BODMAS challenge

National Curriculum attainment target

• Use knowledge of the order of operations to carry out calculations involving the four operations

Previous related lessons

Unit 5, Week 1, Lesson 3; Unit 9, Week 1, Lesson 3; Unit 11, Week 1, Lesson 1

Prerequisites for learning

Pupils need to:

- $\ensuremath{\bullet}$ calculate mentally with all four operations
- use BODMAS with all four operations

Vocabulary

brackets, orders, BODMAS, trial and improvement

Lesson objective

 Investigate the BODMAS rule by inserting brackets

Teach Resources

Getting StartedChoose an activity from Number – Addition and subtraction.

mini whiteboard, pen and eraser (per child)

• Choose a game or activity from Fluency in Number Facts: Y5/Y6 – Addition and subtraction.

Future related lessons

• read the calculation

apply the BODMAS rule

Success criteria

Pupils can:

None

Collins
 Connect
Year 6, Unit 11, Week 1

• Display: Slide 1. Say: Work out this calculation, using your knowledge of the order of operations. Record your working.

- Ask a pair to share the calculation that they worked out. Write on the board: 4 + 16 + 4 1 = 23. Say: This is the calculation we work out if we use the BODMAS rule. Remember, we do the multiplication and division parts of the calculation before we do the addition and subtraction parts.
- Say: Using brackets, how many different answers can you make? Allow about five minutes for pairs to try out different calculations. Remind children that they can use more than one set of brackets.
 - Ask pairs each to share one answer they have found. Record the different calculations they have worked out on the board. Answers may include:

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(4 + 4) \times (4 + 4) - 4 \div 4 = 63

(4 + 4) \times ((4 + 4) - 4 \div 4) = 56

(4 + 4) \times 4 + 4 - 4 \div 4 = 35

(4 + 4 \times 4) + (4 - 4) \div 4 = 20

4 + (4 \times (4 + 4) - 4) \div 4 = 11

4 + 4 \times (4 + 4 - 4) \div 4 = 8

(4 + 4 \times 4 + 4 - 4) \div 4 = 5
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- Say: So by putting the brackets in different places we can make several more answers.
- Display: Slide 2. Read the challenge to the class.
- Say: Do you think that this can be done? Ask some pairs to share their ideas.
- Say: What do you think is the best way to start working this out? Discuss the problem. Establish that it is an open-ended problem and there is no set way to work it out.
- Say: **Different people may want to go about it in a different way.** Record some of the suggested ways on the board. Suggest trial and improvement if this is not mentioned.

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- Say: Start solving the problem. Decide together the strategy you are going to use. Allow pairs five to ten minutes to work on the problem.
- Display: Slide 3. Ask some pairs to share their working out and answers. Record the calculations on the grid.
- Say: If we have two calculations with the same answer, then we will record the most efficient calculation.
- Say: Work out some numbers on your own. You can decide if you wish to stay with the same strategy or whether you wish to change it. Ask some children to share their answers.
- Ask: Now you have started to work on the challenge, have you changed your view of whether the challenge can be done or not? Ask some pairs to share their ideas.
- To finish off this part of the lesson, write BODMAS on the board and briefly recap on the meaning of each set of letters. Make sure children understand the meaning of O for orders in preparation for the Challenges in the Pupil Book.

Individualised Learning

Refer to Activity 1 or 2 from the Learning activities on page 426.

Pupil Book 6C – Page 54: BODMAS Challenge Progress Guide 6 – Support, Year 6, Unit 11, Week 1, Lesson 2: Make it to twenty Resources: Resource 1: 0–9 number cards

Plenary



- Ask a child who has completed Question 6 in Challenge 2 to share one of their calculations with the class, but to keep the name of the mathematician to themselves.
- Say: Discuss with your partner how you use the BODMAS rule to work out this calculation.
- Ask a pair to share their calculations, record them on the board and then decipher the mathematician's name. Check with the originating child that they have the correct answer.
- Repeat with other calculations from Question 6 in Challenge 2.



Year 6, Unit 11, Week 1, Lesson 2: How many numbers?

Resources: pencil and paperclip – for the spinner (per child), sheet of paper (per child), coloured pencils (per child)

Overcoming Barriers

- Children will find this challenging if they are not confident using all four operations mentally and with written methods. Use calculations with only two operations, a power and/or one set of brackets to provide them with focussed practice.
- Children may confuse the word 'orders' in BODMAS with the order in which calculations should be done. Be sure to explain that when we say 'orders' we mean 'powers', like square and square root.