Assessing students' work

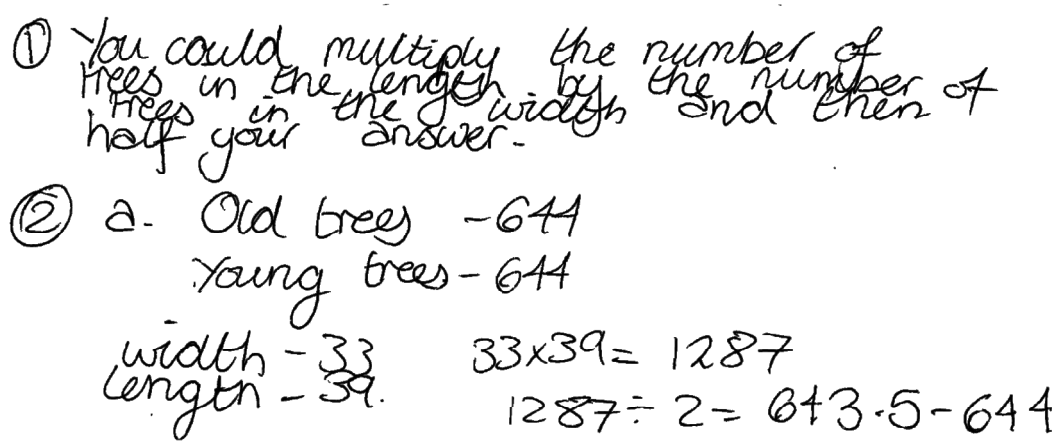
The following descriptions indicate typical levels of performance. After each description is an example of some work at this level.

Little progress

- **Representing:** Chooses a method, but this may not involve sampling (E.g. Counts all trees or multiplies the number of trees in a row by the number in a column).
- **Analysing:** Follows chosen method, possibly making errors. E.g. Does not account for different numbers of old and young trees or that there are gaps.
- **Interpreting and evaluating:** Estimates number of new and old trees, but answer given is unreasonable.
- **Communicating and reflecting:** Communicates work adequately but with omissions.

Sample response: Laura

Laura attempts to estimate the number of old and new trees by multiplying the number along each side of the whole diagram and then halving. She does not account for gaps nor does she realise that there are an unequal number of trees of each kind.



Questions for Laura:

Laura could be encouraged to improve his response by asking the following questions:

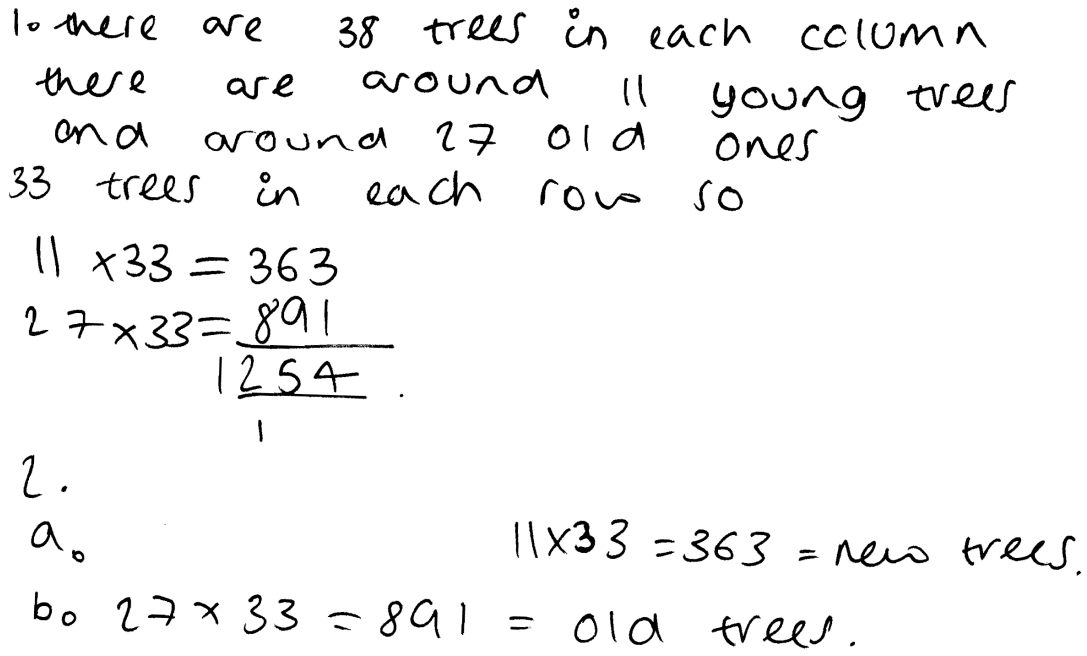
- *Your method assumes that there are the same numbers of new and old trees. Is this a reasonable assumption?*
- *You have examined the number of trees in the left hand column and bottom row. What would happen if you had chosen a different row and column?*
- *Can you suggest a second, different sampling method?*

Some progress

- **Representing**: Chooses a sampling method but this is unrepresentative or too small. E.g. tries to count the trees in first row and multiplies by the number of rows
- **Analysing**: Follows chosen method, mostly accurately. E.g. May not account for different numbers of old and young trees or that there are gaps.
- **Interpreting and evaluating**: Estimates number of new and old trees, but answer given is unreasonable due mainly to the method.
- **Communicating and reflecting**: Communicates reasoning and results adequately, but with omissions.

Sample response: Jenny

Jenny realises that sampling is needed, but she multiplies the number of young trees and old trees in the left hand column by the number of trees in the bottom row. She ignores the columns with no trees in the bottom row, so her method underestimates the total number of trees. She does, however, take account of the different numbers of old and new trees.



Questions for Jenny:

Jenny could be encouraged to improve her response by asking the following questions:

- *How many columns of trees are there?*
- *Which columns have you left out of your calculations?*
- *Using your first column as your sample, how many trees do you think there are altogether?*
- *What would happen if you used the number of trees in a different column for your sample?*
- *So how could you improve your estimates?*

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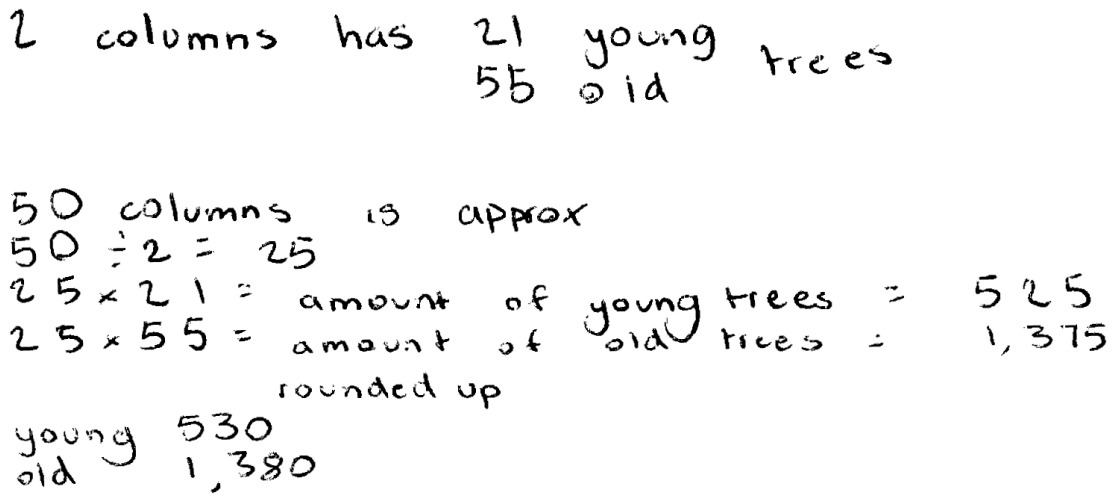
Substantial progress

- **Representing**: Chooses a reasonable sampling method. A reasonable sampling technique chosen
- **Analysing**: Follows chosen method, mostly accurately.
- **Interpreting and evaluating**: Estimates a reasonable number of old and new trees in the plantation. The reasonableness of the estimate is not checked. E.g. by repeating with a different sample.
- **Communicating and reflecting**: Communicates reasoning and results adequately, but may lack detail.

Sample response: Woody

Woody uses a sample of two columns and counts the number of old and young trees. He then multiplies by 25 (half of 50 columns) to find an estimate of the total number.



Questions for Woody:

Woody could be encouraged to improve his response by asking the following questions:

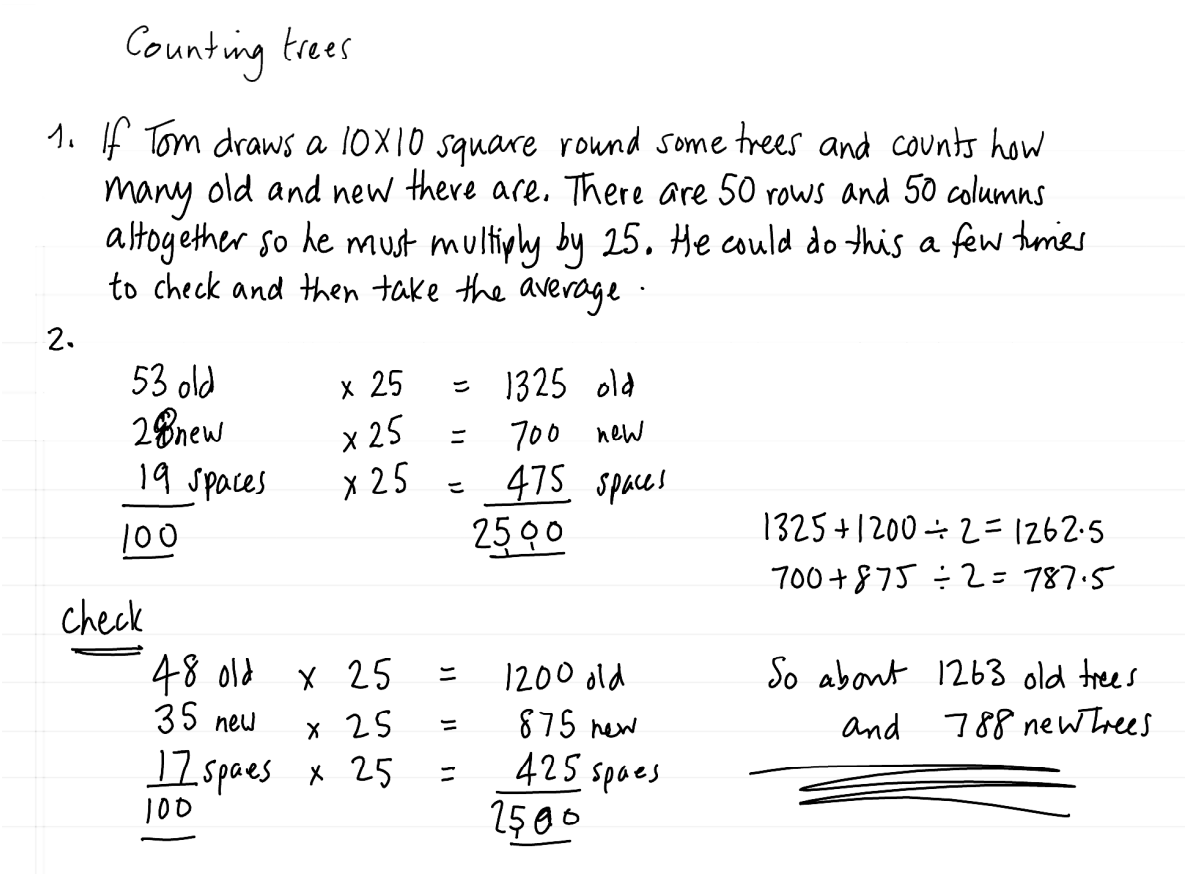
- *How could you test the accuracy of your estimate?*
- *What would happen to your estimate if you chose a larger number of columns for the sample?*
- *What other sample could you have chosen?*

Task accomplished

- **Representing**: Chooses an appropriate sampling technique
- **Analysing**: Follows chosen method accurately. Uses a proportional argument correctly.
- **Interpreting and evaluating**: Deduces a reasonable number of old and new trees in plantation. There is some evidence of checking the estimate. E.g. Considers a different sampling method.
- **Communicating and reflecting**: Communicates reasoning clearly and fully.

Sample response: Amber

Amber chooses a representative sample and carries through her work to get a reasonable answer. She correctly uses proportional reasoning. She checks her work as she goes along by counting the gaps in the trees. Her work is clear and easy to follow.



Counting trees

1. If Tom draws a 10X10 square round some trees and counts how many old and new there are. There are 50 rows and 50 columns altogether so he must multiply by 25. He could do this a few times to check and then take the average.

2.

53 old x 25 = 1325 old
28 new x 25 = 700 new
19 spaces x 25 = 475 spaces
100 2500

1325 + 1200 ÷ 2 = 1262.5
700 + 875 ÷ 2 = 787.5

Check

48 old x 25 = 1200 old
35 new x 25 = 875 new
17 spaes x 25 = 425 spaes
100 2500

So about 1263 old trees and 788 new trees

Questions for Amber:

Amber could be encouraged to improve her response by asking the following probing questions:

- *How accurate do you think your answer is?*
- *If you miscount your sample by 1, how does that affect your overall estimate?*
- *How many samples would you need to choose to get an estimate within about 10% of the real answer?*