CENTRES FOR EXCELLENCE IN MATHS

FE centre resource

Pearson

Lesson plan

Substitution and formulae

Level 2

1. Lesson objectives

- Revise order of operations
- Use formulae in words and symbols
- Substitute positive and negative numbers in formulae

2. Functional skills Level 2 curriculum

Using numbers and the number system
3 evaluate expressions and make substitutions in given formulae in words and symbols
12 follow the order of precedence of operators, including indices

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
Introduction	Check prior knowledge and confirm understanding of key terms Address fundamental mathematical ideas/concepts	10	Formative assessment – progress through the slides, each time asking, ‘What’s the same, what’s different?’ Depending on the level and confidence of learners, this could be an individual, pair or group activity. Especially confirm knowledge of variables, formulae and expressions. Encourage learners to share their own examples of formulae. The tutor could make suggestions where appropriate.	Slides 2–3 Mini whiteboards Pens Calculators
Discuss and Explore 1	Expression review in context and opportunity for pair/group work Demonstrates that variables do not need to be named ‘x’, as can be seen in the examples	15	Ask again, what’s the same and what’s different. Allow time for discussion but prompt if required e.g. any patterns between the pair of expressions. BIDMAS might be referred to here. Make a note if this is the case. Repeat with Slide 5, ask what’s the same and what’s different. Slide 6 answers Slide 4. Complete the worked example by progressing through the animations. Confirm BIDMAS knowledge and the importance of following BIDMAS structure.	Slides 4–10

Activity	Purpose of this activity	Time (min)	Guidance	Materials
	Address fundamental mathematical ideas/concepts Highlight mathematical structure using context		Slide 7 is the worked example for Slide 5. Students to complete this and Slide 8 using the whiteboards. Use the substitution example based around speed and a Dev and Ruby scenario. Tutor to demonstrate the worked example but allow students to attempt the blue box question to promote reasoning. Complete this section by confirming knowledge and emphasise the key ideas.	
Explore 2	The substantial task of the lesson is to demonstrate the relationship between formulae as expressions and in sentence form, before introducing number tables	30	Distribute card match up exercise. Distribute the envelope containing the cut-up formulae and expressions first. The tutor to support and discuss with learners through activities. Once checked and confirmed correct, the tutor can follow up with the number tables, which learners not only match to the other cards, but also complete, by working out the missing numbers. Card matching confirms knowledge of the order of operations and formulae construction.	Slides 11–12 Card match exercise to be prepared and cut up into rectangles prior to the lesson and in envelopes for quick distribution

Activity	Purpose of this activity	Time (min)	Guidance	Materials
	Opportunity for learners to discuss and collaborate Task can be extended depending on the level of the class		Extension opportunity: Learners can be challenged to develop their own examples of expressions, sentences and number tables. Tutor should judge class confidence when deciding whether to do this.	Number tables to be distributed after the expressions and formulae have been matched by student group.
Discuss and Explore 3	Complex example with tutor support Confirm understanding of order of operations Highlight mathematical structure using context	10	Converting Fahrenheit to Celsius is a more complex example but still relevant, and accessible to learners. Emphasise order of operations and substitution in action. Learners discuss whether Dev is correct in telling Ruby to take warm clothes because December is always cold. Potential for individual or pair work. Use Slide 14 to showcase a worked example and ask students to identify if Ruby or Dev is correct and more importantly why.	Slides 13–15 Mini whiteboards Pens Calculators
Review	Summary of activities completed to this point in the lesson	5	Review key knowledge and confirm understanding of examples given through discussion and presentation. Allow for Q&A before linking to exam questions.	Slide 16

Activity	Purpose of this activity	Time (min)	Guidance	Materials
Practice questions	To demonstrate the relevance of substitution and formulae by showcasing examples from exam papers	15	Exam questions increase in complexity. Opportunity for tutors to add additional questions if necessary. Support learners to complete questions. Learners can complete the activity on mini whiteboards or on paper. Exam questions also on a worksheet and answers provided from mark schemes.	Slides 17–21 Mini whiteboard kits Pens Calculators Exam questions handout and answers
Review	Conclude lesson, reviewing objectives	5	Reinforce key language and the order of operations knowledge in order to complete substitution and formulae related questions. Review the objectives from the start of the lesson.	Slide 22