Numbas

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# Numba*t*

Numbas is an open-source system developed by the e-Learning Unit of Newcastle University's School of Maths and Stats, based on many years of use, experience and research into e-assessment.

It's aimed at numerate disciplines.

It creates SCORM-compliant exams which run entirely in the browser, compatible with VLEs such as Blackboard and Moodle.

A cue ball, moving with speed $v_i = 5.000\text{ms}^{-1}$ collides with a black ball on a snooker table. After the collision the black ball moves at a speed of $v_b = 4.240\text{ms}^{-1}$ at an angle of $\theta_b = 32°$ with respect to the cue ball's original direction of motion. Both balls have mass 0.5kg.
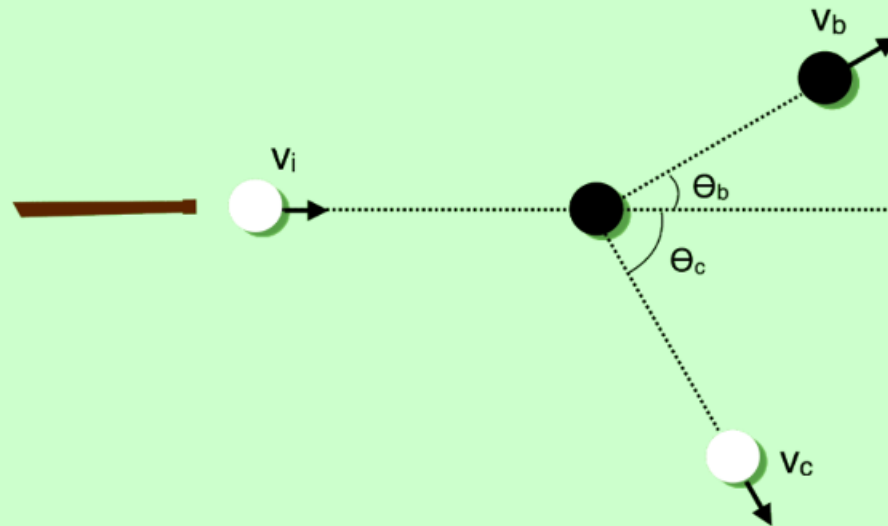
In this question you can ignore any friction effects of the table.

a)

Find the speed v_c of the cue ball after the collision. (Give your answer to 1 d.p.)

$v_c =$ ⬚ 2.6 ✔ ms^{-1}
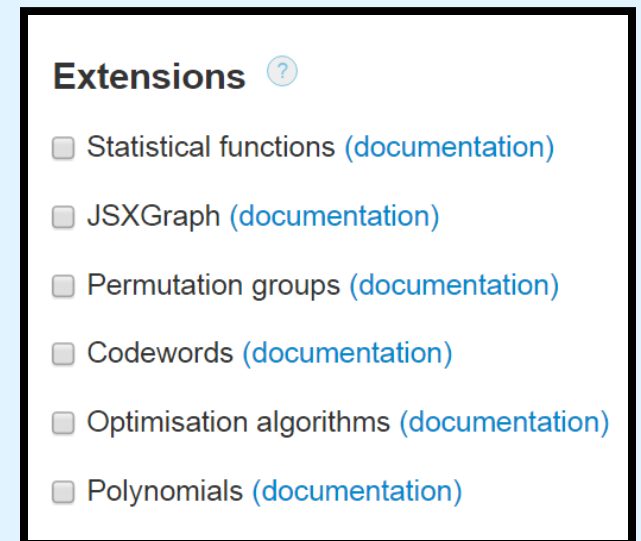
Score: 2/2 ✔   Show feedback

Design goals

- Scalable, reliable and accessible to a broad range of users.

- Good-looking and easy for students to use.

- Used by question authors who aren't experts, **without support**.

Customisation

A large driver for Numbas was the lack of customisability in previous systems.

Interface and logic are completely separated in Numbas - custom themes can change the look of tests, or reimagine how they're run.

Extensions allow the addition of new functions, data types, and resources.

Extensions ⊙

☐ Statistical functions (documentation)

☐ JSXGraph (documentation)

☐ Permutation groups (documentation)

☐ Codewords (documentation)

☐ Optimisation algorithms (documentation)

☐ Polynomials (documentation)

Integration with a VLE

- Numbas can use the SCORM standard to integrate with compliant VLEs, such as Moodle and Blackboard.

- Or there's a Basic LTI tool provider which works better than most SCORM implementations.

- Or you can use it without a VLE.

Formative vs summative use

Computer-aided assessment is great for formative assessment.

Students can try randomised questions over and over until they're happy.

Summative assessment poses problems:

- How to prevent cheating?

- Can you ask the right sort of questions for a high-stakes summative exam?

Current use

- **At Newcastle** in the Maths and Stats degree, and many service courses.

- **100+ universities** in the UK and around the world.

The unique challenge of doing everything client-side, in JS

- No calling out to a CAS

- So you've got to reimplement everything from scratch

(Not completely true)

On the train up, I had some luck making the variable generator work asynchronously, which would allow calls to remote systems.

Google image search for "good train", CC-BY 2.0, John on Wikimedia Commons

Helping with development

- Most feature ideas go in the GitHub issue tracker.

- We've had some success using up-for-grabs.net to attract new contributors.

- Our website has a Contribute to Numbas page with information on different ways to contribute.

Thanks!

Website

numbas.org.uk

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Source code

github.com/numbas

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