Math-in-CTE Lesson Plan Template

| Lesson Title: Drawing Scales | | Lesson # M 22 | | |
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| Occupational Area: Precision Machine | | | | |
| CTE Concept(s): Scale | | | | |
| Math Concepts: Ratios and Similarity | | | | |
| Lesson Objective: | Relating drawing scales to machine parts | | | |
| Supplies Needed: | Drawings that are not to scale (ratios not involving 1: 1) | | | |
| | 6" scale rules, micrometers, calipers, conversion charts | | | |

| THE "7 ELEMENTS" | TEACHER NOTES (and answer key) |
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| 1. Introduce the CTE lesson. | |
| Today we are going to talk about scale drawings. "What is a scaled drawing? When would we use a scale drawing? Can anybody give some examples of "scaled drawings"? | Some examples: remote car drawings, models, blue prints etc |
| What do think would happen if you were to draw a car on a 1 to 1 scale? | You would need a very large piece of paper! |
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| 2. Assess students' math awareness as it relates to the CTE lesson. | Talk about some of the examples brought out. Discuss why scale drawings are necessary. |
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| Bring out some examples of different materials such as a writing pen, or a chair or even a battleship. | Discuss the definition a scale and how it is depicted. 1:10 |
| Bring out some different blue prints with different scales and a blown up version. Explain to the students that the same part | Discuss different units of measure. |
| though a symmetric part might look the same, portions of it, like the threads would look different with a different scale. | Discuss the necessity of constant similarity. For example, the scale doesn't change in your drawing unless specifically addressed or called out. |
| Ask | |
| Why would some parts require smaller scales while others need larger scales? | It depends on the size of the object. |
| Why won't one scale fit all parts? | A large part would not be able to be drawn on a piece of paper and a small part would have to be scaled up to be able to see the part features. |
| If a scale of 1": 5" means one inch on the drawing is equal to 5 inches on the part, what would a scale of 2": 1" mean? | A scale of two to one means that for every 2 inches on the drawing is equal to one inch of the part. |
| When would you have a scale of 2": 1"? | A very small part needs to be drawn larger to be able to see details. |

| 3. Work through the math example <i>embedded</i> in the CTE lesson. | |
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| 1. With a scale of 1": 5", (1/5) what would be the dimensions for the actual part? If the part has a dimension of ¼ (.250) multiply .250 x 5 =1.250 | Answer: Multiply all dimensions by 5, The part would be 5 times larger than the drawing shows. .250 x 5 = 1.250 |
| With a scale of 1:4, (¼) what would be the dimensions for an actual part?Measure the part and multiply all dimensions by 4 | 2. Answer: multiply all dimensions by 44 x .250 =1.000 |
| 3. On a blue print drawing, you see at the bottom right hand corner of the page a title block that states: 1 inch = 1 foot. What is the scale? | 3. Answer. SCALE IS NOT 1:1 Student must make sure unit of measure are the same. In this case, |
| | 1inch : 1 foot (times) 12 inches/foot = 1:12 |
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| 4. Work through <i>related, contextual</i> math-in-CTE examples. | |
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| Using your full scale drawing/blue print or actual part, find all the dimensions for the following: Half scale: | Hand out drawings or parts to each student. Students will do the math. Answers will vary depending on drawing or part. |
| Double scale: | |
| One and one half: | |
| 5. Work through traditional math examples. | Answers will vary depending on the drawing. |
| You have been given a picture of a model car with a scale of 1:32. Using your six inch ruler measure the drawing and determine the diameter of the wheels, the length and beight of the car | Measure using a 6 inch steel rule. All measurements will be multiplied by 32. |
| | Example: 3/8 (.375) would be multiplied by 32/1 |
| | 3/8 X 32/1 = 96/8 = 12 .375 x 32 = 12 |

| 6. Students demonstrate their understanding. | |
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| Explain how you would find the dimensions of a scaled drawing at 1:8 | Students must be able to explain and determine dimensions for given parts. |
| Determine the dimensions of the part at a scale of 1:4 | |
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| 7. Formal assessment. | |
| Each student will be given a full scale drawing with all dimensions given. They will then be asked to redraw the drawing to various scales. | Instructor can use the same drawing for all students. Since all the students can be given different scales, answers/dimensions will be different for each student. |

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