(1) How do you teach students to effectively use calculators as a tool?

(2) How can you tell when the class is ready to move on to the next problem/concept/topic/etc. especially is some students seem to understand and some don't? How do you make sure those who do understand aren't bored?

1) I'm still not sure - I'm figuring this out as I go along. Using a calculator is a relatively new occurance in my teaching - it used to be that the big bad AIMS Test was no-calculator, so we didn't use calculators in class.

I think the trick is: a calculator should not be a <u>crutch</u> - it should be a <u>tool</u> that is the most efficient choice in that moment & for that job. Evaluating "-3-7" shouldn't take a calculator. Finding the minimum of a quadratic so you can analyze a scenario should use a calculator. I'm still figuring out everything in between.

2) This answer depends on the class I'm teaching. Ex a 30+ student Algebra class, I

2) The answer to this depends on the goal of the class. Am I teaching something new and am trying to build in practice as I teach? Or is this a day of practice & reinforcing, so students have problems to solve to prove/strengthen their understanding?

In the former scenario, its all about having some sort of tangible way for students to show me that they understand, which are usually practice problems built into our notes. The students who understand can move a head. The students who don't can stick with the lesson. The biggest indicator for me is how confident students are with self-starting problems we've just been learning about.

You may also be asking about the fear of the "classroom rift" where half the class understands and is becoming bored/annoyed/disgruntled because we're taking so long, but the other half of class is still clueless of where to start and is also becoming annoyed/disgruntled by their perception of themselves as failures and "I'll never get it - this is dumb - I'll just stop trying". This is an important situation to avoid wherever possible. I find that it usually happens whenever the problems we're doing are very long or involve a non-obvious choice. ~~For example:~~ Some examples: systems of equations, factoring, simplifying fractions. The trick is to ~~break~~ isolate & practice each step before continuing ~~to~~ with the problem - this keeps everyone at a closer pace and increases that feeling of success.

For my lesson on adding & subtracting Fractions, if I had it to do again, I would have had them just draw the picture of a few Fractions first, then draw the combined Fractions, a few times then re-draw the original, and then finally combine to get the answer. In other words: instead of 4 problems done completely & sequentially, I would have done a part of 4 problems simultaneously so all 4 get finished at about the same time instead of restarting at the end of every problem.

Anyway - one more thing about this choice - to move on or not? In a class of 30+ students, eventually a critical mass is reached and I have to move on and hope I remember which students I need to work with during bellwork tomorrow.

But I won't be able to catch everyone — some students fall through the cracks. They get used to teachers moving on when they're not ready. Then they get used to ~~not trying~~ feeling bad because the rest of the class gets it but they don't. Then they get used to not trying because the teacher will just move on before they're ready so what's the point?

And then there are the students that I teach in my intervention class. ~~The~~ who are used to ~~being~~ waiting out the teacher and ~~getting them to move by~~ taking their time so the teacher has to move on. This is a learned behavior from years of feeling inferior in math. So — in my intervention classes, I never move on until everyone has it. Even if I spend an extra 20 minutes with just 1 student, I need to do this to break this behavior and teach the student that they can't fade into the background in my class. [redacted] is the textbook example of a student who started the year with this attitude.

This is a luxury that I have with my 12-person intervention class - its much harder in a 30+ traditional class.

Last comment - if I've done a decent job at creating a truly meaningful classroom culture, then the default response from a student who gets it should be "let me help you!". This is one of many reasons that I take extra time at the start of the year developing a culture of "we're all in this together"!