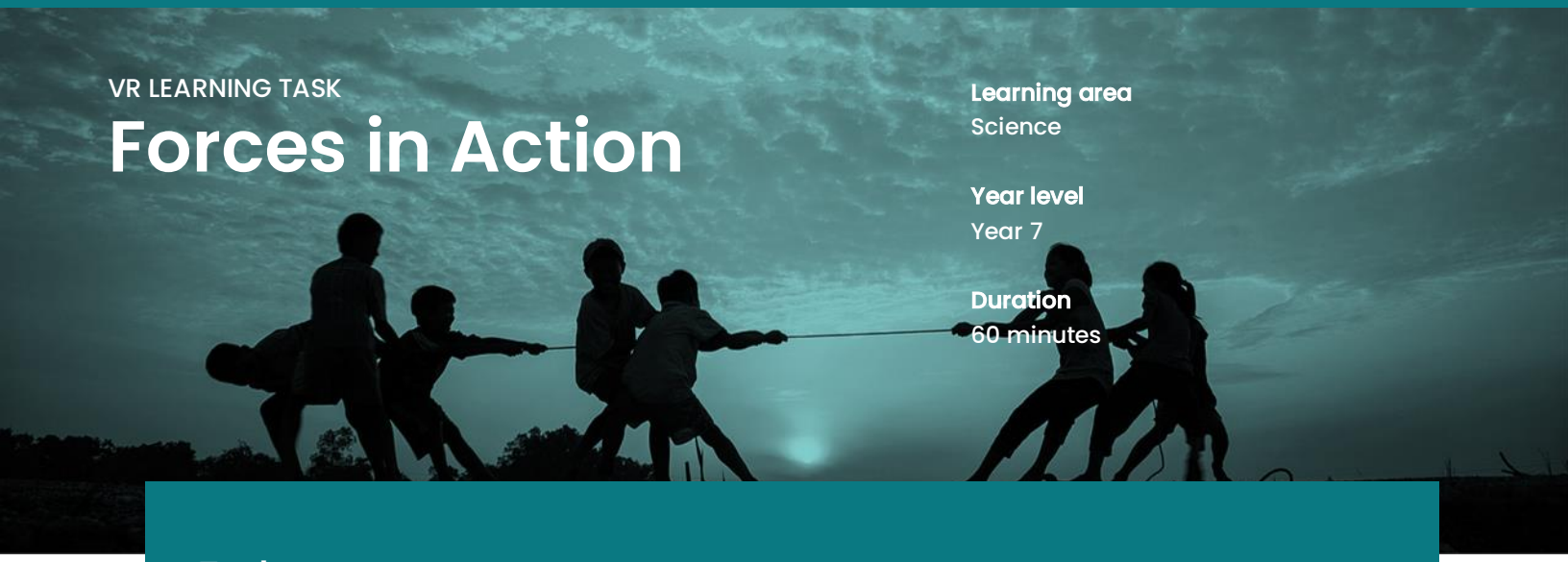

VR LEARNING TASK

# Forces in Action

**Learning area**
Science

**Year level**
Year 7

**Duration**
60 minutes

## Task summary

Students will analyse and recreate the effect of balanced and unbalanced forces on an object's motion such as starting, stopping and changing direction using virtual reality (VR) and augmented reality (AR).

## Session overview

Students can identify and model balanced and unbalanced forces using virtual reality (VR). They will investigate and represent balanced and unbalanced forces, including gravitational force, acting on objects, and relate changes in an object's motion to its mass and the magnitude and direction of forces acting on it.

## Digital technologies

- ✓ VR
- ☐ AR
- ☐ Robotics
- ☐ Drones
- ☐ Other: _____

## Required resources

**Hardware:**

- Devices - For viewing VR videos and CoSpaces
- Handheld Virtual Reality (HHVR) headsets
- Laptop or tablet - For creating on CoSpaces

**Apps:**

- **YouTube** - This needs to be whitelisted and downloaded on your devices.
- **Microsoft Whiteboard** or **Canva Whiteboard** - For brainstorming
- **CoSpaces EDU** (Download via Google Play or Apple App Store) with CoSpaces accounts ( Pro) - For creating VR spaces.
  **NOTE: Only Pro accounts are able to create VR worlds with Physics function.*

**VR videos:**

- Plank World 360° | Physics Simulations in Virtual Reality (Stereoscopic 360°) (7:11) - A VR

video showing various forces in action using balls and planks.

**Additional video:**

- Simulations - CoSpaces Edu key applications (3:08) - A quick tutorial on how to use the Physics simulation function on CoSpaces.

**Teaching resources:**

- Teaching deck – this is a slide deck template that teachers can download and use for this learning task.
- Student reflection template (Doc) or Student reflection template (PDF) – to be distributed either in printed format or digitally via email or school learning management system.

**Other:**

- Tug-of-war rope

## Other resources to try (optional)

**Miscellaneous:**

- VR/AR Safety Poster (PDF)

## Planning and preparation

**Assumptions**

- Students have had some lessons on different types of forces, including balanced and unbalanced forces -background knowledge in viewing and creating in CoSpaces, otherwise, teachers will need to allocate at least 1 lesson to teach students the basics.

**Additional preparations for teachers**

- Watch and test all videos that would be used in class, to make sure they are appropriate for your school and students.
- Check that the YouTube and CoSpaces apps are installed properly on your devices.
- Make sure all devices are fully charged.
- Set up a Pro account on CoSpaces and set-up students with individual logins (the Physics function is only available with a Pro account).
- Organise students into 3 groups for the station-based learning activities and write their names on slide 7 of the teaching deck.

# Task Sequence

## 1

### Introductory activity / Provocation
(5 - 10 mins)

Take the students outside with the tug-of-war rope and tell them that they will be working in two teams to play a game of tug-of-war.

After playing the game, ask students the following questions:

- Did the rope move? If so, in which direction?
- Did one team consistently win, or did the rope stay in the middle?

Using slide 3 of the teaching deck, explain to students that when the rope didn't move, that is an example of a balanced force, where the forces coming from both sides of the rope were equal. When the rope sways one way or another, it means there is an unbalanced force.

Tell students that balanced and unbalanced forces are the focus for this lesson.

## 2

### Prior knowledge check
(5 - 10 mins)

Get students to write their reflections using the THINK, PUZZLE, EXPLORE thinking routine (See Microsoft Whiteboard example or Canva example):

- What do they THINK they know about balanced and unbalanced forces?
- What are the things that still PUZZLE them about forces?
- How are they going to EXPLORE the topic of forces?

## 3

### Activities
(30 - 45 mins)

If teachers haven't done so prior to this session, show students the Simulations - CoSpaces Edu key applications (3:08) from slide 5 of the teaching deck.

Introduce the 3 learning stations overview using slide 6.

- **Station 1: AR station (slide 8)**
  Using the devices, students will view 2 CoSpaces experiences to learn more about forces in AR.

  Instruct students to go on to the CoSpaces app and scan the QR codes found below. Students can also use the share code (the 6 letters in the middle of the QR code) or visit the links to access the experiences.

| | |
|---|---|
| HZR VFJ<br>Fun With Physics | ZXW YAC<br>Physics With CoBlocks |

  Students answer the following questions on their student reflection template.
  - What types of forces did you see in action?
  - What were examples of balanced and unbalanced forces?

- **Station 2: Creation station (slide 9)**
  Tell students that they will be creating their own VR experience showing balanced and unbalanced forces in action. Encourage students to:
  - Choose real world scenarios (e.g., moving car, etc.)
  - create three to five examples of balanced forces and three to five examples of unbalanced forces.
  - label each of the examples accordingly -add interactive features when possible (e.g., click on something, pop-up text, quiz, etc).

- **Station 3: HHVR station (slide 10)**
  Get students to watch Plank World 360° | Physics Simulations in Virtual Reality



Developed by Shai Coggins & Naomi Guglielmo

(Stereoscopic 360°) (7:11) using the HHVR headsets. Students can access the video by scanning the QR in the teaching deck.

After students have viewed the video, they will need to answer the following questions on their reflection template:

- What are the forces at work in this video? (gravity, friction)
- What examples of balanced forces did you see? What examples of unbalanced forces?
- What makes a force balanced or unbalanced?

*Please note: this session may be extended across two lessons for students to complete their CoSpaces experience.*

When the students have completed the task, encourage them to share their work with a partner to give feedback.

## 4

## Check for understanding
(5 - 10 mins)

Ask students to take a short video of their CoSpaces creation and upload to the class learning management system. Teachers can check the accuracy of students' examples created in CoSpaces.

| Differentiation for students with additional needs | Extension ideas | Video tips |
|---|---|---|
| Students may choose to work with a small group of 2 or 3.<br><br>Students may create just one or two examples of balanced and unbalanced forces.<br><br>Students may choose to keep their CoSpaces design more simple with little to no interactivity. | Students may be encouraged to identify balanced and unbalanced forces in the same scenario (e.g., moving car = balanced forces vertically: gravity pulling down and road pushing up; unbalanced forces horizontally: forwards or backwards motion)<br><br>Students may create a game or escape room experience in CoSpaces that features balanced and unbalanced forces. | The video for this learning task demonstrates how students can record their CoSpaces creation. |

## Curriculum Connections

### Australian Curriculum Version 9.0

**Year 7 - Physical Sciences**
Investigate and represent balanced and unbalanced forces, including gravitational force, acting on objects, and relate changes in an object's motion to its mass and the magnitude and direction of forces acting on it (AC9S7U04).

### Cross-curriculum priorities

- ☐ Aboriginal and Torres Strait Islander Histories and Cultures
- ☐ Asia and Australia's Engagement with Asia
- ☐ Sustainability

### General capabilities

- ☐ Literacy
- ☐ Numeracy
- ✓ Digital literacy
- ✓ Critical and creative thinking
- ☐ Personal and social capability
- ☐ Ethical understanding
- ☐ Intercultural understanding


Developed by Shai Coggins & Naomi Guglielmo