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| **Course:** Middle School |
| **Unit:** Manufacturing Level 3 | **exercise:** Chocolate Casting | **Time Frame:** 4 - 5 Hours |
|  | Preparation: *Summary of “to do’s” that the teacher should understand and prepare before bringing this lesson to the classroom.* |
| Teachers will need to ensure that the proper supplies are available for students to build their solutions. **Materials:*** Chocolate melting pot
* Candy molds-truffles
* Candy mold/stars
* Candy molds-mint discs
* Candy melts, red
* Candy melts, dark cocoa
* Candy melt, peanut butter
* Candy melts, light cocoa

**Tools:*** Chocolate melting pot
* Scale classroom compact
* Spoons measuring rbrmd 4p
* Ladle hi temp nylon
* Spatula spoon silicone
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|  | Safety: *Summary of safety strategies in the lesson.* |
| The chocolate melting pot heats up, be careful around hot surfaces. Clean chocolate right after the experiment. Residual chocolate can be difficult to clean later and is unhealthy to eat if left on a surface for extended periods of time. Please use this space to describe safety procedures or highlights for this lesson.  |
|  | Desired Results:  |
| Established Goals: |  | Transfer: |
| *Problem Solving Techniques and Applications Standards:*Teachers should use the STEM Academy Standards Correlation System available in the STEM Connections area of a unit to extract specific standards and insert these standards here.  | *Students will be able to independently use their learning to…** Create a chocolate casting a mold
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| Meaning: |
| Understandings*Students will understand that...** The design process
* What an engineer is
* Engineers improve people’s lives
* Scientists explore and engineers create
* Engineering researchers are interested in the application of a breakthrough
* Scientists are concerned with the knowledge that accompanies a breakthrough
* A successful person will develop the ability to communicate well with others
* Employers look for people who have activities in their lives outside of work
 | Essential Questions*Students will keep considering...** What gap do development engineers create a bridge for?
* What do development engineers do with researchers’ findings?
* What does test engineering involve?
* When do we need a systems engineer?
* Who do construction workers work with?
* Who must operations and maintenance engineers interact with?
* Why do sales engineers need interpersonal skills?
* What are important skills needed to be a well-rounded engineer?
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| Acquisition OF KNOWLEDGE AND SKILL: |
| *Students will know...** The job of an engineer
* The engineer versus the engineering technologist
* The engineer versus the scientist
* Development engineers
* Test engineering
* Design function/design engineer
* Systems engineering
* Manufacturing and construction engineers
* Operations and maintenance engineering
* Technical support engineer
* Sales force engineers
* Consulting
* Management
* Key skills and qualities in an engineer
 | *Students will be skilled at...** Demonstrating the differences between an engineer and a scientist
* Analyzing their energy use
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|  | Evidence:  |
| Evaluative Criteria: |  | Assessment Evidence: |
| * Graded rubric
 | *Performance Task(s):* **Chocolate Casting Activity**You will be given time from your instructor to cast your chocolate mold and then weigh it, recording this information to compare to the class later. The objective is to create the most “perfect” casting by not using too much or little chocolate to fill the mold. Your weight will be compared to the weight of a perfect mold and to your classmates’ molds. |
| * Thoughtful, clear, thorough
* Graded on accuracy, multiple-choice questions
* Completed on time
 | *Other Evidence:* * Online end-of-unit test
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|  | Learning Plan: *Summary of Key Learning Events and Instruction* |
| **Pre-Assessment:** Exploring Engineering Pre-Test **Outline:**1. **Introduce**
2. Have students read the problem
3. Have students listen as you go over procedures for casting the chocolate molds and write down any special instructions.
4. Divide students into small groups (2-3)
5. **Brainstorm**
6. Have students talk to their group about possible ways to cast their molds and write these ideas down
7. **Construct**
8. Students cast their chocolate molds
9. **Test**
10. After the chocolate cools, students remove the chocolate from the mold and weigh it.
11. **Communicate Results**
12. Students tell you their results or add it to a class chart on the board
13. Within their small group, students discuss how their weight compares to the ideal weight and weight of their classmates’ casts
14. Students read the reflection questions and write their answers in the space provided

**Learning Experiences:**1. <Set induction> Discuss some of the many uses within manufacturing for using castings and molds.
2. Direct each student to open the document What is Engineering Unit 1A. Within this section students will need to first read before they complete the associated activities. You may choose to do this as a class or individually. Discuss the covered material as a class.
3. During completion of the reading assignment, have students complete the associated reading worksheet. This will help them review vocabulary and concepts for the section quiz.
4. Once students have completed both the reading and reading worksheet, prepare them for the section activity. This activity will help them to apply what they have learned from the readings.
5. Review the instructions for the section activity and provide adequate time to complete it. Each student will be responsible for his or her own project.
6. Distribute all necessary materials. Be careful as this project can get very messy!
7. Provide class time to test each student’s design. Each student will also need to complete all necessary paperwork.

**Progress Monitoring:**Teacher observes students and provides on-going feedback during the activity. While introducing the unit, the teacher will pause and ask for questions to make sure everyone understands.Students will complete self-assessment and brainstorm how they could improve their skills in the future. At the end of the unit, there will be a quiz to measure their overall understanding. |
|  | Differentiation: *Summary of Key Differentiation Techniques* |
| Please use this space to insert your differentiation techniques. Depending on the needs of students, various techniques might be needed in a classroom, therefore use the information below and experts in the area needed to design your plan for differentiation.The ASCD Study Guide for Integrating Differentiated Instruction and Understating by Design: Connecting Content and Kids.by Carol Ann Tomlinson, Jay McTigheIntegrating Differentiated Instruction and Understating by Design: Connecting Content and Kids.by Carol Ann Tomlinson, Jay McTigheISBN-13: 978-1416602842 ISBN-10: 1416602844Differentiating Reading Instructionby Laura Robb.ISBN13: 9780545022989A Teacher's Guide to Differentiating InstructionThe Center for Comprehensive School Reform and Improvement |

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|  | career Connections: *Summary of Career Opportunities Associated with this Lesson* |
| Please use this space to insert careers that might be connected to this lesson. This section will need continuous updating as new careers and emerging technologies change the opportunities available in the workforce.Good sources for career connections:Occupational Outlook Handbook<http://www.bls.gov/ooh>The National Career Clusters® Framework<http://www.careertech.org/career-clusters> |
|  | Keywords: *Please Insert Keywords from this Lesson with their Definitions* |
| Please use this space to insert keywords and their definitionsUse resources like [dictionary.com](http://dictionary.reference.com/) to find definitions to your keywords |