NCEA Math Lesson Plan

Grade: 4 **Subject:** Mathematics

Domain:
Measurement and Data

Standard Number(s) and Description:
4.MD.1 Know relative sizes of measurement units within one system of units. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit.

4.MD.2 Use the four operations to solve word problems involving distances...including problems involving simple fractions or decimals and problems that require expressing a larger unit in terms of a smaller unit.

Vocabulary to be Highlighted:
Linear measure terminology

Mathematical Practices (#):
1. Make sense of problems and persevere in solving them.
4. Model with mathematics.
6. Attend to precision.

Essential Questions:
What do I know? What am I being asked to find?
How can I represent these problems; would a number line or bar help? What real world benchmarks do I know that will help me?
How can I use my real world knowledge to decide whether my answer is reasonable? Can I do the problem another way to check? How exact should my answer be?

Materials/Tools (include technology):
Yard/meter stick
Rulers

Connections to Other Math Domains:
Numbers in base ten will be used while calculating
Possibly fractions

Connections to Other Subject Areas:
Art
Religion
History
Physical Education

Catholic Identity Component:
Students will explore the relationship of various measures to their bodies, increasing their understanding and appreciation of the temple God has created for them. Students can also solve problems (examples below) that relate to situations in church.

Resources (attachments):
More problems on the worksheet at http://www.mathworksheetsland.com/4/23relative/ip.pdf

Activities/Timeline:
1. Activate the topic by asking students whether they know the origin of imperial length measures (inch, foot, yard). If they are not familiar, point out the relationship between the inch and the distance between the middle two knuckles, the foot and an adult foot, and a yard to a stride length. (If desired, other relationships can also be explored: the length of one's foot is the distance from the elbow to wrist, twice around the wrist relates to once around the neck, and height and wingspan are roughly equal.)

One can also remind students of benchmarks to help with metric measures. The distance across a fourth grader's finger is roughly a centimeter, while the thickness of a fingernail is about a millimeter. The meter stick is fairly easy to imagine, but students can also explore how far the meter stick reaches across their wingspan (usually from one fingertip to the opposite armpit).

2. On the whiteboard, list common conversions (elicit these from the students):
1 mi = 1760 yd = 5280 ft. (they won't know this one, but they can work from yards to get the feet)
1 yd = 3 ft. = 36 in
1 ft. = 12 in (Point out here that the students know 12s from their multiplication tables. 60 inches as 5 feet is a great benchmark from which to work forward and backward.)
1 km = 1000 m
1 m = 100 cm = 1000 mm
1 cm = 10 mm
Include more measures if desired for thoroughness.

3. Use an example problem (below) to discuss with students how conversions will work. Make sure to have the conversation about whether answers are expected to become larger or smaller. (See formative assessment notes.)

4. Sample problems for introduction, and for students to work on in small groups for the remainder of the class (these are multiple step problems; for simpler problems, see the resource worksheet):

-Many large theme park rides require that riders be 54 inches tall. Chris is 4 feet and 3 inches tall. Is Chris tall enough? Are you?
-Robin wants to make a toga for a costume for All Saint's Day. The toga needs enough material for twice Robin's height. Robin is 5 feet tall. Is the 3 yards of cloth that Mom bought going to be enough?
-The altar is 2m wide, and stands 1m off the ground. The altar cloth needs to drape across the altar and over on each side, leaving about ½ m of space between the cloth and the ground. An altar cloth that was donated from another church is 300cm long. Will it work? Tell Father why or why not.
-The top of the lectern is one and a half meters tall. The new priest is 150 cm tall. Should he use the stool, which will make him 9 cm taller? Why or why not?
-Horses and donkeys are measured in “hands,” which are four inches each. They are measured to the top of their front leg (shoulder). Jesus is looking for a colt to ride into Jerusalem. Jesus' legs are 36 inches long. The colt is 9.5 hands tall. Can Jesus ride this colt?

Formative Assessment (what to look for, how/when to look):
A common confusion is that when students think about a number of a smaller unit making up a larger unit, they will actually divide when converting from smaller to larger. CCSS helps eliminate this by focusing first on one direction of conversion, and adding the other direction in a subsequent year once the first is mastered. A discussion with students about what makes sense is in order. (If we want to cover the same distance, will it take more inches or more feet to do the job?)

Watch for students to draw a picture to help them get started, and suggest this to students who are not doing it.

Summative Assessment:
Ask students to solve a similar group of problems, or use a comprehensive assessment task such as those found at https://grade4commoncoremath.wikispaces.hcpss.org/Assessing+4.MD.2.