

Faculty Work Comprehensive List

7-29-2014

Team Analysis And Review: Using Group Assessment for Learning

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Team Analysis And Review: Using Group Assessment for Learning

Abstract

Team work is widely reported to be a highly desired skill by prospective employers and professional schools. To help my students develop teamwork skills I have been using group quizzes called "Team Analysis And Review" (TAARs) in my introductory algebra-based physics course. A TAAR takes the full 50-minute class period and the students will review the material on the quiz three times during the period: individually, in an assigned group, and finally as a whole class. The individual TAAR allows the student to identify personal gaps in their understanding of the material. The group TAAR encourages peer instruction and offers an immediate opportunity to learn from your mistakes. Reviewing the TAAR as a whole class closes the feedback loop and allows the instructor to correct any lingering student misunderstandings. Students respond favorably to the process and report that TAARs are helpful for their learning.

Keywords

collaborative learning, collaborative testing, TAAR, Team Analysis And Review, undergraduate students, physics course

Disciplines

Higher Education | Physics

Comments

Poster presented at the Summer Meeting of the American Association of Physics Teachers held on the campus of the University of Minnesota in Minneapolis, Minnesota, July 26-30, 2014.

Team Analysis And Review - Using Group Assessment for Learning

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What is Team Analysis And Review (TAAR)?

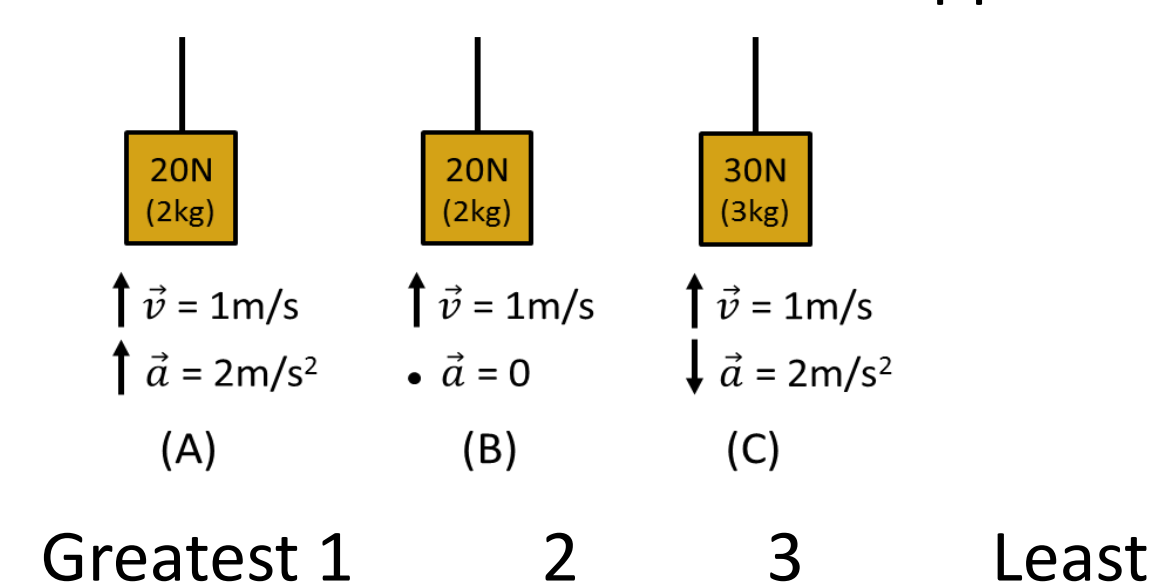
TAAR [1] is a group quizzing technique that transform quizzes into a formative learning opportunity. TAARs encourage meta-awareness of learning progress and provide a structured, incentivized, low risk self-assessment tool by:

- Helping students to recognize their own level of understanding and identify their weaknesses
- Creating a forum for immediate peer feedback in the style of collaborative exams [2,3]
- Closing the learning feedback loop in an instructor-led discussion of the quiz answers

What kinds of questions do you use on TAARs?

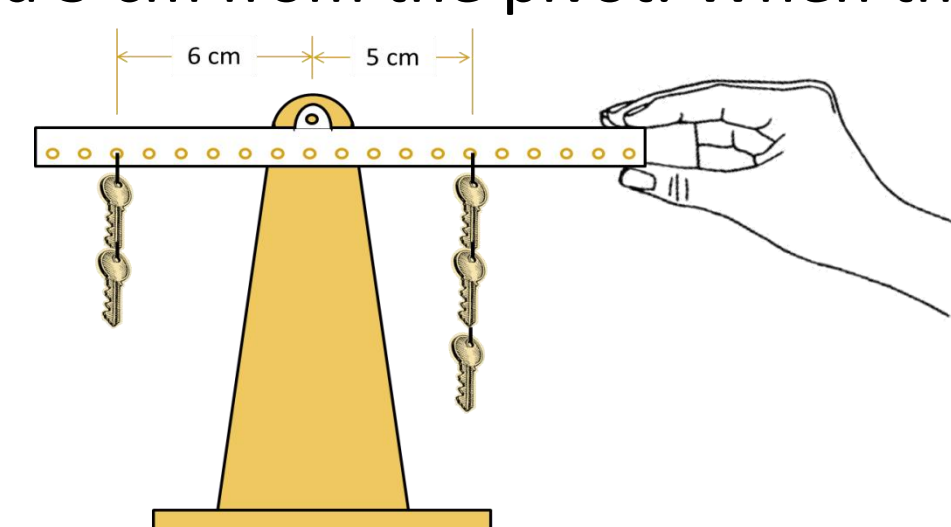
Questions focus on concepts and quantitative reasoning, not calculations and often include an “explain” prompt. For example:

In each case shown, the block is supported by a massless string. The mass of the block, the acceleration and the velocity for each block are shown in the figure. Rank these situations based on the tension in the supporting string.



Explain:

Five identical keys are suspended from a balance, which is held horizontally as shown. The two keys on the left are attached to the balance 6cm from the pivot and the three keys on the right are attached 5 cm from the pivot. When the person lets go, the beam will:



- Lean to the right
- Stay horizontal (level)
- Lean to the left
- Impossible to determine

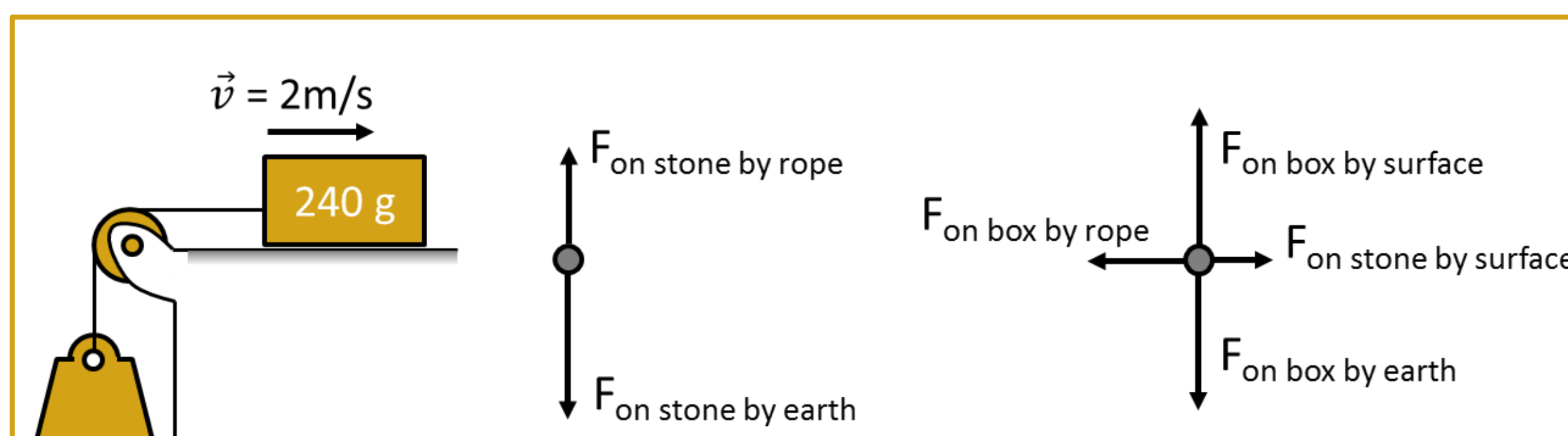
Explain:

How do students respond to TAARs?

Students tend to be extremely positive about TAARs:

- “The group quizzes are helpful; sometimes having a classmate explain something helps you understand the concept”
- “TAARs were difficult but helpful in tracking my progress”
- “TAAR → showed what we knew and what we needed to study further about the material”

Course Evaluation Question	% (number) of Students Responding		
	Disagree (1 or 2)	No Opin. (3)	Agree (4 or 5)
Group quizzes (TAARs) helped me learn the material	21% (3)	0% (0)	79% (11)
Group quizzes (TAARs) helped me identify gaps in my knowledge	0% (0)	21% (3)	79% (11)



Four students discussing these free-body diagrams argue as follows:

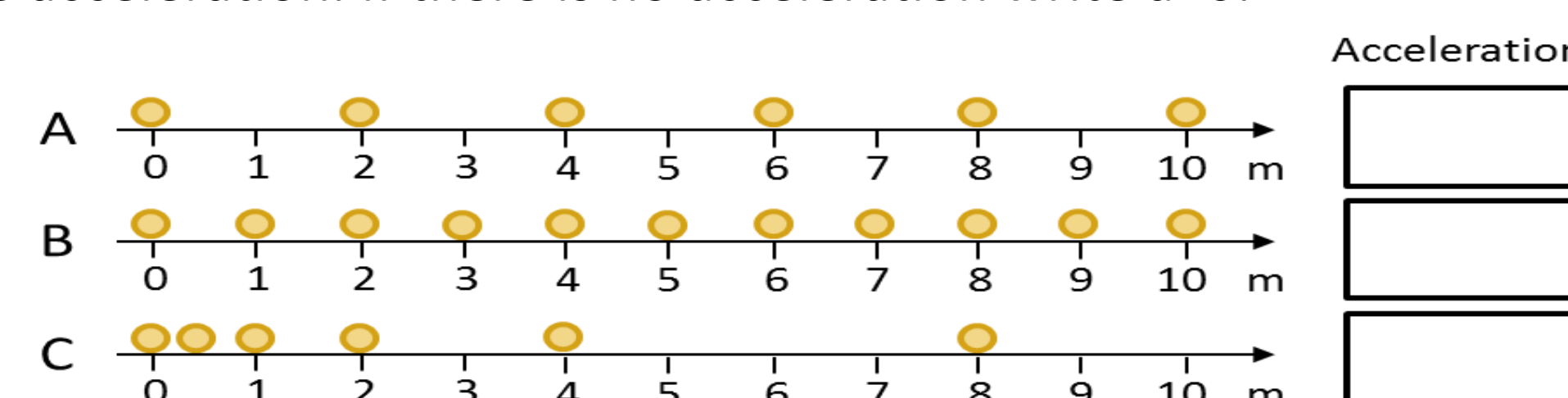
- Ali: “I think there is a problem with the free-body diagram for the hanging stone. The two forces should have the same magnitude.”
- Beth: “But the stone is moving upward—there should be a larger force in that direction.”
- Carl: “No, the diagram for the hanging stone is okay, but there is a problem with the diagram for the box. The frictional force is in the wrong direction.”
- Dan: “No, all three of you are wrong. Both free-body diagrams are correct because both show the way the objects would be accelerating.”

Which, if any, of these students do you think is right?

Ali ___ Beth ___ Carl ___ Dan ___ None ___

Explain:

Photographs were taken every second of a set of spheres moving from left to right. The diagram below shows the location of each sphere when each photograph was taken. Draw an arrow indicating the direction of the acceleration. If there is no acceleration write $a=0$.



Where do you look for TAAR questions?

Any book with clicker-type questions, for example:

- College Physics (Knight Jones & Field; Pearson).
- nTIPERs and E&M TIPERs (Hieggelke; Pearson)
- Ranking Task Exercises in Physics (O’Kuma; Pearson)
- Peer Instruction (Mazur; Prentice Hall)

How do you “do” TAARs?

TAARs are a 3-stage process that typically use the full 50 minute class period:

Stage 1: Individual

- Students take quiz individually (15-20 min)
- Collect individual quiz; counts for 30% of quiz grade
- Purpose: force students to confront their understanding.

Stage 2: Group

- Give groups of 3-4 students a copy of the quiz
- Remind groups that agreeing on an answer doesn’t mean their answer is correct, so they should discuss reasoning
- Allow groups 15-20 minutes to discuss the questions
- Collect group quiz; counts for 70% of quiz grade
- Purpose: Immediate feedback, meta-awareness

Stage 3: Class

- Give each student another copy of the quiz (to keep)
- Discuss quiz questions, focusing on “explain”

How do you form groups?

Students are assigned to a group because TAARs benefit from groups that have (relatively) balanced ability levels. Students self-report their ability level using the following questions:

Scientific Background Index

(Give yourself the appropriate number of points on each line)

- Round your cumulative college GPA DOWN and multiply by 5
- 10 points for each high school (or other) physics class you have taken
- 5 points for each upper level (200 or higher) chemistry class you have taken
- 5 points for each college-level math class you have taken (AP Calc counts)

Groupwork Index (choose one)

- I am outgoing and work well in groups (20)
- I sometimes prefer to be a leader and sometimes to be a follower (15)
- I am shy but like to help the group in quiet ways (10)
- I consider walking my dog a significant group experience (5)

Motivation Index (choose one)

- I really want to take this course (20)
- This course sounds interesting and I like physics (15)
- This course is required for my major or program (5)

Using the total score students are sorted and assigned to a group fantasy draft style (i.e. 1,2,3,3,2,1,1,2,3,...).

References

- [1] Foster M. & Vander Werff J. “Techniques from Workshops on Teaching.” Proceedings of the American Society for Engineering Education, Vancouver, BC. 26-29 June 2011.
- [2] Weiman, C, Rieger, G, & Heiner, C. “Physics Exams that Promote Collaborative Learning.” The Physics Teacher 52.1 (2014): 51-53.
- [3] Gilley B, & Clarkston B. “Collaborative Testing” J. College Teaching 43.3 (2014): 83-91.