

ONE OF THIRTY SIX

1	2	3	4	5	6
7	8	9	10	11	12
13	14	15	16	17	18
19	20	21	22	23	24
25	26	27	28	29	30
31	32	33	34	35	36

Can you find the chosen number from this square using the clues below?

1. The number is odd.
2. It is a multiple of three.
3. It is smaller than 7×4 .
4. It has an even tens digit.
5. It is the greater of the two possibilities.

Solution: The number is 27.

One method is to use the table, cross out the odd numbers and then cross out numbers which are not multiples of 3 leaving one column. As the tens digit is even only 21 and 27 are possible solutions. From clue 5 the solution must be 27.

NOTES FOR TEACHERS

Diagnostic Assessment This should take about 5–10 minutes.

1. Write the question on the board, say to the class:
“Put up 1 finger if you think the answer is A, 2 fingers for B, 3 fingers for C and 4 fingers for D”.
2. Notice how the learners responded. Ask a learner who gave answer A to explain why he or she gave that answer and DO NOT say whether it is right or wrong but simply thank the learner for giving the answer.
3. Then do the same for answers B, C and D. Try to make sure that learners listen to these reasons and try to decide if their own answer was right or wrong.
4. **Ask the class again to vote for the right answer by putting up 1, 2, 3 or 4 fingers. Notice if there is a change and who gave right and wrong answers.** It is important for learners to explain the reason for their answer otherwise many learners will just make a guess.
5. If the concept is needed for the lesson to follow, explain the right answer or give a remedial task.

What do you know about the number 33?

Is it:

1. An odd number?
2. In the 3 times table making it a multiple of 3?
3. Smaller than 6×5 ?
4. Does it have an even units digit?

Which of the above did you answer YES to ?

- A. 1 and 3 B. 2 and 4 C. 1 and 2 D. 3 and 4

C. is the correct answer.

Common Misconceptions

Learners may be able to answer all questions 1, 2, 3 and 4 correctly and not be able to reason about which **pair** of answers is correct. You can help by asking learners to put **thumbs up for yes** and **thumbs down for no** to each of the questions 1 to 4 and then write yes or no beside each one.

After that ask them to chose one of the pairs **A, B, C or D**

<https://diagnosticquestions.com>

Why do this activity ?

This activity gives learners practice interpreting a question and it encourages learners to think mathematically and to apply their knowledge of number properties in a logical way.

Intended learning outcomes

The activity helps learners to revise what they know about even and odd numbers, about facts from multiplication tables and about deciding on whether one number is smaller or larger than another number.

Suggestions for teaching

A good way to start the lesson and to lead up to the One of Thirty Six activity would be to play the "What's my rule?" game.

Decide on a number property, for example odd numbers, and draw a large circle on the board. Explain to the learners that they have to work out your rule by suggesting just, for example, ten numbers. If the number they suggest fits your rule, you write it in the circle. If not, write it outside the circle. After ten suggestions, can they work out the rule? (You might have to alter the number of suggestions they're allowed!) Play this game a few times, perhaps asking individuals to come to the board and be the one to choose the rule. This is an excellent activity for encouraging mathematical thinking and developing understanding of number properties and skills that lead later to algebra and functions.

You could then ask pairs of learners to try and solve the One of Thirty Six Puzzle. Emphasise that after a specified length of time you will be asking them **HOW** they went about solving it rather than just wanting to know the answer. It would be useful for each pair to have a copy of the problem or just of the grid but you could write it on the board. It might be worth stopping them after just a few minutes to share good ways of keeping track of what they're doing. For example, some learners might suggest crossing out or circling numbers on the grid. Once the learners have worked on this problem (and possibly the extension too), the key point to bring out in a whole class discussion is the idea that the first clue was not necessarily the most useful to start with. Invite pairs to describe how they found the solution, emphasising where choices were made as to which clue they used next.

Key questions

How did you go about finding the solution?

Which clue is the most useful to start with? Why?

Possible extension

Learners could be challenged to make up their own clues for a number of their choice. They could then ask a friend to find the number from the clues. Can they write, for example, just three clues to pinpoint one number? Different ranges of numbers could be used rather than necessarily 1 to 36.

Possible support

The NRICH activity [Number Detective www.nrich.maths.org/204](http://www.nrich.maths.org/204) has the same aims but has fewer numbers to choose from, so it would be a good activity to do before the One of Thirty Six activity.

Note: The Grades or School Years specified on the AIMING HIGH Website correspond to Grades 4 to 12 in South Africa and the USA, to Years 4 to 12 in the UK and up to Secondary 5 in East Africa.

Note: The mathematics taught in Year 13 (UK) and Secondary 6 (East Africa) is **not included in the school curriculum for Grade 12 SA.**

	Lower Primary or Foundation Phase Age 5 to 9	Upper Primary Age 9 to 11	Lower Secondary Age 11 to 14	Upper Secondary Age 15+
South Africa	Grades R and 1 to 3	Grades 4 to 6	Grades 7 to 9	Grades 10 to 12
USA	Kindergarten and G1 to 3	Grades 4 to 6	Grades 7 to 9	Grades 10 to 12
UK	Reception and Years 1 to 3	Years 4 to 6	Years 7 to 9	Years 10 to 13
East Africa	Nursery and Primary 1 to 3	Primary 4 to 6	Secondary 1 to 3	Secondary 4 to 6