


The following suggestions describe one possible approach to self- and peer-assessment. Pupils are given a chance to tackle a problem unaided, to begin with. This gives you a chance to assess their thinking and to identify pupils that need help. This is followed by a formative lesson in which they collaborate, reflect on their work and try to improve it.

 Pupil handouts and presentations for these tasks can be found in the *Into the classroom* section on the DVD or Website.

Before the lesson**20 minutes**

Before the lesson, perhaps at the end of a previous lesson, ask pupils to attempt one of the assessment tasks, *Counting Trees*, *Cats and Kittens* or *Security Cameras* on their own. Pupils may need calculators, pencils, rulers, and squared paper.

The aim is to see how able you are to tackle a problem without my help.

- *You will not be told which bits of maths to use.*
- *There are many ways to tackle the problem - you choose.*
- *There may be more than one 'right answer'.*

Don't worry if you cannot understand or do everything because I am planning to teach a lesson on this next in the next few days.

Make sure that pupils are familiar with the context of the problem.

Counting Trees

Does anyone know what a tree plantation is?

How is a plantation different from a natural forest?

The plantation consists of old and new trees

How might the arrangement of trees in a plantation differ from that of a natural forest?

Cats and Kittens

This is a poster made by a cats' charity, encouraging people to have their cats spayed so they can't have kittens. The activity is about what happens if you don't have your cat spayed and whether the statement on the poster is correct.

Is it realistic that one female cat would produce 2000 descendants in 18 months?

You are given some facts about cats and kittens that will help you decide.

Security Cameras

Have you ever seen a security camera in a shop or a bus? What did it look like?

Some may not look like cameras at all, but rather like small hemispheres. They may be fixed, but many swivel round. The cameras in this problem can turn right round through 360°. The drawing shows a plan view of a shop.

This means we are looking down on the shop from above.

The little circles represent people standing in the shop.

Remember to show your working so I can understand what you are doing and why.

Collect in their work and provide constructive, qualitative feedback on it. This should focus on getting pupils to think and reason - a Key Process agenda. Don't give marks or levels! Write *only* questions below their work. Focus feedback on such issues as:

Representing

Can you think of a different way of tackling his problem?

What sort of diagram might be helpful?

What assumptions have you made?

Reasoning

How have you got this result?

Have you checked your calculations?

What would happen if ...?

Interpreting

How can you test the accuracy of your estimate?

What other sample could you have chosen?

Communicating

I find it difficult to follow your thinking here.

Can you present your reasoning so that someone else can follow every step?

Try to identify particular pupils who have struggled and who may need support. Also look out for pupils that have been successful. These may need an extension activity to further challenge them.

Resources needed for the lesson

You will need the following resources:

- One copy of the problem sheet per pupil
- Mini whiteboards
- Large sheets of paper for making posters and felt-tipped pens
- Calculators and rulers

Counting Trees

- Spare, large copies of the trees picture for groups to work on together.

Cats and Kittens

- A supply of graph paper or squared paper (if requested)

Security Camera.

- Spare copies of the plan of the shop for rough working
- Squared paper (only if requested)

Re-introduce the problem to the class**5 minutes**

Begin the lesson by briefly reintroducing the problem:

*Do you remember the problem I asked you to have a go at last time?
I have had a look at your work and I have written some comments at the bottom of it.
Today we are going to work together trying to improve on these initial attempts.
First, on your own, carefully read through the questions I have written on your work.
Use your mini-whiteboards to note down answers to these questions.*

It is helpful to ask pupils to write their ideas on a large sheet of paper or mini whiteboard using felt-tipped pen. This helps you monitor their work and also helps pupils to share their ideas later in the lesson.

Pupils work alone responding to your feedback**5 minutes**

Allow the pupils some time to reflect on your comments and write their responses.

Pupils work in pairs to improve their solutions**10 minutes**

Ask pupils to now work in pairs or threes. Give out a large sheet of A3 (at least) paper and a felt-tipped pen to each group.

*Now I want you to share your work with a partner.
Take it in turns to explain how you did the task and how you now think it could be improved.*

Now I want each pair to work together, comparing their ideas and the feedback I have given. Together, I want you to try to produce an answer to the problem that is better than each of you did separately.

Go round the room, listening, assessing their thinking and making interventions asking strategic questions. Consult a copy of the progression steps for the relevant problem and decide which questions would be most appropriate for moving their thinking towards higher levels of performance. Use strategic questions like:

*What is known and what is unknown?
What are you asked to find out?
How can we simplify this problem?
What assumptions have you made?*

Pupils share their approaches with the class**15 minutes**

Ask pupils to present their ideas and approaches to the class. Focus on their methods rather than their answers. As they respond, use the progression steps to assess their responses. In particular, focus on the quality of the reasoning and communication.

"We decided to count the different types of trees along each side, then multiply these numbers together."

"We drew a time line along the top of the paper and then drew cats underneath to show when they gave birth."

As pupils present their ideas, ask other pupils to comment on:

- Representing: Did they choose a good method?
- Analysing: Is the reasoning correct – are the calculations accurate?
- Interpreting: Are the conclusions sensible?
- Communication: Was the reasoning easy to understand and follow?

Pupils continue with the problem or an extension of the problem**20 minutes**

Encourage pupils to return to the problem and continue working on it using some of the ideas that have been shared. If they have already produced a good solution, either ask them to find an alternative method, a more convincing reason, or to explore an extension.

Counting Trees

If I now showed you a very large jar of coloured sweets, how could you estimate the fraction that are red? Write down your method. Can you use what you learned from "Counting Trees"?

Cats and Kittens

Can you find a simpler, more elegant way of presenting your calculations to "Cats and Kittens"? Can you use a diagram of some kind?

Security Camera

There are several places that the camera might be placed that are as good as the one you have found. Try to find all the solutions. Can you convince me that these are all possible solutions? Can you explain why they all give the same coverage of the shop?

Collect examples of pupils' work for the follow-up discussion. Try to assess how much pupils have learned from the sharing session.