

# Orthographic Drawing, Solidworks, and Excel BOM & MOM Review Activity

## Phase 1 – Orthographic Drawing

1. Students get into pairs. A group of three is ok, if there is an odd number of students in class.
2. Hiding their work from their partners with a manila folder, each student must create an object (with at least 3 irregular faces) using 15 Lego pieces.
3. With paper, pencil, and a ruler, student draws a 3-view Orthographic drawing of their Lego object. Drawing must include dimensions in cm, and faint markings for division of blocks.
4. When the drawing is done, student disassembles their Legos, and exchanges their bag of Legos and their drawing with their partner.
5. Now, with only the drawing as a guide, students must re-build the object in the drawing.
6. Once finished, students exchange Legos & drawings again and check for accuracy with their new Lego object. Report results to teacher for acknowledgement.

## Phase 2 – Solidworks Drawings

1. Student creates a new object with their Legos (again, at least 3 irregular faces) using 15 pieces.
2. Student logs into Solidworks and creates their object. Each piece must be created separately (to scale, using cm) and then mated into an assembly. Actually color the pieces as they are in reality! Students do not have to include the studs on the tops of the Legos.
3. Student creates a mechanical drawing of their assembly in Solidworks, including dimensions.
4. Once finished, report show Solidworks assembly & drawing to teacher for acknowledgement.

## Phase 3 – Excel MOM & BOM

1. Student uses Lego object from Phase 2. They can use their Solidworks assembly as a reference if they no longer have access to the actual Lego pieces.
2. Student creates a Bill of Materials and Mass of Materials spreadsheet to calculate the total cost and mass of their object. Student is provided with a key for how to interpret the cost and mass of each Lego piece (below).
3. Designate each row of the BOM & MOM for a different brick. Therefore, there should be 15 rows. Note: Cost & mass values for bricks have been arbitrarily created...
4. Once finished, report results to teacher for acknowledgement.

Lego Color	Lego Cost per Stud	Lego Color	Lego Mass per Stud
Black	\$0.55	Black	0.33 g
White	\$0.25	White	0.84 g
Red	\$0.35	Red	0.35 g
Orange	\$0.70	Orange	0.26 g
Yellow	\$0.10	Yellow	0.75 g
Light Green	\$0.72	Light Green	0.10 g
Dark Green	\$0.46	Dark Green	0.99 g
Blue	\$0.87	Blue	0.42 g
Brown	\$0.29	Brown	0.76 g

Columns for BOM & MOM should be as follows:

[Part] [Material Description] [Mass or Cost] [Unit Per] [Amount used] [Part Mass or Cost]