

FOR YOUNGER FOR OLDER



Abe	Buk	Chris	Dudu	Erin
2	8	10	14	16

Sam	Mzu	Bulie
10	12	14

The tables show the ages of two groups of children. Find the average (mean) age in each group.

If Abe leaves his group what happens to the average age in the group?

If Chris leaves the group instead what happens to the average?

If Erin leaves the group instead what happens to the average?

What would happen to the average ages in the two groups if Sam left his group and joined the other group?

Can you find a way for one child to leave one group and join the other so that the average age in the group he leaves drops and the average age in the group he joins rises?

HELP

To work out the mean add the numbers and divide the total by the number of children in the group.

There are 3 different averages. This question is about the one called the **mean**.

You might work with another learner so that you can help each other.

NEXT

Is it possible for a child to leave one group and join the other so that the mean age in the group he leaves goes up and the mean in the group he joins goes down? If not, why not?

Can you make up your own groups so that this is possible?

NOTES FOR TEACHERS

SOLUTION

The mean age of Abe's group is $50/5 = 10$ years.

The mean age of Sam's group is $36/3 = 12$ years.

If Abe leaves the group the mean becomes $48/4 = 12$ years so the mean goes up.

If Chris leaves the group the mean becomes $40/4 = 10$ years so it stays the same.

If Erin leaves the group the mean becomes $34/4 = 8.5$ years so the mean goes down.

If Sam left his group and joined the other group the means become 10 for Abe's group and 13 for the other group.

If Bulie left her group and joined the other group the means become $64/6 = 10$ years 8 months and 11 years so the mean for her group goes down and the other one goes up.

Similarly If Erin left her group and joined the other group the means become $34/4 = 8.5$ and $52/4 = 13$ so the mean for her group goes down and the other one goes up.

Also if Dudu left her group and joined the other group the means become $36/4 = 9$ and $50/4 = 12.5$ so the mean for her group goes down and the other one goes up.

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”.

The mean of four numbers is 24.

What is the sum of the numbers?



96



28



6



Impossible to tell

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 A because $96/4 = 24$ and possible misconceptions:

B. The student has found the sum of 24 and 4.

C. The student has divided 24 by 4, rather than multiplying.

D. The student may have guessed. They may benefit from revising this topic.

<https://diagnosticquestions.com>

Why do this activity?

This activity provides practice in working out means and it may support a deeper understanding of means. It provides a simple case for the problem 'For Richer for Poorer' and it can be used if learners find that problem difficult. Learners can be encouraged to ask what else might be possible. Encouraging students to ask questions and organise their work in a systematic way in order to draw conclusions are all key mathematical skills that should be encouraged.

Learning objectives

In doing this activity students will have an opportunity to deepen their understanding of the concept of a mean.

Generic competences (some suggestions, select from list or write your own)

In doing this activity students will have an opportunity to **persevere and work systematically** to investigate all possible cases;

Suggestions for teaching

This is a simple problem that learners can be given without introduction by the teacher to give them practice in reading the question for themselves.

Ensure that students notice that the average can stay the same, go up or go down depending on whether the age of the child leaving is the same as, less than or greater than the average of the group. This is the focus of the main problem.

Learners (perhaps working in pairs) could be asked to present their findings. This may offer an opportunity to reflect on the value of approaching the work in a systematic way.

Key questions

In what ways can the means change?
What are the possibilities?

Follow up

For Richer for Poorer <https://aiminghigh.aimssec.ac.za/years-9-12-for-richer-for-poorer/>
Mean, Median, Mode and Range

<https://aiminghigh.aimssec.ac.za/years-8-9-mean-median-mode-and-range/>

M, M and M <https://aiminghigh.aimssec.ac.za/years-8-11-m-m-and-m/>

Match the Matches <https://aiminghigh.aimssec.ac.za/years-7-12-match-the-matches/>

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