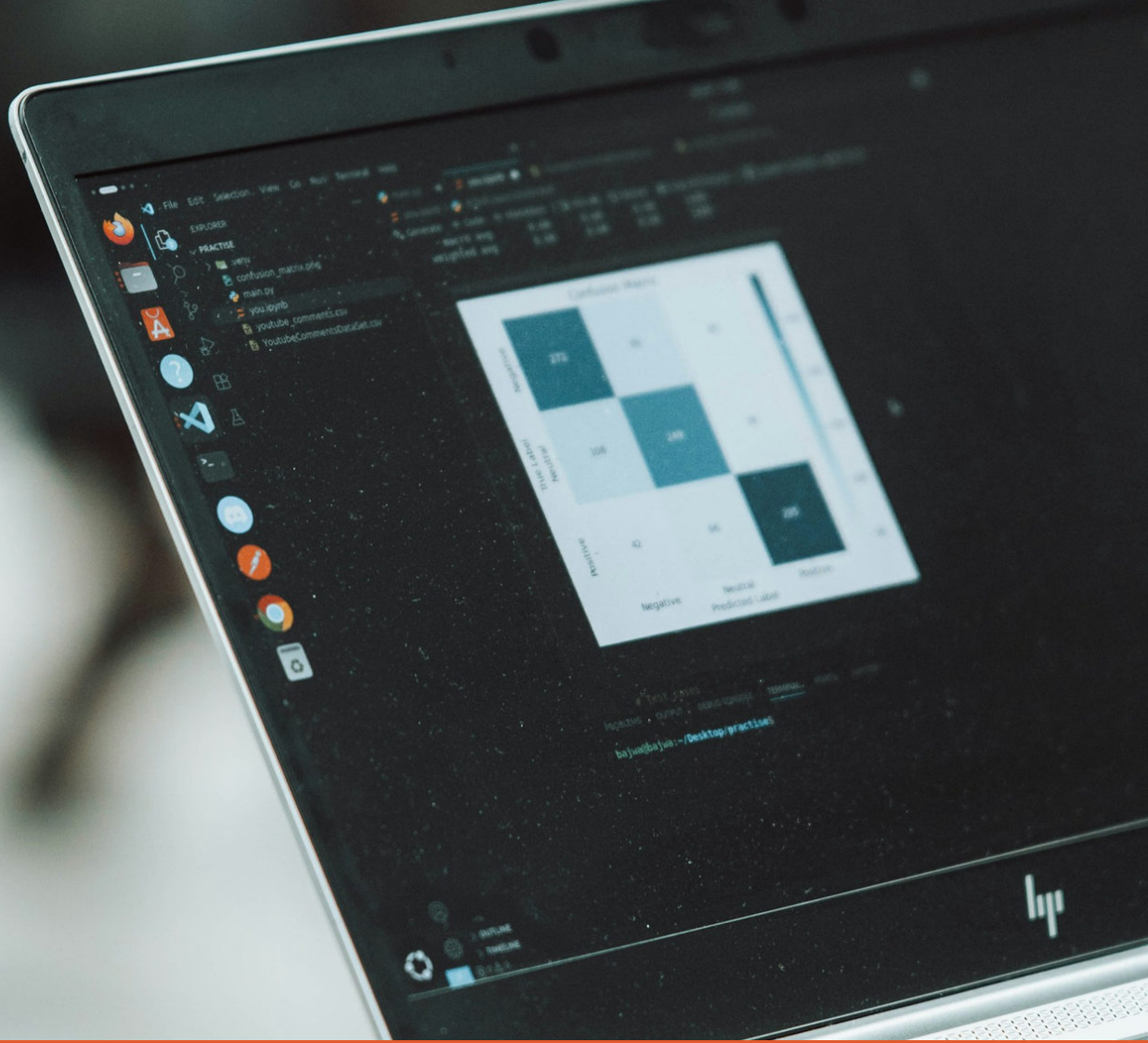




EduTrend Contents

EDUTECH · GAMIFICATION IN STEM EDUCATION · HIGH SCHOOL

Simulation Prediction League

Predict outcomes in a PhET simulation, justify with physics and analyse your prediction accuracy

Ages 15–18

Level: Advanced

75 minutes

Teams of 3 · up to 30

Activity 05

Inside: activity at a glance · step-by-step session plan · facilitator notes · 3 student worksheets · assessment checklist

ACTIVITY 05 · AT A GLANCE

Simulation Prediction League

Teams use the free PhET projectile motion simulation. In each of five rounds the teacher sets launch conditions and teams predict range or height, showing their calculation or reasoning. Points go to justified predictions and to accurate ones within a margin. Teams then analyse their errors: which assumptions failed, such as ignoring air resistance, and how the physics explains the difference.

Learning outcomes

By the end of the session students can:

- apply kinematics to predict motion;
- justify predictions with physics;
- analyse prediction errors;
- evaluate model assumptions.

KEY WORDS

projectile · range · angle · model · assumption · error

CURRICULUM LINKS

Physics: motion and forces. Maths: trigonometry and quadratics. Computing: simulations.

1

GOAL

What is the learning goal?

2

CHALLENGE

What is the task?

3

FEEDBACK

How do players know?

4

PROGRESS

How is growth shown?

5

RETRY

Can they try again?

6

REFLECT

Did it help learning?

Materials (per team)

- Devices with the PhET projectile motion simulation
- Calculators
- Round cards with launch conditions
- Worksheets 1, 2 and 3

Before the session

- Check the simulation runs on school devices.
- Prepare five round cards.
- Solve each round in advance.
- Set scoring margins.

SAFETY

Follow school device rules. Keep screen time purposeful with regular discussion breaks.

ACTIVITY 05 · SESSION PLAN

Step by step

Include one round with air resistance switched on to challenge assumptions.

Time	What happens	Say or ask
0–10 min Launch	Introduce the league and scoring.	<i>“What decides the range?”</i>
10–50 min Rounds	Five rounds: predict, justify, test.	<i>“Show your reasoning.”</i>
50–65 min Error analysis	Analyse the worst prediction.	<i>“Which assumption failed?”</i>
65–75 min Debrief	Share insights about models.	<i>“When is a model good enough?”</i>

CHALLENGE CARD (print or copy onto the board)

Top the league by making predictions you can justify with physics, then explain exactly why your worst prediction missed.

ACTIVITY 05 · FACILITATOR NOTES

The STEM game know-how in brief

Without air resistance, range depends on launch speed, angle and height; for launch and landing at the same height, maximum range is at 45 degrees.

Simulations give instant feedback on predictions. Scoring reasoning keeps attention on the model, not on trial and error.

Common ideas to listen for

- “45 degrees always gives the maximum range.” Not with height difference or drag.
- “Heavier objects fall faster.” Not without air resistance.
- “A wrong prediction means bad maths.” The model may be too simple.

Adapting the activity

Support

Provide the range equation and a worked example.

Stretch

Derive the optimal angle when launched from a height.

WORKSHEET 1

League rounds

Name: _____

Class: _____ Date: _____

Record each round.

League rounds

Round	Prediction and working	Result	Points

WORKSHEET 2

Error analysis

Your worst prediction.

Error analysis

Question	Answer
Prediction	
Result	
Assumption made	
Why it failed	
Better model	

WORKSHEET 3

When is a model good enough?

Use your results.

A model is good enough when... In our rounds...

FOR THE TEACHER

Assessment checklist

Use during the session. One sheet covers up to eight students; copy as needed.

Student	Applies kinematics	Justifies predictions	Evaluates assumptions

Suggested codes: W = working towards · E = expected · G = greater depth

ABOUT THIS ACTIVITY

Simulation Prediction League is a sample activity from the EduTrend Contents Edutech Gamification in STEM Education programme (high school, level: advanced). Every activity in the programme follows the same format: a practical challenge, a clear session plan, facilitator notes and ready-to-print worksheets, so that teachers, club leaders and parents can run it without extra preparation.

Full 15-, 20- and 32-week programmes are available from EduStore at edutrend.org.

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