CENTRES FOR EXCELLENCE IN MATHS

FE centre resource

Pearson

Lesson plan

Directed Numbers

1. Lesson objectives

- Understand and use directed numbers in the context of temperature
- Make valid generalisations about the effect of operations on direct numbers
- Input equations with negative numbers effectively into a calculator

2. GCSE curriculum

Number
N1 Order positive and negative integers, decimals and fractions; use the symbols =, ≠, <, >, ≤, ≥
N2 Apply the four operations, including formal written methods, to integers, decimals, and simple fractions (proper and improper), and mixed numbers – both positive and negative; understand and use place value (e.g. when working with very large or very small numbers, and when calculating with decimals).

3. Lesson plan

This is an overview of the lesson. More notes can be found in the notes in the lesson slides.

Activity	Purpose of this activity	Time (min)	Guidance	Materials
Discuss	Learners to identify the placement of negative numbers relative to positive numbers	10	Temperatures are used as a context for directed numbers. Learners are asked to place the temperatures of five cities on a vertical number line, and to consider the differences in temperature between them.	Slides 2−4 Mini whiteboards
Explore 1	Develop fluency in ordering and calculating the difference between directed numbers in the context of temperature	20	Learners calculate the actual temperatures of different cities from information about their relative temperatures . They then go on to work out the differences in temperature between other pairs of cities.	Slide 5−6 Handout 1 and answers
Explore 2	Use of double-sided counters as a scaffold to gain more understanding of directed numbers at a lower scale	20	Learners are introduced to double-sided counters (DSCs) as a manipulative to support calculations with directed numbers. Different calculations are modelled using DSCs, and the concept of ‘zero pairs’ is introduced. Learners then have an opportunity to use DSCs in a task which encourages learners to use low numbers to identify movement either side of ‘0’. The idea is that learners will be able to see the	Slides 7−18 Handout 2 and handout 2 extension Handout 2 answers

Activity	Purpose of this activity	Time (min)	Guidance	Materials
			numbers moving on a smaller scale and relate the movement to larger proportions.	Double-sided counters
Discuss	Use of a calculator with directed numbers	10	Learners discuss how to input negative numbers, and sums involving negative numbers into a calculator. Problems are left to the tutor's discretion, but it would be beneficial to use sums that the learners identified in the previous activity.	Slide 19 Calculator
Explore 3	Explore misconceptions related to directed numbers	20	Learners work in groups to discuss statements about directed numbers – categorising them as either ‘always’, ‘sometimes’, or ‘never’ true. They are then challenged to justify their decisions, providing examples to support their reasoning. Finally, learners are presented with an exam question in which they have to judge the truth of different statements.	Slide 20−22 Handout 3 Calculator Number line or double-sided counter
Practice Questions	Practice so that learners can gain experience of answering exam questions related to directed numbers	10	Exam question practice for plenary.	Slides 23−26 Exam questions handout Double-sided counters or number lines