-like brain activity, less activity in an attachment area as time passes, and feelings that gradually weaken, with no agreed recovery time.

10 False. The reading says the condition is usually temporary and most people recover within days or weeks, which contradicts "always" and "permanent."

11 No. The writer says later research questioned this idea and that the detailed brain activity for pain and rejection was different, so the writer does not present the 2003 study as proof.

12 Best answer: to admit the limits of current research. The final sentence names an open question rather than offering a conclusion. Accept a reasoned answer about scientific caution.

Notes on the Evidence

- Brain-imaging studies named in the reading: Aron, Fisher, Mashek, Strong, Li, and Brown, Journal of Neurophysiology, 2005 (17 people in intense early-stage love; activity in dopamine-rich reward areas such as the ventral tegmental area and caudate). Eisenberger, Lieberman, and Williams, Science, 2003 (13 UCLA undergraduates, Cyberball; anterior cingulate activity during exclusion). Woo, Koban, Kross, Wager, and colleagues, 'Separate neural representations for physical pain and social rejection,' Nature Communications, November 2014 (60 participants given painful heat and shown photos of an ex-partner; pattern classifiers told pain and rejection apart, and the two representations were uncorrelated even within the dorsal anterior cingulate). Woo et al. reanalyzed data from a 2011 PNAS paper by Kross et al. that had argued for shared representation. The overlap question is still debated; the reading presents it as questioned, not settled. Fisher, Brown, Aron, Strong, and Mashek, Journal of Neurophysiology, 2010 (10 women and 5 men, average 63 days since rejection; activity in the ventral tegmental area, nucleus accumbens, orbitofrontal cortex, insula, and anterior cingulate; less activity in the right ventral putamen/pallidum, an attachment-related area, as days since rejection increased). The addiction framing is the authors' interpretation, not a clinical diagnosis.
- Cortisol: Renner, Stanulla, Walther, and Schindler (TU Dresden), 'CortiLove,' Comprehensive Psychoneuroendocrinology, 2021, a pilot study of 101 women (14 recently separated, 16 newly in love, 40 in long-term relationships, 31 single). Hair cortisol over the previous month was higher in the separated, infatuated, and single groups than in the long-term group; only the separated group reported more distress. The authors call the sample very small and preliminary. No named study found for a drop in oxytocin after a breakup, so that claim was removed.
- Takotsubo cardiomyopathy: naming history (Hikaru Sato, Japan, 1990; octopus trap, after the shape of the left ventricle) and triggers checked with Cleveland Clinic and American Heart Association pages. Cleveland Clinic lists physical stressors (surgery, severe illness, asthma attacks) alongside grief, fear, and even good news, and names women over 50 as the group most at risk. Figures from Movahed and colleagues, Journal of the American Heart Association, May 2025: 199,890 US hospitalized adults, 2016 to 2020; 83 percent women; overall in-hospital death rate 6.5 percent, 11.2 percent for men versus 5.5 percent for women. The authors suggest that physical triggers, more common in men, may explain part of the gap. These figures describe hospitalized cases only, not the general risk after grief or a breakup. Recovery 'within days or weeks' follows the AHA's wording; some clinical sources say weeks to months. Figures checked September 2026.
- Attachment framework: Bowlby's protest, despair, and detachment stages come from his work on children separated from a parent (Attachment and Loss, 1969 to 1980). Applying them to adult romantic breakups is the work of later writers, which the reading states. No figure for recovery time is given because sources do not agree.
- Revision (September 2026, fix mode): (1) Paragraph 2 rewritten. The earlier version stated as fact, with no named study, that dopamine and oxytocin drop and cortisol rises after a breakup, and it said cortisol triggers the fight or flight response, which is driven mainly by adrenaline. It now cites Aron et al. 2005 and the 2021 German hair-cortisol study, with that study's limit. (2) Paragraph 3 adds Woo et al. 2014, which challenged the idea that rejection and physical pain share the same brain representation, and corrects 'slowly' (participants were excluded after a few throws). (3) Paragraph 4 adds physical triggers and the 83 percent female share from the 2025 study. (4) Paragraph 6 replaces the unsourced claim that cortisol gradually falls with Fisher's time-since-rejection finding. (5) Paragraph 1 drops 'so far'. (6) The True/False/Not Given model answer was wrong (Not Given); it is False. The Yes/No/Not Given item was replaced with one the reading answers (No). (7) Reading Comp, True or False, comprehension questions, model answers, and two discussion questions updated to match; discussion question 11 duplicated question 4 and was replaced. (8) Resources: the Science.org paper (403 on fetch) and the full-text Fisher PDF were replaced with the Rutgers news release and a Discover post on the 2014 study. (9) Hindi 'withdrawal' changed from a literal calque to नशा छोड़ने के लक्षण.
- Translations: Hindi and Arabic have not had a native-speaker check. Also doubtful: Hindi 'trigger' (उत्पन्न करना, closer to 'produce').