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Question 1: Flat Screens, Question 2: Volleyball Travel

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Original Publication Citation

Weinstein, L. (2021). Question 1: Flat screens; Question 2: Volleyball travel. *The Physics Teacher*, 59(3), 217. https://doi.org/10.1119/10.0003673

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Book Reviews

Understanding physics through dance: Review of *Physics and Dance*, by Emily Coates and Sarah Demers (Yale University Press, New Haven & London, 2019), 184 pages. ISBN: 9780300195835

*P*hysics and Dance by Emily Coates and Sarah Demers is not the first book on this topic. It is, however, the first collab-

oration between a former professional ballet dancer (Coates) and a particle physicist (Demers). Both are on the faculty at Yale University. Coates provides artistic insight with dance history and examples of specific movements from ballet and various forms of modern dance, while Demers provides the conceptual and mathematical framework of the relevant physics.



The book jacket asserts that no previous knowledge of dance or physics

is required, because the authors provide the essential introductory background. As a result, it claims, readers will finish the book having obtained a broad knowledge of both dance and fundamental physics (ranging from classical mechanics to modern physics such as relativity and quantum mechanics). It also claims that the book will be of interest to anyone curious about dance and physics.

As a college physics professor (and former amateur ballet dancer for 16 years), I find that these claims seem unrealistic. The classical mechanics covered in the book is at the level of a college physics textbook. This is true of both the conceptual content and the level and amount of algebra employed. The discussions on energy and modern physics would challenge a college student with some physics background. The dance maneuvers are at first described in terms of ordinary vernacular—e.g., standing, walking, and jumping—but eventually employ dance-specific terminology such as plié and pirouette. Finally, although the artistic elements and history of dance would likely be of interest to someone with a dance background, I am not sure that a general reader would be so inclined.

So, who would benefit from reading this book? Any *AJP* or *TPT* educator wishing to expand their repertoire in the physics of human movement. Also, anyone who teaches high school or college physics. Everyday examples of human statics (lying down, standing, and balancing) and kinematics (walking, sliding, and falling) are used as gateways to discussing the physics of dance. Why resort to modeling cars and boxes when you can connect students with their own kinesthetic experience?

What this book does particularly well is provide readers with a personal physical context for dynamics and kinematics. The authors invite the reader to perform specific movements to "feel" or experience the physics: this includes exercises on center of mass, balance, gravity, momentum, and friction. These movements can easily be incorporated into a lecture class—where each student can be asked to try them in class to connect physics to their own experience. There are "experiments" suggested using, for example, force plates that could be used as classroom demonstrations or developed into laboratory experiments for a first-semester physics course. The book does offer a selection of both physics exercises for use as homework problems and choreographic scenarios as term projects. The authors do a credible job covering important aspects of modern physics itself. On the other hand, the dance connections to modern physics, while intellectually interesting, seem to be a bit of a stretch and are too abstract to be of use in the physics classroom.

Jennifer Birriel, Morehead State University, Morehead, KY

Fermi Questions

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Question 1: Flat screens

How much total space did we save by switching to flat screen TVs and monitors? (*Thanks to Jalopnik via Robert Friedhoffer for suggesting the question.*)

Question 2: Volleyball travel

How far does a volleyball travel during a typical volleyball game?

Look for the answers online at tpt.aapt.org under "Browse," at the very end of the current issue.

Question suggestions are always welcome!

For more Fermi questions and answers, see *Guesstimation 2.0: Solving Today's Problems on the Back of a Napkin*, by Lawrence Weinstein (Princeton University Press, 2012).

DOI: 10.1119/10.0003673