Decide and Defend

Purpose

Use this routine to help students decide if a provided solution makes sense and to create an argument for or against the solution. This activity helps a teacher understand how a student attacks a problem and their reasoning behind it and gives the opportunity to point out any misconceptions.

Time

10-30 minutes

Supported Standards

MP. 3 Construct viable arguments and critique the reasoning of others.

Materials

- Problem with provided solution
- Whiteboard or PDF

Procedure

This routine can be done in a small group or with an individual student. It can also be done in person or virtually. Students should be presented with a problem and a solution to that problem. Students will need to look at the information given and decide if they agree or disagree with the provided solution. Once they've made their decision, they will need to defend their reasoning.

1. The teacher will tell the student(s) that they will be given a problem that has a solution already provided. Their assignment will be to first decide if the provided solution is accurate and then tell why or why not.

2. The teacher gives the student the problem. The teacher can write this out on the whiteboard (in person or virtually) or provide a printed copy or show a PDF.

3. The student takes time to decide if they think the solution is correct or not and comes up with their reasoning.

4. Once the student has decided their answer and reasoning, the teacher and student can discuss this together.

5. If this is done in a group setting, the teacher can decide to put students in pairs or groups and have the students discuss their reasoning amongst themselves before presenting to the class. Pay particular attention to students who change their minds and ask them to explain their thinking.

6. The teacher, in the end, can correct any misconceptions and elaborate on student thinking.

Example 1:

Kim solved the following problem and got an answer of n = 10.

n - 2 - 2 = - 6

Step 1:
n - 2 - 2 = - 6
n - 4 = - 6

Step 2:
n - 4 = - 6
 + 4   + 4

n = 10

Sample student responses:

Sample Answer 1: The answer 10 is correct. In the first step, we need to combine like terms - 2 - 2 = - 4. In the second step we need to add 4 to both sides to get the answer: 6 + 4 = 10.
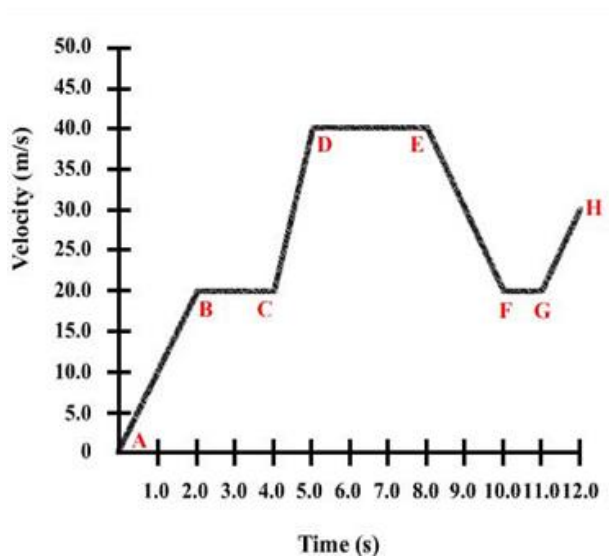
Sample Answer 2: The answer is incorrect because - 6 + 4 doesn't equal 10.

Example 2:

Look at the graph below and describe the motion depicted between:

1) A-B
2) D-E
3) E-F

Acceleration of an Object

Kevin looks at this graph and answers the question like this:

1) In A-B, the object is moving forward/speeding up.
2) In D-E, the object isn't moving at all.
3) In E-F, the object is moving backward/slowing down.

Sample student responses:

Sample Answer 1: Kevin's answers are correct. From A-B the line is going up, so the object is accelerating and, therefore, moving forward. In D-E, the line is flat, so the object isn't accelerating anymore, which means it's not moving. And in E-F, the line is going down, so the object is decelerating.

Sample Answer 2: Not all of Kevin's answers are correct. Kevin is correct for A-B because the line is going up, so the object must be accelerating and, therefore, moving forward. In D-E, the object isn't moving anymore because the line is horizontal. In E-F though the line is going down, so the object is still going forward, not moving backward, but it is slowing down.

Sample Answer 3: Kevin has Parts 1 and 3 correct, but D-E is not correct. The line is horizontal, which means the object is moving at a constant speed and isn't speeding up or slowing down. It is still moving, though. Part 1 is correct because the line is going up, which means the object is accelerating and moving forward. Part 3 is correct because the line is going down, which means the object is slowing down.

More information on this routine can be found on the [Fostering Math Practices website](), the [Decide and Defend Activity](), and in the book *Teaching for Thinking: Fostering Mathematical Teaching Practices Through Reasoning Routines* by Grace Kelemanik and Amy Lucenta. Examples of this routine, applied to Student Achievement Partners' math tasks, can be found here:

[Three Composing/Decomposing Problems (Jose)]() 2.NBT.A
[Fraction Comparisons with Pictures 3.NF.A.3d]()
[Cup of Rice 6.NS.A.1, 5.NF.B.7]()