

eREAP - Learnlex 教學建議

每個學生都有與生俱來的好奇心，不少教師亦常以此作為課堂的切入點，例如提出有趣的問題，去改善學生的學習動機。這份教學建議將以有向數這一課題為例，使用 Learnlex 解難平台激發學生的好奇心，並將負數以及有向數加減運算的概念生動地引入課堂。

課堂時長：40 分鐘

目標學生：KS3

學生已有知識：於 KS1 及 KS2 學習的基本四則運算（加、減、乘、除）

目標	在課堂結束後，學生能： <ul style="list-style-type: none">- 明白「負數」的意思- 把負數由小至大排列- 使用帶有正數和負數（即有向數）的數線來查找兩個或多個數字之間的關係- 利用數線計算答案
物資	<ul style="list-style-type: none">● 電子裝置，例如 iPad／平版電腦／電腦● A4 紙張（讓學生寫下答案）
簡介	<p>[10 分鐘 三至四人一組]</p> <ol style="list-style-type: none">1. 將學生分組成三至四人一組2. 針對有向數這一課題，提出一條具有挑戰性的問題（來自 Learnlex 的問題，如「Robot Commands」見後頁圖片）<ul style="list-style-type: none">● 著學生進行小組討論，旨在激發他們的思維● 學生不需將答案輸入到 Learnlex，只需在紙上寫下答案並略加解釋● 邀請學生在課堂上發表自己的想法

資料 題目 題解 繁體 EN 分數

第一頁 第二頁 第三頁

一個機械人在印有數的運輸帶上行走，
它會根據指令向左右移動。

🕒 點擊按鈕以觀察這個機械人如何執行以下一連串的指令

... -5 -4 -3 -2 -1 0 +1 +2 +3 +4 +5 ...

現在往第二頁.....

重新設定 提交

資料 題目 題解 繁體 EN 分數

第一頁 第二頁 第三頁

現在，機械人在印有「+1」的方格上。

... -5 -4 -3 -2 -1 0 +1 +2 +3 +4 +5 ...

指令 ??

前進 重設

🕒 試在以下空格內輸入正確的指令，從而令各條連串的指令可使機械人從印有「+1」的方格走到印有「+2」的方格。
你可以在上方輸入指令以作出測試。

開始	指令	結束
+1	←2	+2
+1	?? →5 ←2	+2
+1	?? ←5 →2	+2

重新設定 提交

資料 題目 題解 繁體 EN 分數

第一頁 第二頁 第三頁

假設機械人由印有「-4」的方格上開始行走。

🕒 若機械人接收到這一連串的指令：

←3 ←3 ←3 ←3

機械人最後會走到印上「？」的方格。

假設機械人由印有「-4」的方格上開始行走。

🕒 若機械人接收到這一連串的指令：

→4 →4 →4 →4 →4 →4 →4

機械人最後會走到印上「？」的方格。

重新設定 提交

<p>延伸一</p>	<p>[10 分鐘 小組討論]</p> <ul style="list-style-type: none"> ● 回應學生的意見 <ul style="list-style-type: none"> ● 能力較弱的學生：給他們一些提示並鼓勵他們繼續解答 ● 能力較高的學生：着他們講解自己如何得出答案 ● 通過具挑戰性的問題帶出課題 <ul style="list-style-type: none"> ● 引入負數和數字線的概念 ● 關鍵概念：正數 = 數字線的右側，而負數 = 數字線的左側 <ul style="list-style-type: none"> ▪ 例如，當向左移時，數字的負值會更大；當向右移時，數字的正值則更大 ● 從最小到最大排列數字
<p>延伸二</p>	<p>[15 分鐘 全班]</p> <ul style="list-style-type: none"> ● 使用數線找出答案（加減法） <ul style="list-style-type: none"> ● 關鍵概念：加法=向右移動，減法=向左移動 ● 提供一些問題 <ul style="list-style-type: none"> ▪ $(-2) + 3 =$ 從-2 的位置開始向右移動 3 個單位 ∴ 答案 = +1 ▪ $(-2) - 3 =$ 從-2 的位置開始向左移動 3 個單位 ∴ 答案 = -5 ● 有向數的加減運算規則 <ul style="list-style-type: none"> ● 關鍵概念： ● 正負得負，負正得負 <ul style="list-style-type: none"> ▪ 例如：$(-2) + (-4) = -2 - 4 = -6$ ● 正正得正，負負得正 <ul style="list-style-type: none"> ▪ 例如：$(-2) - (-4) = -2 + 4 = +2$ ● 提供一些例子
<p>總結</p>	<p>[5 分鐘 全班]</p> <ul style="list-style-type: none"> ● 畫數線的重要性 ● 正數和負數的位置 ● 正負數加減運算的關鍵概念
<p>作業/跟進</p>	<ul style="list-style-type: none"> ● 學生必須自行使用 Learnlex 再次完成問題 ● 輸入答案並將最終答案提交至 Learnlex 平台 ● 在提交答案後，學生可以在平台內查看詳細解釋，如對解釋感到困惑可於課上向教師提問 ● 教師可以從班級報告中了解學生的學習進度，從而安排更多練習給能力較弱的學生

資料來源：在 Learnlex 中搜索「Robot Commands」

eREAP - Learnlex Suggested Lesson Plan

Every student is born with curiosity, and therefore teachers often start their classes with interesting questions as this helps ignite students' innate drive for learning. Taking the topic of directed numbers as an example, this teaching idea aims to stimulate students' curiosity with the use of the problem-solving platform Learnlex, and introduce the concepts of negative numbers, and addition and subtraction of directed numbers.



Lesson Duration: 40 mins Level / target students: KS3 Prerequisite: Learnt the basic arithmetic operations (i.e. addition, subtraction, multiplication, division) in KS1 and KS2	
Objective	After the lesson, students will be able to <ul style="list-style-type: none"> - understand the concept of 'negative number' - arrange negative numbers in order from smallest to largest - use a number line with positive and negative numbers (i.e. directed numbers) to find the relationship between two or more numbers - calculate the answer by using number line
Equipment Needed	<ul style="list-style-type: none"> ● Electronic devices (e.g. iPads / tablets / computers) ● Pieces of paper for students to write the answer of the challenging question
Set / Introduction	<p>[10 mins Groups of 3-4]</p> <ol style="list-style-type: none"> 1. Divide students into groups of 3 to 4 2. Raise a challenging question of directed numbers (e.g. 'Robot Commands') found in Learnlex <ul style="list-style-type: none"> ● Ask the groups to discuss. This aims to stimulate students' thinking ● Students are not required to input the answers to Learnlex but simply write down the answers and how they come up with the answers on the paper ● Students are invited to present their ideas in front of the class ● The question is shown as below

INFORMATION QUESTION SOLUTION SCORE

Page 1 Page 2 Page 3

Here is a robot on a number track.
It takes input commands to move left or right.

Click here to see how the robot follows this sequence of commands.


Now go to page 2.

Reset Submit Restore

INFORMATION QUESTION SOLUTION SCORE

Page 1 Page 2 Page 3

The robot is now on square "+1".



COMMAND BOX
??

Go Reset

Input the correct commands in the spaces below so that each sequence of commands will move the robot from square "+1" to square "+2".
You can use the command box above to test your command.

START		END		
+1	← 2	??	+2	
+1	??	→ 5	← 2	+2
+1	??	← 5	→ 2	+2


Reset Submit Restore

INFORMATION QUESTION SOLUTION SCORE

Page 1 Page 2 Page 3

Suppose the robot starts from square "-4".


If the robot receives the inputs:



the robot will move to square " ? ".

Suppose the robot starts from square "-4".

If the robot receives the inputs:



the robot will move to square " ? ".

Reset Submit Restore

Development 1	<p>[10 mins Groups of 3-4]</p> <ul style="list-style-type: none"> ● Respond to students' ideas during presentation <ul style="list-style-type: none"> ● Less capable students: give them some hints and encourage them to continue ● More capable students: ask them how they obtain the answer ● Using a challenging question as a transition to the topic of the lesson <ul style="list-style-type: none"> ● Introduce the concept of negative numbers and the number line ● Key concept: Positive numbers = the right-hand side of the number line, while negative numbers = the left-hand side of the number line <ul style="list-style-type: none"> ▪ For example, when you go to the left, the number will be more negative. The number will be more positive when you move to the right ● Arrange the numbers from the smallest to the largest
Development 2	<p>[15 mins Whole class]</p> <ul style="list-style-type: none"> ● Calculate the answer by using number line (addition & subtraction) <ul style="list-style-type: none"> ● Key concept: addition = moving rightwards, subtraction = moving leftwards ● Providing some examples <ul style="list-style-type: none"> ▪ $(-2) + 3 =$ starting from the position of -2 and moving rightwards by 3 units ∴ The answer = +1 ▪ $(-2) - 3 =$ starting from the position of -2 and moving leftwards by 3 units ∴ The answer = -5 ● The rules in addition and subtraction of directed numbers <ul style="list-style-type: none"> ● Key concept: ● Two like signs come together will become positive sign <ul style="list-style-type: none"> ▪ E.g. $(-2) - (-4) = -2 + 4 = +2$ ● Two opposite signs come together will become negative sign <ul style="list-style-type: none"> ▪ E.g. $(-2) + (-4) = -2 - 4 = -6$ ● Providing some examples
Conclusion / Summary	<p>[5 mins Whole class]</p> <ul style="list-style-type: none"> ● Importance of drawing a number line ● The positions of positive numbers and negative numbers ● Key concepts about calculating the numbers with different signs
Homework / Follow-up Work	<ul style="list-style-type: none"> ● Students are required to return to Learnlex and finish the questions again ● Input and submit the answer to Learnlex ● Students can refer to the detailed explanation on the platform and ask their teachers if they still feel confused with the answers ● Teachers can understand students' progress from the class report. More exercises can be arranged for relatively less capable students to catch up

Source: Search 'Robot Commands' in Learnlex