Lesson 1.3. Measuring with Floor Tiles

The Main Point

The correct way to read *any* metric ruler may by summed up as follows: <u>Read</u> *the length down to the smallest marks on the ruler, then* <u>estimate</u> *the next digit from the space between the smallest marks.*
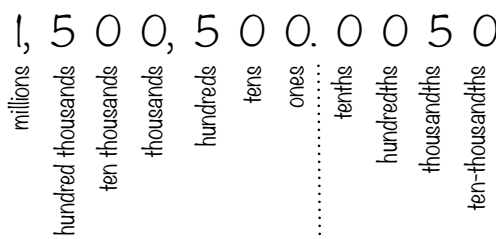
A New Ruler

In a previous lesson, what did the students of Lab Group 1 decide to use as a ruler for position measurements? (If you cannot remember, then consult *Lesson 1.2. Position in Space*.)
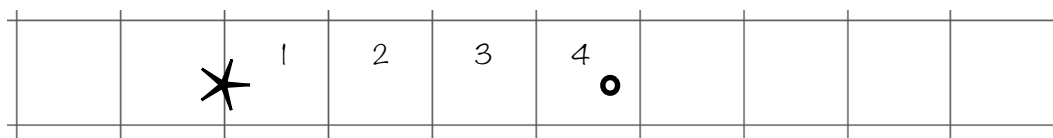
_____

It turns out that floor tiles make a really good ruler! This is because the relatively large size of the tiles makes them an excellent first measuring instrument when one is learning to read a metric ruler correctly. The correct way to read *any* metric ruler may by summed up as follows:

<u>Read</u> *the length down to the smallest marks on the ruler, then* <u>estimate</u> *the next digit from the space between the smallest marks.*

It will be helpful to begin by reviewing the concept of *place* in a number. In our decimal number system, the value of a digit depends on its *place*, or position in the number. Each place has a value of 10 times the place to its right.[1]

The marks on a metric ruler such as the floor of the physics classroom also form a kind of decimal system. The lines on the floor are evenly spaced, one tile apart; thus, each line counts *one tile*, corresponding to the *ones place* in the value of a measurement. The next place, the *tenths* place, is what you must estimate in the space between the lines.

The distance between the reference point and the washer is three whole tiles plus part of the fourth tile. There is no question about the three whole tiles, but you must *estimate* the part of the fourth tile. To do this, mentally divide the fourth tile into ten equal divisions, then *estimate* which tenth of a tile corresponds to the location of the washer. In the example above, some people will estimate 0.7 tile and other people will estimate 0.8 tile. These are *both* correct estimates! (In a future lesson, I will explain why both are correct. For now, please just accept this.)

Thus, the distance between the washers may be correctly reported as either 3.7 tiles or 3.8 tiles.

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[1] <http://www.math.com/school/subject1/lessons/S1U1L2GL.html> August 19, 2012

Here are some measurements for you to practice. For each one, determine the distance between the reference point and the washer.
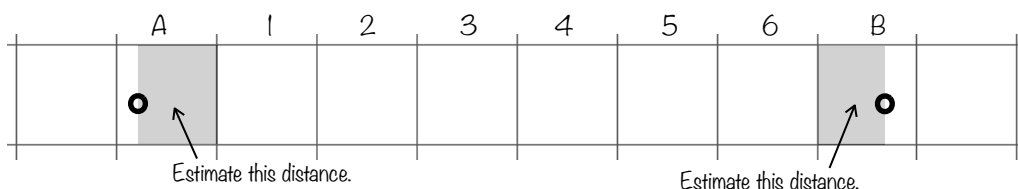
1) Number of whole tiles (to ones place): _____   Estimated part of remaining tile (tenths place): _____

   Measurement result to report: _____

2) Number of whole tiles (to ones place): _____   Estimated part of remaining tile (tenths place): _____

   Measurement result to report: _____

In the following example, I ask you to measure the distance between two washers. The purpose of this example is for you to discover why it is considered superior technique to measure from the reference point to each washer rather than from each washer to the next. (Hint: Compare the number of distances you must estimate in the example below with the number of distances you must estimate in the examples above. Fewer estimations is better!)

A   1   2   3   4   5   6   B

Estimate this distance.   Estimate this distance.

3) Number of whole tiles (to ones place): _____

   Estimated part of remaining tile A (tenths place): _____

   Estimated part of remaining tile B (tenths place): _____

   Measurement result to report: _____

*Be careful here! Remember, you are measuring the space **between** the washers. Therefore, be sure to estimate the remaining parts of*

*tiles A and B that lie **within** the space between the washers.*

Answers to practice measurements
   Different people will correctly report …
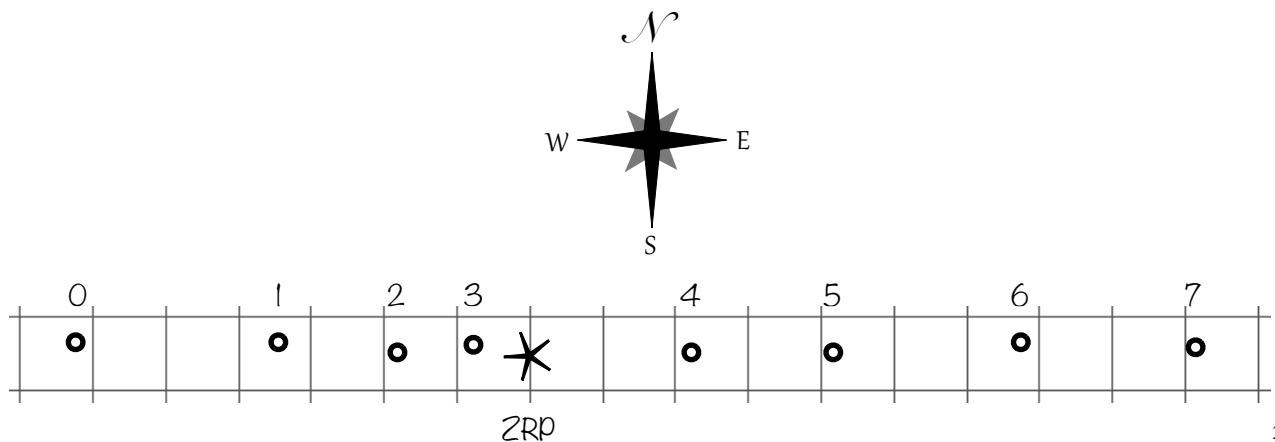   1) 5.1 tiles *or* 5.2 tiles   2) 12.3 tiles *or* 12.4 tiles   3) 7.4 tiles *or* 7.5 tiles *or* 7.6 tiles

Name: _____

Homework 1.3. Floor Tiles

Date: _____   Period: _____

Please answer the following questions neatly, in pencil, right on this sheet!

Please measure the distance from the ZRP to each washer in the diagram below.

- In each case, state the number of whole tiles, state your estimates of any remaining parts of tiles, and state the total distance and direction to the washer.
- Record your results in the data table.

Distance and direction between ZRP and each washer in order to practice reading a metric ruler

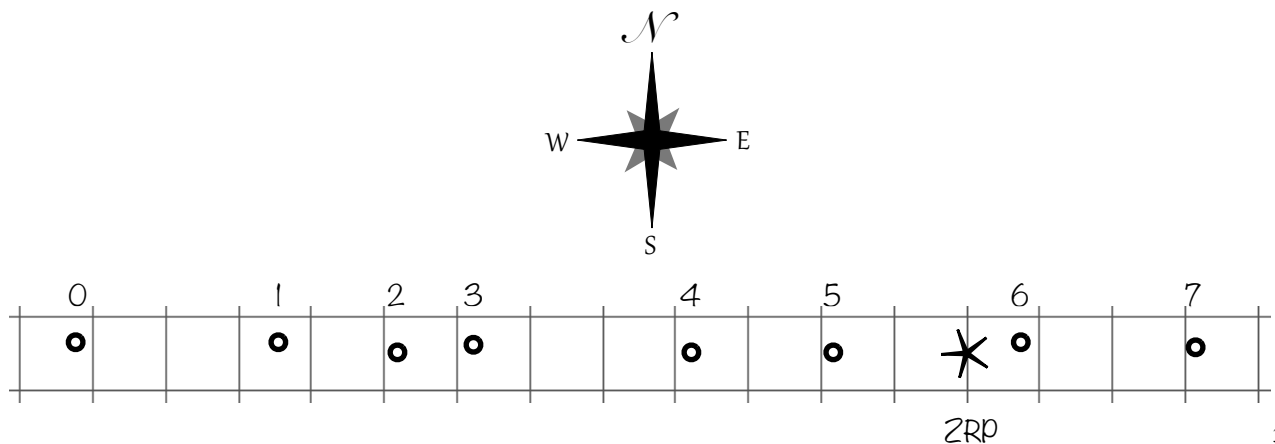| Washer Number	Whole tiles	Part of a tile	Position
0	6 tiles, W	0.3 tile, W	6.3 tiles, W
1			

Homework 1.3. Floor Tiles

Name: _____

Date: _____ Period: _____

Please answer the following questions neatly, in pencil, right on this sheet!

Please measure the distance from the ZRP to each washer in the diagram below.

- In each case, state the number of whole tiles, state your estimates of any remaining parts of tiles, and state the total distance and direction to the washer.

- Record your results in the data table.

Distance and direction between ZRP and each washer in order to practice reading a metric ruler

Washer Number	Whole tiles	Part of a tile	Position
0	12 tiles, W	0.3 tile, W	12.3 tiles, W
1			

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[3] <http://customgraph.com/piart.php?art=170> September 8, 2013

Name: _____

Homework 1.3. Floor Tiles

Date: _____ Period: _____

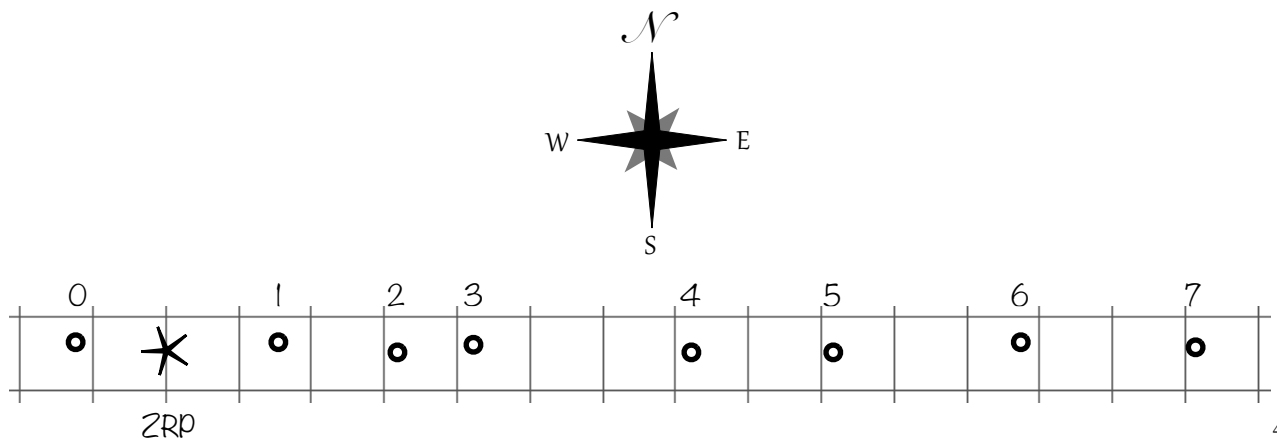*Please answer the following questions neatly, in pencil, right on this sheet!*

Please measure the distance from the ZRP to each washer in the diagram below.

- In each case, state the number of whole tiles, state your estimates of any remaining parts of tiles, and state the total distance and direction to the washer.

- Record your results in the data table.

Distance and direction between ZRP and each washer in order to practice reading a metric ruler

Washer Number	Whole tiles	Part of a tile	Position
0	1 tile, W	0.3 tile, W	1.3 tiles, W
1			

Name: _____

Homework 1.3. Floor Tiles

Date: _____   Period: _____

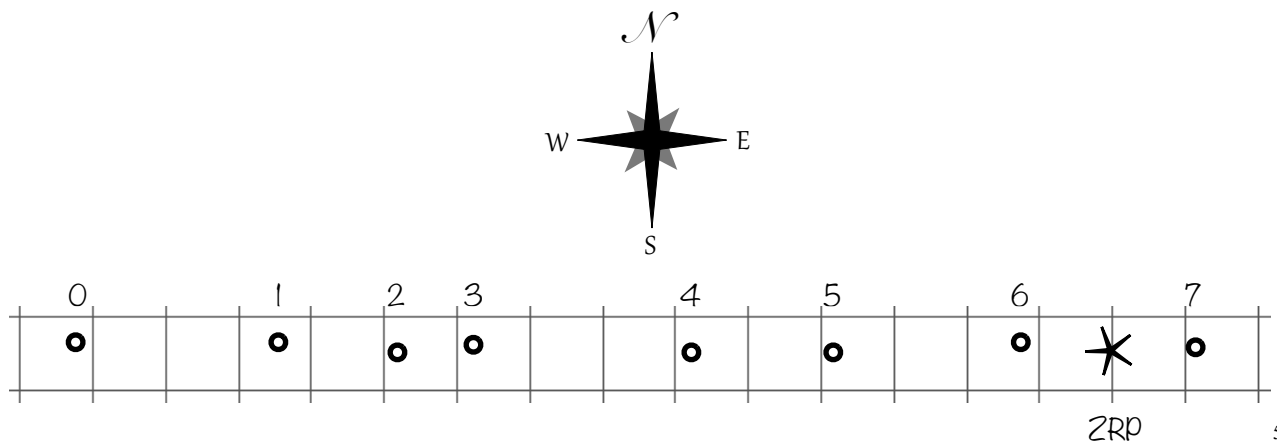*Please answer the following questions neatly, in pencil, right on this sheet!*

Please measure the distance from the ZRP to each washer in the diagram below.

- In each case, state the number of whole tiles, state your estimates of any remaining parts of tiles, and state the total distance and direction to the washer.
- Record your results in the data table.

Distance and direction between ZRP and each washer in order to practice reading a metric ruler

Washer Number	Whole tiles	Part of a tile	Position
0	14 tiles, W	0.3 tile, W	14.3 tiles, W
1			