UP DOWN GAME

-9	-8	-7	+3	+4	+5
-6	-5	-4	+6	+7	+8
-3	-2	-1	+9	+10	+
0	+1	+2	+	–	–

This is a game for 2 players, or a group of 3 or 4 players, or for the whole family. You will need to print and cut out 2 sets of these 24 cards.

Separate the 40 number cards from the 8 operation cards and shuffle them separately to mix them up.

With two players or a small group each player is dealt 3 number cards and 2 operation cards and has to rearrange them to get the highest positive number. This can be played with a timer. The player who gets the highest number wins one point. If two or more players get the same highest number each player gets a point.

The first player to reach 10 points is the winner.

HELP
You could start with a few rounds of the much simpler game using 2 number cards and 1 operation

NEXT
You could introduce multiplication × and/or division ÷.

+3	+4	+5
+6	+7	+8
+9	+10	+
+	−	−

-9	-8	-7
-6	-5	-4
-3	-2	-1
0	+1	+2

NOTES FOR TEACHERS – See more ideas and activities for Inclusion and Differentiation in the Inclusion and Home learning Guide.

SOLUTION

For example, using $^+9$, $^-7$ and $^-5$ with the operations – and + , the highest number is:
$$^+9 - {}^-7 + {}^-5 = {}^+11$$
or, if brackets are allowed:
$$^+9 - ({}^-7 + {}^-5) = {}^+21$$

Diagnostic Assessment This should take about 5–10 minutes.

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 for D".**

Work out

$$-7 - -2 =$$

a) 5

b) 9

c) -5

d) -9

1. 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.
2. 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.
3. **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.

C. **is the correct answer.**

Common Misconceptions

A. , **B.** , **D**. Learners who give these answers do not understand how to add and subtract integers.
https://diagnosticquestions.com

Why do this activity?

This makes practice in adding and subtracting positive and negative numbers into an enjoyable game.

Learning objectives

In doing this activity students will have an opportunity for practice in adding and subtracting positive and negative numbers

Generic competences

In doing this activity students will have an opportunity to:
- **think mathematically,** reason logically and give explanations;
- play games competitively following the rules **with consideration for other people.**

Suggestions for teaching

Resources: 2 sets of cards (48 cards) for the class game. Or 2 sets of cards for each group of 2, 3 or 4 players.

Tell the class that the lesson will be about negative numbers.

Pedagogical Note:

It's advisable to be very careful over your use of language. Always use the words 'add' and 'subtract' for the operations of addition and subtraction (never plus and minus) and always use the words 'positive' and 'negative' for the numbers.

It seems that the problems that people have in understanding the use of negative numbers concerns:

- the difference between the *operation* of subtraction and the *object* (a negative number), since the same sign is used for both;
- the language involved like 'minus minus 3' as opposed to 'subtract negative 3';
- separating the physical model or analogy (be it profit/loss or rise/fall in temperature or rotation/direction in the plane) from the rules of operating on the entities.


The balloon suggests an analogy for directed numbers (vectors) with positive numbers going up and negative numbers going down. This is a hot air balloon over the migration of millions of antelope across the Masai Mara.

Talk about many applications of negative numbers today, for example in measuring temperatures, sport, lifts in multistorey car parks, accounting and banking, science, engineering and height above sea level and depth below sea level.
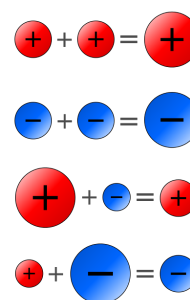

Negative numbers are used here on the scoreboard for a golf championship game to record shots below par, that is below the average number of shots for that hole on the golf course.
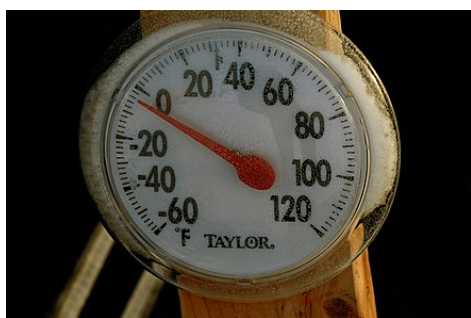
| Thermometer showing minus 4 Fahrenheit inside a fridge. | Control buttons in an elevator (lift). | Integer arithmetic. |

As a whole class game – lesson starter

Use 48 cards as with the game for small groups. Shuffle the cards and deal out 3 number cards and 2 operation cards. Write them on the board. The learners should write their calculation and total on a showboard as large as possible and hold up their showboards when you say "UP". The players with the largest total score a point.

Game for small groups

Notice that the difference between playing in small groups and the whole class game is that with the whole class all the players have **the same chance of winning** whereas with the small group game the chance of winning each time depends to some extent on **luck and which cards a player is dealt**. This aspect of the games should be discussed by the class as an exercise in thinking about probability.

Key questions

How could you use the – sign to make a bigger number?
Could you use brackets to make a bigger number?

Follow up

Read the article What are Numbers https://nrich.maths.org/5805

Read the article Making sense of Positives and Negatives https://nrich.maths.org/9958

Target game https://aiminghigh.aimssec.ac.za/years-7-10-target-game/

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