

**NANYANG
TECHNOLOGICAL
UNIVERSITY**

SINGAPORE

Technology! From in-class instant feedback to *bona fide* 3D visualization

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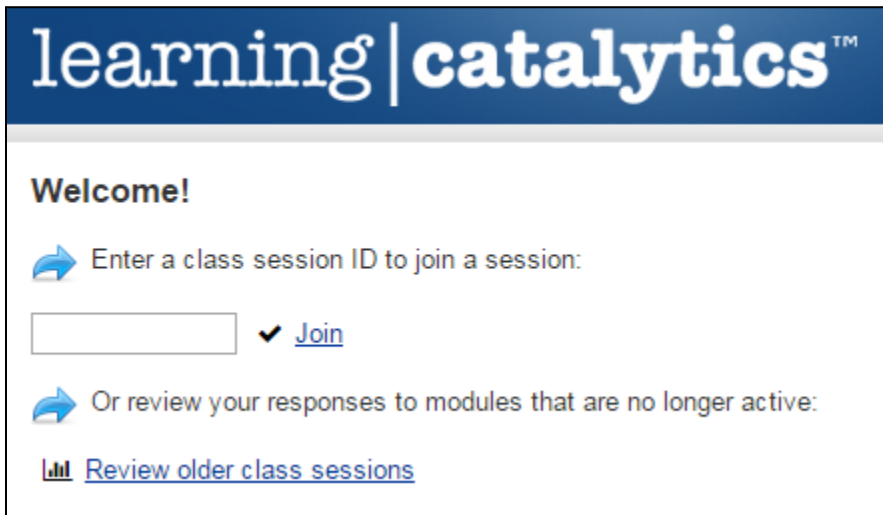
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2. Enter class session ID, and click “Join”.



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Welcome!

➔ Enter a class session ID to join a session:

✓ [Join](#)

➔ Or review your responses to modules that are no longer active:

📊 [Review older class sessions](#)

Session ID:
40570358

I've converted to self-paced so you can feel free to go in to look at all the questions at your own pace

3. Click on “Show seat map”, and select your assigned seat.



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Select seat

Enter the seat number you are sitting in: or 🔍 [Show seat map](#)

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17 August 2017



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Making and Tinkering

- **Making and Tinkering (Lite)**

Computer controlled electronics

Computer Simulation

3D printing

- **Making and Tinkering**

SPMS's key educational initiatives to provide opportunities for students to make use of their scientific knowledge to build and make useful solutions to problems they identified.

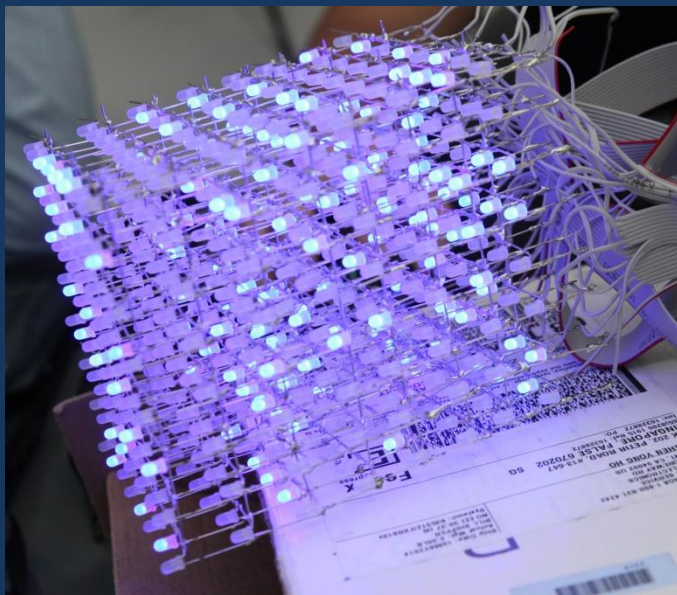
Teaching Students about Technologies



<https://apps.spms.ntu.edu.sg/makingtinkering/>

Students-developed Education Technologies

LED cube used for visualization

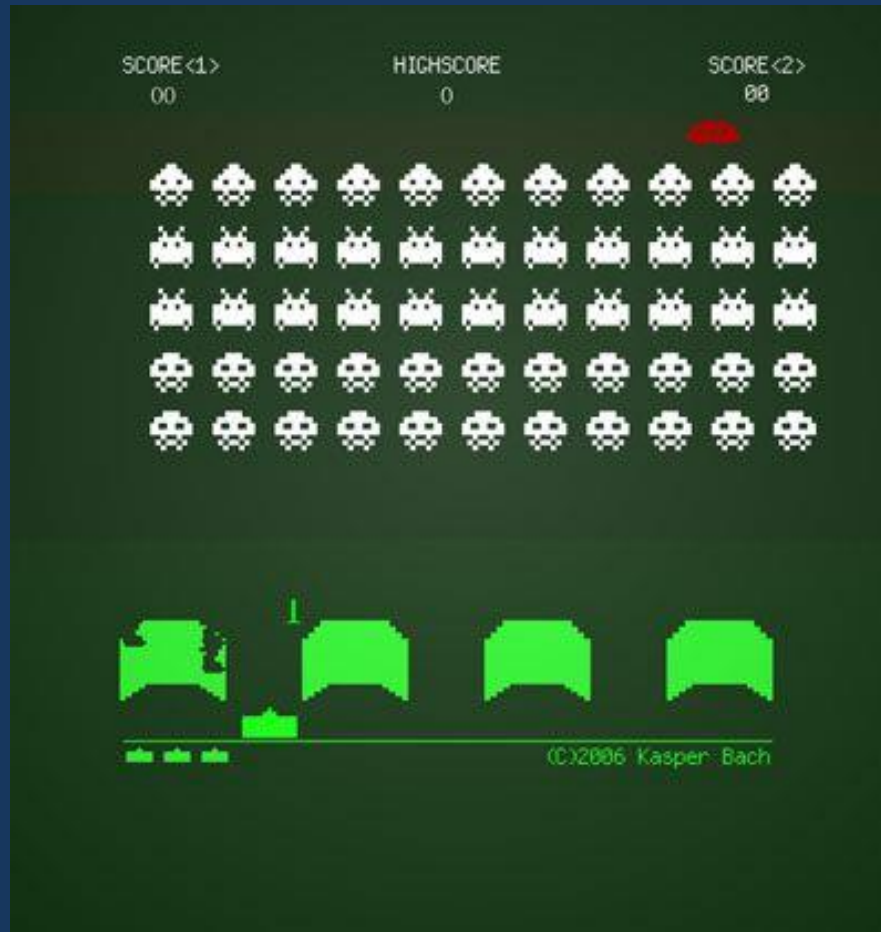


2014

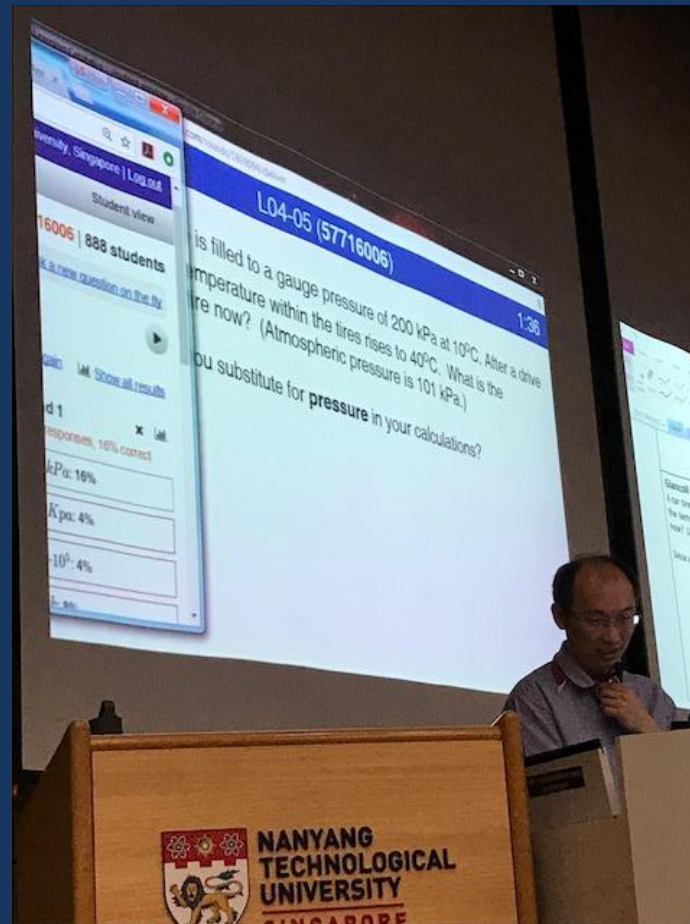


2016-17

Once Upon a time



21 August 2017





Learning Catalytics


**Technology! From in-class instant feedback
to *bona fide* 3D visualization**

How to use Clickers

Last Updated: 12 January 2011

1. Plug in the Clickers USB Cable 
2. Launch the TurningPoint software 
3. Open your Presentation file (.ppt/ .pptx)
4. Ensure your students' Response Devices are set to the room's Channel Frequency
5. Ensure you have set your input devices to
6. Ensure you have loaded your Participant List (if required)



 Do **NOT** change the pre-set Channel number.

Property of CELT

eLearning@NTU

ResponseWare – An Efficient Way to Improve User Response

Learning Solutions and Application, CITS

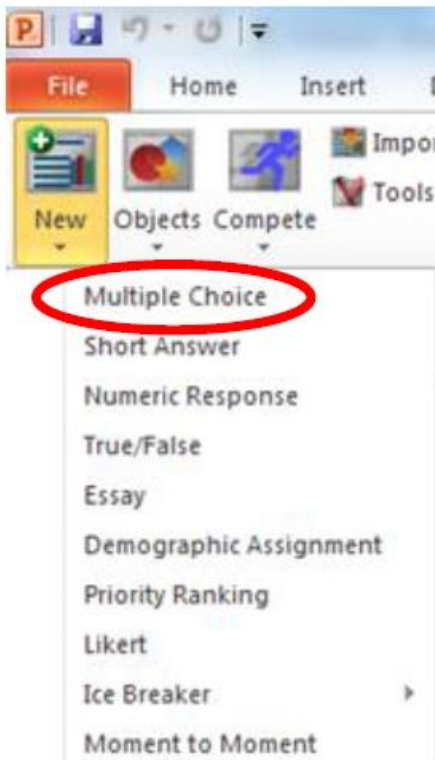
ResponseWare is an audience response application for gathering students' feedback during classroom lesson. It is introduced in AY2016/17 in place of Clicker, the hardware audience response system used in all the lecture theatres and tutorial rooms at NTU since 2008.

All Freshmen will no longer be issued with the hardware device Clicker, and instead they will use the [ResponseWare](#) app installed on their mobile devices or laptops.



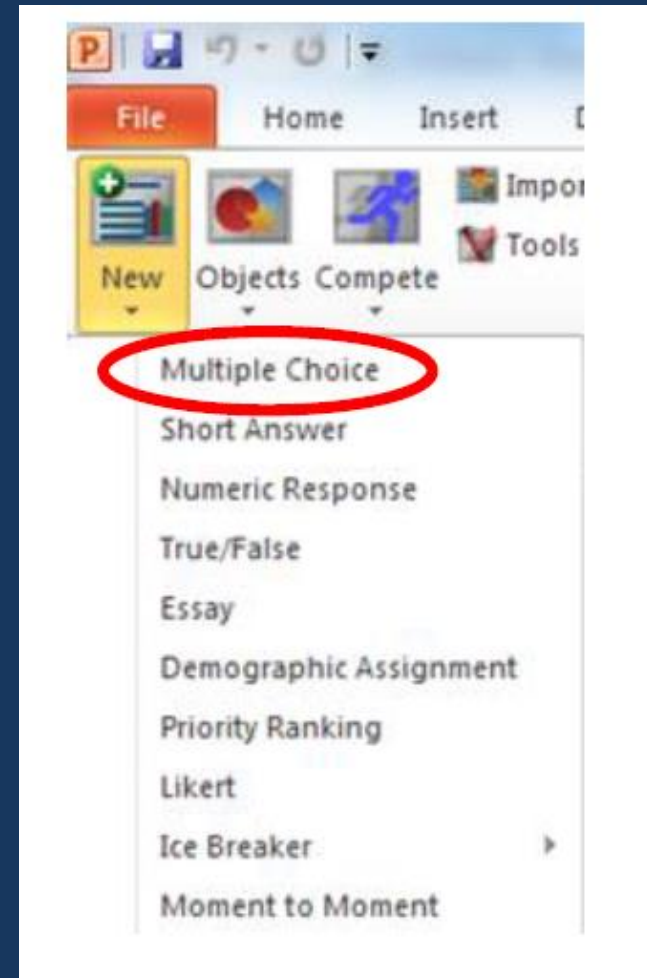
Why ResponseWare?

1. ResponseWare uses the same TurningPoint application as Clicker for creating the interactive PowerPoint slides for gathering audience response. Hence, there is no need to re-create the interactive slides.
2. ResponseWare supports more question types such as multiple-choice, multiple answer and short essay questions which can now include images and math equations.
3. The question and answer choices are displayed on the smart devices/laptops while polling is activated.
4. ResponseWare turns any web-enabled mobile device into a software Clicker, and can be used anywhere via WiFi or mobile data access.



Learning Catalytics Question-Types

- Composite sketch
- Confidence
- Data collection
- Direction
- Expression
- Highlighting
- Image upload
- Long answer
- Many choice
- Matching
- Multiple choice
- Numerical
- Priority
- Ranking
- Region
- Short answer
- Sketch
- Word cloud
- Slide





ACADEMIC TECHNOLOGY

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Learning Catalytics

[Learning Catalytics](#) is a web-based platform for managing the interactive classroom. Originally developed by the Mazur Group at Harvard and now owned by Pearson, it supports the peer instruction method of teaching, and can also be used to get real-time feedback during class. Faculty can engage students with questions about the material—with numerical, algebraic, textual, or graphical responses—and the platform can help group students for follow-up discussions and track their responses.

Learning Catalytics is in use in courses at Harvard and several other schools.

- Learn more at the [Learning Catalytics website](#)
- [Take a Tour](#) of Learning Catalytics
- Read [how Learning Catalytics is being used](#) in courses at Harvard and elsewhere

Examples of Harvard FAS Courses Using Learning Catalytics

See links to course websites below (not a comprehensive list). Syllabi will often

Demonstration

Add Questions and Customize Module

The module has been created. Now it's time to customize the module settings and add questions.

Settings

Name:

The name of the module, as shown to students.

Date:

The date is used for sorting modules within the table on the course page (enter as YYYY-MM-DD or click to select date).

Response type: **Instructor-Led Synchronous** [Change response type](#)

Students respond individually to questions as they are delivered one at a time, typically in class or online with an instructor present.

Hide sessions for this module from students

If checked, do not show active sessions for this module in the list of active sessions students see when they log on.

Participation weight: **Final score = 0% Correctness + 100% Participation**

Students receive credit only for correct responses

Students receive credit for any response

Responses in each round receive separate grades; for example, credit-bearing responses on two rounds of a three-point question would result in six points overall.

Do not allow students to review their performance on this module

If checked, do not show sessions for this module in the list of older sessions that students can review within Learning Catalytics.

Gradebook transfer: Send grade data to MasteringPhysics course (PH1107-CY1307-RELATIVITY AND QUANTUM PHYSICS)

Points transfer as

Make the above grade transfer settings the default for all new modules

Questions

Format	Question	Points

[+ Create a new question](#) [Add a question from the library](#)

[Copy or move checked questions](#)

Create new question

Question Type

Priority Ranking Region Short answer

Discipline

Calculus-based Physics

Students click or touch their screen to indicate a point on an image. You draw a region on the image that defines what answers should be considered correct.

Prompt

Rich text editor toolbar with icons for bold, italic, underline, strikethrough, subscript, superscript, link, unlink, list, indent, outdent, link, unlink, source, and fullscreen. Below the toolbar is a text area containing the prompt: "Mark on the map to show where you stay in Singapore."

→ [Switch to simple editor](#)

Add Images

Click "Add Images" below to select an image to upload, then drag and drop the uploaded file into the Prompt or Answer/Explanation text boxes to insert them into the question.

PH1012 Engineering Physics A Lecture



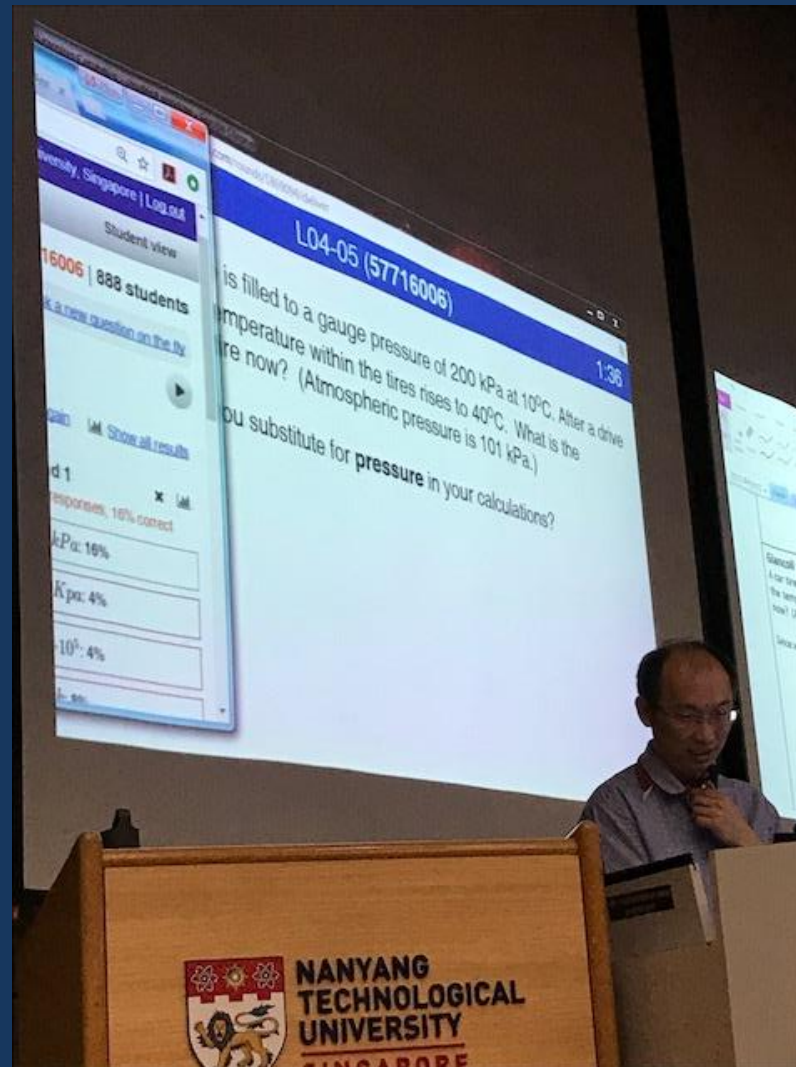
Interactive Student Response System – Learning Catalytics



Interactive Student Response System – Learning Catalytics



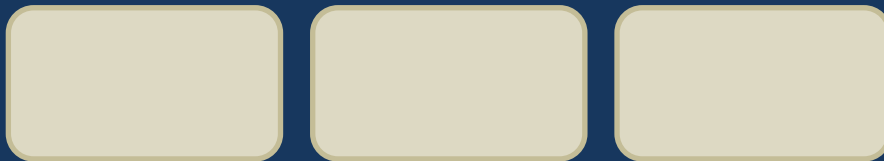
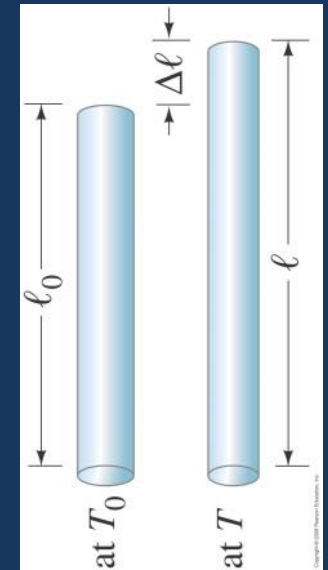
Interactive Student Response System – Learning Catalytics



Some Examples

$$\Delta l = \alpha l_0 \Delta T$$

“A concrete highway is built of slabs 12 m long (15°C). How wide should the expansion cracks between the slabs be (at 15°C) to prevent buckling if the range of temperature is -30°C to 50°C?” What value should you substitute for ΔT ?



Round 1

681 responses

Round 2

672 responses

-80: 0%	-20: 0%
35°C: 1%	35!!!!!!!: 0%
35 degrees celsius: 0%	35degC: 0%
35: 31%	35C: 0%
40: 0%	35/2: 0%
45 and 35: 0%	sounds like 35: 0%
45,35: 0%	35deg : 0%
45: 7%	35°C: 0%
50-15=35: 0%	35°C: 1%
80 C: 0%	35K: 1%
80 degrees celsius: 0%	35: 84%
80degrees: 0%	40: 1%
80 °C: 0%	45: 2%
80degree: 0%	50-15=35: 0%
80Celsius: 0%	50-15: 0%
80°C: 0%	50: 0%
80°C: 1%	65: 0%
80: 50%	70: 0%
283.15: 0%	75: 0%

Round 1	Round 2
80: 0%	-20: 0%
-25: 0%	0.00000: 0%
-25: 0%	0.00000: 0%
-20: 0%	0.00000: 0%
-15: 0%	0.00000: 0%
1: 1%	0.01152: 0%
0.15: 0%	0.023: 0%
12: 0%	0.47500: 0%
15: 0%	3.0010^-3: 0%
20: 0%	3.10^-3: 0%
200: 0%	3.0^-10^-3: 0%
25: 0%	3.10^-3: 0%
30!!!!: 0%	3.00000: 0%
35degrees Celsius: 0%	3.4110^-40: 0%
-350: 0%	10: 0%
350: 0%	12: 0%
350: 0%	15: 1%
35deg C: 0%	17.3: 0%
35deg: 0%	20: 1%
35 degree celsius: 0%	35degrees Celsius: 0%
35°C: 1%	35!!!!!!!: 0%
35 degree celsius: 0%	35deg C: 0%
35: 31%	35C: 0%
40: 0%	35: 2%
45 and 35: 0%	sounds like 35: 0%
45: 7%	35deg : 0%
50-15=35: 0%	35°C: 1%
50-30: 0%	35degrees: 0%
50-15: 0%	35 huss: 0%
50: 1%	35C: 0%
50-15: 0%	>35: 0%
55: 1%	35 deg celsius: 0%
80C: 0%	350: 1%
80 degrees celsius: 0%	35: 84%
80degrees: 0%	40: 1%
80 °C: 0%	45: 2%
80degree: 0%	50-15=35: 0%
80Celsius: 0%	50-15: 0%
80°C: 0%	50: 0%
80°C: 1%	55: 0%
80: 50%	70: 0%
283.15: 0%	75: 0%
30: 0%	80: 0%
308.15: 0%	80: 2%
353: 0%	308.150: 0%
353.15: 0%	7: 0%
353.15: 0%	in 727: 0%
525.3: 0%	THIRTY Five: 0%
Eight: 0%	Thirtyfive: 0%
FORTY-FIVE: 0%	35: 0%
The temprange: 0%	



<http://www.gettyimages.com/detail/photo/portrait-of-a-blindfolded-businessman-holding-a-royalty-free-image/57434588>

[My Courses](#) > [PH1012-PHYSICS A](#) > [L07-09](#) > **Session 58368583**[Download results](#) [Attendance information](#) [Messages](#) [Resend grades](#) [Delete data](#)

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14



10. expression

Differentiate $y = 7x^3 + 2x + 5$ with respect to x .

Differentiate $y = 7x^3 + 2x + 5$
with respect to x .

Round 1



832 responses, 93% correct

 $21x^2 + 2$: 91% $y = 21x^2 + 2$: 1% $21 \cdot x^2 + 2$: 0% $21x^2 + 2$: 0% $21x^2 + 2 + 0$: 0% $21x^2 + 2$: 0% 21^{2+2} : 0% $21x^2 + 2 + c$: 0% $21x^2 + 2$: 0% $21x^2 + 2 + \frac{5}{x}$: 0% $7x^2$: 0% $21x^2 + 2$: 0% $21x^2$: 0% $21x^2 + 2\Delta$: 0% $7x^2 + 2$: 0% $21x$: 0%

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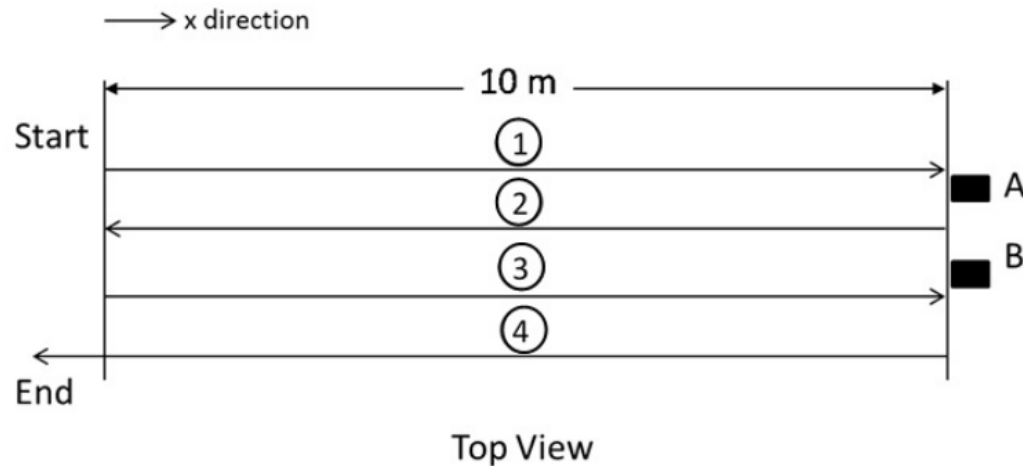
14



9. sketch

[02 - pg15] The 4 x 10m shuttle run is one of the items of the Physical Fitness Test. An individual starts running ^① from start line towards block A, picks it up; ^② runs back towards the start line, drops block A; ^③ runs towards block B, picks it up; and ^④ runs past the end. The individual is to complete the 4 x 10 m in the shortest possible time.

Take right (\rightarrow) direction as positive.

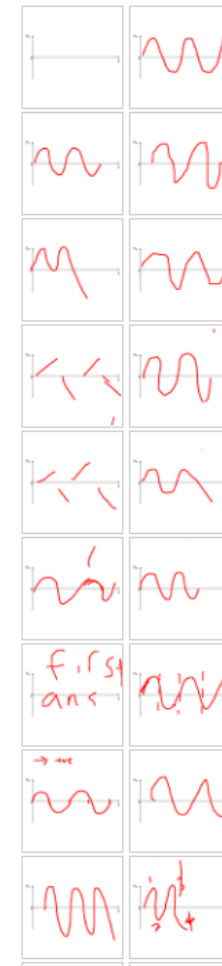


On the axis provided, **sketch** how the velocity v_x of the individual in the x -direction changes versus time t , from the start to the end of the shuttle run.



Round 1

823 responses



Implementation

- 10% of CA, maximum of 1% each week
- Points awarded for participation and not correctness of answer
- 6 – 8 questions each week during lectures
- 12 weeks of LC in total (to provide some buffer for students)

Implementation

Mon

Tue

Wed

Thu

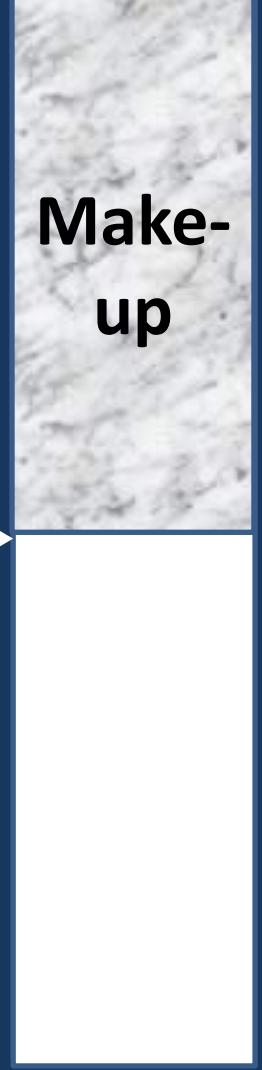
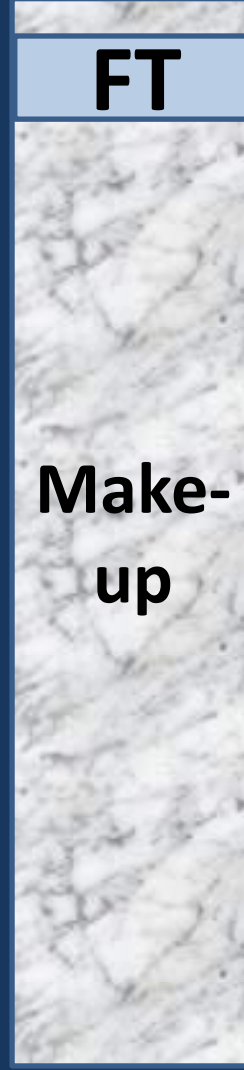
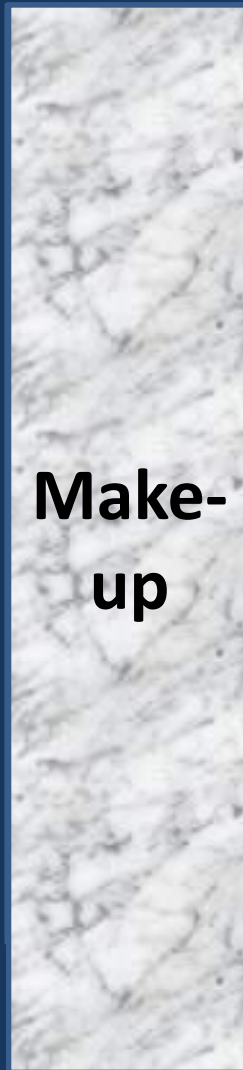
1:15 pm →

6:45 pm →

11:00 pm →

← 9:15 am

12:00 pm →



Some General Observations

- Students are generally excited about using LC
- They are excited to see their own response displayed on screen
- They are happy with the credit they get from participation

Some General Observations

- Most still try their best even though they are given points for participation, not correctness of their responses.
- Students are given an answer and explanation at the moment they most desire it.

Availability of LC in NTU

- Comes together with Mastering Physics License
- Available for students who took PH1011, PH1012, PH1801, Physics major year 1 courses to end of Year 1 Sem 2 (at least)

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