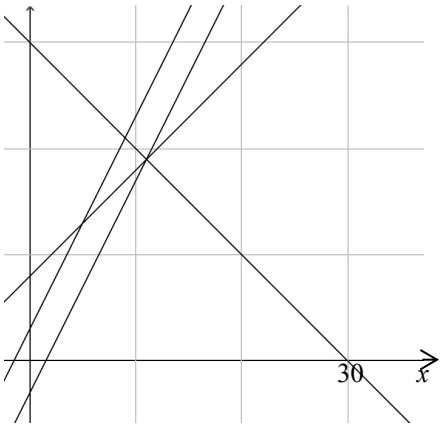
ODD ONE OUT



Three of the four expressions:
2x – 3
x + 8
2x + 3 and
30 – x are equal.

Find their value and which expression is the odd one out.

Copy and label the diagram and explain the connection between the diagram and the first part of the question.

HELP

You need to use the information to write down your own equations.

To solve an equation like, $2x - 3 = x + 8$ you must **DO THE SAME TO BOTH SIDES**.

$2x - 3 + \mathbf{3} = x + 8 \ + \mathbf{3}$ adding 3 to both sides

so $2x = x + 11$

so $2x - \boldsymbol{x} = x - \mathbf{x} + 11$ taking x from both sides

so $x = 11$.

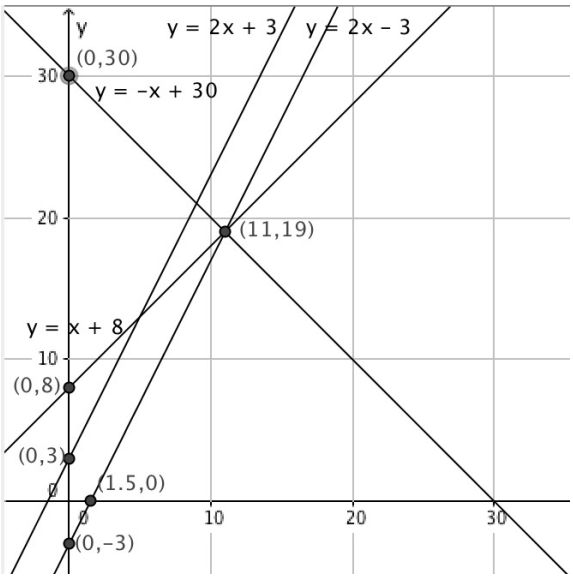
Now can you work out what happens when a different pair of expressions are equal?

NEXT

Make up your own similar example, exchange your example with another learner and then each do the example they have been given. Then compare results.

NOTES FOR TEACHERS

SOLUTION



If $2x - 3 = x + 8$ then $x = 11$.
If $2x - 3$ cannot be equal to $2x + 3$
If $2x - 3 = 30 - x$ then $3x = 33$ so $x = 11$.
So, for x = 11:
$2x - 3 = x + 8 = 30 - x = 19$
and so $2x + 3$ is the odd one out.

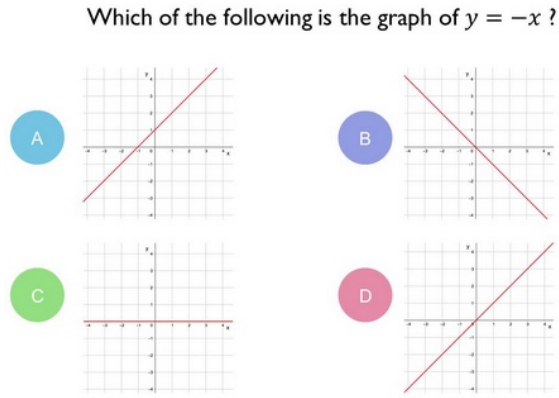
The diagram shows three lines
$y = 2x - 3$
$y = x + 8$
$y = 30 - x$
and the only point where 3 of the three lines intersect (11, 19) shows that the expressions $2x - 3$, $x + 8$ and $30 - x$ have a common value $y = 19$ for $x = 11$.

The diagram shows the line $y = 2x + 3$ which is parallel to the line $y = 2x - 3$ and cuts the other two lines in different points. So $2x + 3$ is never equal to two of the other expressions at the same time.

We know this because any 2 non-parallel lines only cut in one point.

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.

The correct answer is B
Any other choice shows little or no understanding of line graphs.
https://diagnosticquestions.com

Why do this activity?

This activity is an exercise in solving linear equations with a difference. It is not a routine question but one that needs some mathematical thinking that helps the development of a deeper understanding. Learners need to decide for themselves that they must write down and solve some linear equations to find the solution for x, and then substitute the value of x in the expressions to find their common value. Giving the unlabelled graphs helps learners to make the connection between the algebra and geometry by considering the equations and intersections of straight lines. Labelling the graphs, and making this connection, calls for more understanding than the routine procedure of plotting the graphs. The lesson will remind learners about what they should know about straight line graphs.

Learning objectives

In doing this activity students will have an opportunity to:

- practise and deepen understanding of solving linear equations;
- deepen understanding of coordinates and straight line graphs
- make connections between algebra and geometry

Generic competences

In doing this activity students will have an opportunity to:

- **think mathematically and** reason logically and apply knowledge and skills;
- interpret information and **solve problems**.

Suggestions for teaching

Start with the diagnostic quiz. It is necessary for the learners to have the necessary prior knowledge of straight line graphs before attempting this activity.

Write the first part of the question on the board: "Three of the four expressions: $2x - 3$ and $x + 8$ and $2x + 3$ and $30 - x$ are equal. Find their value and which expression is the odd one out."
To help them to develop independence and give them practice at reading questions for themselves, tell the learners to read the question and do it INDIVIDUALLY. Then use the 1-2 – 4 - more teaching strategy.

After a few minutes tell them to compare their work with a partner and to check each other's work. Then, if time, ask pairs to compare their answers, working in groups of four.

Then invite learners to come to the board and explain what they have found out. Have a class discussion until you are satisfied that all the learners understand what has been done. Make sure that learners know the different meanings of the words 'expression' and 'equation'

Then draw the diagram on the board and tell the learners "Copy and label the diagram and explain the connection between the diagram and the first part of the question".

It is a good idea to get learners to focus on what they know about straight line graphs and **not** on filling in tables of values and plotting points.

Finish with a class discussion when you ask learners to label the diagram and explain its significance in relation to finding the common value of three of the expressions.

Key questions

- What does the question tell you?
- Just pick two of those expressions. If they are equal what would that tell you?
- What value of x makes those 2 expressions equal?
- Is it possible for the expressions 2x+3 and 2x-3 to be equal for any value of x? Why or why not?
- What is the common value of the expressions?
- Can you label the lines and points in the diagram?
- Where do the lines cut the y axis?
- Where do the lines cut each other?
- Could there be any other points off the edge of this diagram where any of these lines cut?

Follow up

Matching Equations https://aiminghigh.aimssec.ac.za/years-6-9-matching-equations/
Use area to find x https://aiminghigh.aimssec.ac.za/years-7-9-use-area-to-find-x/
Interpreting Equations https://aiminghigh.aimssec.ac.za/years-8-10-interpreting-equations/
Graphical Triangle https://aiminghigh.aimssec.ac.za/years-8-10-graphical-triangle/

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