TARGET GAME

In this game players combine two given numbers to get as close to a target as possible using one of the operations: addition +, subtraction -, or multiplication ×, and each number once and only once. For example, combining (-3) and (-5) to get as close as possible to the target of -10 the best answer is (-3) + (-5) = -8.

For -7 and +9, the nearest to a target -35 is (-7) – (+9) = (-16) and the nearest to 0 is (+9) + (-7) = (+2). To hit the maximum and minimum targets: use (+9) – (-7) = +15 for the maximum and (+9) × (-7) = (-63) to hit the minimum.

Find the best answers for:

1. Target -60 with (-6) and (+9);
2. Target +45 with (-5) and (-9);
3. Target the minimum number with (-9) and (+2).

Now you are ready to play the game. Cut out the cards on page 2. This game can be played by a whole class and then the teacher decides on the best answer, or it can be played by any number of players when they need to agree between themselves on the best answer for each round.

RULES FOR THE TARGET GAME

The aim is to get as close to the target as possible.

Players score 5 points if they hit the target.

If nobody hits the target players getting nearest to the target score 2 points.

Mix up the numbered cards and place them face down.

Mix the target cards and place them face down.

Turn over the top two number cards and one target card.

All the players must write down the two numbers and choose an operation to combine them to get as near to the target as possible.
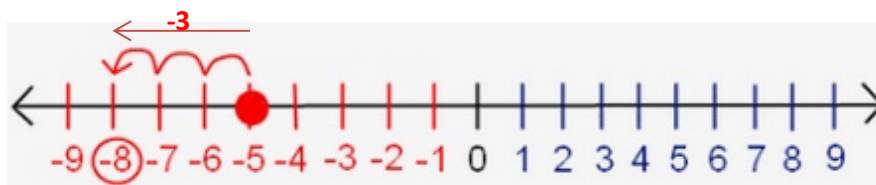
Then check your answers with each other.

Agree on the points to be awarded and record the scores.

The first player to reach 20 points wins the game.

HELP

The use of a number line will help you to carry out the numerical operations. Here you see (-5) + (-3) = -8.

NEXT

You can make more cards of your own with different numbers and different targets. An advanced version of the game could be played with 3 numbers and two operations so that there are more cases to consider.

See below for the cards for playing this game.

0	+1	+2	+3	+4
+5	+6	+7	+8	+9
-1	-2	-3	-4	-5
-6	-7	-8	-9	◎ MINIMUM
◎ NEAREST TO -10	◎ NEAREST TO +75	◎ NEAREST TO 0	◎ NEAREST TO -7	◎ MAXIMUM
◎ NEAREST TO -35	◎ NEAREST TO -60	◎ NEAREST TO +15	◎ NEAREST TO +45	◎ NEAREST TO +8

NOTES FOR TEACHERS

SOLUTION

1. Target -60 with (-6) and (+9); Nearest (-6) x (+9) = (-54)
2. Target +45 with (-5) and (-9); Target (-5) x (-9) = +45
3. Target the minimum number with (-9) and (+2). Minimum (-9) - (+2) = (-11)

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.

Jo and Paul are trying to write different calculations for the diagram on the left.
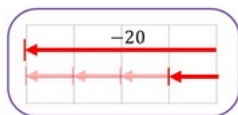
Jo writes: $4 \times (-5) = -20$

Paul writes: $\frac{(-20)}{-4} = -5$

Who is correct?

The correct answer is A.

B. Paul's statement should read $(-20)/4$ or $-20 \div 4 = -5$ in order to be a correct representation of the diagram and mathematically correct, too.

https://diagnosticquestions.com

A	B	C	D
Only Jo	Only Paul	Both Jo and Paul	Neither is correct

Why do this activity?

Through playing this game learners will get practice in number work with positive and negative integers in an enjoyable way. The desire to win will motivate learners to learn and remember their multiplication tables and to understand and remember the rules for numerical operations with negative numbers. The game can be played frequently for a few minutes each time to reinforce the rules. Learners need to think mathematically, to try the 4 possible cases, and to decide which is nearest to the target. This will also reinforce the idea that addition and multiplication are commutative and subtraction is not commutative.

Learning objectives

In doing this activity students will have an opportunity to:

- practise calculations involving positive and negative integers;
- to work systematically to test the four possible cases.

Generic competences

In doing this activity students will have an opportunity to:

- develop a healthy attitude to competition, enjoying the game, enjoying winning and being a good loser;
- **think mathematically,** reason logically and give explanations and proofs;
- **persevere and work systematically** to investigate all possible cases.

Suggestions for teaching

The first time the class is introduced to this game start the lesson woth the diagnostic quiz and review what the learners know about addition, subtraction and multiplication of integers.

Explain to the class that they are going to play a game involving integers and that they need to learn how to play the game. Write -7 and +9 on the board and tell the class that they must combine these numbers using only + or – or × to get the largest (or maximum) answer. Ask the learners to try it and then to explain how they found the maximum.

Similarly they should combine the numbers to get the minimum. Then tell them that they must find the nearest answer to zero. Explain the rules of the game, explain that you will give them 2 numbers and a target number and that the aim is to get as close to the target as possible. Players score 5 points if they hit the target. If nobody hits the target, the player getting nearest to the target score 2 points. Play a few trial rounds of the game as a class until you are sure everyone understands what to do. Then tell the class that the first player to reach 20 points wins the game. Play the game with players keeping their own scores. You may or may not choose to copy, cut out and use the cards below.

You can copy the sheet and organize the class so that the learners play the game in small groups.

Key questions

- Tell me all the different ways you can combine the two numbers. Can you find any other ways to combine the two numbers?
- How close is your answer to the target? How do you know that?
- How many different ways can you combine the two numbers? Do some ways give the same answer every time?
- Show me the answers for combining the two numbers in all the different ways?
- Which one of your answers is nearest to the target.

Follow up

See Extremes https://aiminghigh.aimssec.ac.za/years-6-10-extremes/

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. The mathematics taught in Year 13 (UK) and Secondary 6 (East Africa) is beyond the school curriculum for Grade 12 SA. For resources for teaching A level mathematics see https://nrich.maths.org/12339				
	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