Mechanics

Bolts

Lesson objective

Students develop skills in calculating and recording accurate measurements using mechanics' tools.

Lesson overview

Students measure bolts to determine bolt specifications and catalogue numbers. Students also measure the head of the bolt to determine the appropriate spanner/socket to be used.

Classroom organisation

Students work in small groups, and require sufficient space to measure each bolt.

Resources

Print

- ❑ Printed student worksheet – one per student
- ❑ Printed Catalogue Extract – one per group

Other

- ❑ Miscellaneous bolts – one set per group
- ❑ Rulers with 1mm increments or vernier callipers – one per student
- ❑ Metric spanners and sockets (optional)

Preparation

You need to collect and organise a range of bolts of different sizes, with an associated printed product catalogue.

Lesson description

1. Students form small groups (two to four)

2. Each group selects five miscellaneous bolts from the pack

3. Students choose one bolt and measure its dimensions using a ruler (or vernier callipers) to the nearest millimetre

   Students measure and record the diameter in the worksheet table. The diameter of the bolt shank is shown in the diagram on the next page as D (see Figure 1)

   - Ensure students are using millimetres.
   - Remind students that most tradespeople use millimetres not centimetres.

   Students measure and record the length of the bolt as shown in the diagram as L (see Figure 1)

4. Students add this information to the worksheet

5. Students add the dimensions by putting an M (for metric) in front of the diameter and finishing off with the length of the shaft, as seen in Figure 1

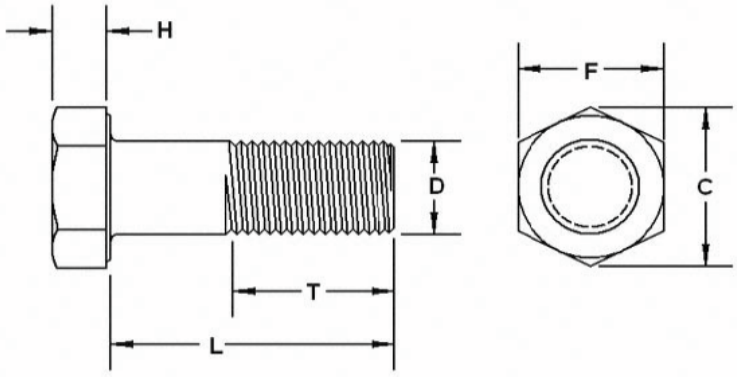
   It is important to note that the **diameter** needs to be **rounded up** to the **next even** millimetre. Also note that the bolts are in even numbers only. If you don't round up, the nut will be too tight to screw onto the bolt. Refer to the metric bolt chart to assist in explanation.

7. Students use the Bolt Description to look up the bolt in the catalogue. Show students how to read the catalogue guide - start with the type: Hex Bolts, then size, for example, M12, and finally check for the length. Once students locate the bolt, they can look up the catalogue number. This can be cross referenced by the teacher using the bar code number to check if the student is correct. Ensure you don't show this to the students until the end as it is important that students measure the bolts.

8. Students measure the head of the bolt to estimate the size of the spanner to be used with their selected bolt. Students measure the head across the flats (shown in Figure 1 as F)

   As before, remind to round up their measurement to the next largest millimetre. If you don't round up, the spanner will be too tight to fit. This is a great opportunity to introduce the concept of *tolerance*

Figure 1



Extension

If you have access to open, ring or combination spanners or socket sets, students can use them to see if they have chosen the correct spanner size.

If they can do this as they proceed through the activities, their estimation skills could be further consolidated.

Acknowledgement

Image HREF: http://www.sunshine-me.com/galorg/071120090903 23BOLT%20DIMENSION.jpg/

Catalogue HREF: http://www.itwproline.com.au/default.aspx?ArticleID=13