

WHAT DO YOU NEED?

| | | | | | | | | | |
|----|----|----|----|----|----|----|----|----|----|
| 0 | 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 | 37 | 38 | 39 |
| 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 |
| 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 |
| 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 |
| 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 |
| 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 |
| 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 |

Find the chosen number from the 100 square using 4 of the 8 clues.

1. The number is greater than 9.
2. The number is not a multiple of 10.
3. The number is a multiple of 7.
4. The number is odd.
5. The number is not a multiple of 11.
6. The number is less than 200.
7. Its ones digit is larger than its tens digit.
8. Its tens digit is odd.

What is the number?

Four of the clues are necessary for finding it.
Four of the clues are true but do nothing to help in finding the number.

Which clues do you need?

Help

Shade or colour the grid according to the information given in each clue can be helpful.

Writing the clues on individual pieces of paper helps in sorting out which are useful and which are not.

Extension

You could make up your own similar problem for a partner or for the whole class to work on. The challenge could be to include exactly four clues that are needed and exactly four that are superfluous.

NOTES FOR TEACHERS

SOLUTION

The number is 35.

You do not need clues 1,2,5 and 6.

Can you find the number using only clues 3, 4, 7 and 8?

One method is to use the table, circle the multiples of 7, cross out the even ones, cross out those with units digit smaller than the tens digit. This leaves only 35 and 49. As the tens digit is odd the answer must be 35.

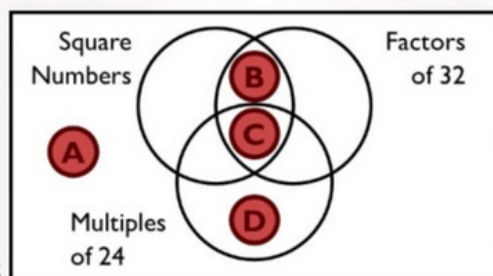
Diagnostic Assessment

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.

Venn Diagrams

Where should the number 16 be placed?



The correct answer is B. 16 is a square number and a factor of 32 but it is not a multiple of 24.

Other answers indicate either a lack of understanding of Venn diagrams or a lack of understanding of factors and multiples or both.

<https://diagnosticquestions.com>

Why do this activity?

This problem is an accessible context in which learners can apply their knowledge of number properties. It is a great opportunity to get learners explaining their reasoning to others.

Learning objectives

In doing this activity students will have an opportunity to review, and reinforce understanding, of factors and multiples.

Generic competences

In doing this activity students will have an opportunity to:

- **think mathematically**, reason logically and give explanations;
- **communicate** in writing, speaking and listening:
 - exchange ideas, criticise, and present information and ideas to others;
 - analyze, reason and record ideas effectively.

Suggestions for teaching

Before trying this activity, you might work with your class on a similar activity that introduces the idea of finding a number from information by reducing the set of possible answers until you have the only possible answer. See One of Thirty Six <https://aiminghigh.aimssec.ac.za/years-4-8-one-of-thirty-six/>

Having discussed the solution of One of Thirty Six, present this problem to the class. Before setting the learners off on this new challenge, ask whether they can suggest some clues that are not needed. For example, it is obvious that the "less than 200 " clue is not needed, given the grid only goes up to 99.

Suggest that pairs work on the problem, recording whatever they find useful. Let them know that rather than simply focusing on the answer you will be asking them to explain and justify their reasoning.

Ask several learners to explain their methods and conduct a class discussion about which clues are unnecessary.

Key questions

- Which clues do you need to use?
- Which clues don't tell you any more information?
- Can you explain why?

Follow up

As preparation: One of Thirty Six <https://aiminghigh.aimssec.ac.za/years-4-8-one-of-thirty-six/>

Multiples: <https://aiminghigh.aimssec.ac.za/years-5-8-multiple-patterns/>

Method of finding prime numbers: <https://aiminghigh.aimssec.ac.za/years-6-9-prime-sieve/>

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. New material will be added for Secondary 6.

For resources for teaching A level mathematics see <https://nrich.maths.org/12339>

Note: The mathematics taught in Year 13 (UK) and Secondary 6 (East Africa) is beyond 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 |