

AFRICAN INSTITUTE FOR MATHEMATICAL SCIENCES

SCHOOLS ENRICHMENT CENTRE (AIMSSEC)

AIMING HIGH

TARGET 10 THOUSAND

LESSON STARTER GAME FOR THE WHOLE CLASS



You will need a 0 to 9 spinner or special die. See instructions for making spinners below.

Each player draws a grid like the one shown.

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Spin the spinner and all the players must write the digit in one of the top five boxes.

Once a number is written it cannot be changed.

Repeat four more times.

Then the learners multiply the 3-digit number by the 2-digit number and write the answer on the bottom line.

The player (or players) with the answer closest to 10,000 wins.

Score 1 point for a win.

ALTERNATIVE VERSION OF THE TARGET 10 THOUSAND GAME.

The players write down all 5 numbers and then at the end decide where to place them. This is a game of skill that involves mathematical thinking and not luck.

GAME FOR 2 PLAYERS Each player draws a grid like the one shown. They take turns to spin the spinner and each player decides which of their 5 cells to fill in. You can't change the position of the number once it is written in. After 5 spins each player multiplies their 3-digit number by their 2-digit number and writes the answer on the bottom line. The players check each other's answers and agree on who has won that round. They need to understand that they must each find the difference (positive or negative) between their answer and 10,000 and compare their difference with the other player's difference.

HELP

To get near the target of 10 thousand, if you round the top number to the nearest hundred and the bottom number to the nearest 10 then you can estimate the product. Another method is to think about the numbers in the two shaded boxes and put numbers in the shaded boxes that have a product of 8 or 9.



For example: 1×8= 8 or 2×4=8 or 3×3=9 and then you will get calculations like

127×83=10541 256×43=10922 314×35=10990

NEXT

Start with any 5 numbers and decide where to place them in the grid to get the answer as close as possible to the target.

For example for 2, 3, 4, 5 and 6 the best answer is

456 × 23 = 10488 (approximately 500×20)

and for 1, 2, 5, 7 and 9 the best answer is

527×19 = 10013 (also approximately 500×20).

Change the target or change the grid to make it suitable for a different calculation and play the game for your chosen new target or calculation.

MAKE A 0-9 SPINNER



To make your own spinner you will need a paper clip and a pin.



Mark in the lines in the template on the right as in the diagram and cut it out.

Open up the paper clip and pin the

paper clip and the template down on a flat surface so that the paper clip spins easily.

If you want to make a spinner without using a pin you can hold down the template and the paper clip with the point of a pencil.

Alternatively make 10 cards that can be shuffled so the you can draw one digit randomly from the pack of ten. **In the Target 10 Thousand game the zero is not used.**

1	2	3	4	5

67890

NOTES FOR TEACHERS

Diagnostic Assessment This should take about 5–10 minutes.

Write the question on the board, say to the class:



1.Notice how the learners respond. 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. It is important for learners to explain the reason for their answer to develop their communication skills and to sharpen their thinking by putting their thoughts into words. 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 to vote again for the right answer by putting up 1, 2, $\overline{3}$ or 4 fingers. Notice if there is a change and who gave right and wrong answers.

D. is the correct answer.

Common Misconceptions

A. Probably a guess

B. They may have given this answer because 5x7=35

C. Probably a guess

https://diagnosticquestions.com

Why do this activity?

The game can be used at different times as a lesson starter. The game develops the learners' number sense and gives practice in estimating the results of calculations. Doing well in this game depends on an understanding of place value and how and why the multiplication algorithm works.

When learning how to do such calculations the game will help to deepen the learners' understanding of the method as well as giving practice. Subsequently the game can be used from time to time to give learners practice in doing calculations. Players should check their own and each others' calculations without using a calculator. You might introduce additional penalty points for incorrect calculations to give extra incentive to work accurately.

Teachers can combine this game with work on rounding numbers to the nearest 10 and to the nearest 100 and then estimating the answer to a calculation.

Teachers can plan a lesson to combine this game with practising other multiplication methods such as the grid method.

The game also develops an appreciation of probability as it requires judgement about where to place the numbers in the grid and whether a 'better' number for that position is likely to come up.

Learning objectives

In doing this activity students will have an opportunity to:

- develop numeracy and skills at performing multiplication of 3 digit numbers by 2 digit numbers;
- deepen their understanding place value and methods of calculation;
- develop skills of rounding numbers to the nearest 10 and to the nearest 100;
- develop skill of estimating the answer to a calculation.

Generic competences

In doing this activity students will have an opportunity to **think flexibly**, be creative and innovative and apply knowledge and skills.

Suggestions for teaching

Start with the diagnostic quiz. Then ask the learners to write out in full the solution to 237×15 to check that they will know how to do the multiplications when playing the game.

To play the game as a whole class, first ask the learners to copy the grid into their workbooks. Then the teacher spins the spinner and calls out the numbers and the learners fill in the numbers in their grids. When they have filled in 5 digits they must multiply their 3-digit number by their 2-digit number. The teacher then asks the learners to find out how close their answer is to 10,000. They must work out the difference between their answer and 10,000.

Ask learners who have got an answer near the target number to come to the board and write up their answer and working. If anyone has got closer to the target they should show also their working on the board. After deciding on the winner ask the class if anyone could have got closer to the target had they known **all the numbers** before filling any numbers in.

You might vary the game by making the target bigger, for example 20,000.

You could also suggest using another method of calculation to check answers. The learners could practise both methods.

For example the	×	500	60	2	Totals	×	800	10	6	Totals
grid method for multiplication: Using 1, 2, 5, 6 and 8 how close can you get to 10 thousand?	10	5000	600	20	5620	20	16000	200	120	16320
	8	4000	480	16	4496	5	4000	50	30	4080
	Totals	9000	180	36	10,013	Totals	20000	250	150	20,400
get to 10 thousand.	Getting close to 10,000:				Getting close to 20,000: $(800+10+6)\times(20+5) = 816 \times 25$					
	$(500+00+2)^{(10+8)} = 502 \times 18$ = 10, 013				= 20,400					

If the learners make spinners to play in pairs you can organise the game in your lesson. In this case the first player to get 5 points is the winner. The learners could use a different way of scoring. They could get penalty points for the difference between their total and the target number and add up their penalty points. They should play a few games until one of the players gets 1000 penalty points and loses the match.

To review what has been learned in this lesson, you might like the class to discuss the reasons why the two methods of multiplying 3 digit numbers by 2 digit numbers illustrated below work.

Then you might like them to discuss strategies for placing the digits to be multiplied so as to get a product as close to ten thousand as possible



Key questions

- Can you round that number to the nearest 100?
- Can you round that number to the nearest 10?
- OK, now can you estimate what answer you would get if you multiplied those two numbers together?
- Suppose you multiply by 50, about how big should the other number be to get 10,000?
- Suppose you multiply by 50, about how big should the other number be to get 20,000?

Follow up

Play these games first:

Target 1000 https://aiminghigh.aimssec.ac.za/years-4-7-target-1000/ and

Target Multiplication

https://aiminghigh.aimssec.ac.za/years-4-7-target-multiplication/

Then play the games involving division:

Target Division https://aiminghigh.aimssec.ac.za/targetdivision/

Target 4 by 2 Division

https://aiminghigh.aimssec.ac.za/years-6-7-target-4-by-2-division/



Go to the **AIMSSEC AIMING HIGH** website for lesson ideas, solutions and curriculum links: <u>http://aiminghigh.aimssec.ac.za</u> Subscribe to the **MATHS TOYS YouTube Channel** <u>https://www.youtube.com/c/mathstoys</u> Download the whole AIMSSEC collection of resources to use offline with the **AIMSSEC App** see <u>https://aimssec.app</u> or find it on Google Play.

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 school years up to Secondary 5 in East Africa. New material will be added for Secondary 6. For resources for teaching A level mathematics (Years 12 and 13) see https://nrich.maths.org/12339

For resources for reaching A level mathematics (rears 12 and 15) see <u>inteps.//inten.maths.org/12557</u>							
Mathematics taught in Year 13 (UK) & Secondary 6 (East Africa) is beyond the SA CAPS curriculum for Grade 12							
	Lower Primary	Upper Primary	Lower Secondary	Upper Secondary			
	Approx. Age 5 to 8	Age 8 to 11	Age 11 to 15	Age 15+			
South Africa	Grades R and 1 to 3	Grades 4 to 6	Grades 7 to 9	Grades 10 to 12			
East Africa	Nursery and Primary 1 to	Primary 4 to 6	Secondary 1 to 3	Secondary 4 to 6			
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			