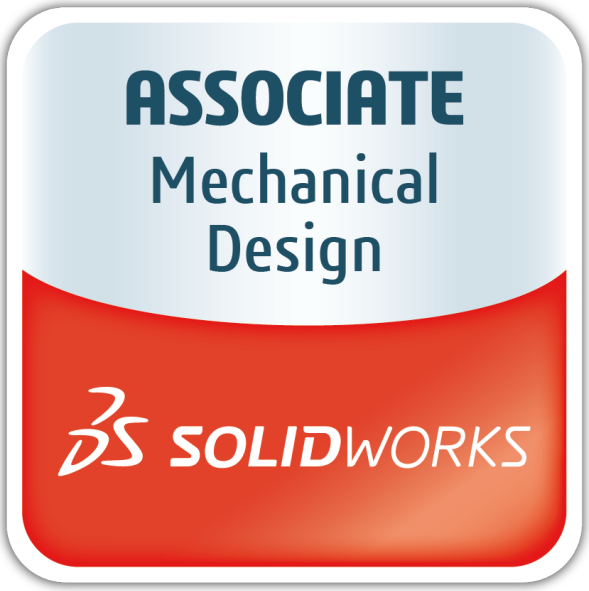
goengineer



CSWA EXAM PRACTICE PACKAGE

SOLUTIONS FOR INSTRUCTORS ONLY

Created by Gian Calise & Ryan Koehler

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Introduction

The CSWA Certification

SOLIDWORKS Certifications are a benchmark to measure your knowledge and competency with SOLIDWORKS software. A certification helps you stand out from the crowd and showcases your expertise to businesses and professionals alike—a valuable asset in a competitive job market.

A few popular SOLIDWORKS Certifications include:

- CSWA: Certified SOLIDWORKS Associate
- CSWP: Certified SOLIDWORKS Professional
- CSWPA: Certified SOLIDWORKS Professional Advanced:
    - Sheet Metal
    - Weldments
    - Surfacing
    - Mold Tools
    - Drawing Tools
- CSWE: Certified SOLIDWORKS Expert

Why take the CSWA Exam?

Being a CSWA is the difference between saying "I've used SOLIDWORKS" and "I know SOLIDWORKS." The information in the CSWA Exam covers basic must-have skills for a serious SOLIDWORKS user. The CSWA may also be your stepping stone towards higher certifications, like the CSWP and the CSWPAs.

CSWA Exam Details

The following is the topic and question breakdown of the CSWA exam:

Drafting Competencies (3 Questions of 5 Points Each):

- Miscellaneous questions on drafting functionality

Basic Part Creation and Modification (2 Questions of 15 Points Each):

- Sketching
- Extrude Boss
- Extrude Cut
- Modification of Key Dimensions

Intermediate Part Creation and Modification (2 Questions of 15 Points Each):

- Sketching
- Revolve Boss
- Extrude Cut
- Circular Pattern

Advanced Part Creation and Modification (3 Questions of 15 Points Each):

- Sketching
- Sketch Offset
- Extrude Boss
- Extrude Cut
- Modification of Key Dimensions
- More Difficult Geometry Modifications

Assembly Creation (4 Questions of 30 Points Each):

- Placing of Base Part
- Mates
- Modification of Key Parameters in Assembly

Total Questions: 14
Total Points: 240
Points Needed to Pass: 165
Maximum Time: 180 min

How to Find Training and Tutorials?

The practice problems in this guide show the basic format of the CSWA exam problems for part modeling and assembly creation. To access information on drafting competencies, you can view free tutorials right from within the SOLIDWORKS interface. Click "Help" on the top menu and go to "SOLIDWORKS Tutorials", and you will find many helpful, step-by-step tutorials to teach you different aspects of the software. Lesson 3 is specifically about drawings and drawing tools, so this will aid in your preparation for the drafting competencies section of the CSWA exam. You will find numerous other tutorials within "CSWP/CSWA Preparation" that will also greatly aid in your exam preparation. Visit My.SOLIDWORKS.com for even more training and tutorials, and learn how to set up your My.SOLIDWORKS account using your school's serial number in the video in this link. Below are some more helpful links:

- SOLIDWORKS Home: www.SOLIDWORKS.com
- SOLIDWORKS Resource Center: http://www.SOLIDWORKS.com/sw/resources.htm
- SOLIDWORKS YouTube Channel: https://www.youtube.com/user/SOLIDWORKS
- MySOLIDWORKS: my.SOLIDWORKS.com
- Training Pages: http://www.SOLIDWORKS.com/sw/support/software-training-certification.htm

What is the CSWA Practice Package?

The CSWA Practice Package is a new product developed by the SOLIDWORKS Education Team in order to provide practice material for certification exams to the SOLIDWORKS Community. The package includes a progression of problems that gradually introduce new features and functionality that are necessary to be familiar with in order to pass the CSWA Exam.

What is included in the CSWA Practice Package?

This package has been produced specifically for educators to use in the classroom to aid in the teaching of 3D modeling and best practices. For each problem in this package, we have included the final part file (.SLDPRT), the 2D drawing file (.SLDDRW), and an image of the completed drawing (.JPG). You will find the following hierarchy of folders and content below:

- CSWA-Exam-Practice-Package.zip
  - CSWA-Practice-Package-SOLUTIONS-Instructors.PDF
  - CSWA-Practice-Package-Students.PDF
  - Parts-for-Section-J-Assembly-Problems
    - Problem-1-Section-J
  - Instructor-Materials
    - Practice-Problem-Solutions
      - Section-A
        - Problem-1-Section-A
          - Final Part/Assembly File (SLDPRT)
          - Drawing of Final Part/Assembly with Solution (SLDDRW)
          - Image of Drawing of Final Part/Assembly with Solution (JPEG)
    - Creating-Practice-Problems
      - Guide-to-Creating-Practice-Problems.PDF
      - Practice-Problem-Part.PRTDOT
      - Practice-Problem-Drawing.SLDDRT

Problem Architecture

The practice problems included are designed to be rebuilt in SOLIDWORKS. Once they are complete, they can be checked by comparing the mass and or center of mass to the value given in the instructors' solution manual. Each problem contains six vital pieces of information needed to recreate the part and assembly files. These pieces of information include;

1. Unit System
2. Decimal Places (for given values as well as students' answer values)
3. Part Origin (if specified)
4. Material Type
5. Material
6. Material Density
7. Drawings/models of the parts/assemblies to be built, which contain all necessary dimensions and values

Please note that these practice problems are represented in drawing styles that do not conform to any one drawing standard. Some drawings may appear to be under-defined from a fabricator's prospective, and this is because the parts in this document are designed for modeling practice, and not meant to be fabricated. The intent of each problem and its drawings is to give the bare minimum amount of information needed to recreate the part or assembly in SOLIDWORKS.

Problem Progression

The following practice problems for the CSWA exam are in ascending order of difficulty. The problems are split up into sections A through K, and each section introduces new features that will be necessary to use in those problems. As problems progress, the minimum number of features required for each problem increases, and this number is indicated in each problem. The features introduced in each block of problems are shown in the list below:

Part 1 – Sketching, Extrusion, and Reference Geometry

A. Sketch Entities, Sketch Relations & Extrude Boss
B. Global Variables, Sketch Tools & End Conditions
C. Sketch Mirror, Circular & Linear Sketch Pattern
D. Reference Geometry (Planes & Axes)

Part 2 – More Advanced Features

E. Extrude Cut & Fillet/Chamfer
F. Revolve Boss & Revolve Cut
G. Linear & Circular Patterns
H. Sweep & Swept Cut

Part 3 – Part Modeling Exam Preparation

I. Intermediate Modeling Problems

Part 4 – Assemblies

J. Assemblies & Mates

Section A – Basic Sketch & Extrusion (5)

In this section, practice problems will include the following topics. For guided lessons, go to MySOLIDWORKS.com and watch the videos in the CSWA Exam Prep Course (https://my.solidworks.com/training/path/14/cswa-exam-prep-course).

- Sketch Entities:
  - Lines & Centerlines
  - Rectangles
  - Circles & Arcs
- Sketch Tools:
  - Smart Dimension
  - Sketch Relations
  - Trim Entities
- Features:
  - Extrude Boss
- General
  - Fully Defining a Sketch

Problems

1. Miscellaneous Object
2. Miscellaneous Object
3. Shaft Collar
4. Plastic Handle
5. Wrench

Section A – Problem 1

CSWA Practice Material - Solution

Part A - Build this part in SOLIDWORKS. Use the values below for global variables, then find the mass of the part (grams).

Unit System: MMGS
Decimal Places:
Part Origin: Arbitrary
Material Type: Aluminum
Material: Aluminum Bronze
Density: 7400 kg/m^3

*Hint: This part can be built using only 2 features

Mass = 537.14 g

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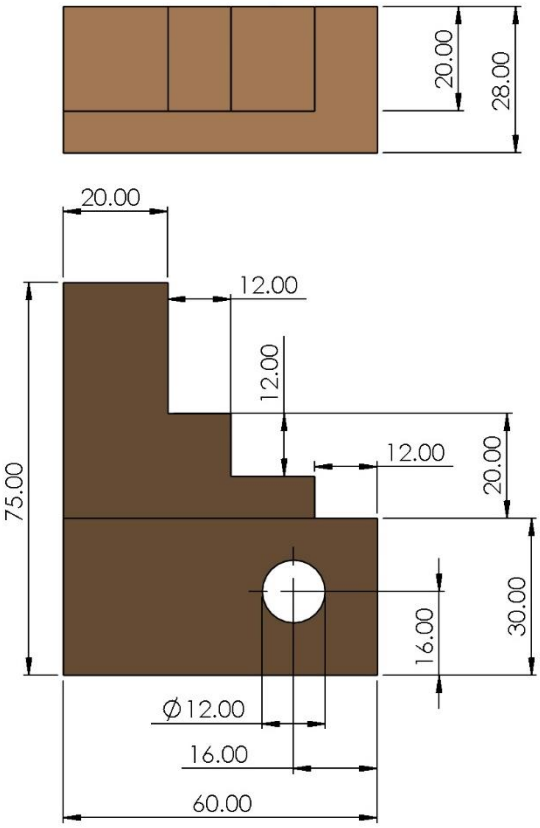

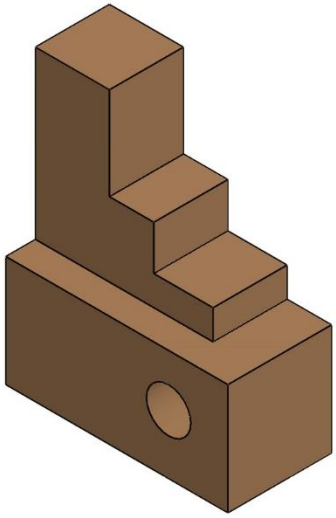

Section A – Problem 2

Part A - Build this part in SOLIDWORKS. Use the values below as needed, then find the mass of the part (grams).

Unit System: MMGS
Decimal Places: 2
Part Origin: Arbitrary
Material Type: Iron
Material: Ductile Iron
Density: 7100 kg/m^3

*Hint: This part can be built using only 3 features

Mass = 497.28 g

CSWA Practice Material - Solution

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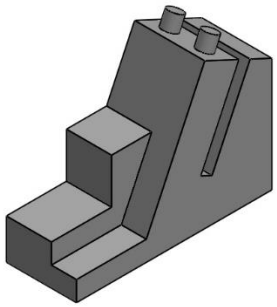

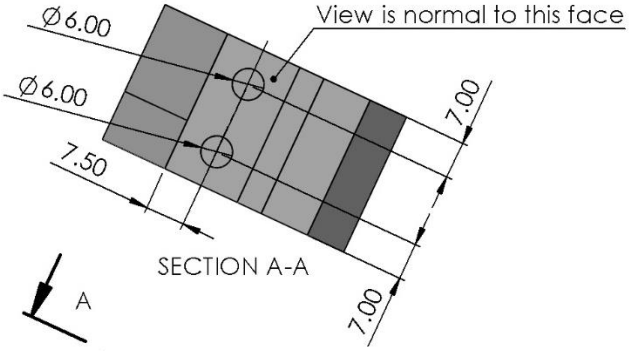

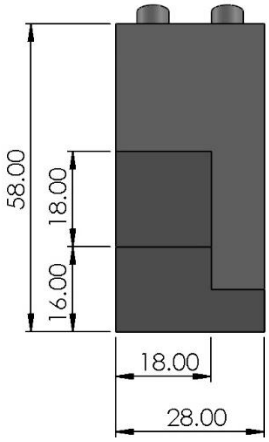

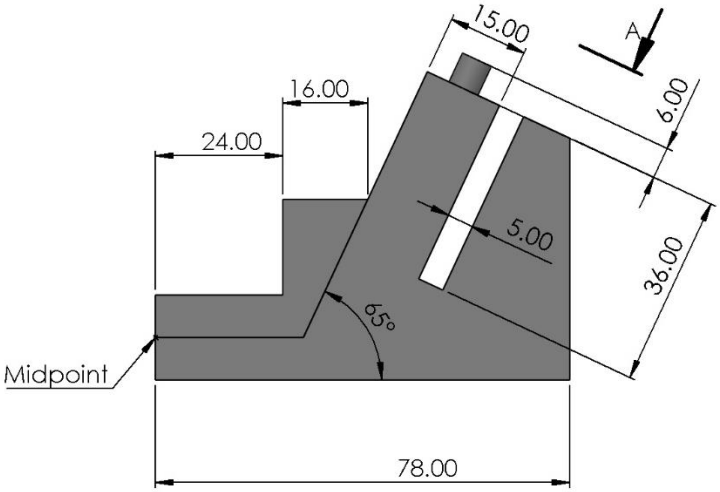

Section A – Problem 3

Part A - Build this part in SOLIDWORKS. Use the values below as needed, then find the mass of the part (grams).

Unit System: MMGS
Decimal Places: 2
Part Origin: Arbitrary
Material Type: Steel
Material: Galvanized Steel
Density: 7870 kg/m^3

*Hint: This part can be built using only 3 features

Mass = 128.03 g

CSWA Practice Material - Solution

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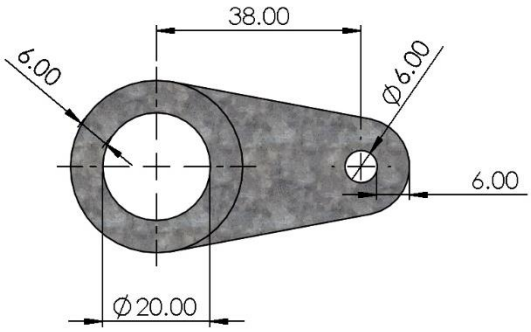
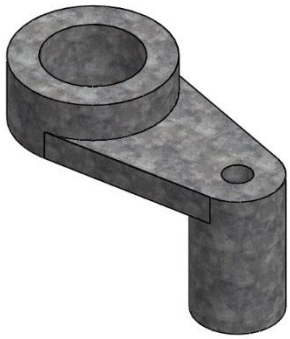
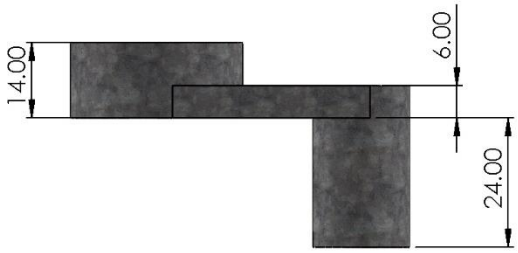






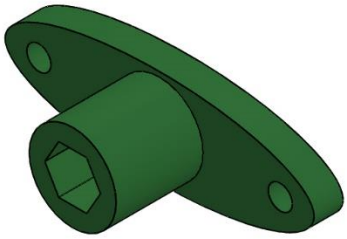
Section A – Problem 4

Part A - Build this part in SOLIDWORKS. Use the values below as needed, then find the mass of the part (lbs).

Unit System: IPS
Decimal Places: 4
Part Origin: Arbitrary
Material Type: Plastics
Material: ABS PC
Density: 0.0386 lb/in^3

*Hint: This part can be built using only 3 feature

Mass = 0.0056 lb



CSWA Practice Material - Solution

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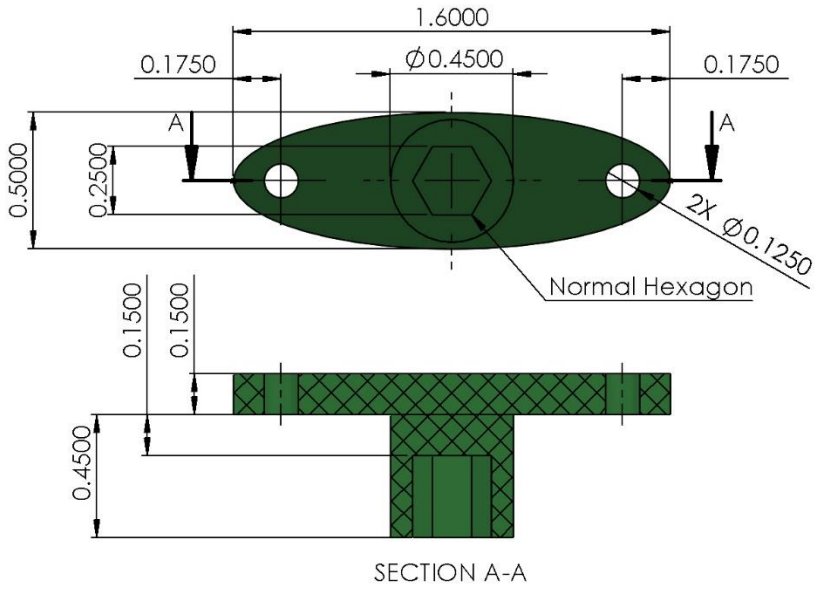

SECTION A-A

Section A – Problem 5

Part A - Build this part in SOLIDWORKS. Use the values below as needed, then find the mass of the part (lbs).

CSWA Practice Material - Solution

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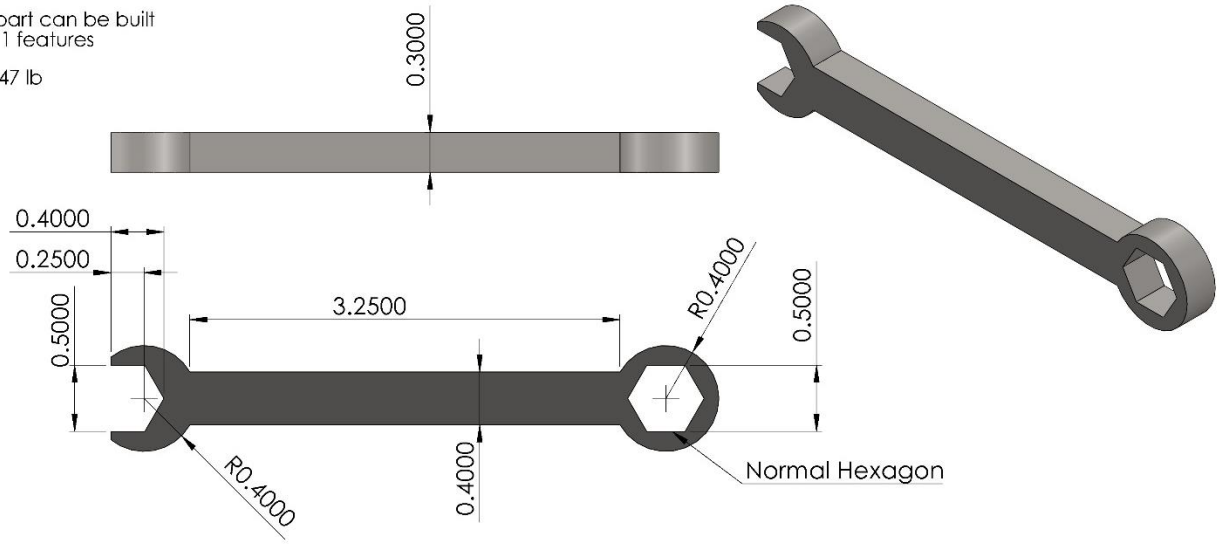
Unit System: IPS
Decimal Places: 4
Part Origin: Arbitrary
Material Type: Steel
Material: Cast Alloy Steel
Density: .2637 lb/in^3

*Hint: This part can be built using only 1 features

Mass = .1447 lb



Section B – Sketch Tools & End Conditions (4)

In this section, practice problems will include the following topics. Topics from previous sections may also be included in these problems. For guided lessons, go to MySOLIDWORKS.com and watch the videos in the CSWA Exam Prep Course (https://my.solidworks.com/training/path/14/cswa-exam-prep-course).

- Sketch Tools:
  - Sketch Fillets & Chamfers
  - Convert & Offset Entities
  - Sketch Mirror
- General:
  - Global Variables
  - Equations
- Features:
  - Start & End Conditions (Extrude Boss)
    - Blind
    - Midplane
    - Offset/Offset From Surface

Problems

1. Name Plate
2. Bottle Opener
3. Pipe Flange
4. Plastic Cover

Section B – Problem 1

Part A - Build this part in SOLIDWORKS. Use the values below for global variables, then find the mass of the part (grams).

Unit System: MMGS
Decimal Places: 2
Part Origin: Arbitrary
Material Type: Copper Alloy
Material: Brass
Density: 8500 kg/m^3

*Hint: This part can be built using only 3 features

A = 1.5
B = 109 Mass = 44.73 g

Part B - Update the global variables using the values below, then find the mass of the part (grams).

A = 3.5
B = 82 Mass = 37.56 g

CSWA Practice Material - Solution

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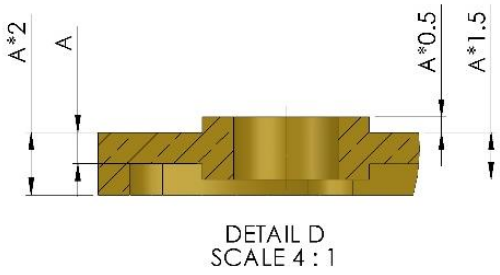
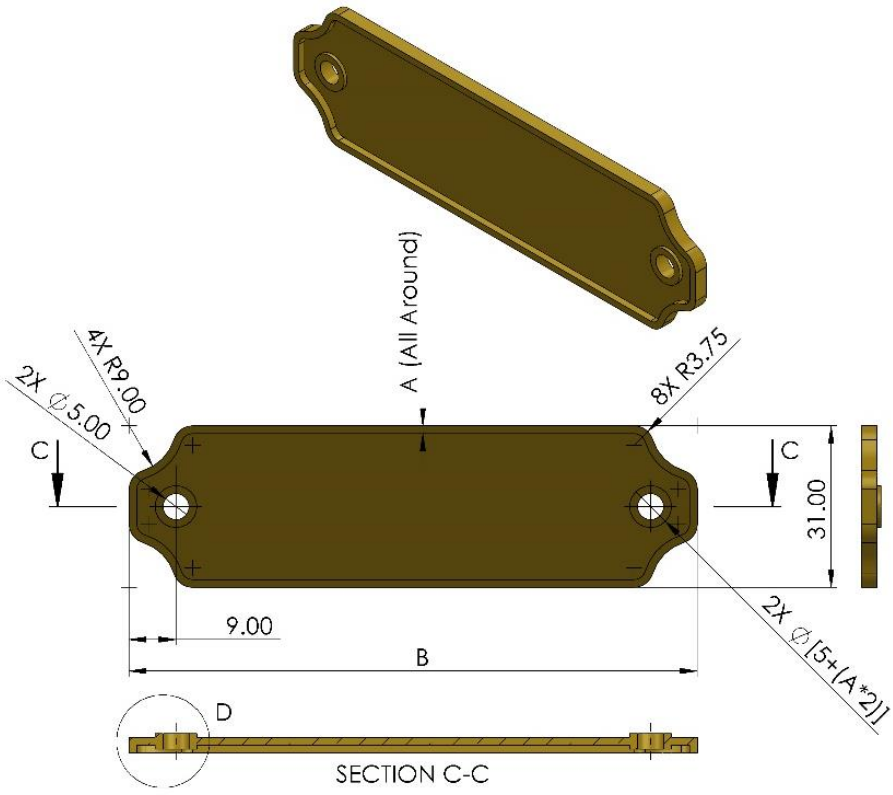


DETAIL D
SCALE 4 : 1



SECTION C-C

Section B – Problem 2

CSWA Practice Material - Solution

Part A - Build this part in SOLIDWORKS. Use the values below for global variables, then find the mass of the part (grams).

Unit System: MMGS
Decimal Places: 2
Part Origin: Arbitrary
Material Type: Steel
Material: AISI 1020
Density: 7900 kg/m^3

*Hint: This part can be built using only 2 features

A = 101
B = 11
C = 1
Mass = 102.95 g

Part B - Update the global variables using the values below, then find the mass of the part (grams).

A = 108
B = 12
C = 1.5
Mass = 117.05 g

Part C - Update the global variables using the values below, then find the mass of the part (grams).

A = 118
B = 14
C = 2
Mass = 151.38 g

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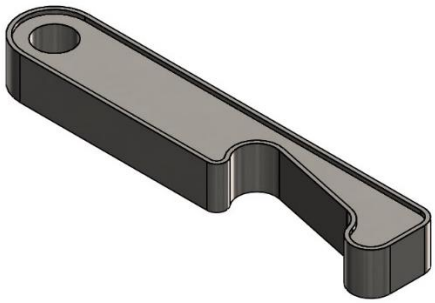
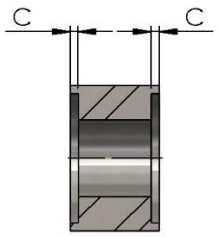
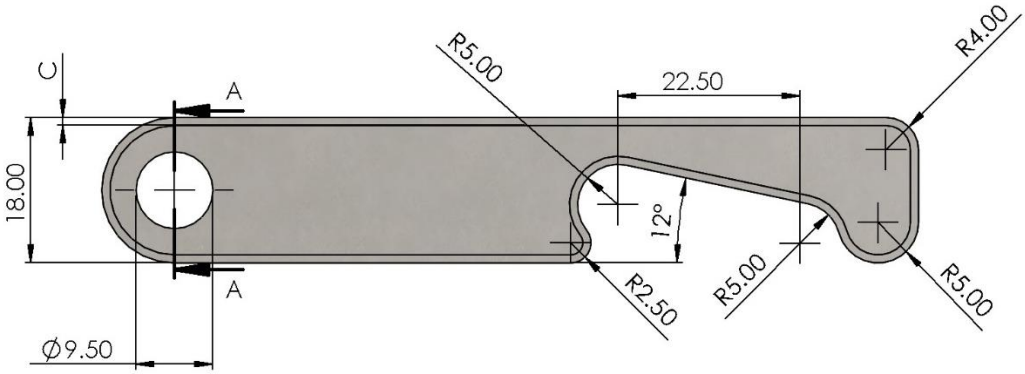
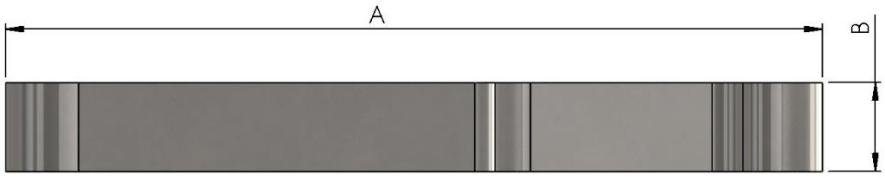




SECTION A-A
SCALE 1.5 : 1





Section B – Problem 3

Part A - Build this part in SOLIDWORKS. Use the values below for global variables, then find the mass of the part (grams).

Unit System: MMGS
Decimal Places: 2
Part Origin: Arbitrary
Material Type: Plastic
Material: Polybutadiene (PB)
Density: 970 kg/m^3

*Hint: This part can be built using only 4 features

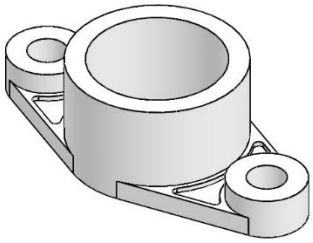
A = 38
B = 12
C = 3
Mass = 315.86 g

Part B - Update the global variables using the values below, then find the mass of the part (grams).

A = 35
B = 10
C = 2
Mass = 293.74 g

Part C - Update the global variables using the values below, then find the mass of the part (grams).

A = 32
B = 6
C = 2.5
Mass = 158.28 g



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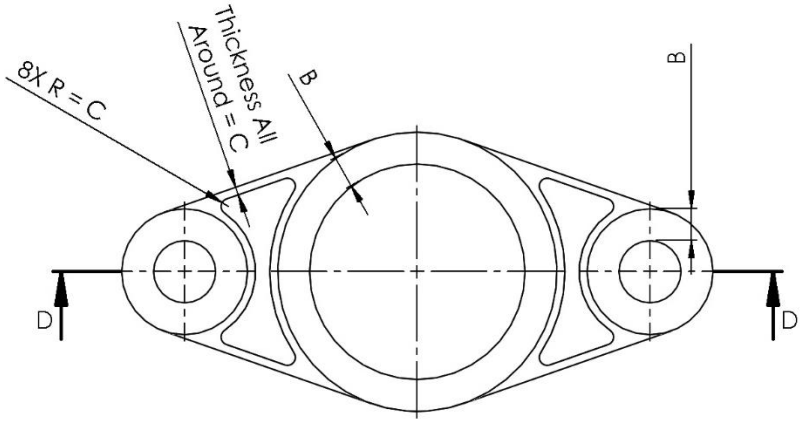
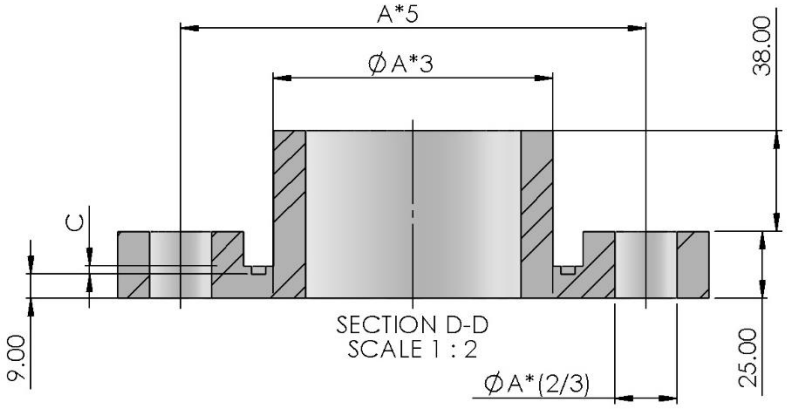




Section B – Problem 4

Part A - Build this part in SOLIDWORKS. Use the values below for global variables, then find the mass of the part (grams).

Unit System: MMGS
Decimal Places: 2
Part Origin: Arbitrary
Material Type: Plastics
Material: PE Low/Medium Density
Density: 917 kg/m^3

*Hint: This part can be built using only 4 features

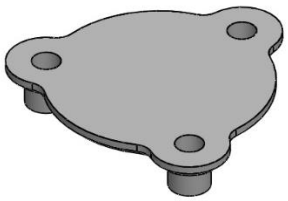
A = 43
B = 18
C = 3
Mass = 38.73 g

Part B - Update the global variables using the values below, then find the mass of the part (grams).

A = 46
B = 16
C = 2
Mass = 30.56 g

Part C - Update the global variables using the values below, then find the mass of the part (grams).

A = 36
B = 10
C = 2.5
Mass = 23.50 g



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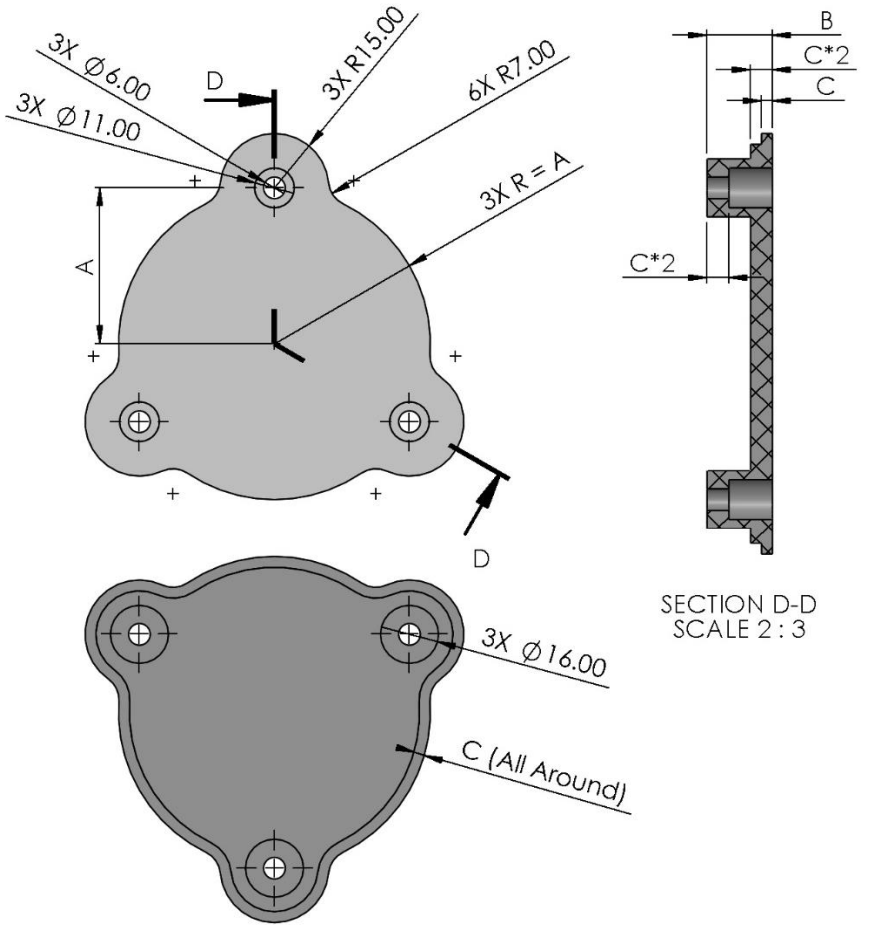

SECTION D-D
SCALE 2 : 3

Section C – Global Variables & Sketch Patterns (4)

In this section, practice problems will include the following topics. Topics from previous sections may also be included in these problems. For guided lessons, go to MySOLIDWORKS.com and watch the videos in the CSWA Exam Prep Course (https://my.solidworks.com/training/path/14/cswa-exam-prep-course).

- Sketch Tools:
  - Circular Sketch Pattern
  - Linear Sketch Pattern

Problems

1. Straight Gear Rack
2. Heat Sink
3. Gear
4. 80-20 Extruded Aluminum

Section C – Problem 1

Part A - Build this part in SOLIDWORKS. Use the values below as needed, then find the mass of the part (grams).

Unit System: MMGS
Decimal Places: 2
Part Origin: Arbitrary
Material Type: Steel
Material: Galvanized Steel
Density: 7870 kg/m^3

*Hint: This part can be built using only 3 features

Mass = 300.19 g

CSWA Practice Material - Solution

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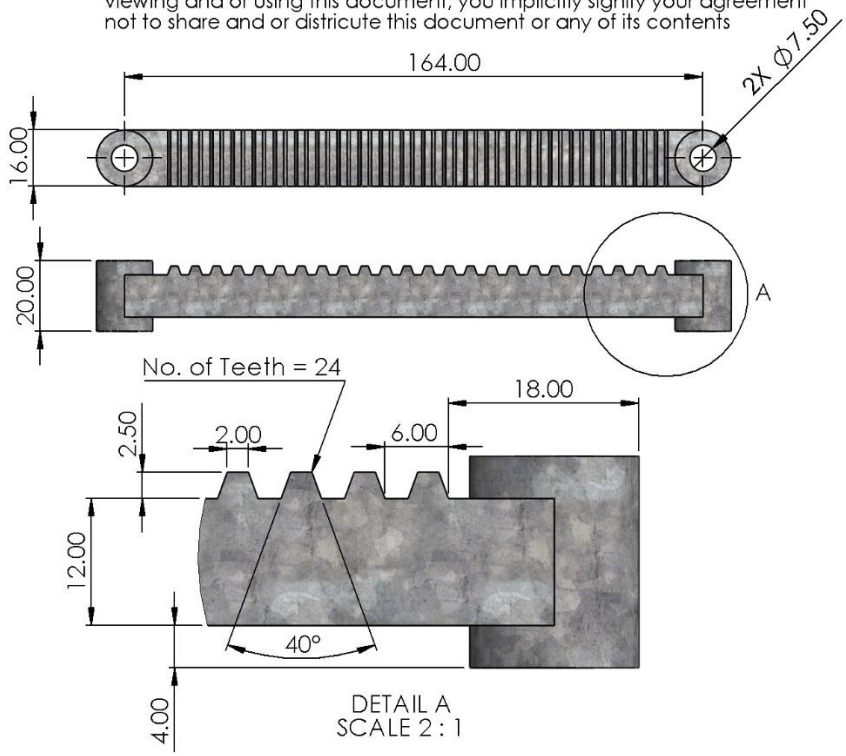

Section C – Problem 2

CSWA Practice Material - Solution

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Part A - Build this part in SOLIDWORKS. Use the values below for global variables, then find the mass of the part (grams).

Unit System: MMGS
Decimal Places: 2
Part Origin: Arbitrary
Material Type: Aluminum
Material: 1060 Alloy
Density: 2700 kg/m^3

*Hint: This part can be built using only 1 features

A = 35
B = 80
C = 1

Mass = 265.89 g

Part B - Update the global variables using the values below, then find the mass of the part (grams).

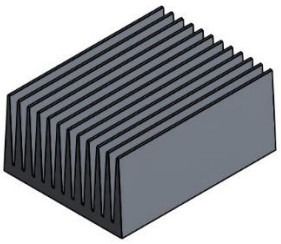
A = 108
B = 12
C = 1.5

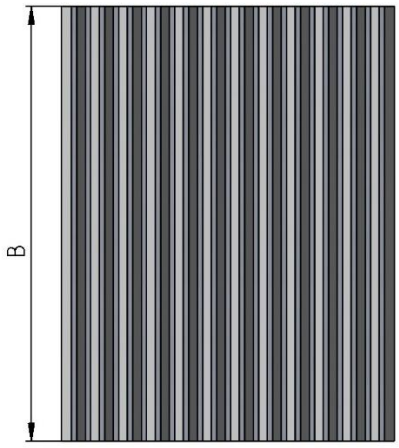
Mass = 506.90 g

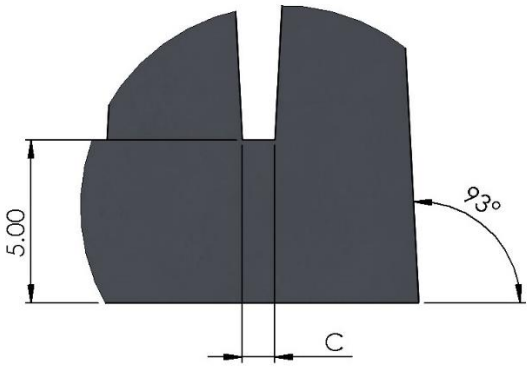
Part C - Update the global variables using the values below, then find the mass of the part (grams).

A = 118
B = 14
C = 2

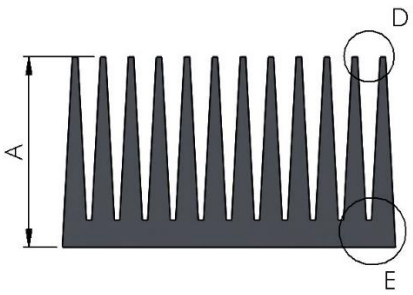
Mass = 784.26 g

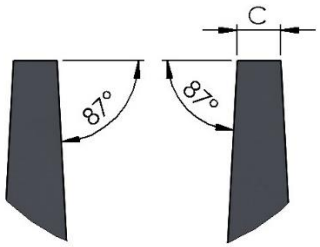






DETAIL E
SCALE 6 : 1





DETAIL D
SCALE 8 : 1

Section C – Problem 3

CSWA Practice Material - Solution

Part A - Build this part in SOLIDWORKS. Use the values below for global variables, then find the mass of the part (grams).

Unit System: MMGS
Decimal Places: 2
Part Origin: Arbitrary
Material Type: Steel
Material: Cast Carbon Steel
Density: 7800 kg/m^3

*Hint: This part can be built using only 3 features

A = 108
B = 24
C = 2.5
Mass = 636.48 g

Part B - Update the global variables using the values below, then find the mass of the part (grams).

A = 112
B = 28
C = 3
Mass = 719.28 g

Part C - Update the global variables using the values below, then find the mass of the part (grams).

A = 128
B = 32
C = 4
Mass = 946.73 g

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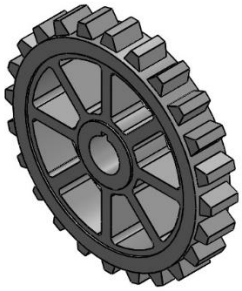
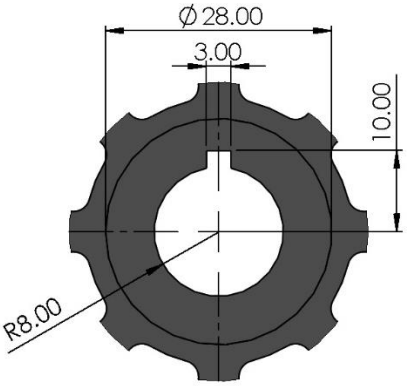
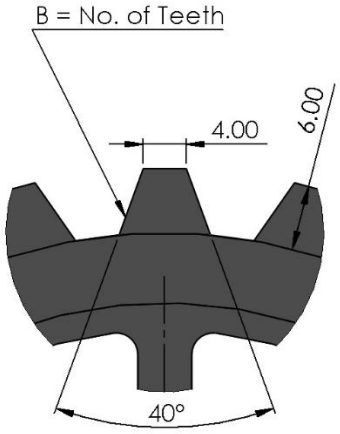
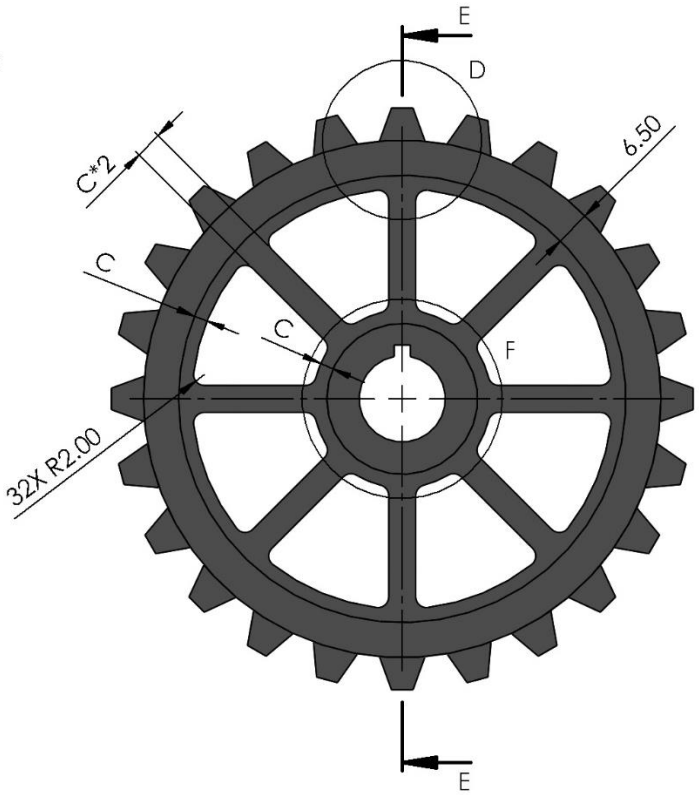


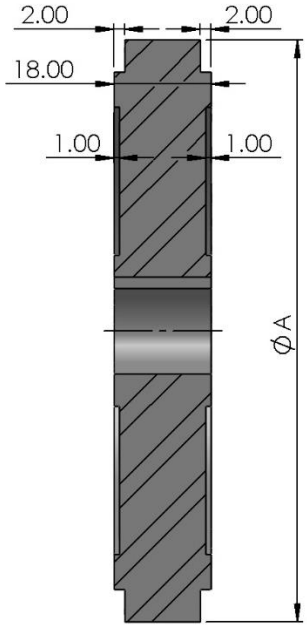


DETAIL F
SCALE 3 : 2



DETAIL D
SCALE 2 : 1





SECTION E-E

Section C – Problem 4

CSWA Practice Material - Solution

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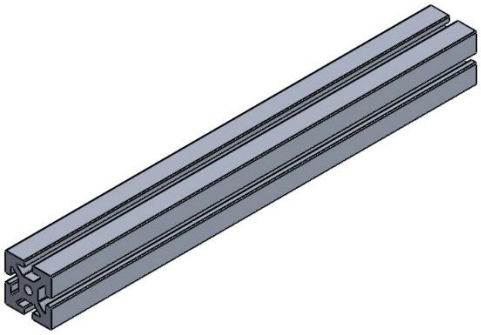
Part A - Build this part in SOLIDWORKS. Use the values below for global variables, then find the mass of the part (grams).

Unit System: MMGS
Decimal Places: 2
Part Origin: Arbitrary
Material Type: Aluminum
Material: 6061-T4 (SS)
Density: 2300 kg/m^3

*Hint: This part can be built using only 1 feature

A = 1.5
B = 2
C = 110
Mass = 26.79 g

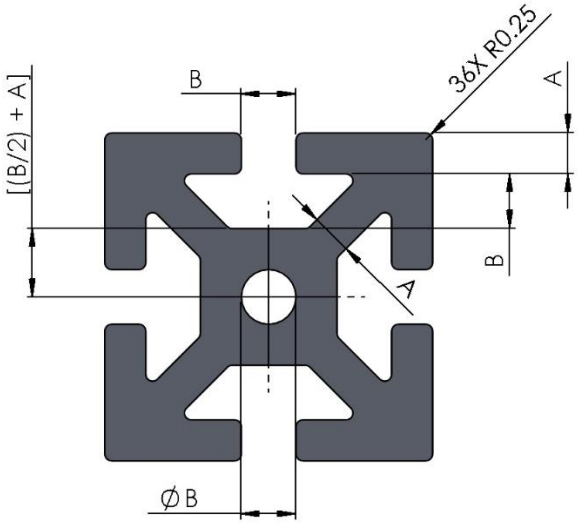


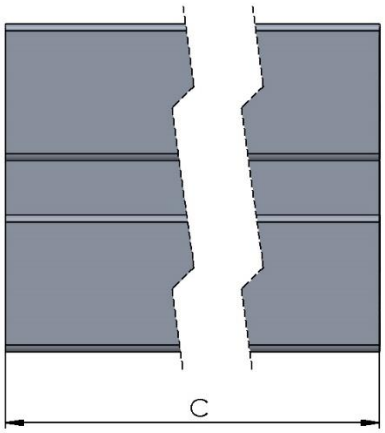
Part B - Update the global variables using the values below, then find the mass of the part (grams).

A = 4
B = 7
C = 195
Mass = 400.81 g

Part C - Update the global variables using the values below, then find the mass of the part (grams).

A = 2
B = 3
C = 95
Mass = 44.18 g





Section D – Reference Geometry (4)

In this section, practice problems will include the following topics. Topics from previous sections may also be included in these problems. For guided lessons, go to MySOLIDWORKS.com and watch the videos in the CSWA Exam Prep Course (https://my.solidworks.com/training/path/14/cswa-exam-prep-course).

- General:
  - Reference Geometry (Planes & Axes)
- Sketch Entities
  - Slots

Problems

1. Miscellaneous Part
2. Flange
3. Multi-Angled-Fixture Block
4. Angled Bracket

Section D – Problem 1

Part A - Build this part in SOLIDWORKS. Use the values below as needed, then find the mass of the part (grams).

CSWA Practice Material - Solution

Unit System: MMGS
Decimal Places: 2
Part Origin: Arbitrary
Material Type: Copper Alloy
Material: Manganese Bronze
Density: 8300 kg/m^3

*Hint: This part can be built using only 2 features

Mass = 239.55 g

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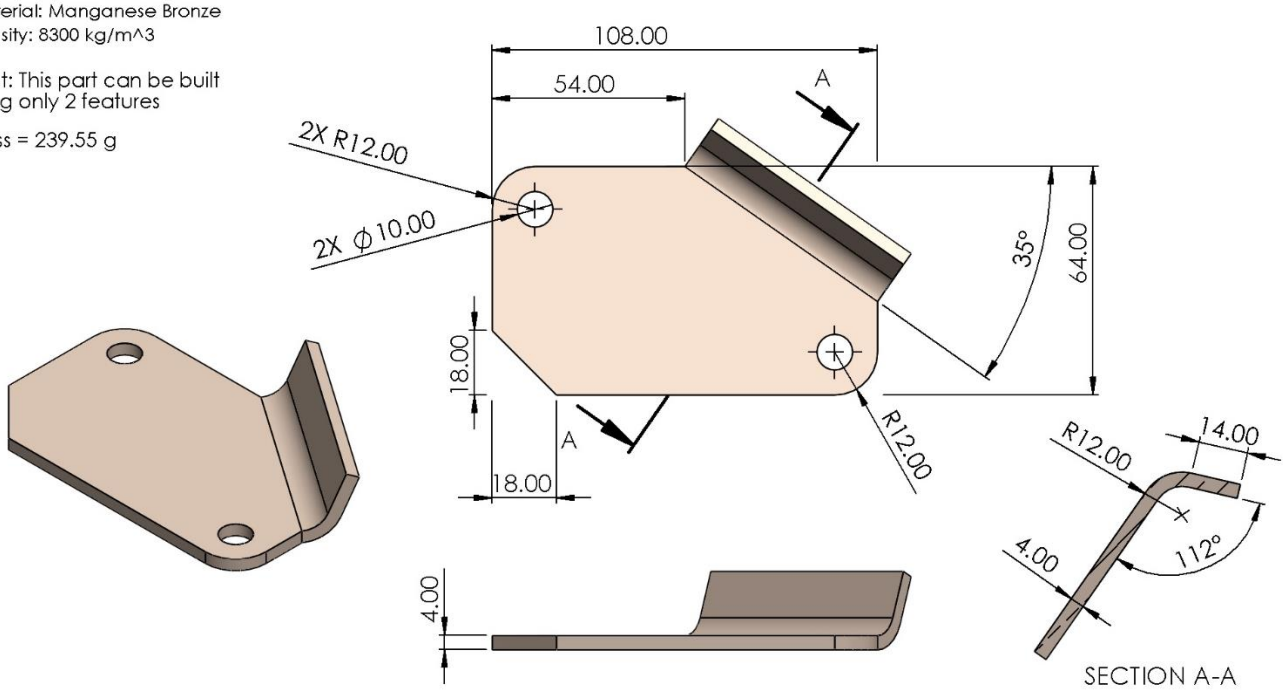

Section D – Problem 2

Part A - Build this part in SOLIDWORKS. Use the values below as needed, then find the mass of the part (grams).

Unit System: MMGS
Decimal Places: 2
Part Origin: Arbitrary
Material Type: Carbon Fibers
Material: Thornel Mat VMA
Density: 2000 kg/m^3

*Hint: This part can be built using only 4 features

Mass = 97.65 g

CSWA Practice Material - Solution

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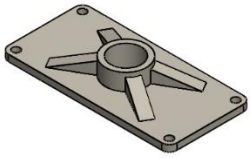
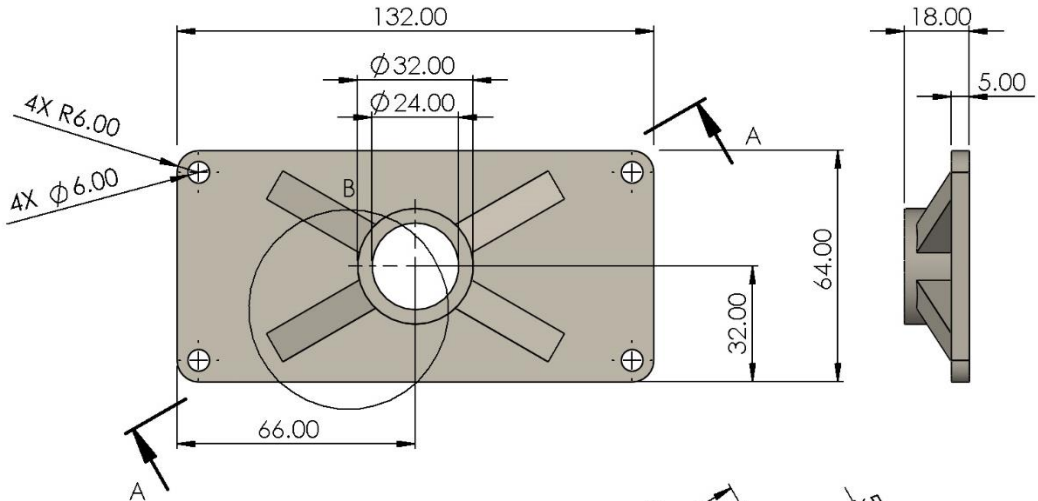
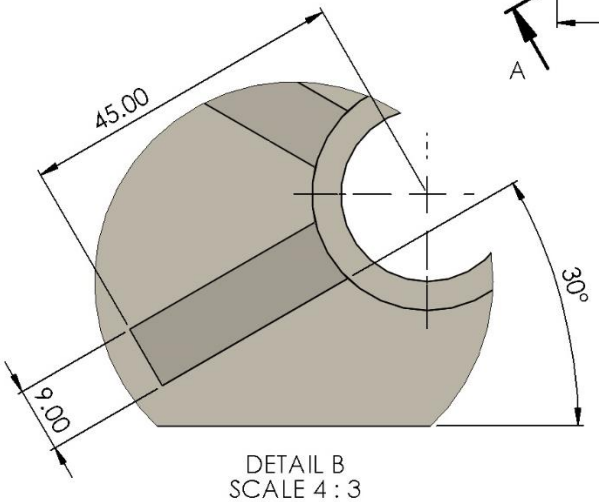
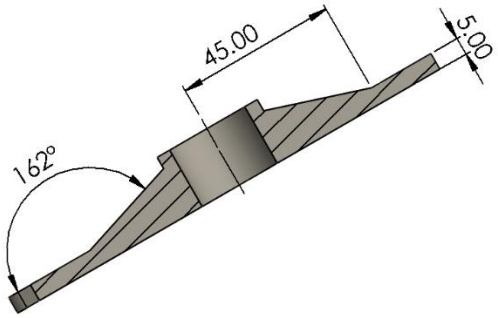






DETAIL B
SCALE 4 : 3



SECTION A-A

Section D – Problem 3

Part A - Build this part in SOLIDWORKS. Use the values below as needed, then find the mass of the part (grams).

CSWA Practice Material - Solution

Unit System: MMGS
Decimal Places: 2
Part Origin: Arbitrary
Material Type: Steel
Material: Alloy Steel
Density: 7300 kg/m^3

*Hint: This part can be built using only 3 features

Mass = 310.44 g

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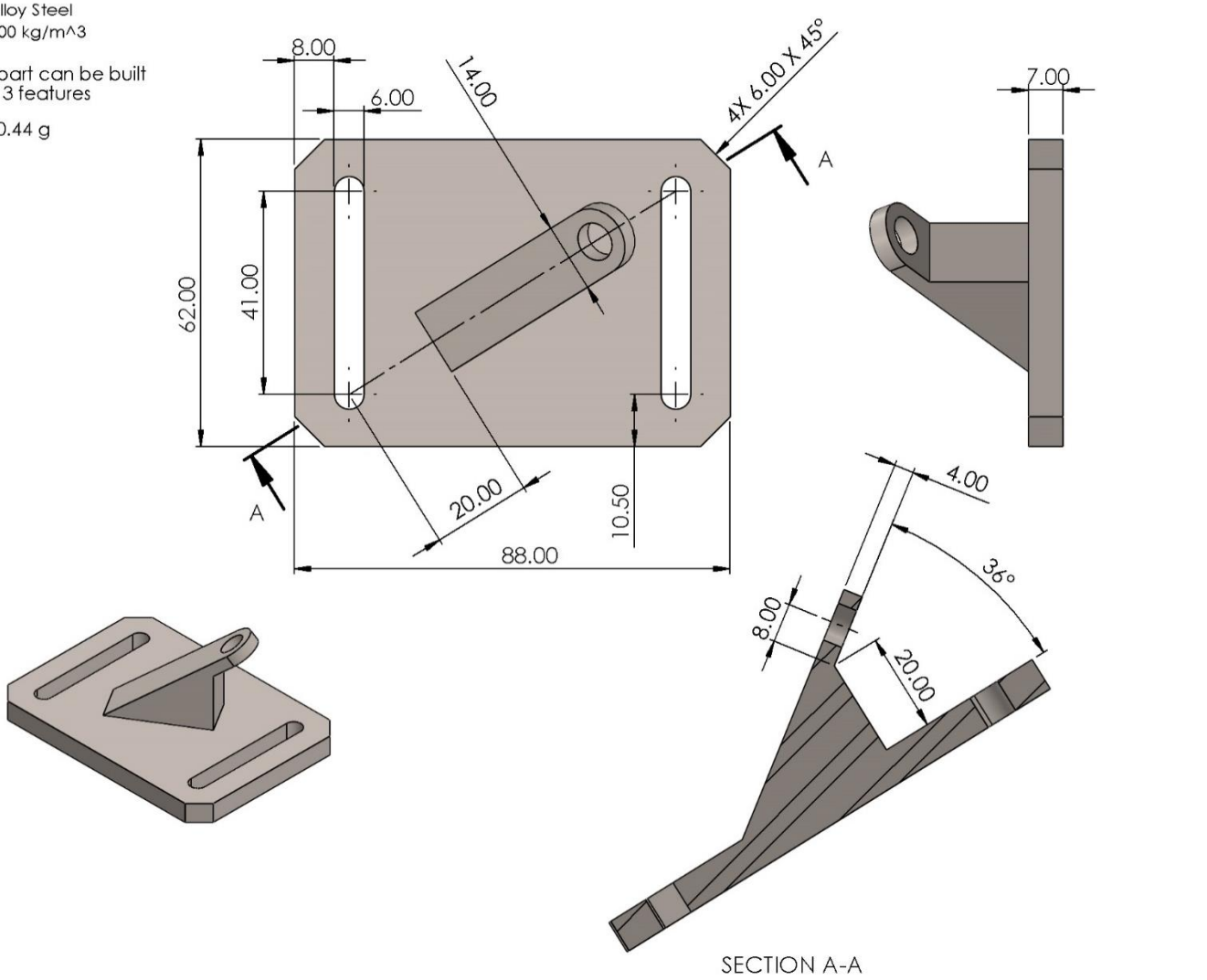

Section D – Problem 4

Part A - Build this part in SOLIDWORKS. Use the values below as needed, then find the mass of the part (grams).

CSWA Practice Material - Solution

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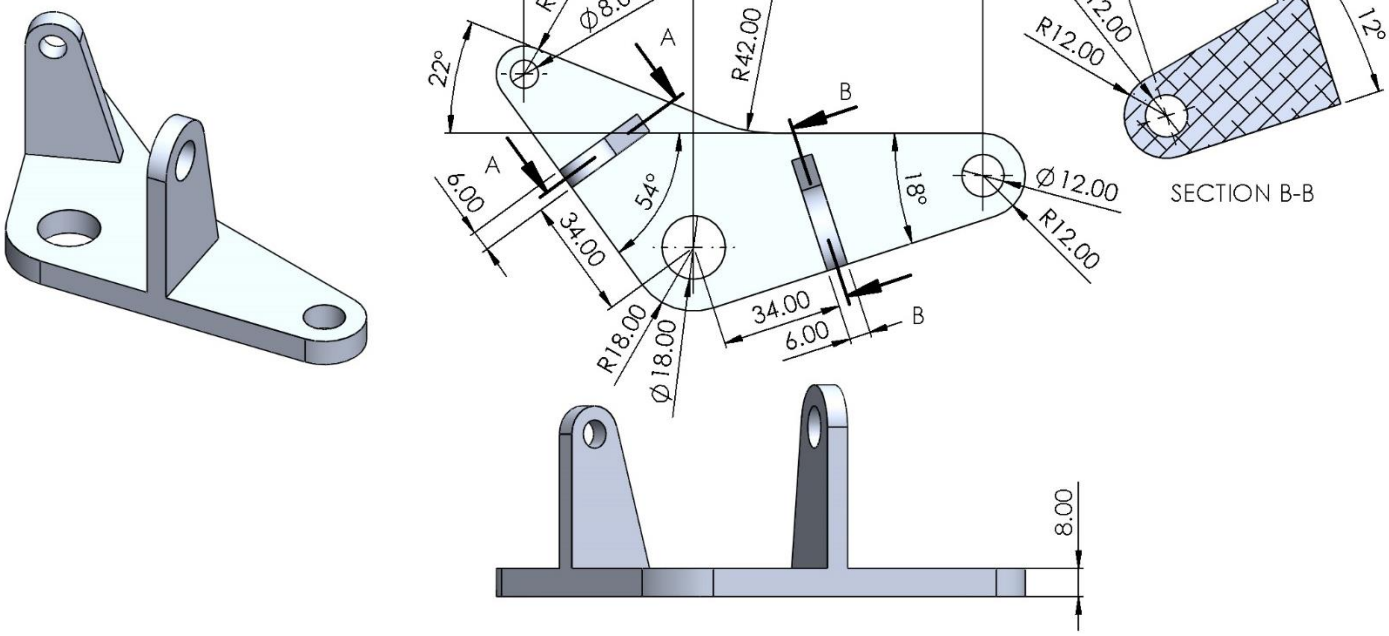
Unit System: MMGS
Decimal Places: 2
Part Origin: Arbitrary
Material Type: Aluminum
Material: 1060 Alloy
Density: 2700 kg/m^3

*Hint: This part can be built using only 3 features

Mass = 146.80 g



Section E – Extrude Cut & Fillet/Chamfer (4)

In this section, practice problems will include the following topics. Topics from previous sections may also be included in these problems. For guided lessons, go to MySOLIDWORKS.com and watch the videos in the CSWA Exam Prep Course (https://my.solidworks.com/training/path/14/cswa-exam-prep-course).

- Features:
  - Extrude Cut
  - Fillet & Chamfer

Problems

1. Screw Driver Shaft
2. Pulley Housing
3. Clamping Collar
4. Lathe Cutting Tool Parting Block

Section E – Problem 1

Part A - Build this part in SOLIDWORKS. Use the values below as needed, then find the mass of the part (grams).

CSWA Practice Material - Solution

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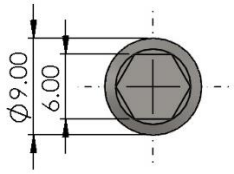
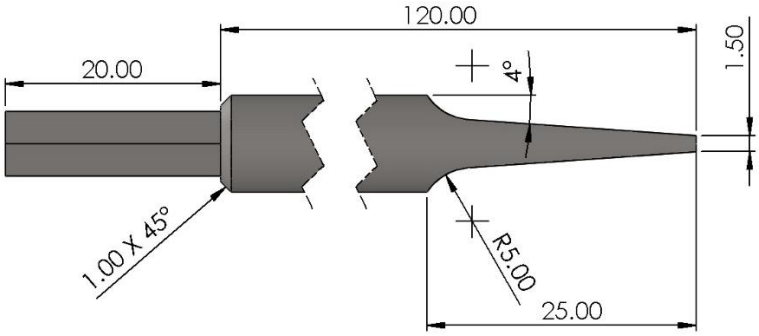
Unit System: MMGS
Decimal Places: 2
Part Origin: Arbitrary
Material Type: Steel
Material: Cast Alloy Steel
Density: 7300 kg/m^3

*Hint: This part can be built using only 4 features

Mass = 53.97 g





Section E – Problem 2

CSWA Practice Material - Solution

Part A - Build this part in SOLIDWORKS. Use the values below as needed, then find the mass of the part (grams).

Unit System: MMGS
Decimal Places: 2
Part Origin: Arbitrary
Material Type: Titanium Alloy
Material: Titanium Ti-8Mn, Annealed
Density: 4730 kg/m^3

*Hint: This part can be built using only 3 features

Mass = 1071.13 g

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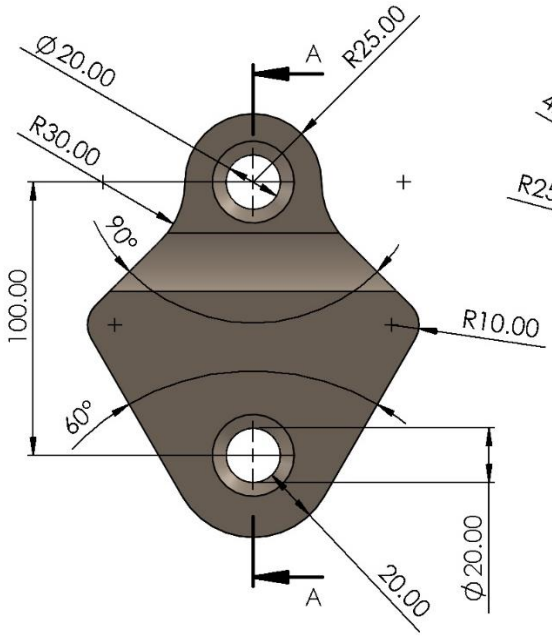

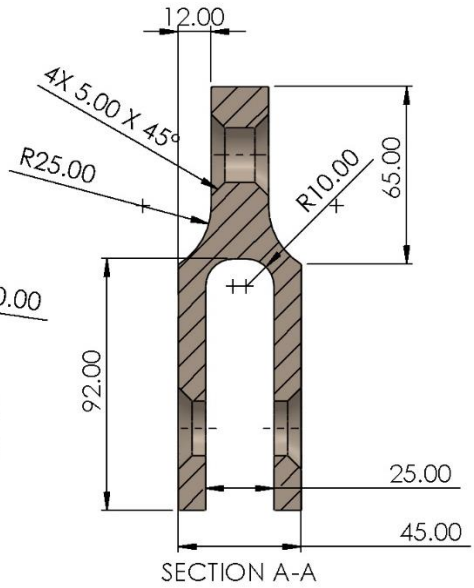

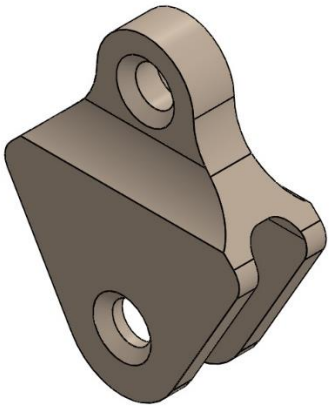

Section E – Problem 3

Part A - Build this part in SOLIDWORKS. Use the values below as needed, then find the mass of the part (grams).

Unit System: MMGS
Decimal Places: 2
Part Origin: Arbitrary
Material Type: Steel
Material: Alloy Steel
Density: 7700 kg/m^3

*Hint: This part can be built using only 5 features that have been introduced in this section or a previous section

Mass = 78.33 g

CSWA Practice Material - Solution

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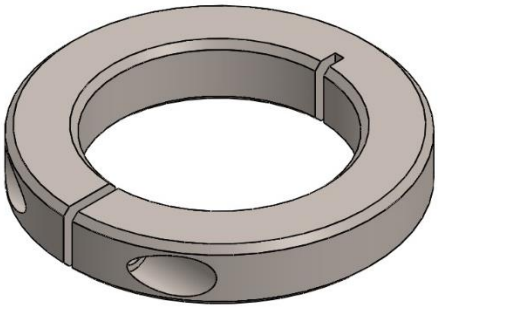

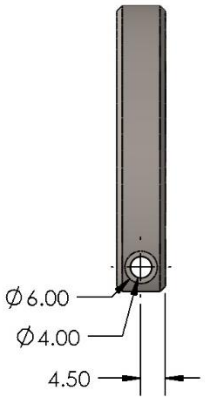

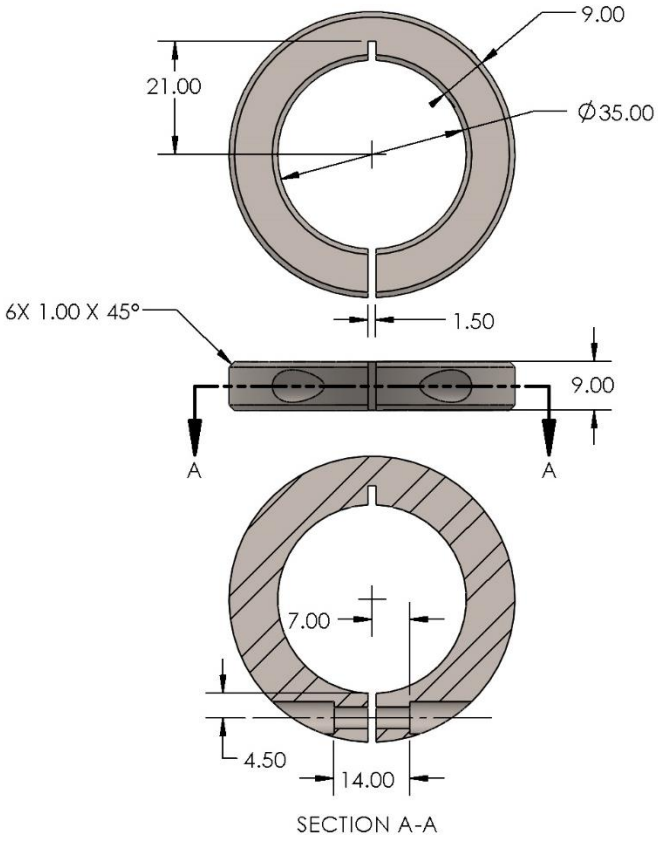

Section E – Problem 4

Part A - Build this part in SOLIDWORKS. Use the values below as needed, then find the mass of the part (grams).

CSWA Practice Material - Solution

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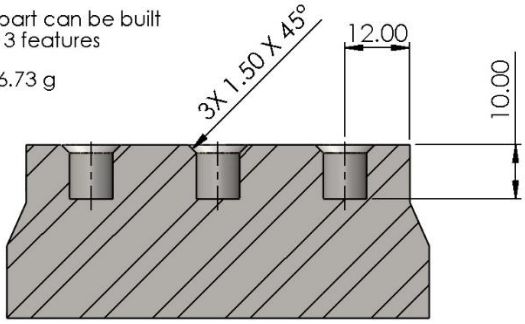
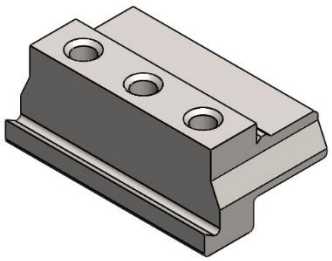
Unit System: MMGS
Decimal Places: 2
Part Origin: Arbitrary
Material Type: Steel
Material: Cast Carbon Steel
Density: 7800 kg/m^3

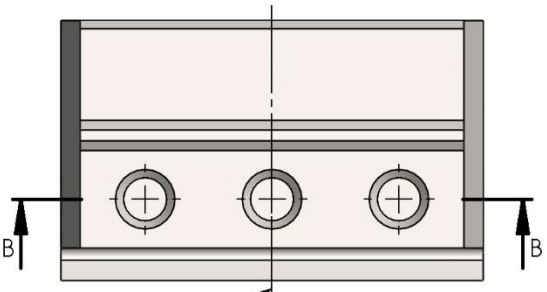
*Hint: This part can be built using only 3 features

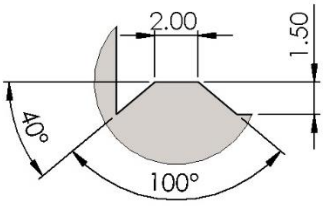
Mass = 516.73 g



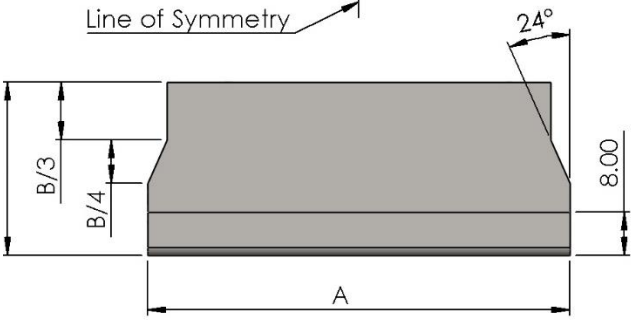
SECTION B-B

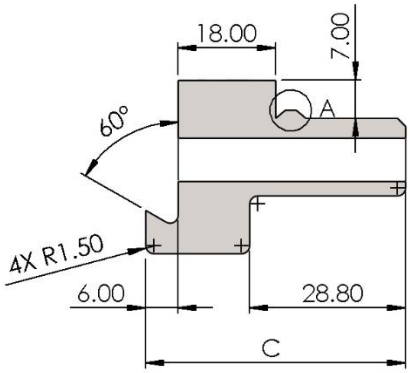






DETAIL A
SCALE 4 : 1





Section F – Revolve Boss/Cut (4)

In this section, practice problems will include the following topics. Topics from previous sections may also be included in these problems. For guided lessons, go to MySOLIDWORKS.com and watch the videos in the CSWA Exam Prep Course (https://my.solidworks.com/training/path/14/cswa-exam-prep-course).

- Features:
  - Revolve Boss
  - Revolve Cut

Problems

1. Chess Pawn
2. Caster Base
3. Hex Bit
4. Pipe Flange

Section F – Problem 1

CSWA Practice Material - Solution

Part A - Build this part in SOLIDWORKS. Use the values below as needed, then find the mass of the part (grams).

Unit System: MMGS
Decimal Places: 2
Part Origin: Arbitrary
Material Type: Plastics
Material: ABS
Density: 1020 kg/m^3

*Hint: This part can be built using only 1 feature

Mass = 6.12 g

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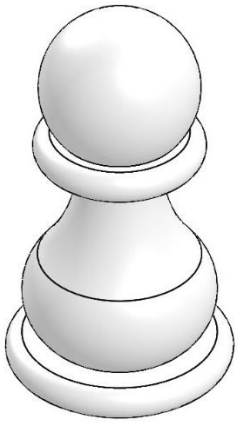
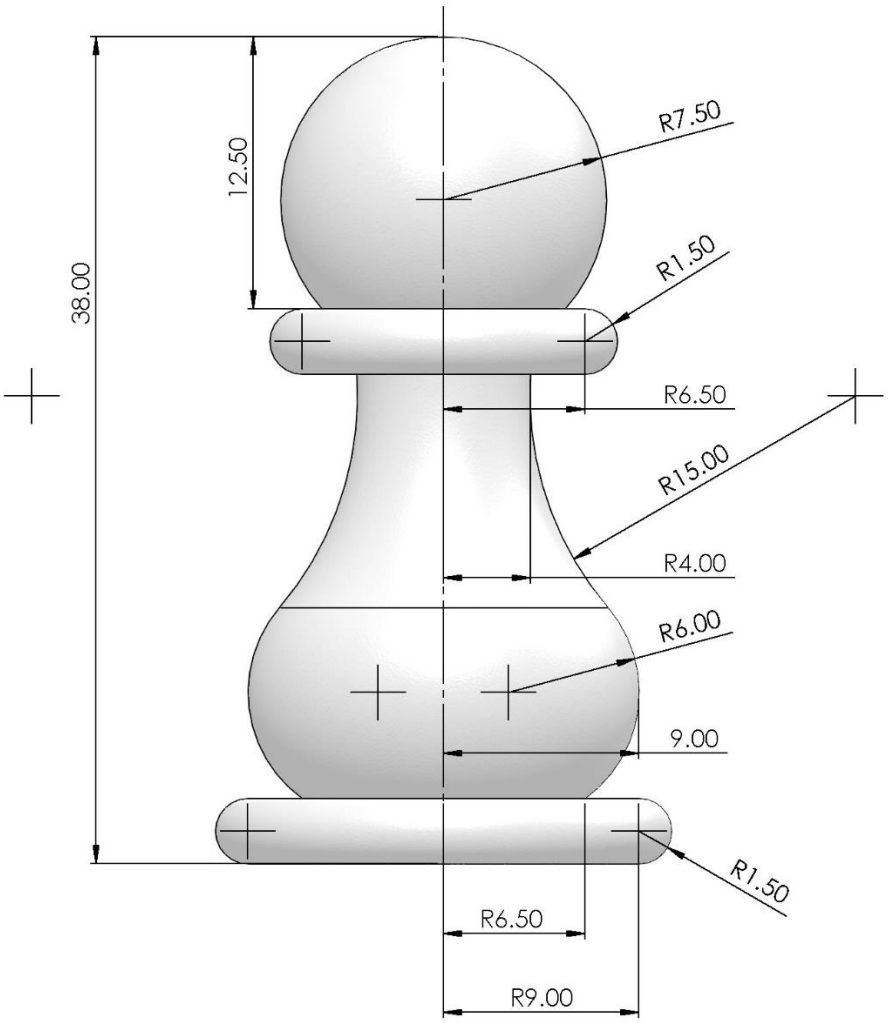




Section F – Problem 2

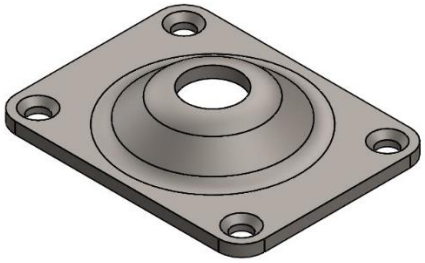
CSWA Practice Material - Solution

Part A - Build this part in SOLIDWORKS. Use the values below as needed, then find the mass of the part (grams).

Unit System: MMGS
Decimal Places: 2
Part Origin: Arbitrary
Material Type: Steel
Material:
Density: 7858 kg/m^3

*Hint: This part can be built using only 3 feature

Mass = 75.46 g



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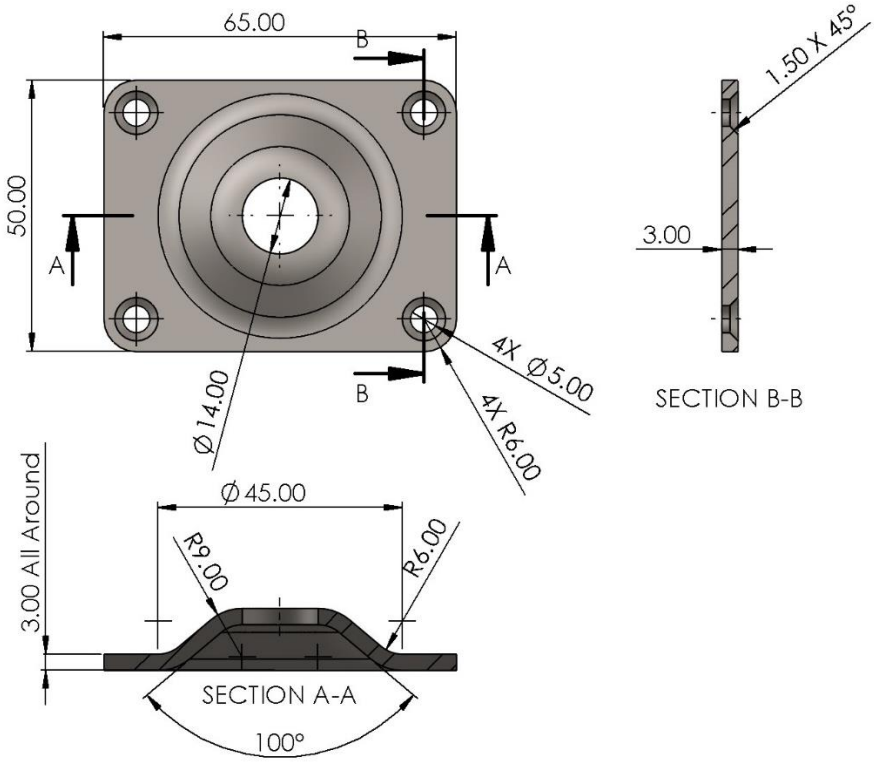

Section F – Problem 3

CSWA Practice Material - Solution

Part A - Build this part in SOLIDWORKS. Use the values below as needed, then find the mass of the part (grams).

Unit System: MMGS
Decimal Places: 2
Part Origin: Arbitrary
Material Type: Steel
Material: Stainless Steel (ferritic)
Density: 7800 kg/m^3

*Hint: This part can be built using only 4 features

Mass = 3.33 g

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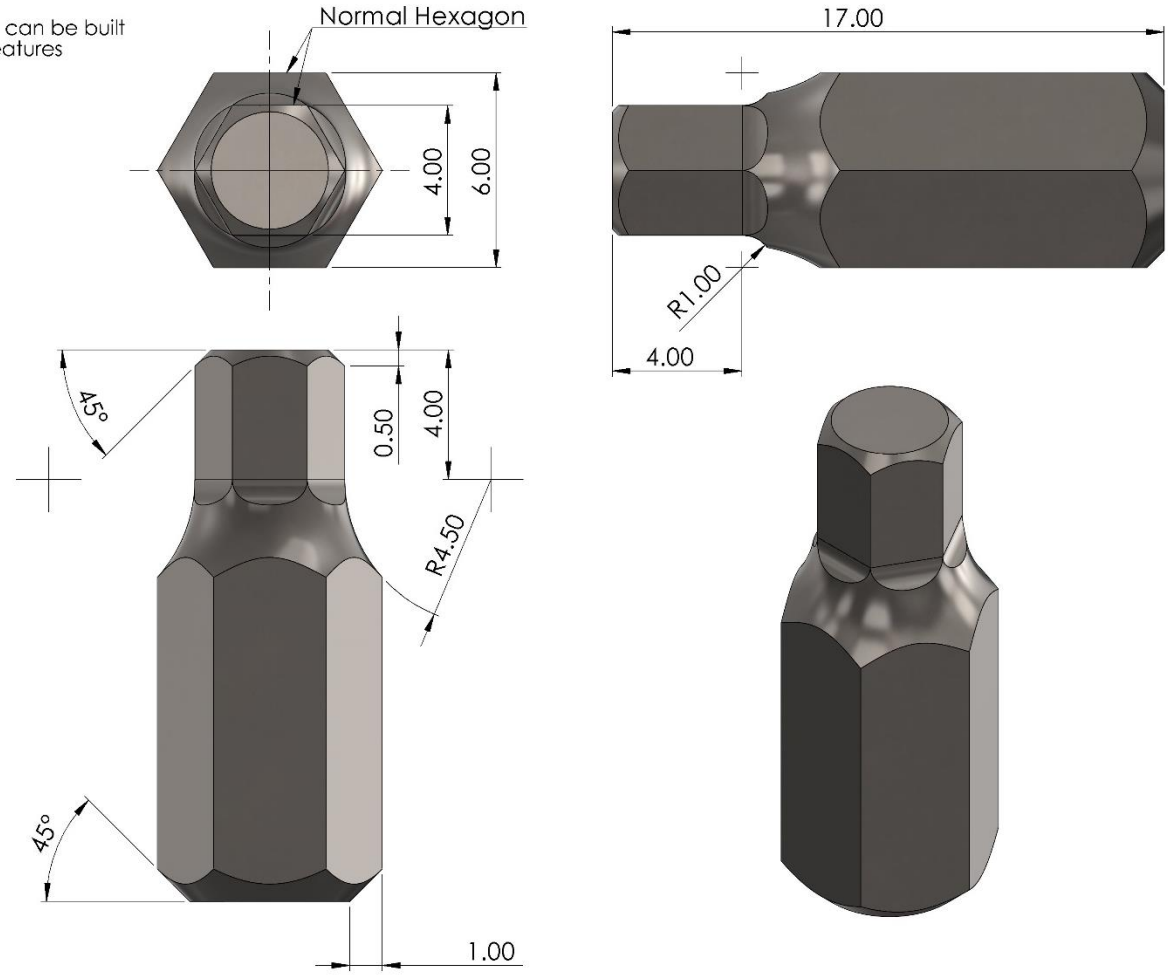

Section F – Problem 4

CSWA Practice Material - Solution

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Part A - Build this part in SOLIDWORKS. Use the values below for global variables, then find the mass of the part (grams).

Unit System: MMGS
Decimal Places: 2
Part Origin: Arbitrary
Material Type: Steel
Material: AISI 304
Density: 8000 kg/m^3

*Hint: This part can be built using only 4 features

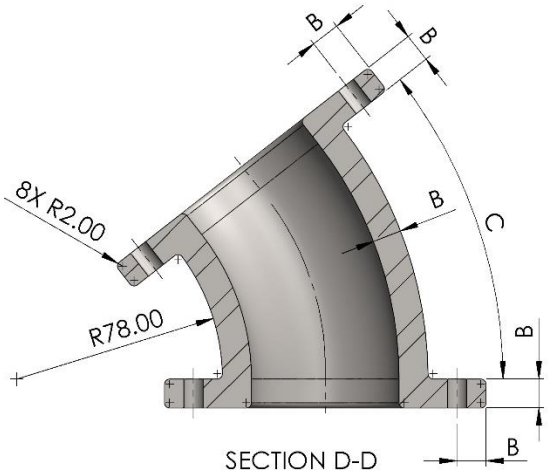
A = 56
B = 11
C = 38 °
Mass = 2962.54 g

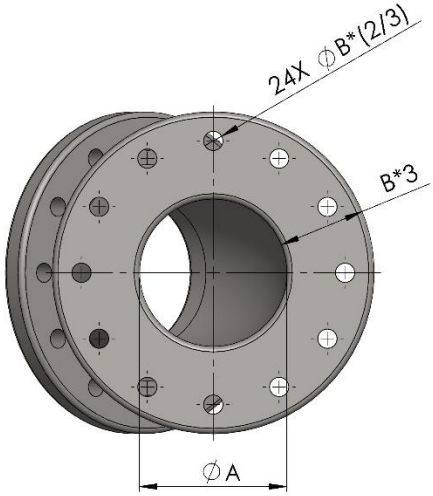
Part B - Update the global variables using the values below, then find the mass of the part (grams).

A = 48
B = 9
C = 43 °
Mass = 1933.33 g

Part C - Update the global variables using the values below, then find the mass of the part (grams).

A = 82
B = 13.5
C = 24.5 °
Mass = 5024.75 g





Section G – Feature Patterning (4)

In this section, practice problems will include the following topics. Topics from previous sections may also be included in these problems. For guided lessons, go to MySOLIDWORKS.com and watch the videos in the CSWA Exam Prep Course (https://my.solidworks.com/training/path/14/cswa-exam-prep-course).

- Features:
  - Mirror
  - Linear Pattern
  - Circular Pattern

Problems

1. Chess Brook
2. Rubber Drying Mat
3. Mini Cup Cake Tray
4. Bearing Retainer

Section G – Problem 1

CSWA Practice Material - Solution

Part A - Build this part in SOLIDWORKS. Use the values below as needed, then find the mass of the part (grams).

Unit System: MMGS
Decimal Places: 2
Part Origin: Arbitrary
Material Type: Plastics
Material: ABS
Density: 1020 kg/m^3

*Hint: This part can be built using only 3 features

Mass = 17.67 g

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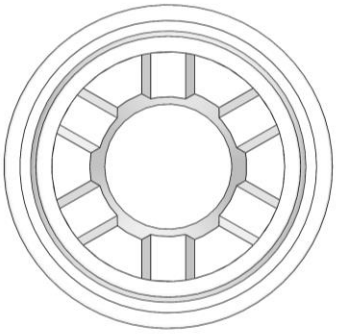
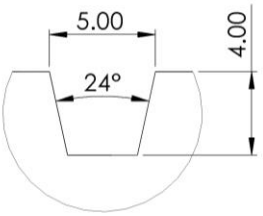
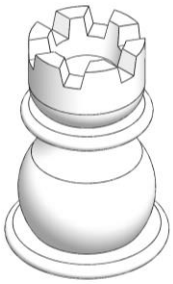
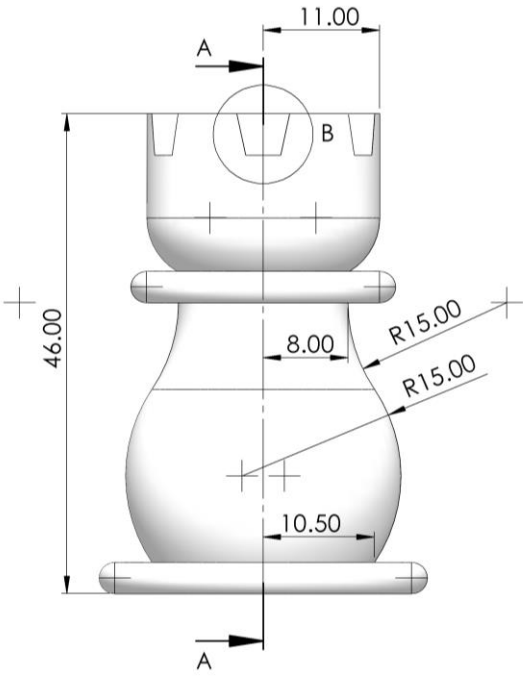
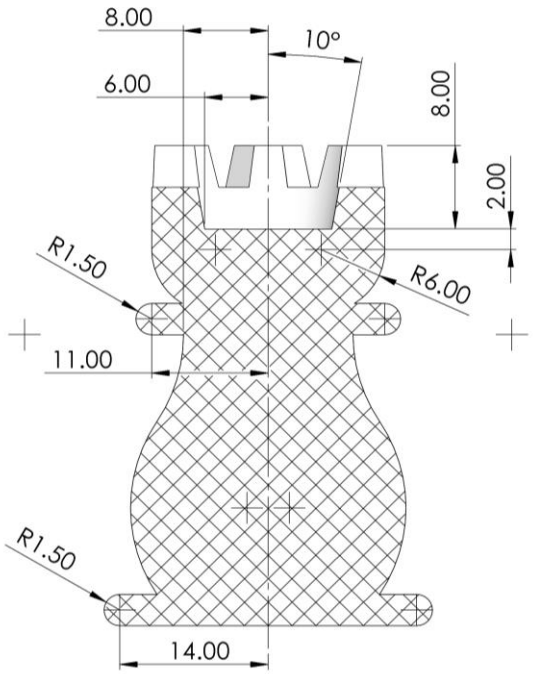




DETAIL B
SCALE 4 : 1







SECTION A-A

Section G – Problem 2

Part A - Build this part in SOLIDWORKS. Use the values below as needed, then find the mass of the part (grams).

Unit System: MMGS
Decimal Places: 2
Part Origin: Arbitrary
Material Type: Other Non-Metals
Material: Rubber
Density: 1000 kg/m^3

*Hint: This part can be built using only 4 features

Mass = 334.75 g

CSWA Practice Material - Solution

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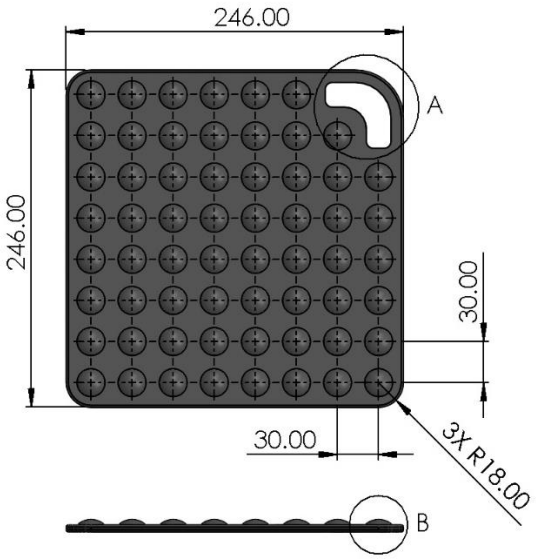
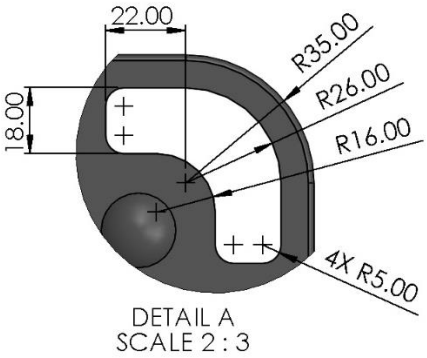
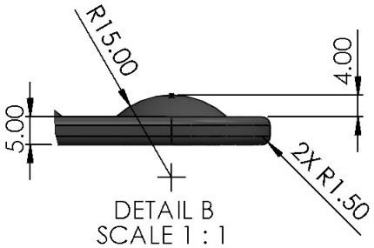




DETAIL A
SCALE 2 : 3



DETAIL B
SCALE 1 : 1

Section G – Problem 3

CSWA Practice Material - Solution

Part A - Build this part in SOLIDWORKS. Use the values below for global variables, then find the mass of the part (grams).

Unit System:
Decimal Places:
Part Origin:
Material Type:
Material:
Density:

*Hint: This part can be built using only 4 features

A = 3
B = 78
C = 8
Mass = 3135.78 g

Part B - Update the global variables using the values below, then find the mass of the part (grams).

A = 3.5
B = 82
C = 10
Mass = 4061.09 g

Part C - Update the global variables using the values below, then find the mass of the part (grams).

A = 4
B = 92
C = 12
Mass = 5650.88 g

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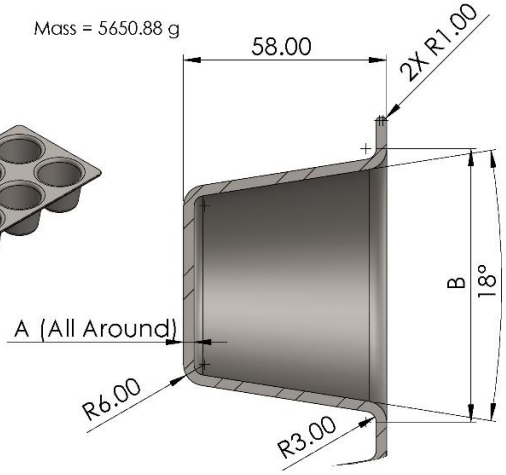
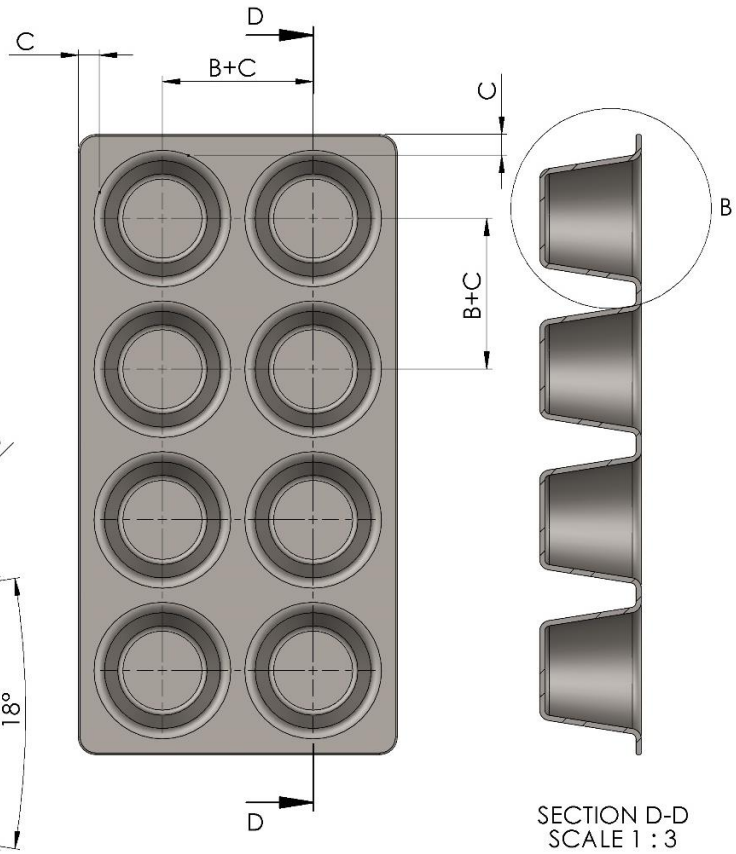


DETAIL B
SCALE 2 : 3



SECTION D-D
SCALE 1 : 3

Section G – Problem 4

Part A - Build this part in SOLIDWORKS. Use the values below for global variables, then find the mass of the part (grams).

Unit System: MMGS
Decimal Places: 2
Part Origin: Arbitrary
Material Type: Steel
Material: Chrome Stainless Steel
Density: 7800 kg/m^3

*Hint: This part can be built using only 4 features

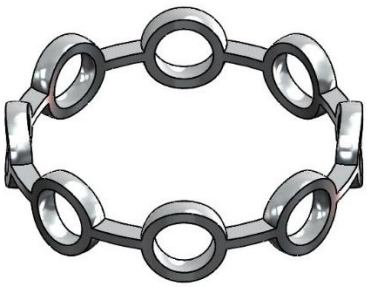
A = 6
B = 29
C = 9
Mass = 3.28 g

Part B - Update the global variables using the values below, then find the mass of the part (grams).

A = 7.5
B = 38
C = 10
Mass = 4.94 g

Part C - Update the global variables using the values below, then find the mass of the part (grams).

A = 4.5
B = 26
C = 12
Mass = 3.42 g



CSWA Practice Material - Solution

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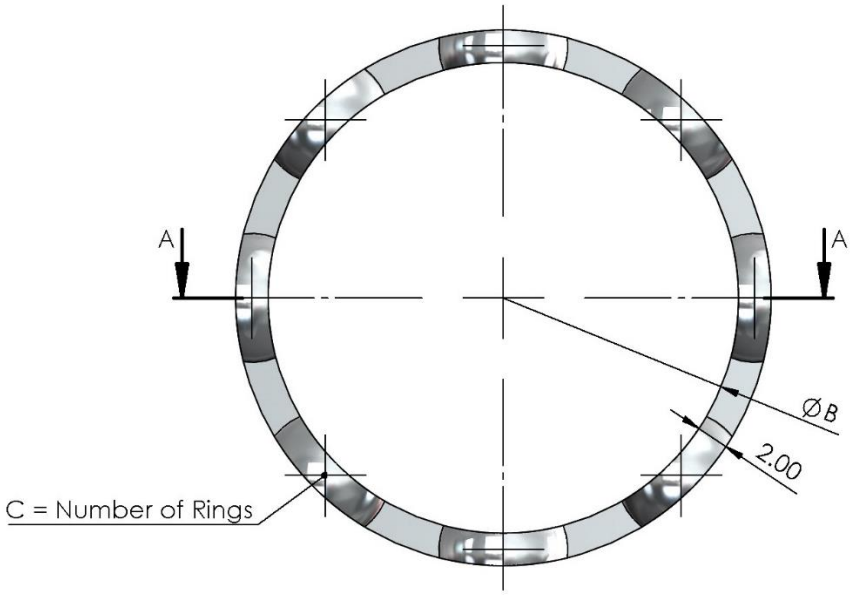
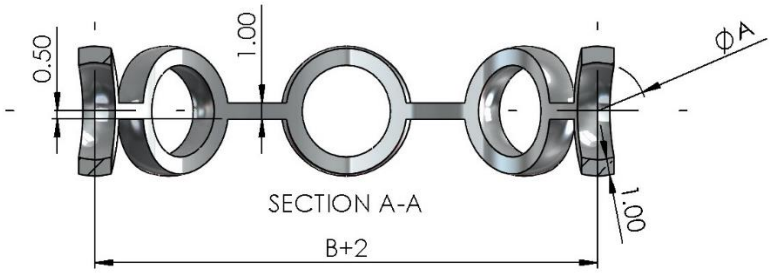




Section H – Sweep Boss/Cut (4)

In this section, practice problems will include the following topics. Topics from previous sections may also be included in these problems. For guided lessons, go to MySOLIDWORKS.com and watch the videos in the CSWA Exam Prep Course (https://my.solidworks.com/training/path/14/cswa-exam-prep-course).

- Features:
  - Sweep Boss
  - Sweep Cut

Problems

1. Alan Wrench
2. Simple Spring Clip
3. Kettle Bell
4. Spring Clip

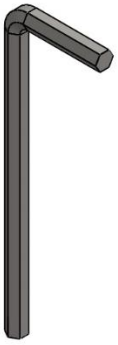
Section H – Problem 1

Part A - Build this part in SOLIDWORKS. Use the values below as needed, then find the mass of the part (grams).

Unit System: MMGS
Decimal Places: 2
Part Origin: Arbitrary
Material Type: Steel
Material: Material
Density: 7900 kg/m^3

*Hint: This part can be built using only 1 feature

Mass = 10.32 g



CSWA Practice Material - Solution

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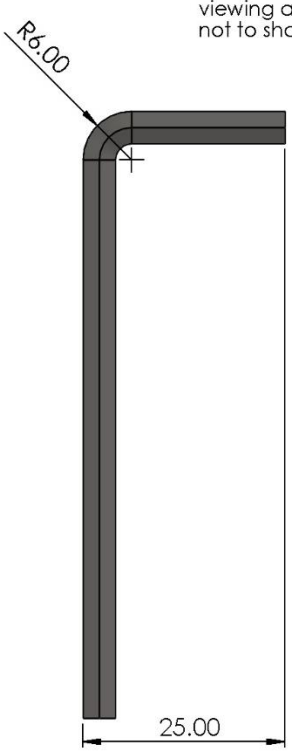

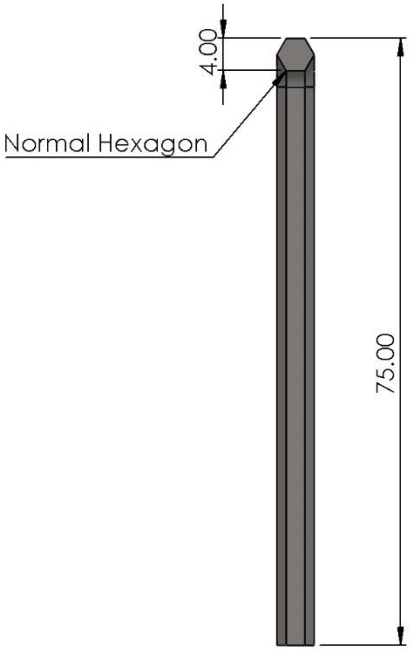

Section H – Problem 2

CSWA Practice Material - Solution

Part A - Build this part in SOLIDWORKS. Use the values below as needed, then find the mass of the part (grams).

Unit System: MMGS
Decimal Places: 2
Part Origin: Arbitrary
Material Type: Steel
Material: AISI 316 Stainless Steel Sheet (SS)
Density: 8000 kg/m^3

*Hint: This part can be built using only 1 features

Mass = 2.31 g

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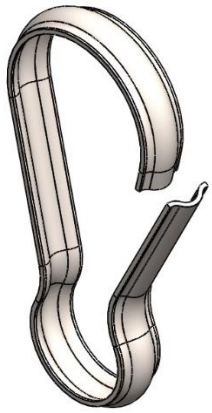
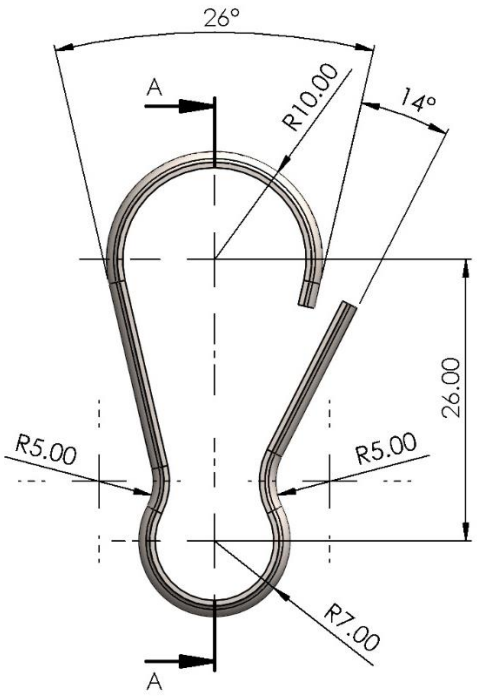
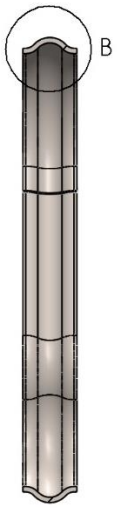
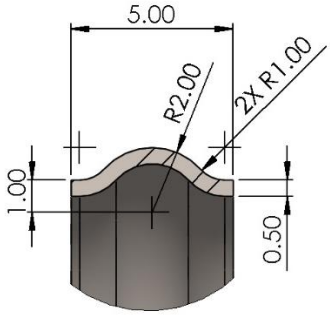






SECTION A-A



DETAIL B
SCALE 6 : 1

Section H – Problem 3

Part A - Build this part in SOLIDWORKS. Use the values below as needed, then find the mass of the part (lbs).

Unit System: IPS
Decimal Places: 4
Part Origin: Arbitrary
Material Type: Iron
Material: Gray Cast Iron
Density: 0.2601 lb/in^3

*Hint: This part can be built using only 3 features

Mass = 69.9628 lbs

CSWA Practice Material - Solution

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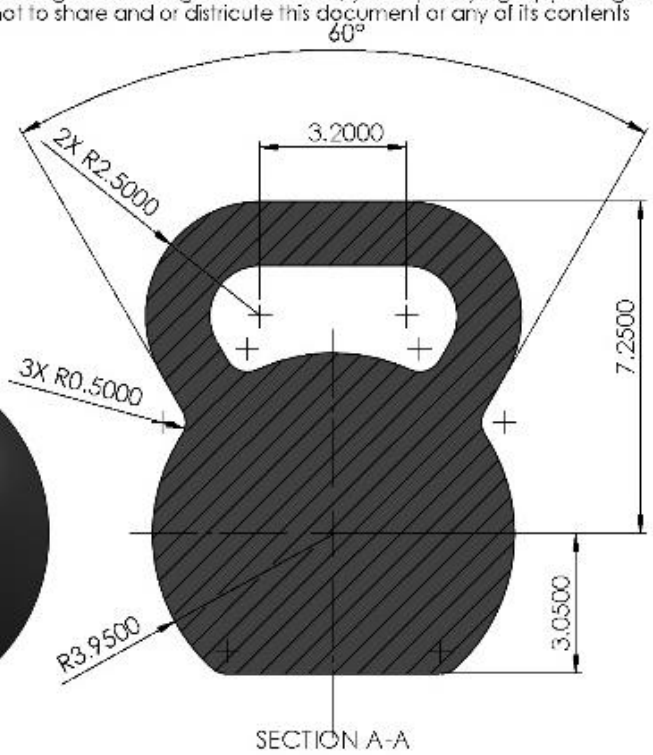

Section H – Problem 4

Part A - Build this part in SOLIDWORKS. Use the values below as needed, then find the mass of the part (lbs).

Unit System: IPS
Decimal Places: 4
Part Origin: Arbitrary
Material Type: Steel
Material: AISI 1020
Density: 0.2854 lb/in^3

*Hint: This part can be built using only 4 features

Mass = .1456 lbs

CSWA Practice Material - Solution

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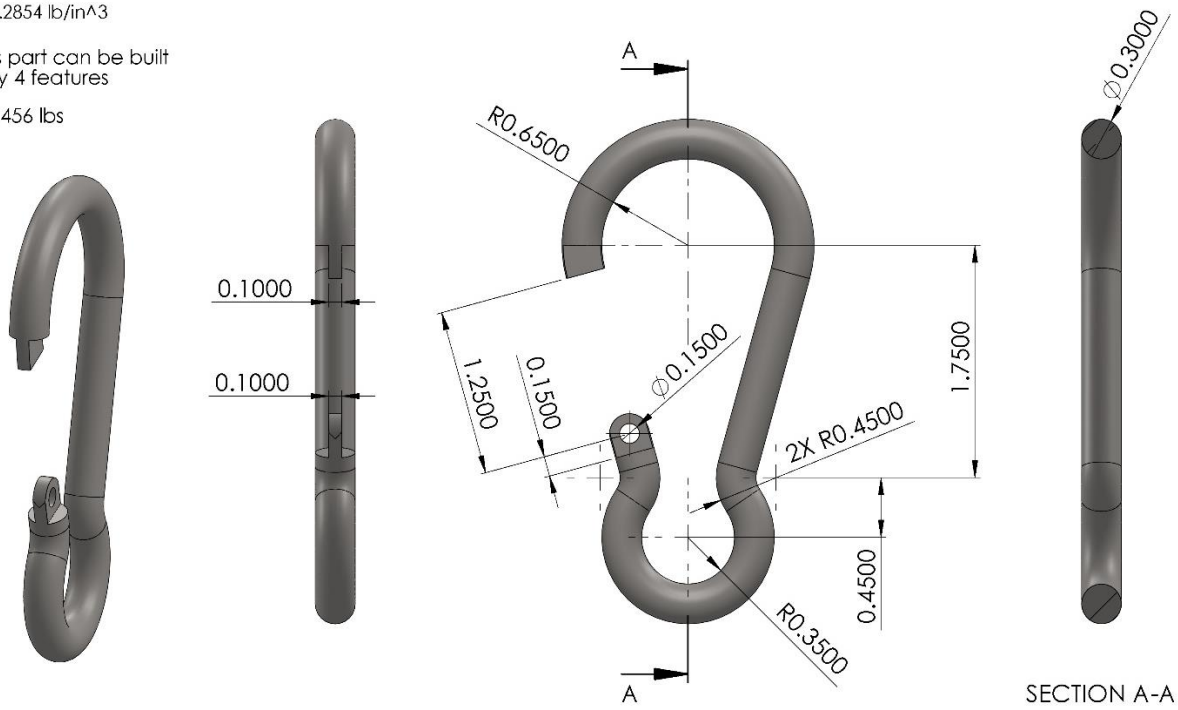

Section I – Exam Level Part Modeling (10)

In this section, practice problems will include no new topics. Only topics from previous sections will be included in these problems. For guided lessons, go to MySOLIDWORKS.com and watch the videos in the CSWA Exam Prep Course (https://my.solidworks.com/training/path/14/cswa-exam-prep-course).

Problems

1. Sledge Hammer
2. Lego Brick
3. Rope Thimble
4. Internal Lathe Jaw
5. Wrench Handle
6. Bicycle Brake Handle
7. Flip Top Cap
8. Lathe Cross Slide
9. Bicycle Pedal
10. Plastic Enclosure

Section I – Problem 1

CSWA Practice Material - Solution

Part A - Build this part in SOLIDWORKS. Use the values below as needed, then find the mass of the part (grams).

Unit System: MMGS
Decimal Places: 2
Part Origin: Arbitrary
Material Type: Iron
Material: Gray Cast Iron
Density: 7200 kg/m^3

*Hint: This part can be built using only 4 feature

Mass = 1458.68 g

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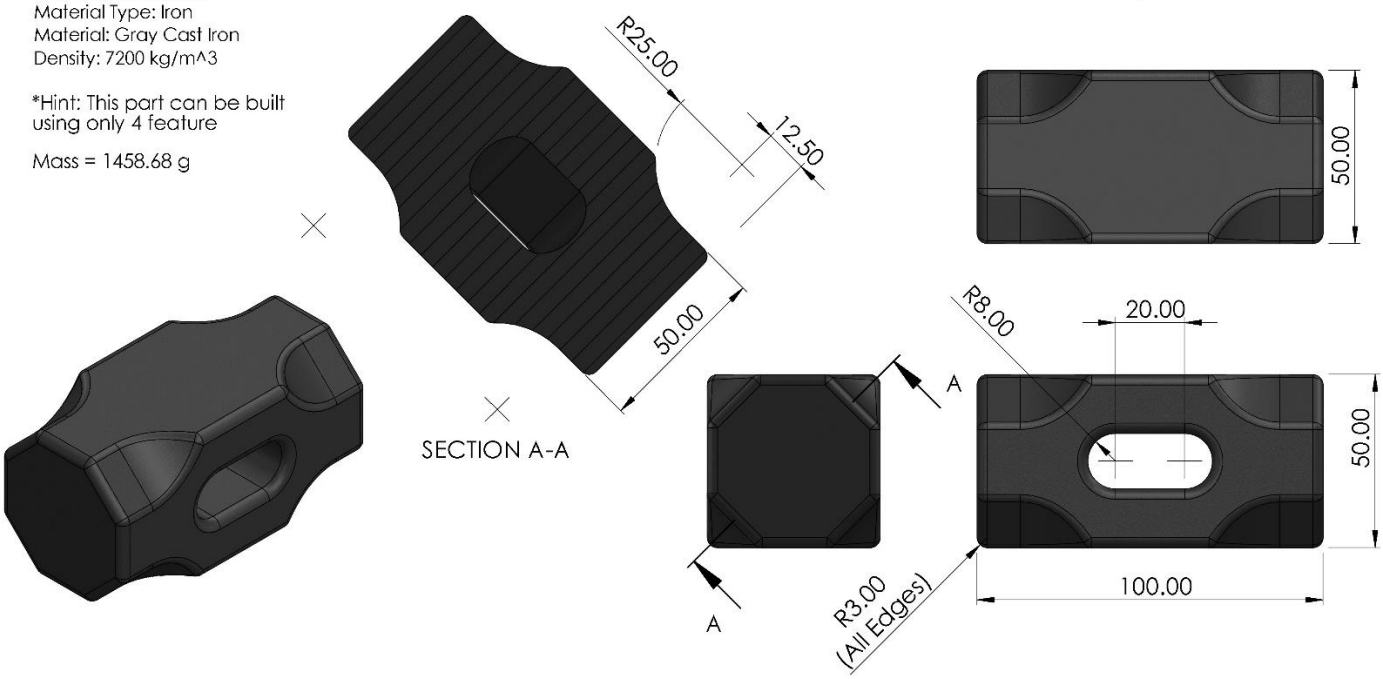

Section I – Problem 2

CSWA Practice Material - Solution

Part A - Build this part in SOLIDWORKS. Use the values below as needed, then find the mass of the part (grams).

Unit System: MMGS
Decimal Places: 2
Part Origin: Arbitrary
Material Type: Plastics
Material: ABS
Density: 1020 kg/m^3

*Hint: This part can be built using only 5 feature

Mass = 2.26 g

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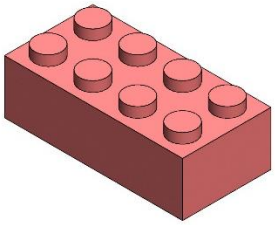

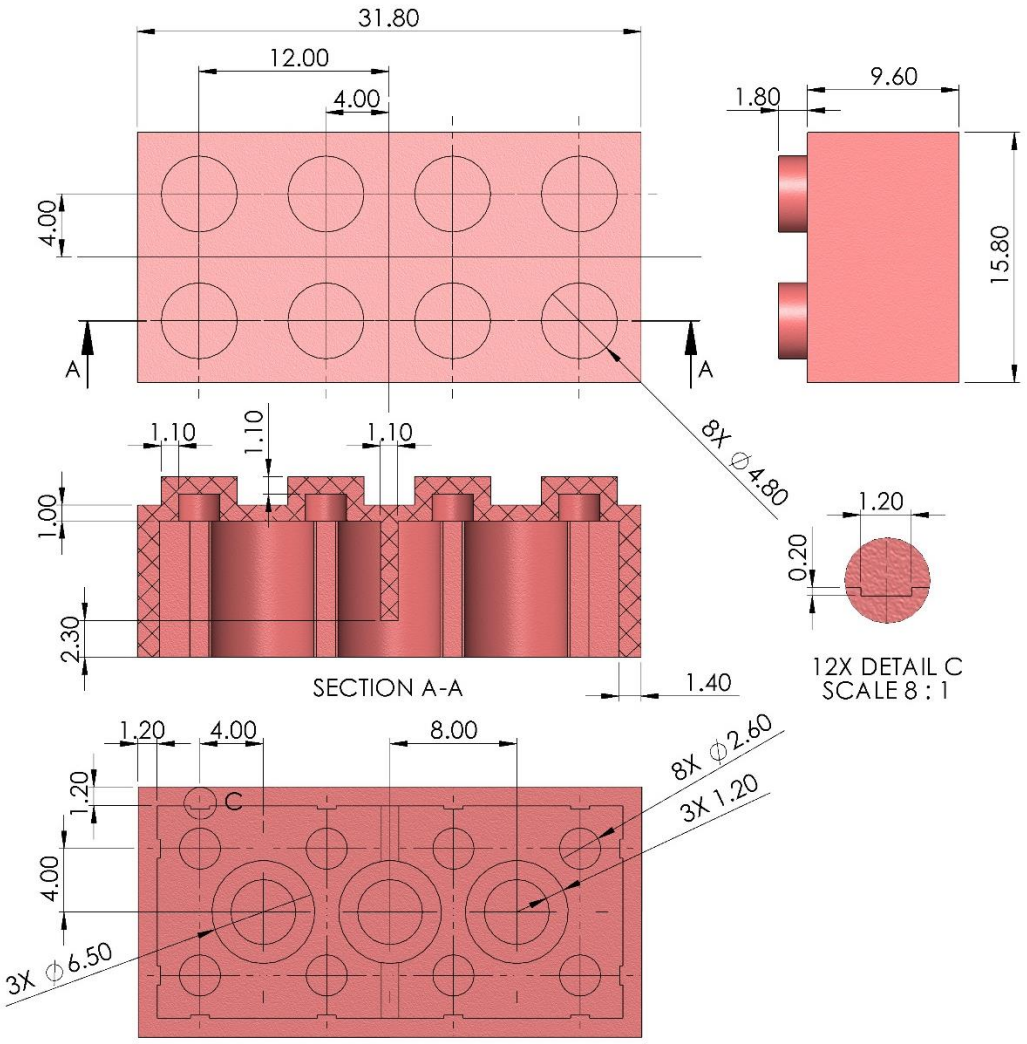

Section I – Problem 3

CSWA Practice Material - Solution

Part A - Build this part in SOLIDWORKS. Use the values below as needed, then find the mass of the part (grams).

Unit System: MMGS
Decimal Places: 2
Part Origin: Arbitrary
Material Type: Plastics
Material: Polyetheretherketone (PEEK)
Density: 1310 kg/m^3

*Hint: This part can be built using only 3 feature

Mass = 6.03 g

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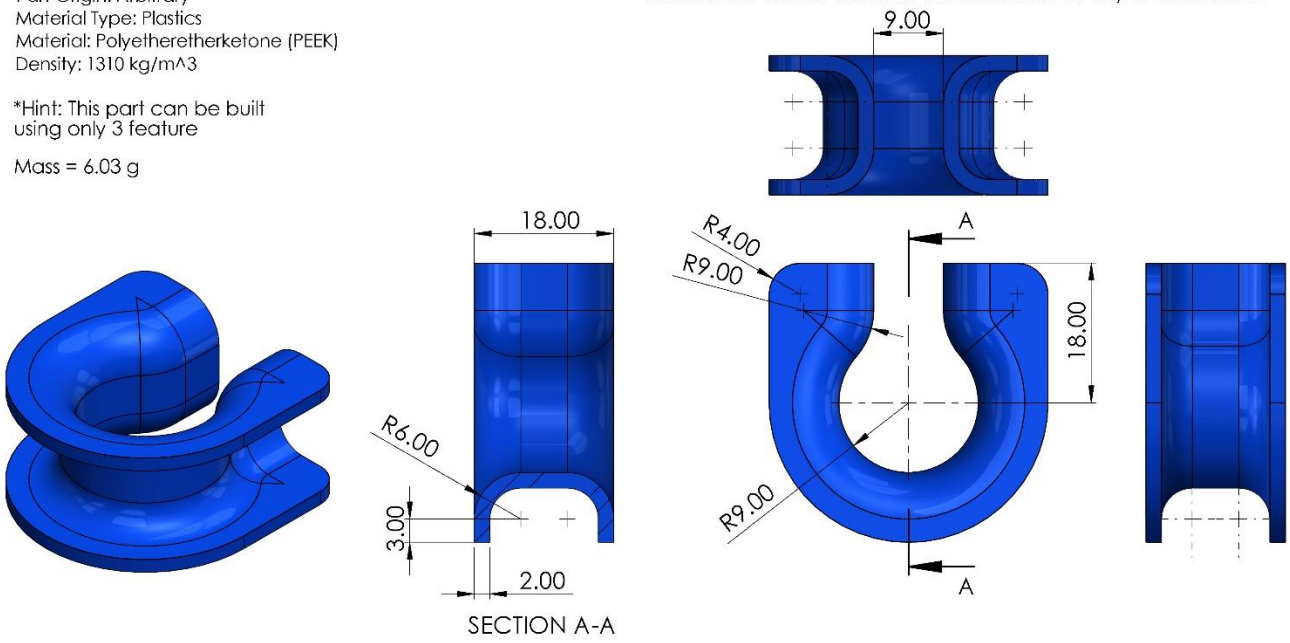

Section I – Problem 4

CSWA Practice Material - Solution

Part A - Build this part in SOLIDWORKS. Use the values below as needed, then find the mass of the part (grams).

Unit System: MMGS
Decimal Places: 2
Part Origin: Arbitrary
Material Type: Steel
Material: Alloy Steel
Density: 7700 kg/m^3

*Hint: This part can be built using only 4 features

Mass = 552.25 g

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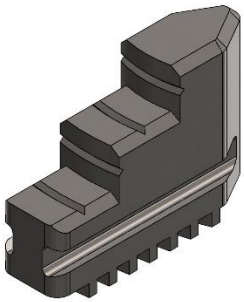
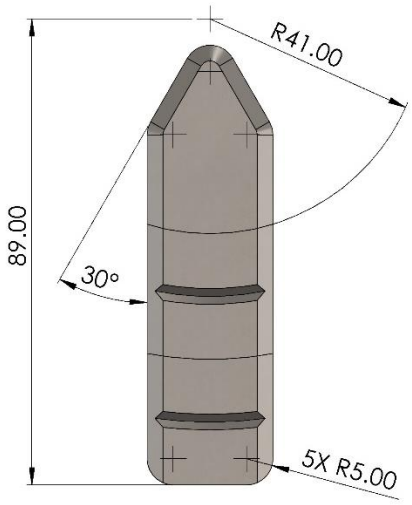
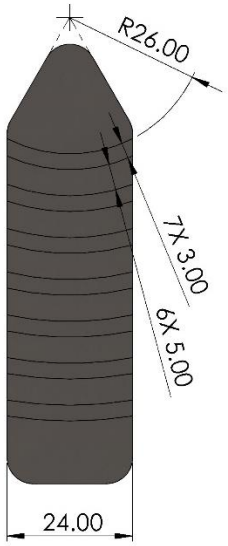
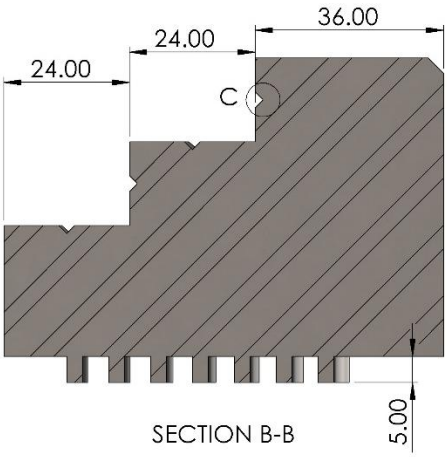
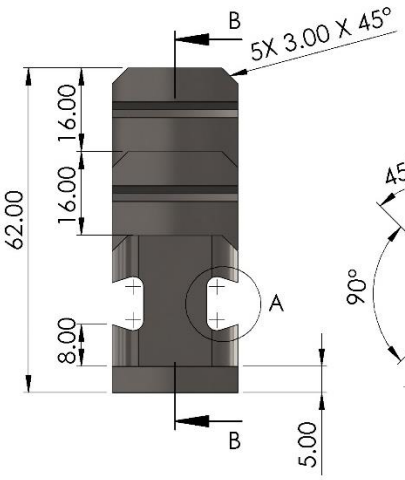


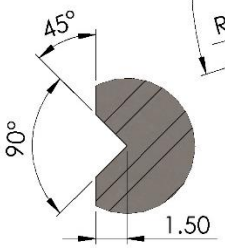




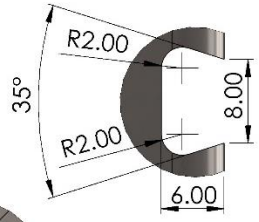


SECTION B-B





DETAIL C (4X)
SCALE 4 : 1



DETAIL A (2X)
SCALE 2 : 1

Section I – Problem 5

Part A - Build this part in SOLIDWORKS. Use the values below as needed, then find the mass of the part (grams).

Unit System: MMGS
Decimal Places: 2
Part Origin: Arbitrary
Material Type: Steel
Material: AISI 4340 Steel, annealed
Density: 7850 kg/m^3

*Hint: This part can be built using only 4 feature

A = 105 Mass = 104.14 g

CSWA Practice Material - Solution

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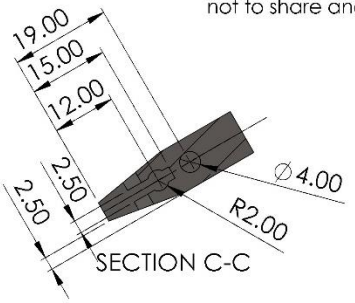
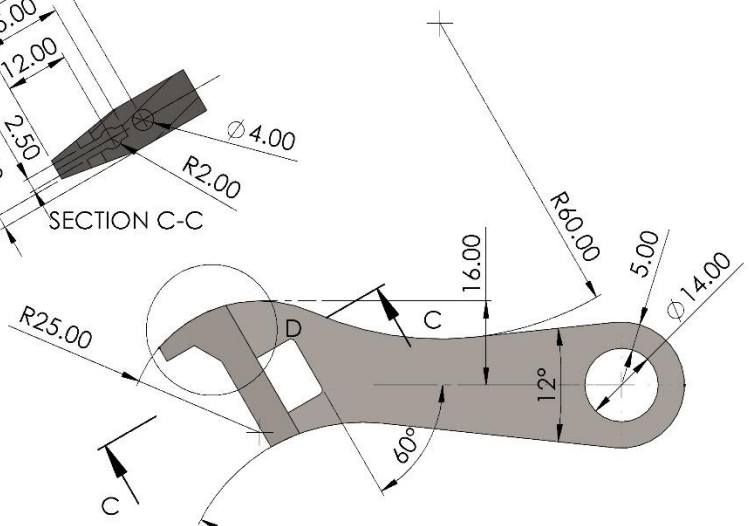
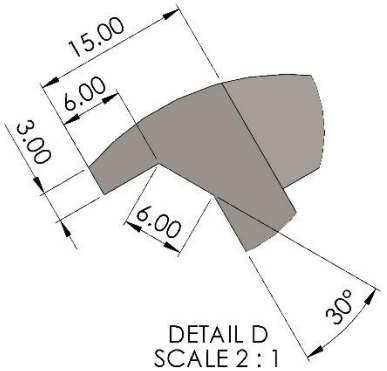
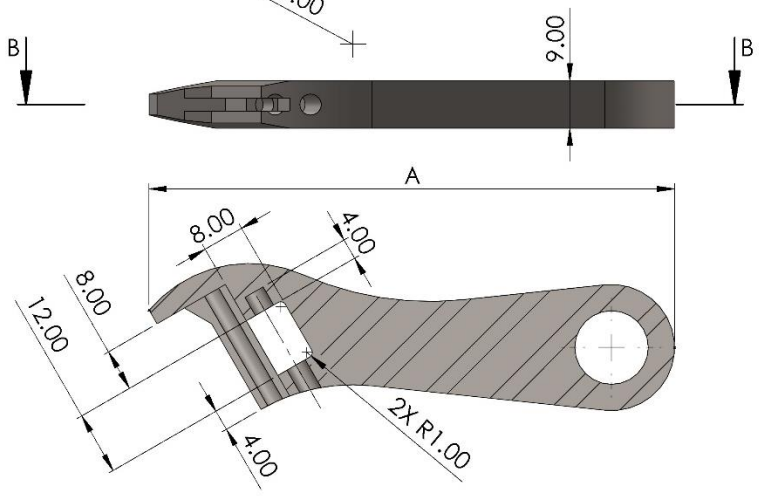


SECTION C-C





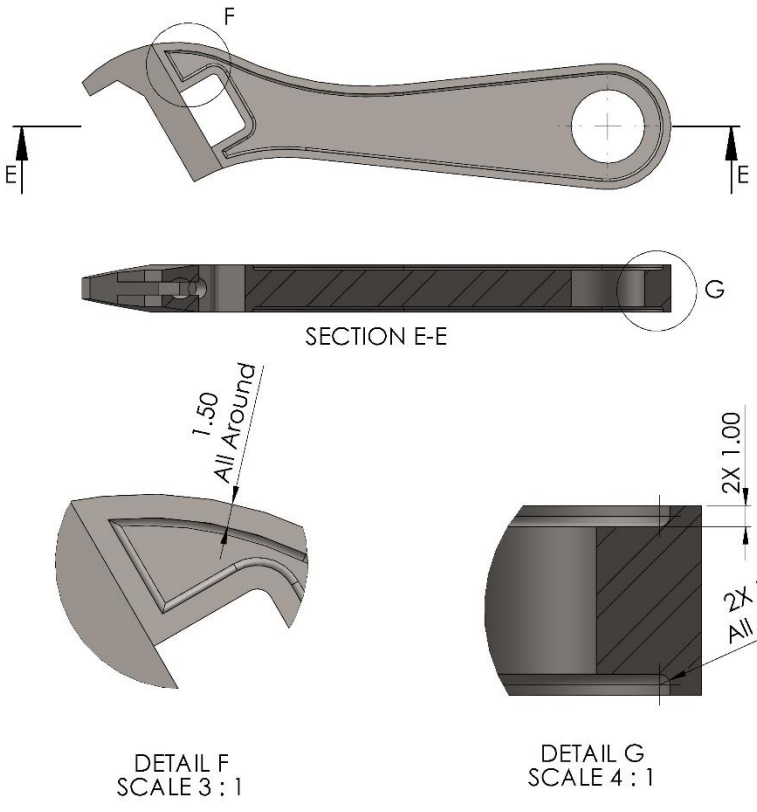
DETAIL D
SCALE 2 : 1



SECTION B-B

Part B - Using the model you created from Part A, add the new feature(s) shown in the drawing views to the right. Update the global variables using the values below, then find the mass of the part (grams).

A = 112 Mass = 94.41 g



Section I – Problem 6

CSWA Practice Material - Solution

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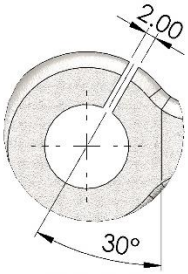
Part A - Build this part in SOLIDWORKS. Use the values below for global variables, then find the mass of the part (grams).

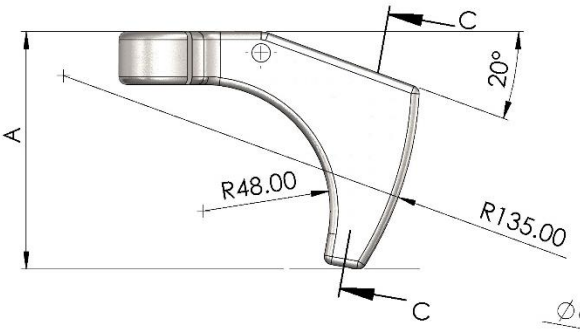
Unit System: MMGS
Decimal Places: 2
Part Origin: Arbitrary
Material Type: Steel
Material: Cast Alloy Steel
Density: 7300 kg/m^3

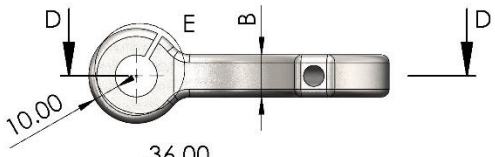
*Hint: This part can be built using only 5 features

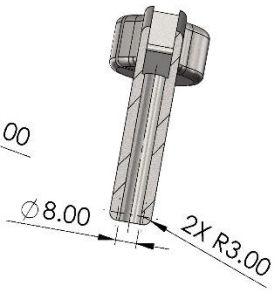
A = 90
B = 16 Mass = 385.31 g



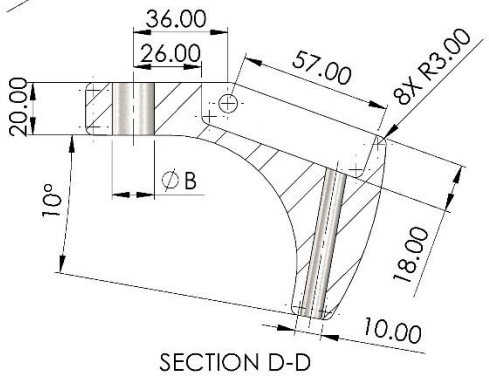
DETAIL E
SCALE 1 : 1







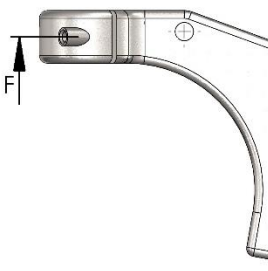
SECTION C-C

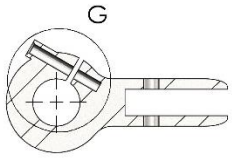


SECTION D-D

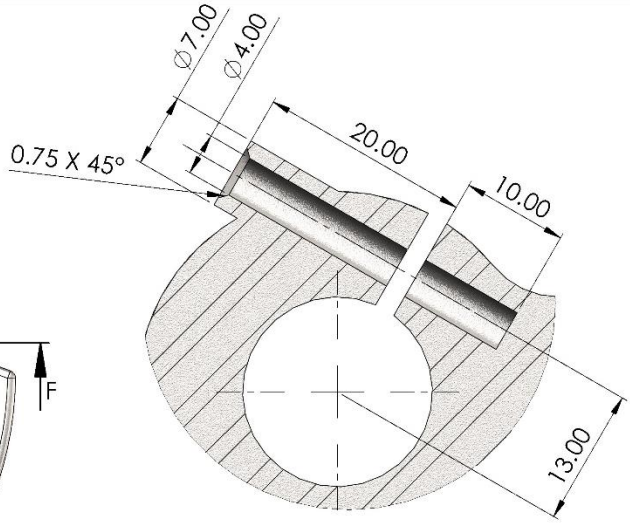
Part B - Using the model you created from Part A, add the new feature(s) shown in the drawing views to the right. Update the global variables using the values below, then find the mass of the part (grams).

A = 95
B = 18 Mass = 453.82 g





SECTION F-F



DETAIL G
SCALE 2 : 1

Section I – Problem 7

CSWA Practice Material - Solution

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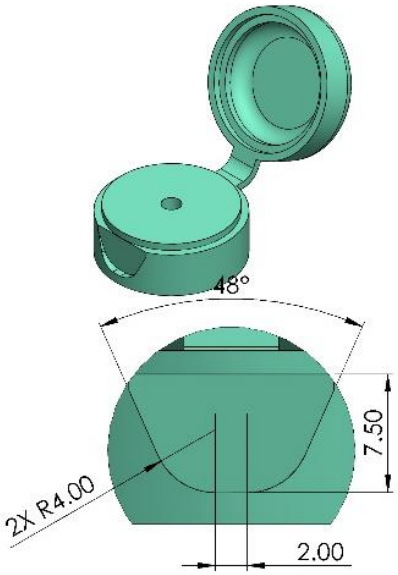
Part A - Build this part in SOLIDWORKS. Use the values below for global variables, then find the mass of the part (grams).

Unit System: MMGS
Decimal Places: 2
Part Origin: Arbitrary
Material Type: Plastics
Material: Polyethylene Cross-Linked
Density: 950 kg/m^3

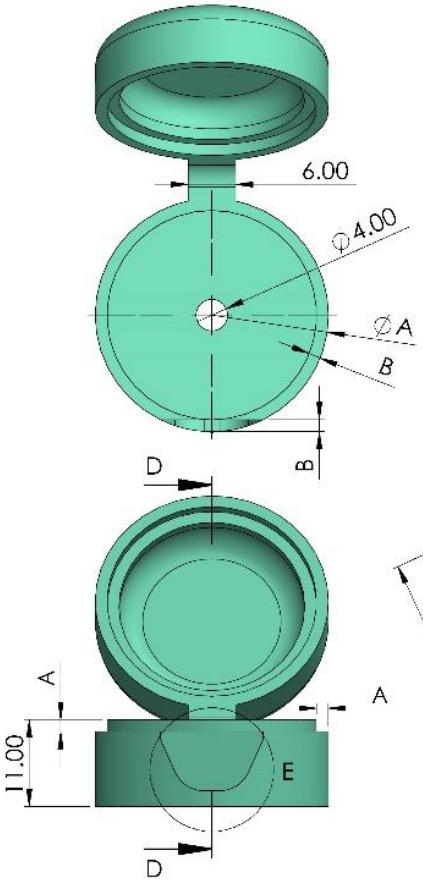
*Hint: This part can be built using only 5 features

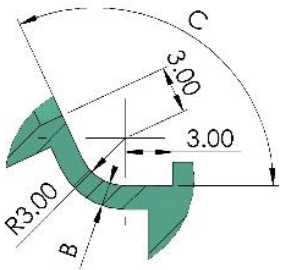
A = 29.5
B = 1.5
C = 115°

Mass = 6.77 g

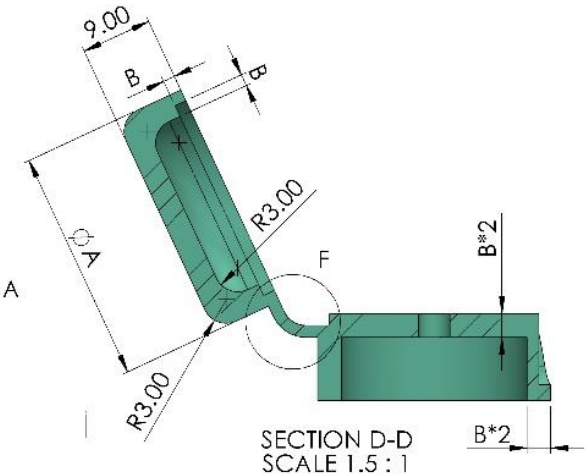


DETAIL E
SCALE 3 : 1





DETAIL F
SCALE 3 : 1

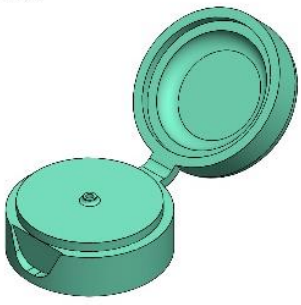


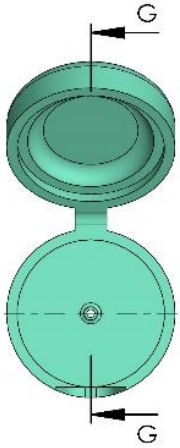
SECTION D-D
SCALE 1.5 : 1

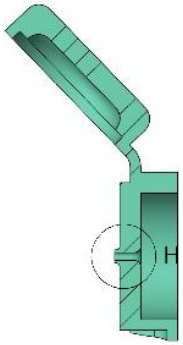
Part B - Using the model you created from Part A, add the new feature(s) shown in the drawing views to the right. Update the global variables using the values below, then find the mass of the part (grams).

A = 32
B = 2
C = 136°

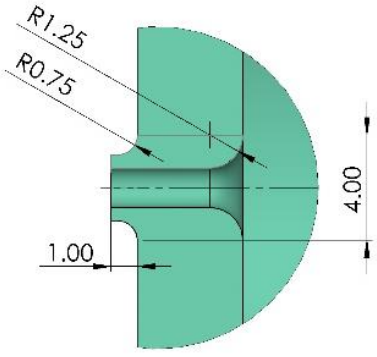
Mass = 9.35 g







SECTION G-G

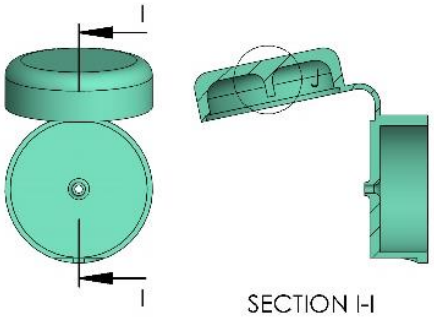


DETAIL H
SCALE 5 : 1

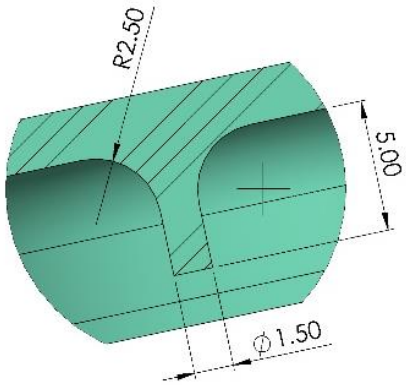
Part C - Using the model you created from Part B, add the new feature(s) shown in the drawing views to the right. Update the global variables using the values below, then find the mass of the part (grams).

A = 28
B = 1
C = 78°

Mass = 4.67 g



SECTION I-I



DETAIL J
SCALE 5 : 1

Section I – Problem 8

CSWA Practice Material - Solution

Part A - Build this part in SOLIDWORKS. Use the values below for global variables, then find the mass of the part (grams).

Unit System: MMGS
Decimal Places: 2
Part Origin: Arbitrary
Material Type: Steel
Material: AISI 1020
Density: 7300 kg/m^3

*Hint: This part can be built using only 5 features

A = 132
B = 165

Mass = 431.38 g

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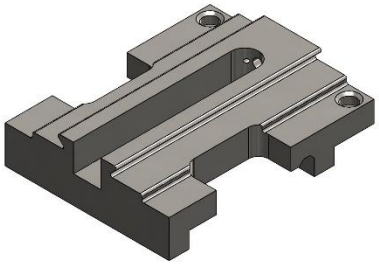
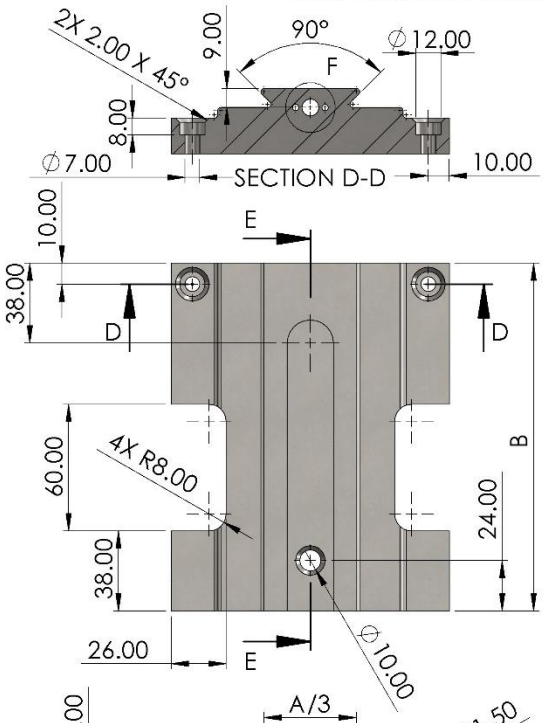
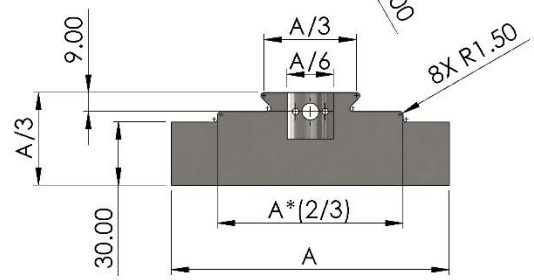
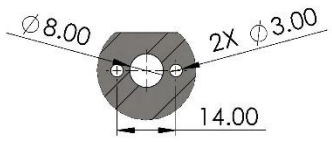
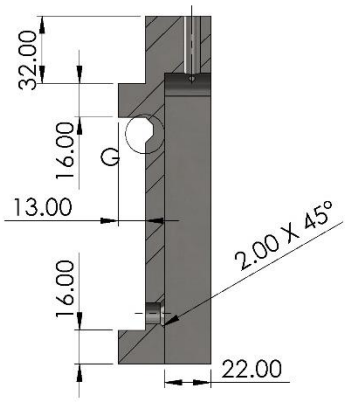




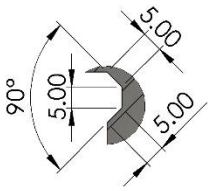




DETAIL F
SCALE 4 : 5



SECTION E-E

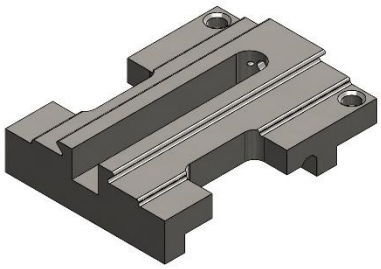


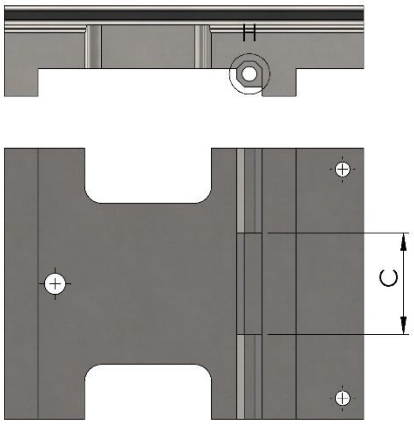
DETAIL G
SCALE 4 : 5

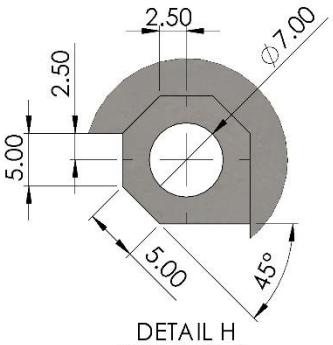
Part B - Using the model you created from Part A, add the new feature(s) shown in the drawing views to the right. Update the global variables using the values below, then find the mass of the part (grams).

A = 128
B = 170
C = 48

Mass = 416.17 g





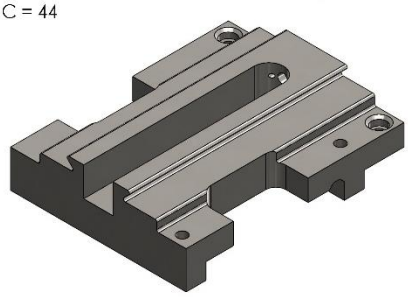


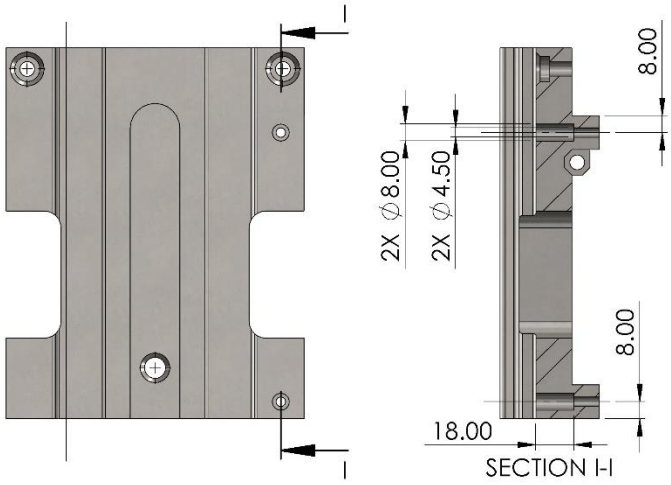
DETAIL H
SCALE 2 : 1

Part C - Using the model you created from Part B, add the new feature(s) shown in the drawing views to the right. Update the global variables using the values below, then find the mass of the part (grams).

A = 141
B = 175
C = 44

Mass = 4253.49 g





Section I – Problem 9

CSWA Practice Material - Solution

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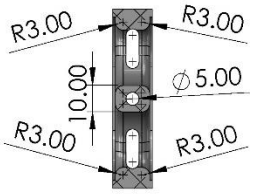
Part A - Build this part in SOLIDWORKS. Use the values below for global variables, then find the mass of the part (grams).

Unit System: MMGS
Decimal Places: 2
Part Origin: Arbitrary
Material Type: Plastics
Material: PE High Density
Density: 952 kg/m^3

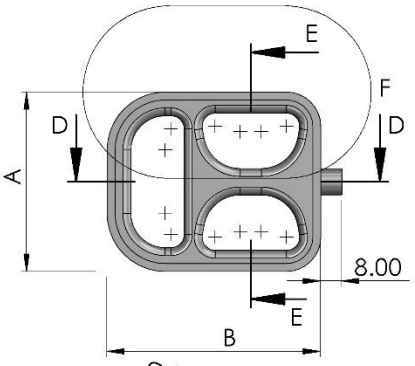
*Hint: This part can be built using only 5 features

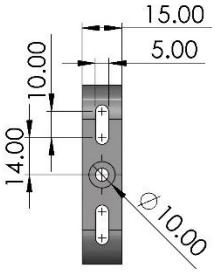
A = 68
B = 81
C = 15

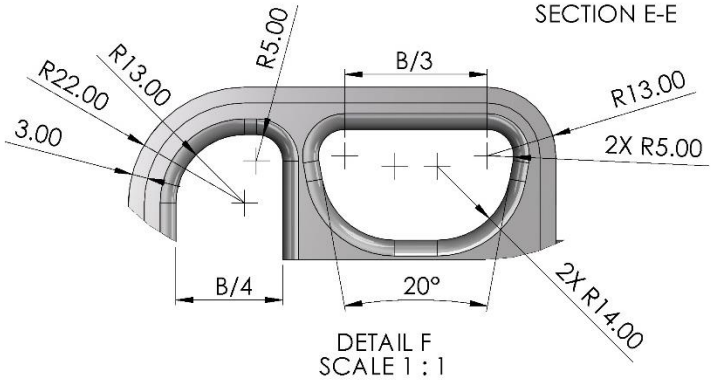
Mass = 32.4 g



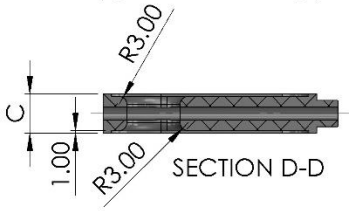
SECTION E-E







DETAIL F
SCALE 1 : 1

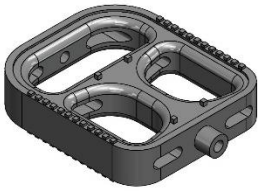


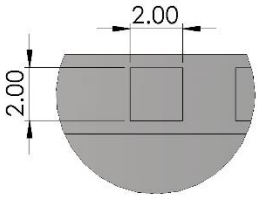
SECTION D-D

Part B - Using the model you created from Part A, add the new feature showin in the drawing views to the right. Update the global variables using the values below, then find the mass of the part (grams).

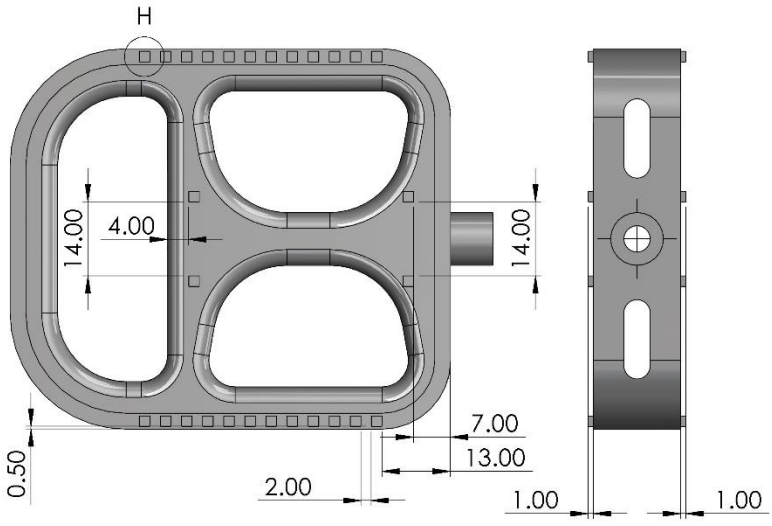
A = 72
B = 83.5
C = 16.5

Mass = 40.12 g





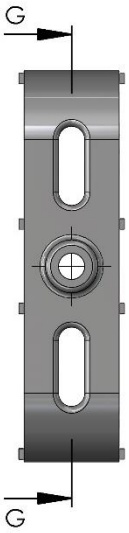
DETAIL H (28X)
SCALE 5 : 1

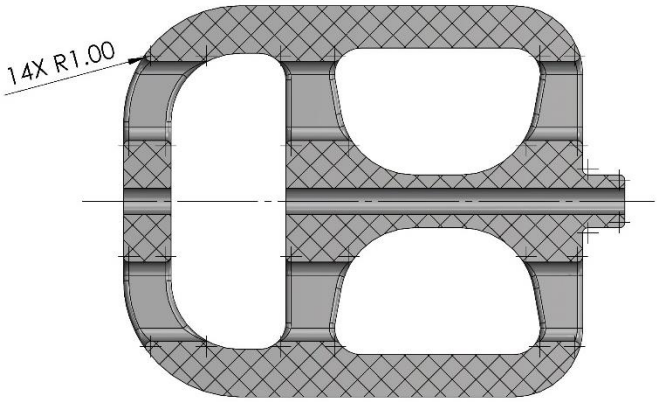


Part C - Using the model you created from Part B, add the new feature showin in the drawing views to the right. Update the global variables using the values below, then find the mass of the part (grams).

A = 74
B = 87
C = 18

Mass = 57.67 g





SECTION G-G
SCALE 1 : 1

Section I – Problem 10

CSWA Practice Material - Solution

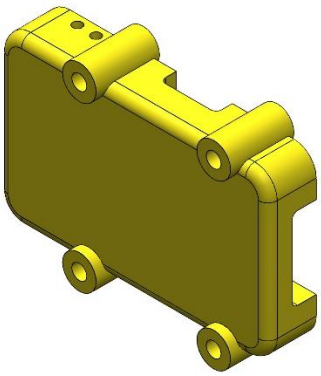
Part A - Build this part in SOLIDWORKS. Use the values below for global variables, then find the mass of the part (grams).

Unit System: MMGS
Decimal Places: 2
Part Origin: Arbitrary
Material Type: Plastics
Material: Polyester Resin
Density: 1160 kg/m^3

*Hint: This part can be built using only 5 features

A = 144
B = 88
C = 26

Mass = 283.07 g



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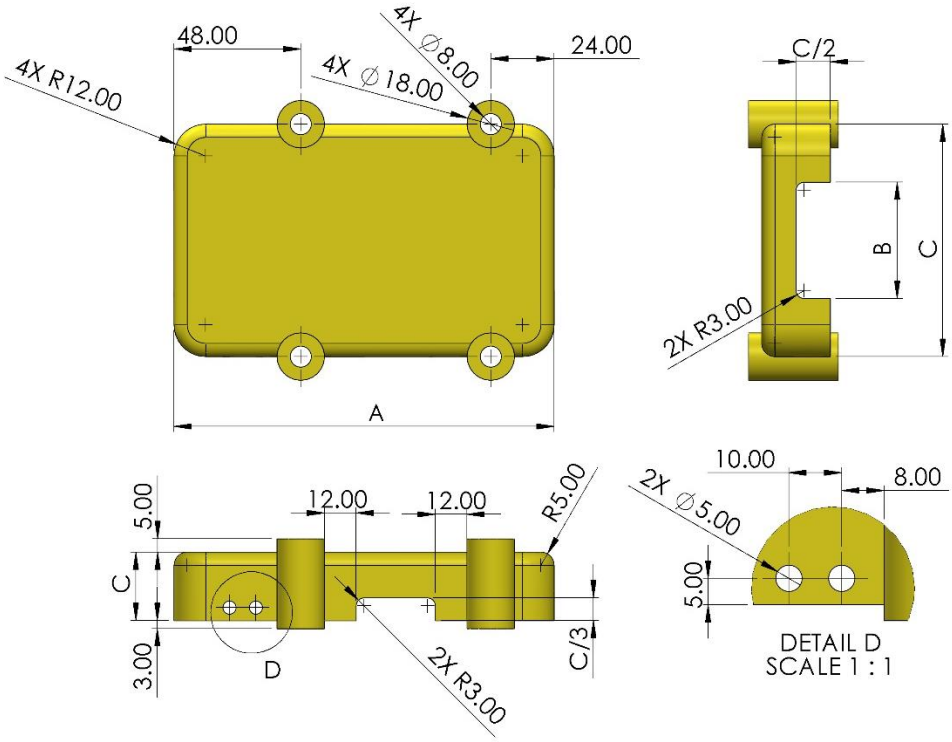
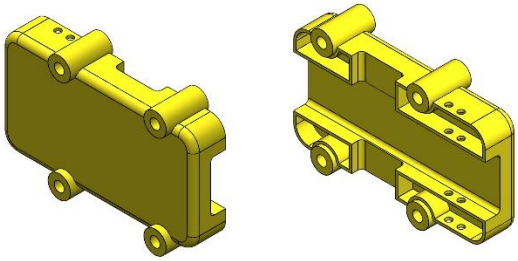
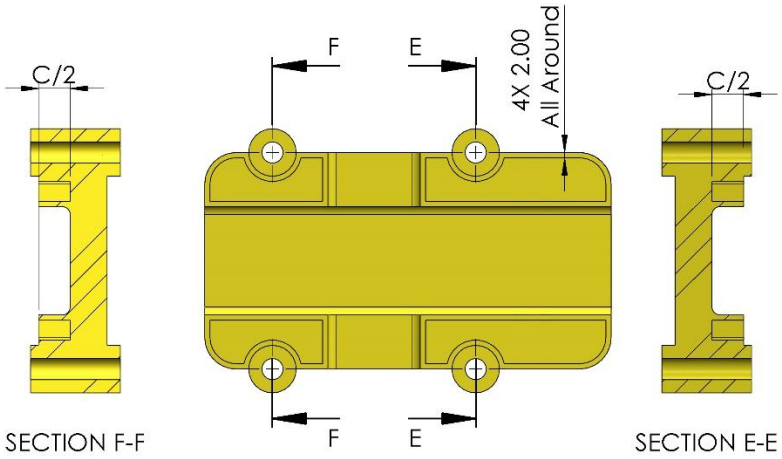


Part B - Using the model you created from Part A, add the new feature(s) shown in the drawing views to the right. Update the global variables using the values below, then find the mass of the part (grams).

A = 154
B = 82
C = 24

Mass = 249.33 g

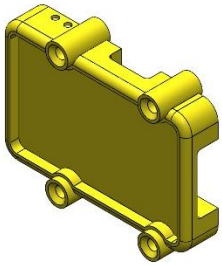


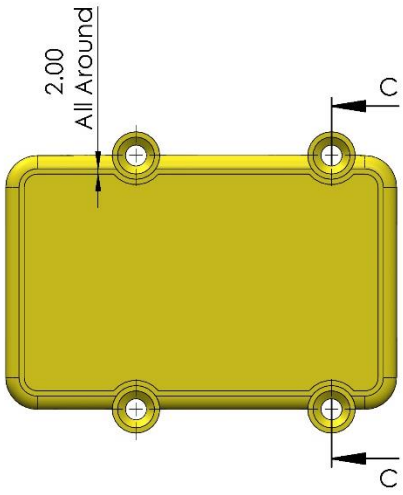


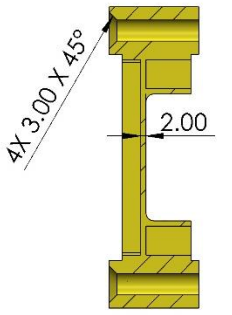
Part C - Using the model you created from Part B, add the new feature(s) shown in the drawing views to the right. Update the global variables using the values below, then find the mass of the part (grams).

A = 148
B = 96
C = 34

Mass = 119.33 g







SECTION C-C

Section J – Assemblies & Mates (5)

In this section, practice problems will include the following topics. Topics from previous sections may also be included in these problems. For guided lessons, go to MySOLIDWORKS.com and watch the videos in the CSWA Exam Prep Course (https://my.solidworks.com/training/path/14/cswa-exam-prep-course).

- Assembly Features:
    - Mates
        - Coincident
        - Concentric
        - Tangent
        - Parallel
        - Distance
        - Angle
        - Width
    - Placing the base part
    - Defining Coordinate Systems

Problems

1. Plyers
2. Track and Roller
3. U-Joint
4. Three Jaw Puller
5. Car Jack

Section J – Problem 1

CSWA Practice Material - Solution

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Part A - Build this assembly in SOLIDWORKS

- Download the zip file associated with this problem and open it.
- Save the contained parts and open those parts in SOLIDWORKS. (Note: If
- SOLIDWORKS prompts "Do you want to proceed with feature recognition?"
- please click "No".)
- IMPORTANT: Create the Assembly with respect to the Origin as shown in
- isometric view. (This is important for calculating the proper Center of Mass)
- Create the assembly using the following conditions:

1. Insert the Plier-Handle-Base as the base part, and use its origin as the assembly origin.
2. Plier-Handle-Base and Plier-Handle are mated concentric to Plier-Joint (no clearance)
3. Plier-Handle-Base end face is coincident to inside face of Plier-Joint, shown in Detail C.
4. Inner faces of plier handles are mated at angle "A", shown in the side view of the assembly.

Find the center of mass of the assembly in x (mm), y (mm), z (mm).

Unit System: MMGS
Decimal Places: 2
Assembly Origin: Origin of Plier-Handle-Base

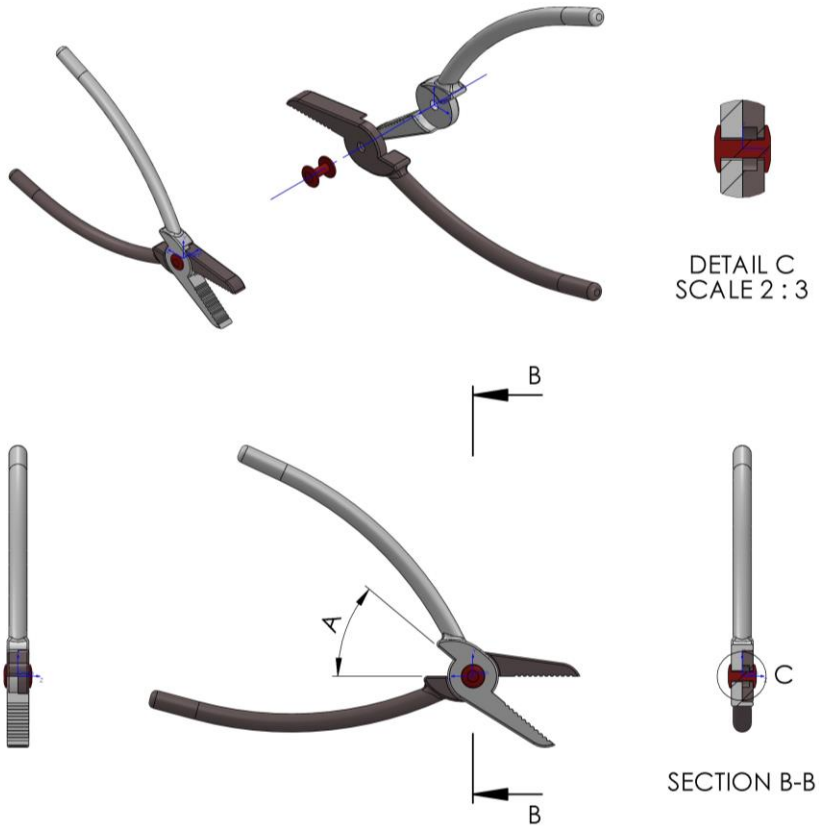
A = 40°

x = 1.57 mm
y = 0.57 mm
z = 0.0 mm

Part B - Update the value for angle A, then find the center of mass of the assembly

A = 8°

x = 1.89 mm
y = 0.13 mm
z = 0.0 mm



Section J – Problem 2

CSWA Practice Material - Solution

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Part A - Build this assembly in SOLIDWORKS

- Download the zip file associated with this problem and open it.
- Save the contained parts and open those parts in SOLIDWORKS. (Note: If
- SOLIDWORKS prompts "Do you want to proceed with feature recognition?"
- please click "No".)
- IMPORTANT: Create the Assembly with respect to the Origin of the base part. (This is important for calculating the proper Center of Mass)
- Create the assembly using the following conditions:

1. Insert the Bracket-Base as the base part, and use its origin as the assembly origin.
2. Two Wheels are tangential to the inner bottem face of the bracket and equidistant from the inner lip and back of the Bracket Base, shown in Detail D.
3. Two wheels are concentric to holes in the back of the Cart, shown in Detail E.
4. Front hexagonal face of the Wheels are coincident to the Rim of the holes on the back of the Cart, shown in Detail E.
5. Top face of hexagon on the Wheels are parallel to top face of the Bracket-Base shown in Detail E.
6. Cart is distance "A" away from edge of Bracket-Base shown in Detail F.
7. Upper cylindrical face of the Hook is concentric to bottom hole of the Cart, and the top hexagonal face of the Hook is coincident to the rim of the bottom hole on the Cart, shown in Detail D.
8. Hook is angle "B" relative to front face of Cart, shown in Detail G.

Find the center of mass of the assembly in x (in), y (in), z (in).

Unit System: IPS
Decimal Places: 2
Assembly Origin: Origin of Bracket-Base

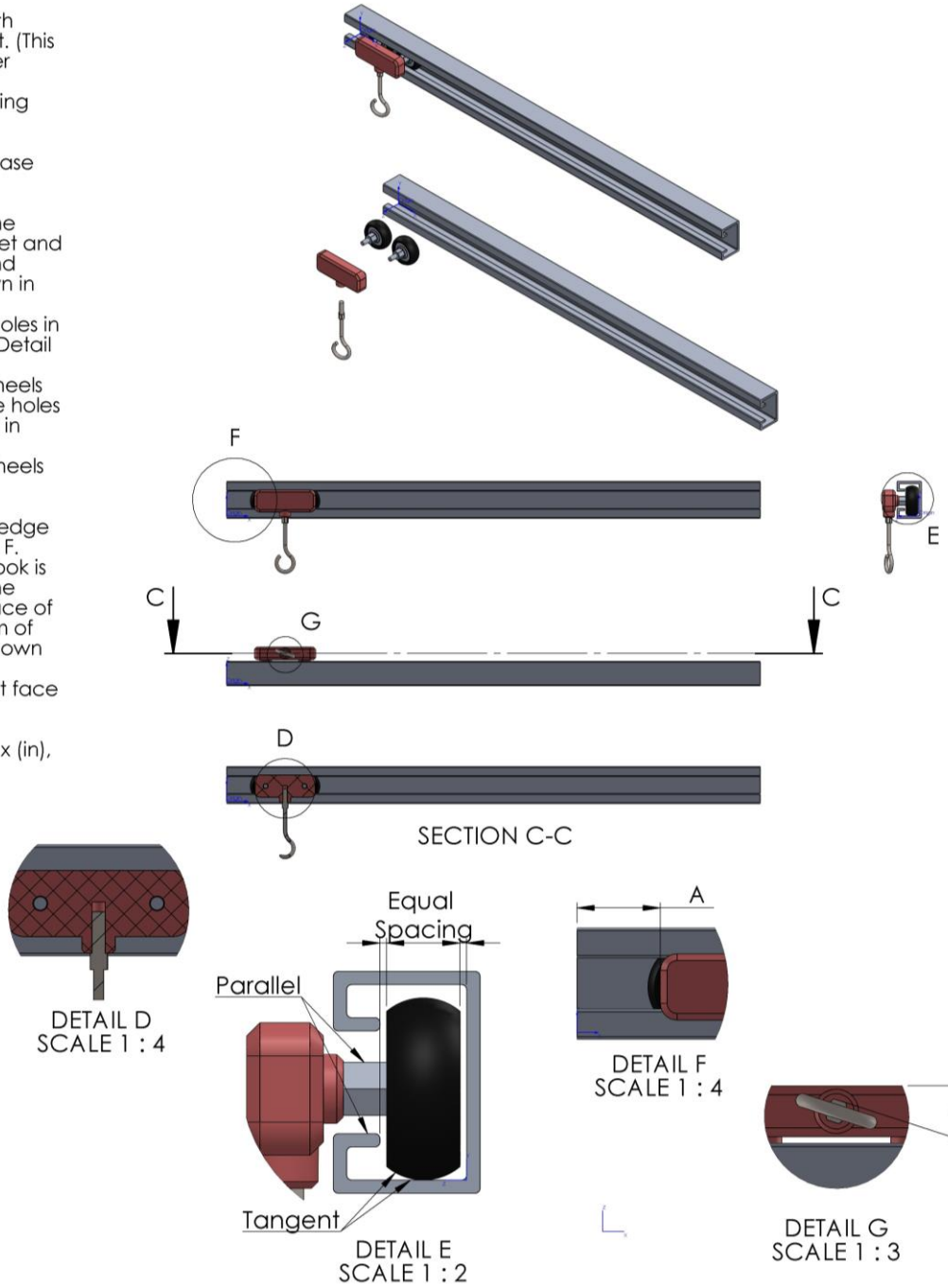
A = 2.5
B = 18°

x = 21.02 in
y = 1.39 in
z = 0.91 in

Part B - Update the value for angle A, then find the center of mass of the assembly

A = 19
B = 58°

x = 23.64 in
y = 1.39 in
z = 0.91 in



Section J – Problem 3

CSWA Practice Material - Solution

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Part A - Build this assembly in SOLIDWORKS

- Download the zip file associated with this problem and open it.
- Save the contained parts and open those parts in SOLIDWORKS. (Note: If
- SOLIDWORKS prompts "Do you want to proceed with feature recognition?"
- please click "No".)
- IMPORTANT: Create the Assembly with respect to the Origin of the base part. (This is important for calculating the proper Center of Mass)
- Create the assembly using the following conditions:

1. Insert the Small-Hole-Fork-Base as the base part, and use its origin as the assembly origin.
2. Hole of Small-Hole-Fork-Base is concentric to Small-Pin and the small hole of the Center-Block.
3. End faces of the Small-Pin are equidistant from the side faces of the Center-Block.
4. Large-Pin is concentric to the large hole in the Center-Block, and the hole through the Large-Pin is concentric to the Small-Pin.
5. Hole in Large-Hole-Fork is concentric to the Large-Pin
6. Inner faces of Large-Hole-Fork are coincident to outer faces of Center-Block.
7. Top face of Center-Block is angle "A" relative to the top face of the Samll-Hole-Fork-Base.
8. Side of Large-Hole-Fork is angle "B" relative to the side of the Center-Block.

Find the center of mass of the assembly in x (mm), y (mm), z (mm).

Unit System: MMGS
Decimal Places: 2
Assembly Origin: Origin of Small-Hole-Fork-Base

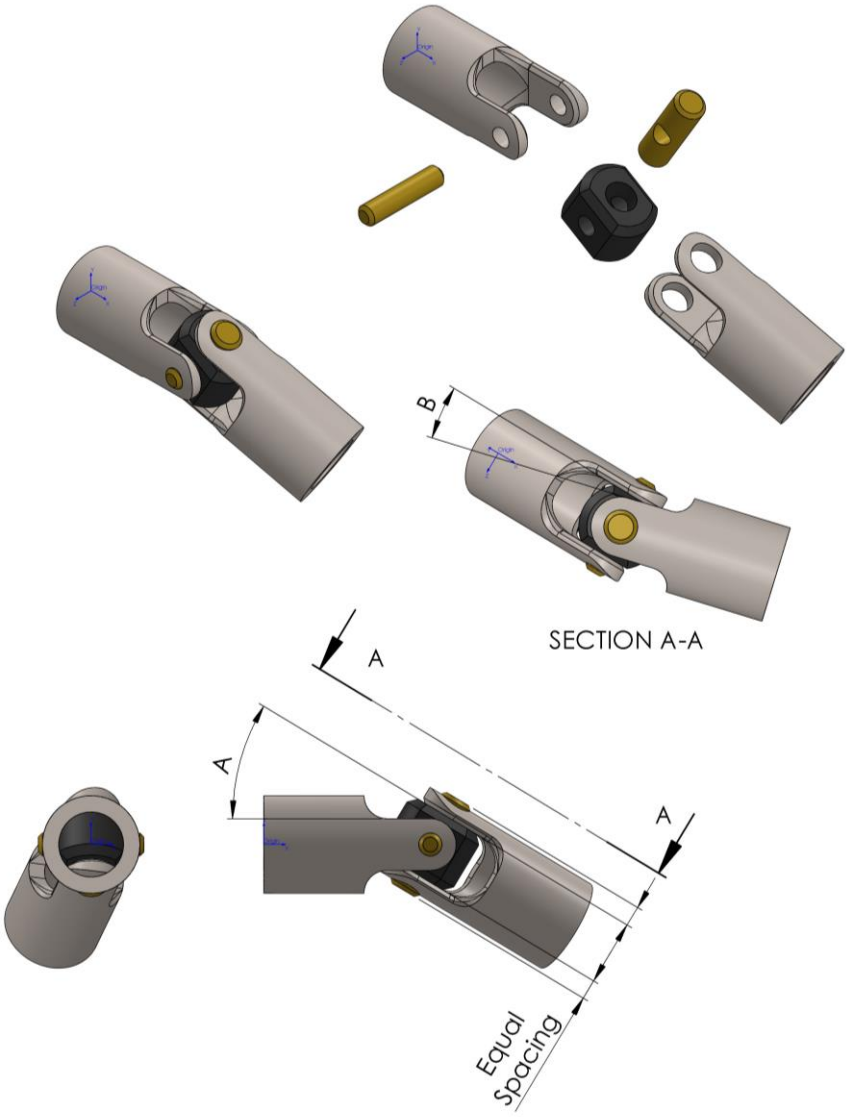
A = 14°
B = 31°

x = 4.63 mm
y = -0.51 mm
z = -0.25 mm

Part B - Update the value for angles A and B, then find the center of mass of the assembly

A = 23°
B = 34°

x = 4.39 mm
y = -0.58 mm
z = -0.58 mm



Section J – Problem 4

CSWA Practice Material - Solution

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Part A - Build this assembly in SOLIDWORKS

- Download the attached zip file and open it.
- Save the contained parts and open those parts in SOLIDWORKS. (Note: If
- SOLIDWORKS prompts "Do you want to proceed with feature recognition?"
- please click "No".)
- IMPORTANT: Create the Assembly with respect to the Origin as shown in
- isometric view. (This is important for calculating the proper Center of Mass)
- Create the assembly using the following conditions:

1. Insert the Spindle-Base as the base part, and use its origin as the assembly origin.
2. The Main-Body part isconcentric to the Spindle-Base part, and the top face of the Main-Body is Distance "A" from the rim of the Spindle-Base, shown in Detail D.
3. One of the 3 identical legs of the Main-Body is parallel to the Y-Z plane, as shown in the top view.
4. Holder parts have holes that are mated concentric to the holes in the Main-Body as well as the upper holes of the Jaw parts.
5. The Holder parts are also coincident to the outside faces of the Jaw parts and the faces of the extending legs on the Main-Body part.
6. Top faces of the Holder parts are all mated to Angle "B" relative to the top face of the Main-Body, shown in Detail D.
7. Flat faces of the Jaw parts are all mated to Angle "C" relative to the top face of the Main-Body part.
8. Bolt and Nut parts are mated concentric to the holes in the holder, and with their inner faces are coincident to the outer faces of the Holder parts. Note the direction in which the Bolt and Nut parts are inserted, as shown in the top view and exploded view.
9. Side faces of the Bolt and Nut are parallel to the faces of the Holder parts as shown in Detail D.

Find the center of mass of the assembly in x (mm), y (mm), z (mm).

*Hint: If you have inserted components into an assembly, you can insert more of the same components by holding CTRL key and dragging in those parts from the FeatureTree into the Graphics Area

Unit System: IPS

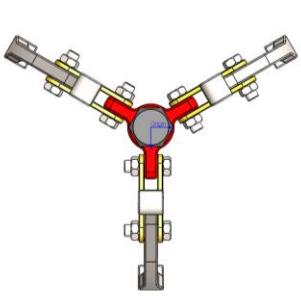
Decimal Places: 2

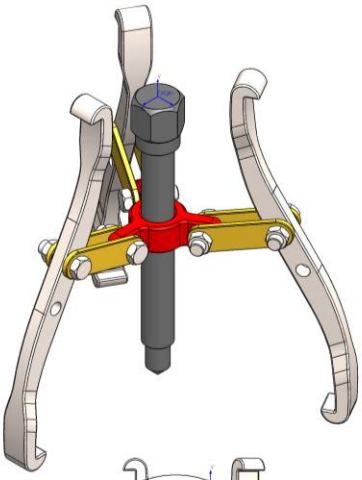
Assembly Origin: Origin of Spindle-Base

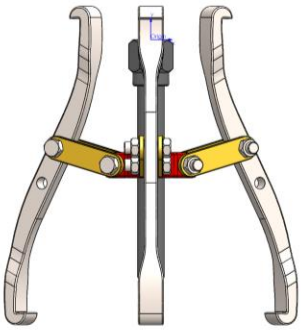
A = 2.5	x = 0.00 in
B = 165°	y = -4.50 in
C = 62°	z = 0.00 in

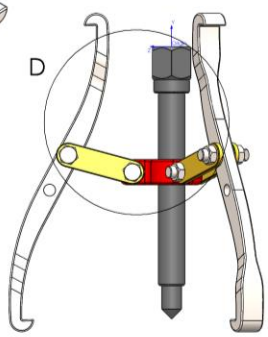
Part B - Update the values for distance A and angles B and C with the values below. Find the new center of mass of the assembly

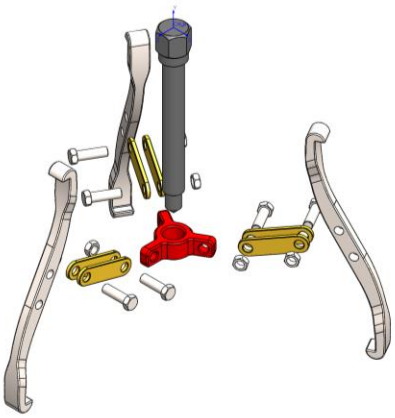
A = 4.2	x = 0.00 in
B = 148°	y = 5.41 in
C = 83°	z = 0.00 in

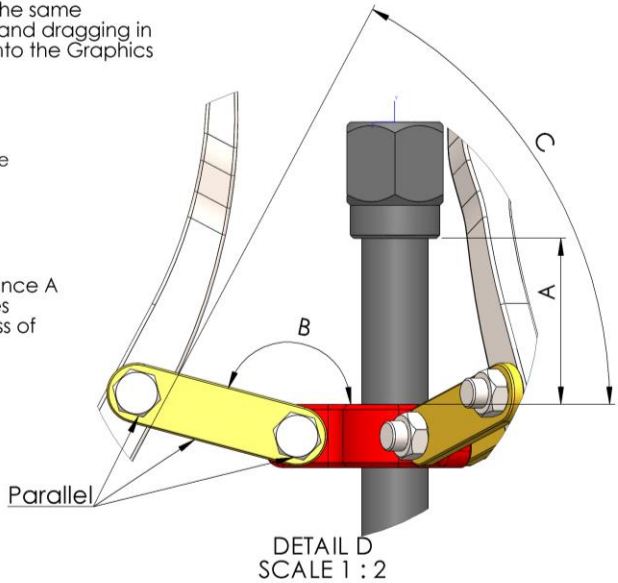












DETAIL D
SCALE 1 : 2

Section J – Problem 5

CSWA Practice Material - Solution

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Part A - Build this assembly in SOLIDWORKS

- Download the zip file associated with this problem and open it.
- Save the contained parts and open those parts in SOLIDWORKS. (Note: If
- SOLIDWORKS prompts "Do you want to proceed with feature recognition?"
- please click "No".)
- IMPORTANT: Create the Assembly with respect to the Origin of the base part. (This is important for calculating the proper Center of Mass)
- Create the assembly using the following conditions:

1. Insert the Base as the base part, and use its origin as the assembly origin.
2. Bottom holes of the Bottom-Linkage parts are concentric to the holes of the base as well as Pins.
3. Outer faces of Bottom-Linkages are coindicent to inner faces of Base.
4. Through-Pins are concentric to the top holes of the Bottom-Linkages as well as the bottom holes of the Top-Linkages.
5. Outer faces of Through-Pins are coincident to inner faces of Bottom-Linkages.
6. Top holes of the Top-Linkages are concentric to the holes on the Top part as well as Pins.
7. Inner faces of Top-Linkages are coincident to outer faces of Top.
8. Inner faces of Top-Linkages are coincident to outer faces of Bottom-Linkages.
9. Through-Rod is concentric to the holes on both Through-Pins.
10. Inner rim of the Through-Rod is tangential to the outer face of the left Through-Pin.
11. Through-Rod is horizontal relative to the Base.
12. Top face of the Top and bottom face of the Base are parallel and separated by distance "A".

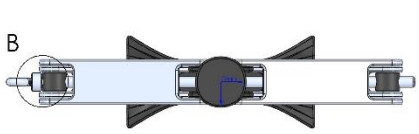
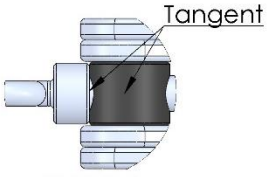
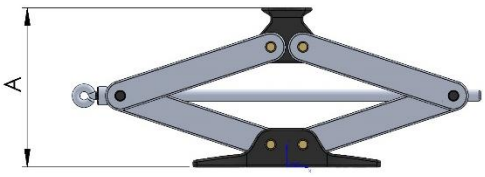
Find the center of mass of the assembly in x (mm), y (mm), z (mm).

Unit System: MMGS
Decimal Places: 2
Assembly Origin: Origin of bottom Bracket-Base

A = 297
x = -2.43 mm
y = 125.66 mm
z = 0.00 mm

Part B - Update the value for distance A, then find the center of mass of the assembly

A = 420
x = -0.46 mm
y = 128.94 mm
z = 0.00 mm

Part C - Update the value for distance A, then find the center of mass of the assembly

A = 612
x = 6.14 mm
y = 272.24 mm
z = 0.00 mm