

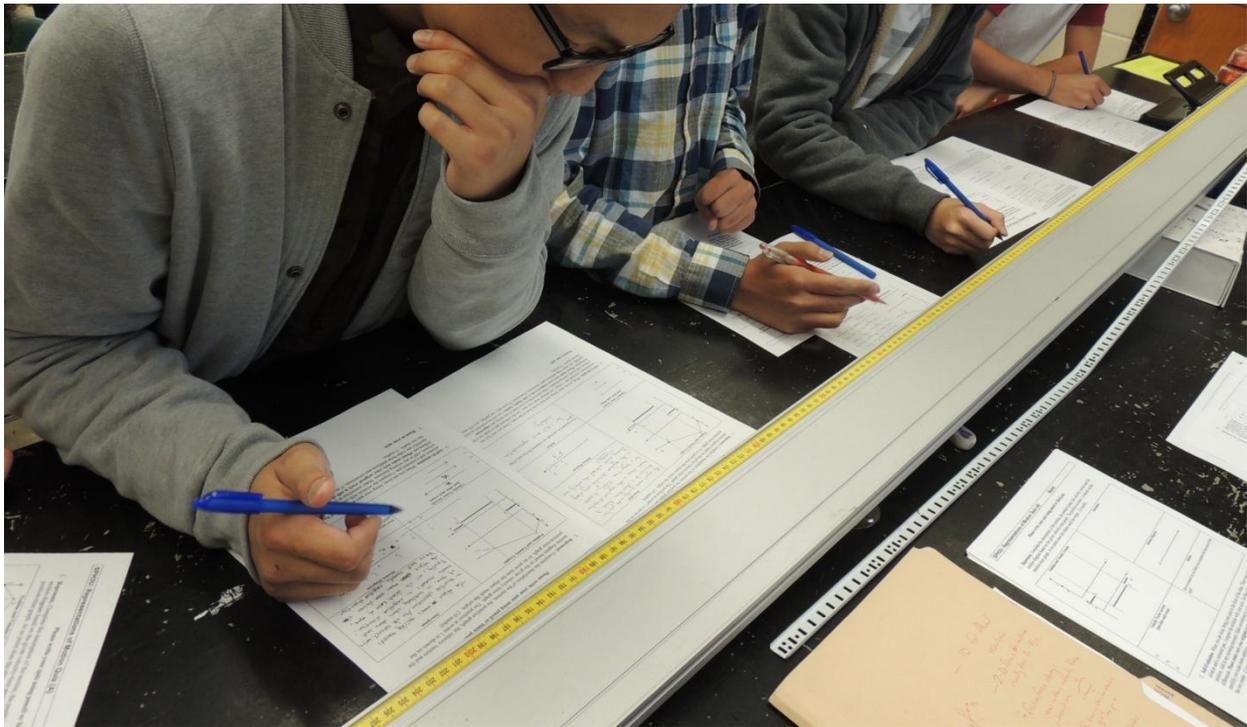
## Instant Feedback Quizzes

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### **What We Did**

In a recent grade 11 physics class, my colleagues and I have tried a new design for our standard motion quiz. Students began by writing the traditional quiz questions. Next, they answered a quick reflection question about the quality of their work. The final step is the novel one for us. Students brought their quizzes to the front of the class where we have seven copies of the solution and coloured pens for marking. They made any additions or corrections to their work and handed in the marked-up quiz.

Students received a mark out of ten for their physics work and a mark out of two for how carefully they corrected their work. We add in any other corrections the student may have missed.



### **Why**

- (1) **Feedback:** Feedback is most effective when given immediately in a clearly targeted way. Students have their responses fresh in their minds and have a better chance of remembering the reasoning they used which led them to their answers. When giving feedback even a day later, their memory of that reasoning can fade. With the reasoning fresh, they have the best chance of mentally confronting the ideas that led to any incorrect responses.
- (2) **Metacognition:** Experts in every field have the ability to continuously monitor their own work, assess its quality and seek way to remedy its deficiencies. In education this is called metacognition, and it is perhaps the defining characteristic of life-long learners. Our students

are just at the beginning stage of developing these expert abilities. The process they went through, an initial reflection during the quiz and then a careful comparison with the solution (an exemplar), helps them to develop that metacognitive sense. In addition, when we review their markings, we can see which problems they successfully picked up and which ones they were not aware of or did not recognize. Sometimes they identify errors where none exist. That is another step in refining their metacognitive sense.

- (3) Teaching Efficiency: This strategy relieves us of the task of giving feedback for the clear-cut problems the student has. Instead, we can quickly give feedback on the issues students don't perceive themselves. By the end of this process, students will have a carefully corrected quiz to reflect on and study from. If instead, we simply posted a solution for students' reference, they will likely not be challenged to reflect on the thinking process that led them their results, nor would they find out what ideas they were unaware of or blind to. This is different from simply recognizing what they did right or wrong.

Below are some examples of marked quizzes. Students made corrections in blue. My corrections and assessment are in red. You can also see the instructions that were part of the quiz.

Please write your quiz using pencil or black pen.

1. **Represent.** Complete the description of the motion, the position graph, the velocity vectors and the motion diagram based on the given velocity-time graph. The position at event 1 is shown on the position-time graph. At no point does the object reach the origin. (10 marks) 6

<p style="text-align: center;"><b>Position and Velocity Graphs</b></p>	<p style="text-align: center;"><b>Description</b></p> <p>The object is moving in a <u>fast</u> velocity toward positive <u>direction</u>. (Event 1 to 2)</p> <p>The object is moving in a <u>slow</u> velocity toward <u>the</u> <u>negative</u> direction (Event 2 to 3)</p> <p>Moving <u>slower</u> in event 3, 4 toward <u>negative</u>. Travel long <u>time</u>, constant <u>speed</u>.</p> <p style="text-align: center;"><b>Motion Diagram</b></p>
<p style="text-align: center;"><b>Velocity Vector Arrows (just after each event)</b></p> <p><math>v_1</math>: <math>\longrightarrow</math></p> <p><math>v_2</math>: <math>\longleftarrow</math> ✓</p> <p><math>v_3</math>: <math>\longleftarrow</math></p>	<p style="text-align: center;"><b>Reflect</b></p> <p>How accurately do you think you completed the four parts of this quiz? I think I got every question right.</p>

2. **Self-Evaluation.** When you are done, bring your quiz to the front of the class. There you will find the solution and a coloured pen. Compare the solution with your quiz. Use the coloured pen to mark-up your solution. Add in any missing elements. Make corrections to your work if you notice any **important** differences. **Please make sure your original work is still clearly visible.** You will be evaluated on how carefully you make these additions and corrections, if necessary. If your quiz was perfect, you still earn the two marks. (2 marks) 0

3. **Hand-in your quiz.**

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Please write your quiz using pencil or black pen.

1. **Represent.** Complete the description of the motion, the position graph, the velocity vectors and the motion diagram based on the given velocity-time graph. The position at event 1 is shown on the position-time graph. At no point does the object reach the origin. (10 marks)

Position and Velocity Graphs	
	<p><b>Description</b></p> <p>The object accelerates quickly for a short period of time in the positive direction from 1-2.</p> <p>The object stops for a split second and begins to speed up in the negative direction from 2-3. <i>moves</i></p> <p>The object continues to go in the negative direction but this time is slower than ever.</p>
	<p><b>Motion Diagram</b></p> <p>• Dots should be on each side of the line not on it to represent positive and negative</p>
<p><b>Velocity Vector Arrows (just after each event)</b></p> <p><math>v_1</math>: </p> <p><math>v_2</math>: </p> <p><math>v_3</math>: </p>	<p><b>Reflect</b> <i>velocity.</i></p> <p>How accurately do you think you completed the four parts of this quiz? Very accurately with very minor errors.</p>

2. **Self-Evaluation.** When you are done, bring your quiz to the front of the class. There you will find the solution and a coloured pen. Compare the solution with your quiz. Use the coloured pen to mark-up your solution. Add in any missing elements. Make corrections to your work if you notice any **important** differences. Please make sure your original work is still clearly visible. You will be evaluated on how carefully you make these additions and corrections, if necessary. If your quiz was perfect, you still earn the two marks. (2 marks)

3. **Hand-in your quiz.**

For Description, I should include that at each interval the speed and velocity was constant. ✓

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Please write your quiz using pencil or black pen.

1. **Represent.** Complete the description of the motion, the position graph, the velocity vectors and the motion diagram based on the given velocity-time graph. The position at event 1 is shown on the position-time graph. At no point does the object reach the origin. (10 marks) 9

<p style="text-align: center;"><b>Position and Velocity Graphs</b></p>	<p style="text-align: center;"><b>Description</b></p> <p>The objects first event begins the movement of a very fast positive movement, then at position/event 2 the object begins to go in the negative direction at a medium speed. Then at the last event the object still moves in the negative direction but at a slower speed. The object was moving at a constant speed.</p> <p style="text-align: center;"><b>Motion Diagram</b></p>
<p style="text-align: center;"><b>Velocity Vector Arrows (just after each event)</b></p> <p><math>v_1</math>:  (longer vector arrow)</p> <p><math>v_2</math>: </p> <p><math>v_3</math>: </p>	<p style="text-align: center;"><b>Reflect</b></p> <p>How accurately do you think you completed the four parts of this quiz?</p> <p>I think I completed it accurately with slight mistakes on the motion diagram (I've had past issues)</p>

2. **Self-Evaluation.** When you are done, bring your quiz to the front of the class. There you will find the solution and a coloured pen. Compare the solution with your quiz. Use the coloured pen to mark-up your solution. Add in any missing elements. Make corrections to your work if you notice any important differences. Please make sure your original work is still clearly visible. You will be evaluated on how carefully you make these additions and corrections, if necessary. If your quiz was perfect, you still earn the two marks. (2 marks) 2

3. **Hand-in your quiz.**

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