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Design and Use of Rubrics in Undergraduate Economics Courses[1]

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Abstract

The purpose of this paper is threefold; first we explain how rubrics can be used in undergraduate economics courses not only as an assessment tool, but also as an effective teaching and learning tool. Next, we show how to design a rubric, using a simple production possibilities frontier (PPF) example with a four-step method that can be applied to any short-answer assignment or exam question. Finally, we provide three additional examples of short-answer questions with accompanying answers and rubrics that instructors can study and use, in order to develop and improve their own rubric-writing skills.

***Key Words*:** rubric, pedagogy, critical thinking, economic education, undergraduate teaching
JEL Codes: A20, A22, I21

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1. Introduction

Customarily rubrics have not been used as part of instruction and evaluation in economics courses. Those instructors who currently use them typically use them for grading essay assignments or oral presentations. In addition, economics instructors may have reservations about how to use rubrics in economics on daily basis. How can one (in fact, should one) apply rubrics with such lofty categories as "knowledge and understanding", "critical thinking", and "communication" to a simple assignment or exam question in a principles of economics class?

The use of rubrics is now also commonplace at outcome assessment meetings at most institutions of higher education, where there is much talk about students' learning objectives, goals, and evaluation criteria. Most of our colleagues in humanities and other social sciences have been using rubrics for years in order to evaluate their students' work, while economics professors still struggle even to define the word "rubric".[3]

The purpose of this paper is to show how rubrics can be used in undergraduate economics courses not only for grading short-answer questions (SAQ) but also how they can be used as an effective learning and teaching tool. In this paper we describe a very practical four-step procedure on how to design a rubric as we apply it to a simple production possibilities frontier (PPF) example that most economics instructors are familiar with. Finally, we provide three additional examples of short answer questions with accompanying answers and rubrics.

2. Background

Too often economics instructors avoid short-answer questions (SAQ) because they are too time-consuming to grade and use multiple choice questions (MCQ) instead. While MCQ are very convenient to measure student understanding of economics – especially with regard to efficiency, they can emphasize lower-order cognitive engagement with material (e.g., recall), or worse, guessing. Although Walstad and Becker (1994) have found no differences in using MCQ or SAQ to measure students' knowledge, Funk and Dickson (2011) point out that performance on multiple-choice exams may provide inaccurate information to instructors concerning student learning and overestimate students' learning of information.

In addition, SAQ encourage students to develop their abilities of presenting their ideas clearly by drawing graphs and diagrams and by writing clear and concise explanations; skills that should be practiced and honed in college. Based on a survey of employers conducted by Hart Research (2010), 89% of employers said that colleges should place a greater emphasis on developing students' ability to communicate effectively, both orally and in writing.[4]

So, how can an instructor of economics use short-answer questions and be able to grade them all in a timely manner without staying up late every night grading while developing carpal tunnel syndrome? We believe that the more tedious elements of the process of grading SAQ can be significantly decreased with the use of rubrics.

[3] Most economists might be able to provide etymological definition of the word rubric rather than the definition used in modern educational circles. In case you did not know, the root for "rubric" comes from red and red ink and was originally used to refer to decorative text or instructions in medieval documents that were penned in red ink.

[4] The top five areas in which employers feel that colleges most need to increase their focus include 1) written and oral communication (89%), 2) critical thinking and analytical reasoning skills (81%), 3) the ability to apply knowledge and real-world setting through internship or other hands-on experiences (79%), 4) the ability to analyze and solve complex problems (75%), and 5) the ability to connect choices and actions to ethical decisions (75%).

Our paper is not the first one to suggest the use of rubrics in undergraduate economics courses. Schini and Hall (2003) present an example of how to use their rubric to evaluate student projects in a business statistics course. Mora (2010) documents the creation and implementation of an economic evaluation rubric in a macroeconomic theory course at Icesi University in Colombia. In addition, McGoldrick and Peterson (2013) have recently published a paper where they also explain how rubrics can be created and used in economics courses and detail the use of two rubrics used in micro principles and quantitative methods classes. However, our paper is the first that describes a very practical four-step procedure on how to design a rubric. We try to bring rubrics closer to instructors by applying this technique step-by-step to a simple production possibilities frontier (PPF) example that most instructors are familiar with. Most of our work is based on the adaptation and modification of Stevens and Levi's (2013) general suggestions on how to construct a rubric and we encourage readers to consult this text for more information on rubrics.

3. Why use rubrics?

One of the main and often repeated selling point for rubrics is that rubrics save a great amount of grading time. As we will explain in Section 5, rubrics can significantly speed up the process of grading while providing students with timely and explicit feedback. With a well-constructed rubric, you can provide students with detailed, formative feedback with simple check marks, circles, and few brief comments. However, as pointed out by Stevens and Levi (2013, p. 75) "[i]n general, the degree to which rubrics facilitate grading by avoiding repetition is in direct inverse ratio to how long it took us to create the rubric. Some rubrics take longer to construct precisely because we are adding all of those feedback details ahead of time." The use of rubrics in large sections, where multiple teaching assistants grade assignments and exams, also increases consistency across grading.[5]

In addition, rubrics can help us refine our own teaching skills and serve as a valuable pedagogical tool. As described in Section 4, the act of designing a rubric forces the instructor to carefully think about the steps involved in solving a complex problem, as well about how to articulate expectations about learning to students. This can in turn lead to more effective teaching and instruction. Rubrics also reveal details of what students may or may not have learned. By breaking each question down to smaller parts, we can pinpoint the areas or skills that students are struggling with. This might not be obvious by simply tallying up the score for the entire question. With this information in hand, we can tailor our teaching and assignments to focus on the areas that students need additional help with.

Rubrics also clearly convey goals and expectations to students. Since a rubric breaks down each question into smaller parts you can identify the important steps that students should complete when answering the question. If you think that labeling the graphs is important (we certainly do), then provide a separate dimension in the rubric dedicated to this task. If you think that each answer should include an explanation of the graph, you can transmit this information by including it in you rubric. By judiciously choosing grade weights for each step of the problem, you can provide your students with additional information about the importance and/or complexity of each step. Finally, as all experienced teachers know, there are certain mistakes that students make in every class, year after year. By describing these common errors in the rubric, you can make your students aware of these common pitfalls.

Not only can rubrics be used to evaluate students' knowledge as a summative tool, they can also serve as a valuable teaching and learning tool (a formative tool). Suppose that you have a short-answer question that you would like your students to know how to answer. First, assign a problem (to be answered either in class or at home) and collect the answers. Then randomly distribute the completed

[5] Rubrics increase consistency also across assignments and grading sessions for the same grader.

assignments back to the students and ask them to grade each other's work by using the assigned rubric.[6] Before students start grading, you should first work out the problem on the board to provide the correct answer and if necessary, explain (or have students explain) the rubric.[7] Then ask students to grade the assignment that they have received. This way grading is done by your students (and not you), students obtain quick feedback, students learn from reading and evaluating someone else's work about the expectations and how to read/use the rubric. Most importantly, they learn not to make the same errors in their own future work. It is often the case that we can more easily detect someone else's mistake than our own.

Finally, the use of rubrics can be used as an effective outcome-assessment tool. Some departments can spend hours and days discussing which questions should be used in order to assess their students. Many times, the outcome assessment project stalls simply because committee members cannot agree on the wording of any question or set of questions used for the assessment.[8] With rubrics, this situation can be somewhat mitigated. If the department members can agree on the skills and tasks the students should learn in a class or a program, then the same rubric can be used by different instructors even when instructors are not using the same questions. Rubric scores can still be compared and combined for the entire department, since the dimensions expected to be visible in the assignment are the same.

4. Designing a rubric

A rubric is typically composed of three or four parts: 1) the assignment, question, or a task description, 2) the important dimensions of the assignment/task, 3) the description of the dimensions, and (optional) 4) scale. A shell of a very basic rubric is displayed in Table 1.

Table 1: Basic Three-Level Rubric

Question or Task Description

	Excellent	**Competent**	**Needs Work**
Dimension 1 (20%)			
Dimension 2 (15%)			
Dimension 3 (35%)			
Dimension 4 (30%)			

When constructing a rubric, we usually follow a four step procedure. The first step may be the easiest, since it simply includes articulating the assignment, question(s), or task that you would like your students to answer or complete. For example, you may give your students supply and demand equations and ask them to sketch a supply and demand diagram based on those equations, calculate the equilibrium price and quantity, and mark this equilibrium on the graph. One additional task that we like to append to most of our questions is to ask students to briefly explain the graph that they have drawn and/or the answer they have obtained. Not only does this give students an opportunity to develop and practice their writing skills in economics, but the act of trying to explain and write about what they have answered adds to their understanding of the material. Recall the maxim that "The best way to learn is to teach or explain".

[6] To preserve anonymity and to prevent students feeling embarrassed, you might ask students to use a specified code on their assignment instead of using their real name.

[7] As part of good teaching hygiene, rubrics should always be presented *together* with the question/assignment itself.

[8] Some instructors use the term "shortage", while other use "excess demand". Some instructors use the term "Central Bank" when talking about monetary policy, while others only use "The Fed".

The next two steps include the establishment of the assignment's dimensions with the distribution of dimension's weights and then a description of the dimensions. The dimensions of a rubric are created by breaking down a complex problem into smaller steps. In addition to this decomposition of the assignment into dimensions, each dimension should also include the dimensions' weights that can be expressed either as points or percentages. The assignment of weights to the dimension should be chosen so that they provide students with additional information about the importance and/or complexity of each dimension. If you consider a specific step as very important you may assigning more points to it to convey this information to your students. In addition, you may consider assigning more points to relatively more difficult and complex steps. This approach is similar to assigning more points to more difficult multiple choice questions and fewer points to easier questions. You should note however, that this may create a bigger grade wedge between the students that are able to complete this more difficult step and those that are not.

The description of the dimensions might be the most time consuming and difficult part of creating rubrics. However, it is definitely worth investing your time in this step, since it is here that you will also learn how to teach this problem and explain it well to your students in class. The way we approach this task of breaking down each assignment/question into smaller steps is to answer the entire question from the beginning till the end while taking notes of what we are actually doing. We get a clean piece of paper and start working.[9]

For example, we would like to ask the following question (Step 1 - the assignment): "Suppose that Oliver can read 15 pages of economics textbook and 30 pages of history textbook in an hour. He spends 3 hours per day studying. a) On a clearly labeled and titled graph draw Oliver's production possibilities frontier (PPF) for reading economics and history textbooks, assuming constant opportunity costs. b) What is Oliver's opportunity cost of reading 90 pages of history? Your answer should include a brief explanation of your diagram and calculations."

The first thing we do when answering this question is to draw the two axes, label them, and give the graph a title and a number such as "Graph 1: Oliver's Production Possibilities Frontier (PPF)" (Dimension 1). Then we calculate the maximum number of pages in economics Oliver is able to read in 3 hours and mark that on the graph (Dimension 2). Next, we calculate the maximum number of pages in history Oliver can read in 3 hours and mark that on the graph (Dimension 3). Now we connect the two points on the axes and draw Oliver's production possibility frontier and label it (Dimension 4). Next, we can either calculate the slope of the curve to answer the question about opportunity costs or calculate it directly (Dimension 5). Finally, we include our calculations with few lines of explanations of the graph and the numerical answer (Dimension 6).

Using this type of self-reflection while answering the question enables us to create a very detailed rubric with six dimensions. A detailed rubric might be more desirable in the beginning, when students are still learning how to work with graphs. Later on, we might combine few dimensions; for example, dimension 2 and 3 (two very similar tasks) could be easily listed under the same dimension. The procedure of initially providing a detailed rubric that is slimmed down later in the term should be applied to any new task that students are trying to master. This provides extra guidance to the students when needed but can be gradually generalized to support the development of more independent work.

[9] Another benefit of writing out the complete answer clearly is that we can also use it as the answer key and share it with our students by simply scanning it and posting it online. Although not formally tested, we also think that students respond better to **clearly** handwritten answers as opposed to professionally designed graphs. Hand-drawn graphs may make them look more attainable.

Additionally, by writing out the answers and observing all the steps we would like our students to complete, we might also notice deficiencies in our task/question description. For example, when we first wrote out the question (not reported here), we did not explicitly ask our students that the graphs should be clearly labeled and come with a title. In addition, we also did not specify that the opportunity costs are constant (as opposed to increasing). It is possible that the shape of the curve for this specific question is not important for you and you will give full credit for production possibilities frontiers that are either a straight line or bow-shaped (but not concave). However, if you expect students to draw a straight line while you do not explicitly mention constant opportunity costs in your question, it is unfair to penalize them if they draw a bow-shaped curve. Students are not mind readers and cannot be expected to make those types of assumptions. It should also be noticed that in our example we do not explicitly state which axis should be labeled as "pages of economics" and which as "pages of history". If you expect your students to put pages of economics on the x-axis and will penalize them if they do not, then this should also be explicitly mentioned in the question. In our question above, we do not require our students to label the axes in any particular way.

With respect to the labeling and explanations, we usually provide clear instructions and a separate handout in the beginning of each semester about our expectations of clearly labeled and drawn graphs. In class we regularly repeat that, even if the question does not explicitly state that the graph should be labeled, students should always label and title all their graphs. By requiring this we are also teaching good writing habits; graphs, figures, tables are all standard in economic writing and students should know how label them and how to refer to them in their text.[10]

If this is the first rubric that you are creating on a specific task, we would recommend that you first draft what is referred to as a "scoring guide rubric" that contains only the description of the highest level of performance and does not include the scale. Using the notes from answering the question above we are able to draft the following rubric:

In the first column of Table 2 we labeled each of the six dimensions. A short and descriptive label is sufficient.[11] In addition, we have provided weights for each dimension that are expressed in percentage terms. This provides students with additional information about the importance and/or complexity of each dimension. For example, in the first couple of weeks of introductory classes, we weight the "graph setup and labeling" and "explanation" more heavily so that the students learn good habits of drawing graphs and writing clear explanations. Later on, when this becomes almost habitual, the weights can be changed so that the actual answer to the question (the content) matters more.

In the second column in Table 2 we provide the description of the highest level of performance in that dimension. In front of each well-defined skill or knowledge involved in the dimension there is a small check box that the instructor can check mark if the student successfully demonstrated that skill or leave it blank to indicate to the student his or her insufficiencies.

The third column is titled "Comments" and allows for some personal touches, where the instructor can write additional comments (maybe give a struggling student some words of encouragement and positive feedback). Finally, in the last column we record the number of points or percentages.

[10] One of the most irritating writing inclinations that students (and many other professional writers) have when writing about graphs, figures, and tables is to state in their texts that a number such and such appears in "table above" or in "table below". If there there are 3 tables above and 4 below, how is a reader supposed to know which specific table they are referring to?

[11] The labels of dimensions should not include any description of the quality of performance. For example, the last dimension is labeled "Explanation" and not "Good Explanation" or "Well Written Explanation".

Table 2: Scoring Guide Rubric

Question: Suppose that Oliver can read 15 pages of economics textbook and 30 pages of history textbook in an hour. He spends 3 hours per day studying. a) On a clearly labeled and titled graph draw Oliver's production possibilities frontier (PPF) for reading economics and history textbooks, assuming constant opportunity costs. b) What is Oliver's opportunity cost of reading 90 pages of history? Your answer should include a brief explanation of your diagram and calculations.

	Criteria	Comments	Points
Graph Setup and Labeling (30%)	□ All axes are correctly labeled with relevant numbers and units. If possible, the graph is drawn to scale. □ The figure has a title and a number.		
Horizontal (x) Axis (15%)	□ The number on the horizontal axis is correct. □ The intercept is correctly marked on the horizontal axis.		
Vertical (y) Axis (15%)	□ The number on the vertical axis is correct. □ The intercept is correctly marked on the vertical axis.		
Production Possibilities Frontier (10%)	□ The two points on the x and y axes are connected. □ The line has the correct shape. □ The line is labeled.		
Opportunity Costs (10%)	□ The opportunity costs are correctly calculated.		
Explanation (20%)	□ The description of the graph/figure is provided and written clearly. □ When referring to the graph/figure the appropriate title and number is used. □ The explanation of the answer is provided and written clearly.		
		Total:	

The fourth and last step when designing a rubric involves the inclusion of a scale. The scale describes how well or how poorly any given task has been performed. As suggested by Stevens and Levi (2013, p.7) "[t]erms used to describe the level of performance should be tactful but clear. In the generic rubric, words such as *mastery, partial mastery, progressing,* and *emerging* provide a more positive, active verb description of what is expected next from the student and also mitigate the potential shock of low marks in the lowest levels of the scale."

Here are some examples of words commonly used to describe a rubric performance scale:

- 1) Exemplary, 2) Accomplished, 3) Developing, 4) Beginning
- 1) Exemplary, 2) Proficient, 3) Marginal, 4) Unacceptable
- 1) Sophisticated, 2) Competent, 3) Partly competent, 4) Not yet competent
- 1) Advanced, 2) Intermediate high, 3) Intermediate, 4) Novice
- 1) High level, 2) Middle level, 3) Beginning level

One can also simply use numbers or grades for each scale; for example, 4, 3, 2, and 1, with 4 representing the highest level of achievement and 1 the lowest. When using numbers you also have to decide if the lowest number will be 0 or 1. When using 0 as your lowest scale, a student's overall score can be very low (in fact, it can be 0). When using 1 as your lowest scale, students who hand in an assignment (no matter how poorly it is written and answered) will always obtain at least few points. This will distinguish them from the students who did not submit any work at all. We typically use 1 as our lowest scale, since we think it encourages the very weak students to at least attempt to answer the assignment and hand it in for some small credit, as opposed to completely giving up.

The scale should be added to your rubric once you have used the scoring guide rubric a few times and are able to describe the most common ways in which students fail to meet the highest level of expectations. As experienced teachers know, there are certain mistakes that students make in every new class, year after year, and you can always anticipate them. By describing these common errors, not only are you creating an additional scale to your rubric that will make grading faster, but you are also making your students aware of these common pitfalls. Another way to create a three-level rubric is by requiring that *all* tasks described in a dimension are *correct* in the highest level, *one or two* may be *incorrect* in the intermediate level, and *all* the tasks are *incorrect* in the beginning level. Using this approach we can create the following three-level rubric for our PPF question shown in Table 3.

When writing additional description of the dimensions of lower levels, the use of conjunctions such as "and", "but", "or" can play an integral role. For example, in the medium level column in Table 3 we state "*The two points on the x and y axes are connected. AND The line has the correct shape. BUT The line is not labeled.*" A student will be graded at the medium level if she has drawn a curve of correct shape, but did not label it. If she would have also labeled it, she would have been graded at the high level and if she would have either not drawn any curve or drawn a curve of the incorrect shape AND not labeled it, she would have been graded at the beginning level. Similarly, in the medium level column in Table 3 we state "*If abbreviations are used, it is not clear what they stand for. OR The figure is labeled but not well.*" In this case, if the student makes one of these two mistakes, his skills in this dimension will be classified in this category. However, if both of them are correct, his skills will be graded at the high level and if both of them are incorrect, his skills will be graded at the beginning level.

Attention should be given to correctly identify which parts are needed for a specific scale grade and which parts can be incorrect or missing. Typically, the rubric has to be used few times, in order to clear out some of the technical problems of what constitutes one or the other level of proficiency. If you are planning to use this rubric to grade an exam or an assignment question, but you have not used it before, it is always a good idea to take the rubric for a test ride in your class. Prepare a question that students answer either at home or in class, and then ask them to assess each other's work using the rubric. You can predict how many problems there are in your rubric by the level of noise and chatter among your students while using it. This can be done as an ungraded "practice" task so that your students do not feel unfairly graded by an untried rubric. Ask your students to let you know which areas in the rubric are problematic.

Table 3: Three-Level Rubric

Question: Suppose that Oliver can read 15 pages of economics textbook and 30 pages of history textbook in an hour. He spends 3 hours per day studying. a) On a clearly labeled and titled graph draw Oliver's production possibilities frontier (PPF) for reading economics and history textbooks, assuming constant opportunity costs. b) What is Oliver's opportunity cost of reading 90 pages of history? Your answer should include a brief explanation of your diagram and calculations.

	High Level	Medium Level	Beginning Level
Graph Setup and Labeling (30%)	□ All axes are correctly labeled with relevant numbers and units. □ The figure has a title and a number.	□ Some axes are correctly labeled. □ Some units are correct. □ Some numbers are correct. OR □ The figure is labeled but not well.	□ None of the axes are correctly labeled with relevant numbers and units. □ The figure has no title and no number.
Horizontal (x) Axis (15%)	□ The number on the horizontal axis is correct. □ The intercept is correctly marked on the horizontal axis.	□ The number on the horizontal axis is incorrect. OR □ The intercept on the horizontal axis is incorrectly marked.	□ The number on the vertical axis is not correct AND □ The intercept is incorrectly marked on the axis.
Vertical (y) Axis (15%)	□ The number on the vertical axis is correct. □ The intercept is correctly marked on the vertical axis.	□ The number on the vertical axis is incorrect. OR □ The intercept on the vertical axis is incorrectly marked.	□ The number on the vertical axis is not correct AND □ The intercept is incorrectly marked on the axis.
Production Possibilities Frontier (10%)	□ The two points on the x and y axes are connected. □ The line has the correct shape. □ The line is labeled.	□ The two points on the x and y axes are connected. AND □ The line has the correct shape. BUT □ The line is not labeled.	□ The two points on the x and y axes are not connected OR □ The line does not have the correct shape AND □ The line is not labeled.
Opportunity Costs (10%)	□ The opportunity costs are correctly calculated.		□ The opportunity costs are not correctly calculated.
Explanation (20%)	□ The description of the graph/figure is provided and written clearly. □ When referring to the graph/figure the appropriate title and number is used. □ The explanation of the answer is provided and written clearly.	□ The description of the graph/figure is provided. □ When referring to the graph/figure the appropriate title and number is occasionally used. □ The explanation of the answer is provided.	□ The description of the graph/figure is not provided. OR □ When referring to the graph/figure the appropriate title and number is not being used. OR □ The explanation of the answer is not provided.

5. Grading with rubrics

After spending two or three hours designing your first rubric, one would really like to know how to grade a question with it and test it to see if having a rubric really speeds up grading time.[12] With rubrics we grade more quickly than without, while still providing detailed, formative feedback on students' assignments and collective summative feedback on exams.

Grading an assignment question with a rubric is very similar to grading the same questions without it – with a few differences. For one thing, if you usually grade a short answer question and write long extensive notes next to each answer, the rubric will save you a great deal of grading time. When using a rubric, you simply select the appropriate check box and/or circle the relevant text in the rubric to convey the same information to the student, without writing the same comment 20 times on as many assignments. If, however, you usually grade short answer questions without providing any comments on the assignments, you probably spend countless hours during your office hours or before, during and after class, explaining to your students why they lost points on a particular question and what they could have done to get full credit. Rubrics, again, can save you that time and effort. Simply select appropriate check box and/or circle the relevant text in the rubric to convey the same information to your students. Third, we instructors can also experience grading fatigue, when after many assignments, our brains begin to fog and it takes more time to try to remember all of the dimensional details on which we held assignments at the beginning of our grading session accountable – with a rubric in front of you that lays out each detail, you do not have to repeatedly try to conjure up all of that information from your poor, over-taxed brain.

One important grading characteristic of the rubric that should be noted is also the fact that with a rubric you can typically assign partial credit. Suppose that the rubric is for a multistep problem, where the student is able to correctly answer steps (a) and (c) but not an intermediate step (b). In this case, you should give your students full credit for part (c) even if part (b) is incorrect. From our experience, students often incorrectly answer an algebraic portion of the question (possibly due to a small calculating error) but are able to correctly explain the steps and the intuition of their work. In this case, students receive a mark in the lowest column of the rubric for the numeric answer but the highest score for the explanation. If you believe that the actual numeric answer matters more than students' general understanding of how to obtain the answer and the interpretation of it (i.e. explanation) you can either omit the explanation part in your rubric or assign more weight to the dimension with the numeric answer in it.

Another support from the rubric is that once you are finished assessing the assigned question/task, you can also add up all the points or percentages that you have assigned to each dimension and achievement level (scale) and quickly calculate the overall assignment grade. If you are using a learning management system, your grading can be made even quicker and easier if it supports rubrics for grading. In Blackboard, for example, you can find rubrics by clicking on "Course Tools" under "Course Management". Click on "Create Rubric" and follow the instructions provided. You can easily add additional rows for dimensions (or rename the existing ones), additional columns for scale (or rename the existing ones), and decide on the weights and points assigned to each dimension and scale. Blackboard also provides an option called "Balanced Weights" so that each cell has the same amount of points (or not). Once you have constructed and saved a rubric in Blackboard you can associate rubrics

[12] It should be noted that one spends two to three hours designing *the very first* rubric and that the design time significantly decreases with practice. In addition, the rubrics can be easily re-designed for similar questions. For example, in the appendix you can see a rubric for a typical supply and demand question that took us about 30 minutes to create. However, the first part of the rubric for the aggregate supply and aggregate demand question looks very similar to the supply and demand rubric where we changed few words and added dimensions for the long run change. As a result it took us about 10 minutes to modify a rubric typically used in introductory microeconomics to a rubric used in introductory macroeconomics class.

with any column in the Grade Center and view them during the grading process. When grading, you simply click on the appropriate cell and the points are automatically added and reported in the Grade Center.

Since a rubric is typically associated with each individual question in Blackboard, you should make sure that each question on an assignment is assigned separately and associated with the appropriate rubric. This will enable you to analyze the performance of your students on each individual question. Blackboard also provides a very impressive "Rubric Evaluation Report" that you can obtain by clicking on the selected column in the Grade Center. This report provides an invaluable summative feedback, where you can analyze each question and observe dimensions of the questions where students performed well, and find the ones that they are struggling with.

Finally, if you would like to see the overall score on an assignment that might include four or five individual questions, you can simply add an additional column (either Average Column, if all questions have the same weight, or Weighted Column, if some questions are weighted more in the assignment than others) in the Grade Center to have it calculate and report the total grade automatically.

6. Concluding remarks

The main purpose of this paper was to explain how rubrics can be used in undergraduate economics courses not only as an assessment tool, but also as an effective teaching and learning tool. In addition, we showed how to design a rubric with a simple four-step method that can be applied to any short-answer question in undergraduate economics. The description of rubric design in this paper was very basic and we recommend that as instructors develop their fledgling skills and are ready for a little more depth in rubric development to look at additional resources such as Stevens and Levi (2013) and Dornish and McLoughlin (2006).

It should be clear that the design of a rubric takes time and, for beginners, the first few rubrics may take more time than they save. However, just like any other skill it takes practice to master it. We suggest that you aim at preparing one or two new rubrics per semester per course – perhaps for your most important and most challenging assignments – and then slowly add to your arsenal. In addition, you will notice that many times you will be able to repurpose some of your older rubrics to a new question by simply adjusting few dimensions. Furthermore the same rubric can be used for seemingly different questions. In intermediate microeconomics you may first ask for a graph showing the income and substitution effect using "typical" indifference curves and in the second question ask for a graph again showing income and substitution effect but now using perfect complements. Even though the graphs will look fairly different, you can use the same rubric for both questions. In addition, suppose that in one question you ask for a graph showing substitution and income effect for a "typical" commodity, while on the next you ask for a graph with labor/leisure and in the third for a graph with present and future savings/borrowing. In all three questions the same rubric can be used.

Finally, in the appendix to this paper we provide three additional examples of short-answer questions accompanied by answers and rubrics that you can use in your own class.

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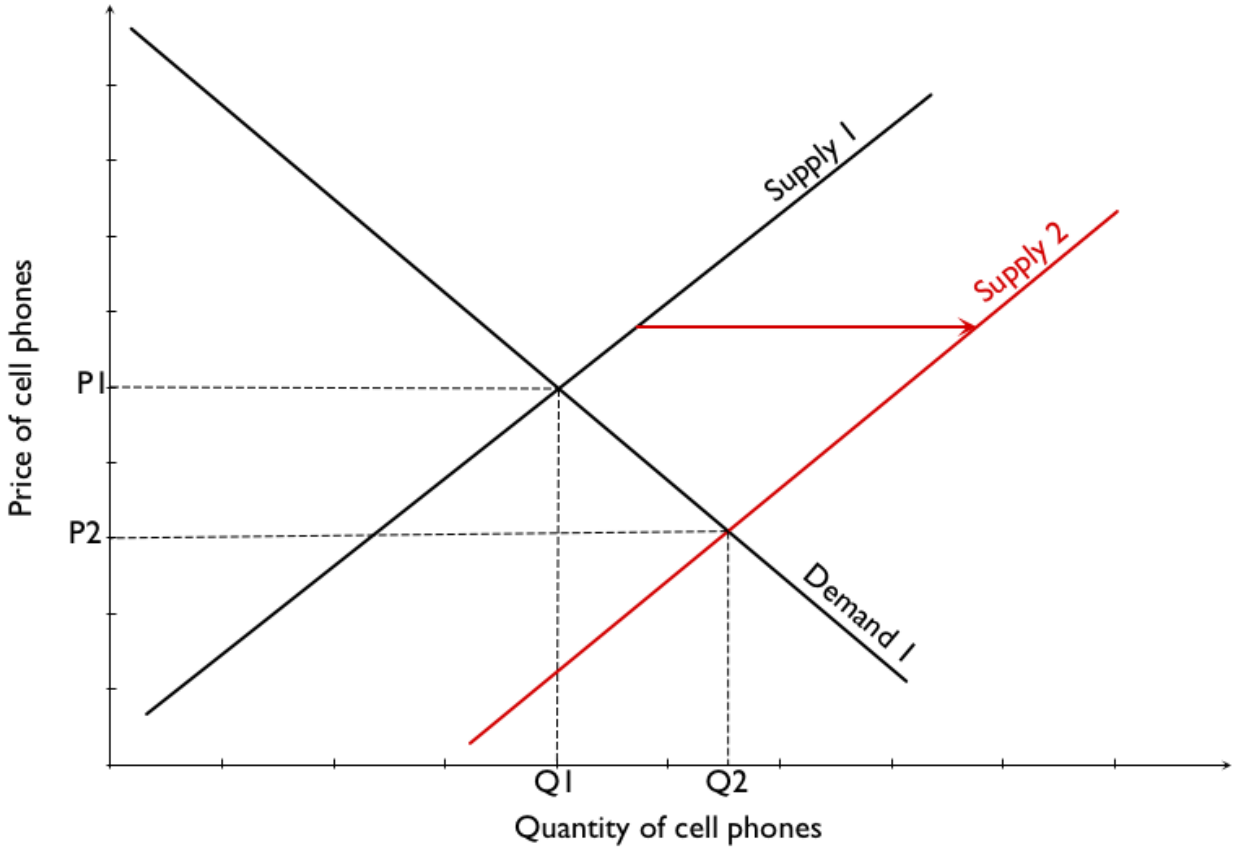
Appendix

Sample Question for Introduction to Microeconomics:

Consider a perfectly competitive market for Cell Phones in the United States. Suppose that a new technological innovation makes the production of cell phones cheaper. On a clearly labeled supply and demand graph show what happens to the equilibrium price and quantity. In addition, write a brief explanation that states which curve or curves (if any) shift and why.

Answer:



Explanation:

Original equilibrium is where Supply 1 and Demand 1 intersect with equilibrium prices P1 and equilibrium quantity Q1. Because of the technological innovation, the supply curve moves to the right, since this event makes production more profitable and suppliers wish to supply more cell phones at any given price. As a result, the new equilibrium is where the new supply curve (Supply 2) intersects the old demand curve (Demand 1) with lower equilibrium price (P2) and higher equilibrium quantity (Q2).

Rubric:

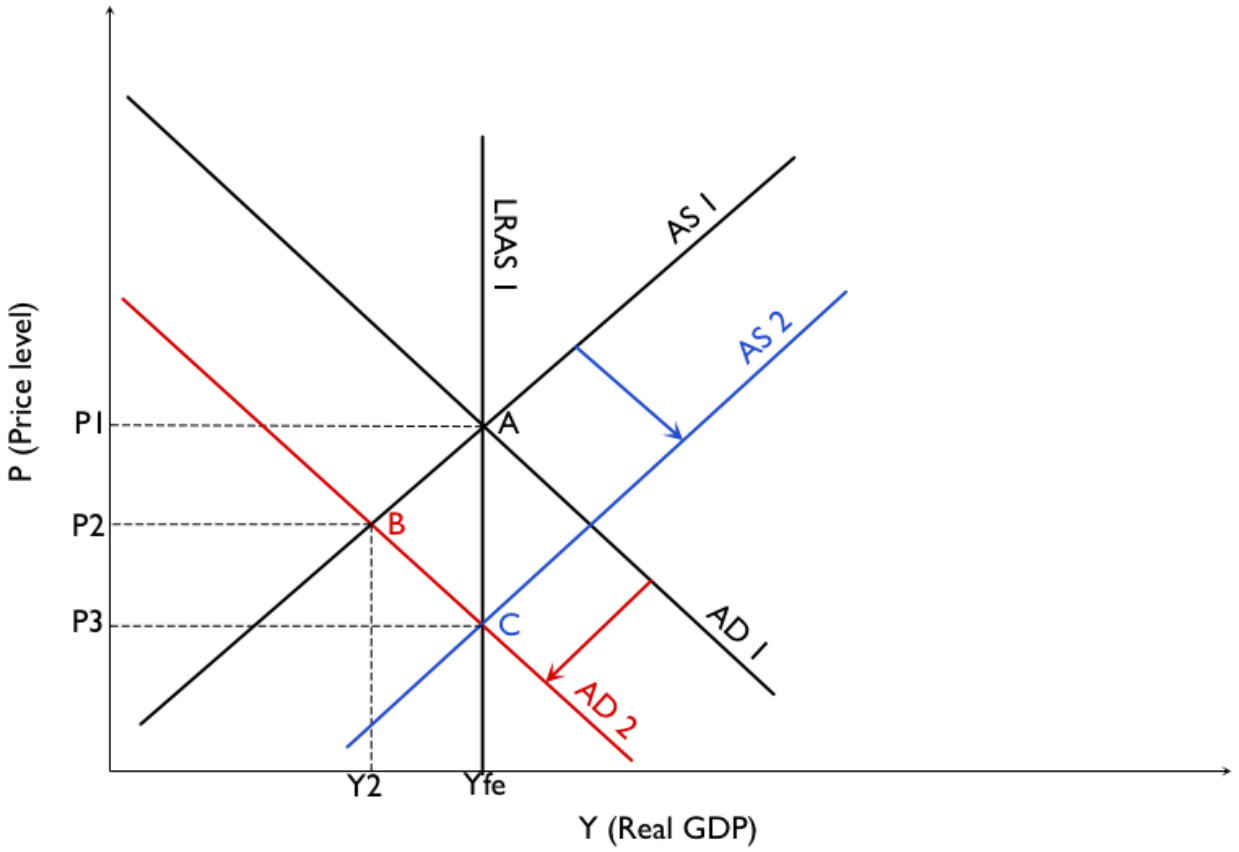
Dimensions	Exemplary	Competent	Unacceptable
Graph Labeling 10%	□ All axes are correctly labeled with relevant numbers and units. If possible, the graph is drawn to scale. □ If abbreviations are used, it is clear what the abbreviations stand for.	□ Some axes are labeled. □ Some units are correct. □ Some numbers are correct. □ If abbreviations are used, it is not clear what they stand for.	□ There are no labels. □ There are no units or numbers.
Supply Curve 10%	□ Supply curve has the correct shape (typically upward sloping) and location.	□ Supply curve does not have the correct shape.	□ There is no supply curve.
Demand Curve 10%	□ Demand curve has the correct shape (typically downward sloping) and location.	□ Demand curve does not have the correct shape.	□ There is no demand curve.
Original Equilibrium 10%	□ Original equilibrium is properly located and marked (i.e. with P1 and Q1).	□ Original equilibrium is not properly located or marked (i.e. with P1 and Q1).	□ It is not clear where the original equilibrium is.
Shifts in the Curves 10%	□ The correct curves shift. OR □ If none of the curves shift it is clearly stated that this is the case.	□ Incorrect curves shift. OR □ If none of the curves shift it is not clearly stated that this is the case.	□ It is not clear at all which curves shift. OR □ None of the curve shift. OR □ If the answer is that none of the curves shift, this is not clearly stated or incorrect curves shift.
Shifts in the Curves 10%	□ The curves shift in the correct direction.	□ The curves shift but in wrong direction.	□ It is not clear at all which curves shift. OR □ None of the curve shift. OR □ If the answer is that none of the curves shift, this is not clearly stated or incorrect curves shift.
New Equilibrium 20%	□ New equilibrium is properly located and marked (i.e. with P2 and Q3).	□ New equilibrium is not properly located or marked (i.e. with P2 and Q3).	□ It is not clear where the new equilibrium is.
Explanation 20%	□ The description of the graph is clearly written. □ The explanation of the curve shift is given. □ It is clearly stated what happens to the equilibrium price and quantity.	□ There is some description of the graph, but it is very short and incomplete. □ It is not clear why the curve has shifted. □ It is not completely clear what happens to the equilibrium price and quantity.	□ There is no explanation of the graph or it is incomprehensible.

Sample Question for Introduction to Macroeconomics:

Draw the AD-SRAS-LRAS diagram for the U.S. economy starting in a long-run equilibrium.

Suppose that there is a stock market crash. Use your diagram to determine the Short-Run and Long-Run effects on the U.S. GDP, the price level, and unemployment in the absence of any policy intervention**.** In addition to a fully labeled diagram, your answer should include a brief explanation of your diagram.

Answer:



Explanation:

The economy starts in the long run equilibrium represented by point A at the intersection of AD 1, AS 1, and LRAS 1 with price level P1 and at the full level of employment (Yfe). The stock market crash reduces consumers' wealth, which depresses their spending. The AD curve shifts to the left. The new short run equilibrium is at point B at the intersection of AS 1 and new AD2. At this point, price levels are lower (deflation), real GDP is lower and as a result unemployment is higher. At point B actual prices are lower than expected prices. Over time, expected prices fall, wages fall, and sticky prices become flexible and fall. The SRAS curve moves rightward. This process continues until the economy arrives to point C, where GDP and unemployment are back at their natural rates of full level of employment but with lower level of overall prices.

Rubric:

Dimensions	Exemplary	Competent	Unacceptable
Graph Labeling 5%	□ All axes are correctly labeled with relevant numbers and units. If possible, the graph is drawn to scale. □ If abbreviations are used, it is clear what the abbreviations stand for.	□ Some axes are labeled. □ Some units are correct. □ Some numbers are correct. □ If abbreviations are used, it is not clear what they stand for.	□ There are no labels. □ There are no units or numbers.
Original Equilibrium 5%	□ Original equilibrium is properly located and marked (i.e. with P1 and Yfe, letter A).	□ Original equilibrium is not properly located or marked (i.e. with P1 and Yfe).	□ It is not clear where the original equilibrium is.
Short Run Shifts in the Curves 10%	□ The correct curves shift. OR □ If none of the curves shift it is clearly stated that this is the case.	□ Incorrect curves shift. OR □ If none of the curves shift it is not clearly stated that this is the case.	□ It is not clear at all which curves shift. OR □ None of the curve shift. OR □ If the answer is that none of the curves shift, this is not clearly stated or incorrect curves shift.
Short Run Shifts in the Curves 10%	□ The curves shift in the correct direction.	□ The curves shift but in wrong direction.	□ It is not clear at all which curves shift. OR □ None of the curve shift. OR □ If the answer is that none of the curves shift, this is not clearly stated or incorrect curves shift.
New Short Run Equilibrium 20%	□ New equilibrium is properly located and marked (i.e. with P2 and Y2, point B).	□ New equilibrium is not properly located or marked (i.e. with P2 and Y2, point B).	□ It is not clear where the new equilibrium is.
Long Run Shifts in the Curves 10%	□ The correct curves shift. OR □ If none of the curves shift it is clearly stated that this is the case.	□ Incorrect curves shift. OR □ If none of the curves shift it is not clearly stated that this is the case.	□ It is not clear at all which curves shift. OR □ None of the curve shift. OR □ If the answer is that none of the curves shift, this is not clearly stated or incorrect curves shift.
Long Run Shifts in the Curves 10%	□ The curves shift in the correct direction.	□ The curves shift but in wrong direction.	□ It is not clear at all which curves shift. OR □ None of the curve shift. OR □ If the answer is that none of the curves shift, this is not clearly stated or incorrect curves shift.
Explanation 30%	□ The description of the graph is clearly written. □ The explanation of the curve shift is given. □ It is clearly stated what happens to the equilibrium price and quantity.	□ There is some description of the graph, but it is very short and incomplete. □ It is not clear why the curve has shifted. □ It is not completely clear what happens to the equilibrium price and quantity.	□ There is no explanation of the graph or it is incomprehensible.

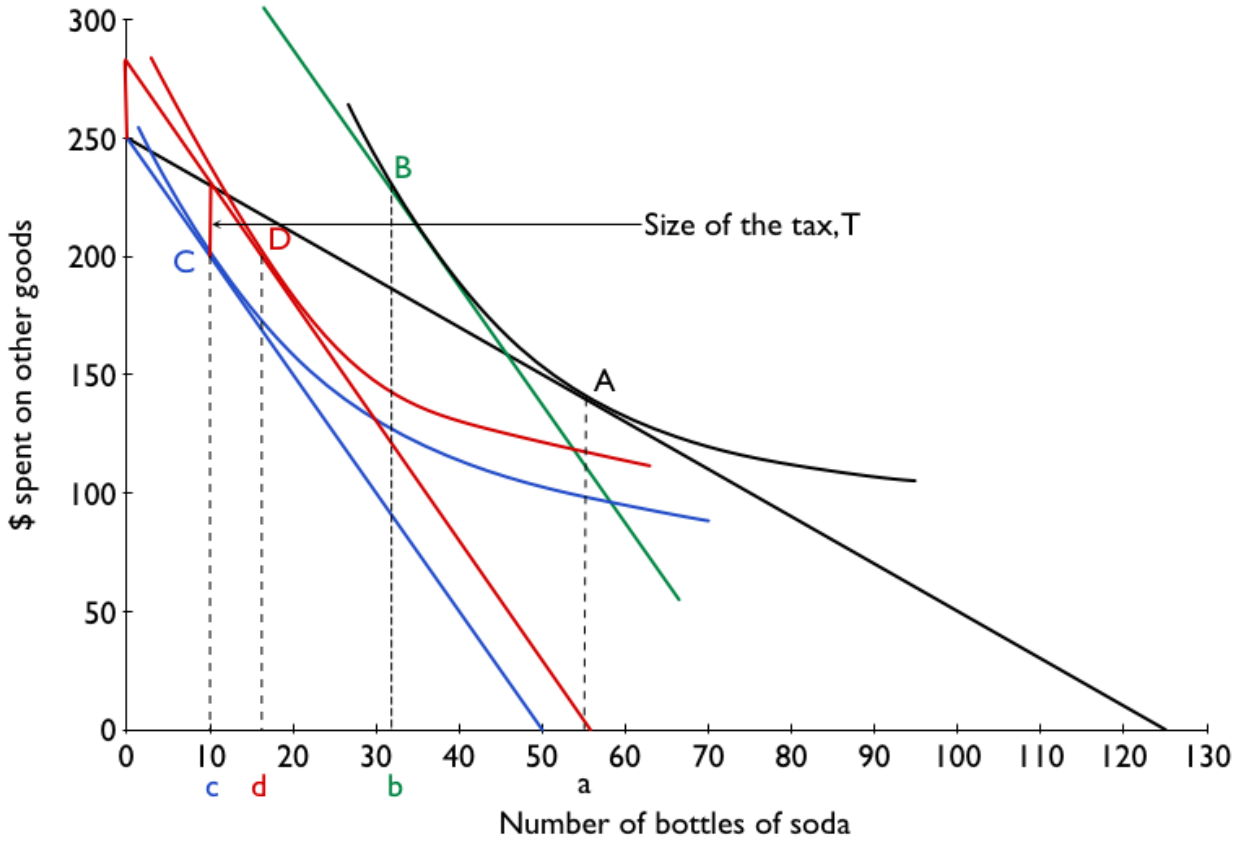
Sample Question for Intermediate Microeconomics:

Given the concerns about obesity epidemic in the US, many have proposed increasing the tax on sugary soda drinks. Suppose Nicolas has a weekly income of $250 and suppose the price of a bottle of soda is $2.

a. Illustrate Nicolas' budget constraint with "number of bottles of soda" per year on the horizontal axis and "dollars spent on other goods" on the vertical. Then illustrate how this changes if the government imposes a tax on price of soda drinks that raises the price per bottle of soda to $5.00. Clearly show the income and substitution effect, assuming soda drinks are a **normal good**.
b. Illustrate in your graph how much in soda taxes is Nicolas paying and call this amount T.
c. One of the concerns about using soda taxes to combat obesity is that it will impose hardship on consumers (and, perhaps more importantly, voters). Some have therefore suggested that the government simply rebate all revenues from the soda tax to taxpayers. Suppose that Nicolas receives a rebate of exactly T. Illustrate how this alters Nicolas' budget.
d. Can you tell whether the tax/rebate policy is successful at getting Nicolas to consume less soda than he would were there neither the tax nor the rebate?
e. True or False: Since the government is giving back in the form of a rebate exactly the same amount as it collected in soda taxes from Nicolas, he is made no better or worse off from the tax/rebate policy. Explain.

Note: To make the graph a bit more readable, you should include only the relevant quantities for soda and ignore the ones for other goods.

Answer:



Explanation:

- The black lines represent the original budget constraint and indifference curve, with point A representing the original optimal consumption bundle.
- Movement from point A to point B shows the substitution effect. Since soda is now effectively more expensive as a result of the tax, consumer is substituting away from it towards consumption of other goods.
- Given the introduction of a tax on soda, consumer feels as if her income has decreased. Since both soda and other goods are assumed to be normal, she will buy less of both soda and other goods. This income effect is shown as the movement from point B to point C. Point C with the blue budget constraint and indifference curve shows the new optimal consumption bundle that this consumer will purchase after the introduction of the tax.
- The red vertical line on the graph shows the amount of the tax that this consumer is paying given her optimal consumption bundle, C.
- If the tax if fully rebated back to the consumer, the budget constraint will move from the blue line to the red line. Notice that the two lines are parallel, since the relative prices have not changed. Given this new budget constraint and the assumption of both goods being normal, this consumer will find her new optimal consumption bundle to be at point D.
- It is obvious from the graph, that the consumer is drinking less soda after the tax is imposed ($c < a$). In addition, we see that with the tax/rebate program, this consumer is still consuming less soda compared to no policy ($d < a$) but slightly more soda compared to the policy with only the tax ($d > c$).
- Policy Evaluation: False. While it is true that the consumer gets back the dollars she sent to the government as tax payment, she nevertheless ends up on a lower indifference curve than the pre-tax, pre-rebate indifference This is obvious from the graph, notice that point D (the optimal consumption bundle with the red tax/rebate budget line) is on a lower indifference curve than original consumption bundle, point A. Thus, the consumer is worse off as a result of the tax/rebate. This ignores any potential benefit to the consumer from potentially lower body mass index that might result from this policy.

Rubric:

Dimensions	Exemplary	Competent	Unacceptable
Graph Labeling	□ All axes are correctly labeled with relevant numbers and units. If possible, the graph is drawn to scale. □ If abbreviations are used, it is clear what the abbreviations stand for.	□ Some axes are labeled. □ Some units are correct. □ Some numbers are correct. □ If abbreviations are used, it is not clear what they stand for.	□ There are no labels. □ There are no units or numbers.
Original Budget Constraint	□ Budget constraint is correctly drawn. □ The two intercepts are clearly labeled. □ If no specific numbers are given in the question, the intercepts are marked in fraction (i.e. I/P1).	□ Budget constraint has the correct shape, BUT the intercepts are not correctly labeled.	□ The budget constraint is not drawn. OR □ The budget constraint cannot be identified on the graph.
Indifference Curve	□ The indifference curves have correct shape based on the assumptions. □ They are properly labeled or described. □ They do not cross and satisfy all standard assumptions.	□ The indifference curves resemble the correct shape, but violate some of the standard assumptions OR □ The indifference curves do not violate standard assumptions, but are not drawn based on the assumptions given in the question.	□ There are no indifference curves or cannot be identified on the graph.
Original Optimal Consumption Bundle	□ Original consumption bundle is clearly labeled (i.e. point A, OCB1, etc). □ It is also correctly located (i.e. at the tangency point or the corner solution). □ The original quantities on the x and y axis are also clearly marked.	□ Original consumption bundle is clearly labeled, but it is at the incorrect location. OR □ Original consumption bundle is at the correct location, but it is not clearly labeled. OR □ The x and y axis are not clearly marked.	□ It is not clear, where the original consumption bundle is and what the original x and y quantities are.
New Budget Constraint	□ Budget constraint is correctly drawn. □ The two intercepts are clearly labeled. □ If no specific numbers are given in the question, the intercepts are marked in fraction (i.e. I/P2).	□ Budget constraint has the correct shape, BUT the intercepts are not correctly labeled.	□ The budget constraint is not drawn OR □ The budget constraint cannot be identified on the graph.

Rubric (continued):

Dimensions	Exemplary	Competent	Unacceptable
Substitution Effect	□ The substitution effect is properly identified and located (i.e. as the point where the line parallel to the new budget constraint is tangent to the original indifference curve, if possible). □ The new quantities on the x and y axis are also clearly marked.	□ The substitution effect is identified, but it is not correctly located (i.e. not on the correct indifference curve, or in the correct direction, etc.) □ The new quantities on the x and y axis may also be missing.	□ There is no indication what the impact of the substitution effect is.
Income/Wealth Effect	□ The income/wealth effect is properly identified and located based on the assumptions given in the question. □ The new quantities on the x and y axis are also clearly marked.	□ The income/wealth effect is identified but it is not correctly located. □ The new quantities on the x and y axis may be also missing.	□ There is no indication what the impact of the income/wealth effect is.
Explanation	□ The description of the graph is clearly written. □ The substitution and income/wealth effect are described, as well as their impact on x and y quantities. □ The explanation for their location is given (i.e. how the assumptions in the question related to the observed movements).	□ There is some description of the graph, but it is very short and incomplete. □ It is not clear what is the impact of substitution and income/wealth effect on quantities. □ It is not clear what the reason is for observed changes in the graph (i.e. no connection to the assumptions stated in the question).	□ There is no explanation of the graph or it is incomprehensible.
Explanation and evaluation of the policy	□ The effects of the policy are clearly stated.	□ Some effects are stated but are not complete or are partially incorrect.	□ There is no explanation and evaluation of the policy