Physics Lab Set-up

Thomas More College

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Download the PDF here

A PDF of this document can be found at http://physics.thomasmore.edu/PHY121Lab/TMC-lab-setup.pdf. (288 kB)

Contents

Class 1

PHY 121L: General Physics (algebra-based, fall)

1.1 Meaningful Measurements

Location	Equipment	Notes
For Each Lab Station		
AF34-14	1 metric ruler	could be a 1-foot ruler or a 0.25-meter stick
AA13	1 Vernier caliper (Figure 1.1.2)	Ask faculty if they want digit or analog before and after lab, verify digital calipers are turned off
AA14	1 micrometer (Figure 1.1.2)	before and after lab verify jaws are not tight
AE82	3 objects to measure	Ask faculty which objects they want (smooth sphere, rough sphere, cube, block of metal, irregular shape, etc)
AE21	string	sufficient string to tie onto the objects in order to immerse them in the cylinder and retrieve them
AF55-19	1 tall, skinny, graduated cylinder	at least 2 of the 3 objects should fit inside the graduated cylinder
At the front for students to share		
S224 AF36-4	at least 1 digital scale	the available scale(s) should be able to weigh the chosen objects

Table 1.1.1: Equipment Needed: Meaningful Measurements

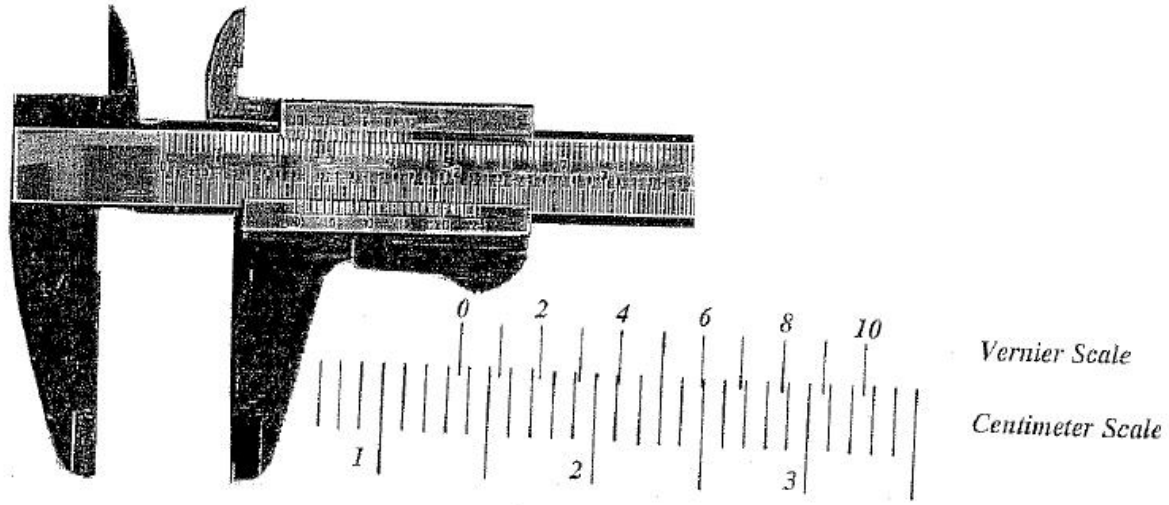

Figure 1.1.2: The Vernier Caliper

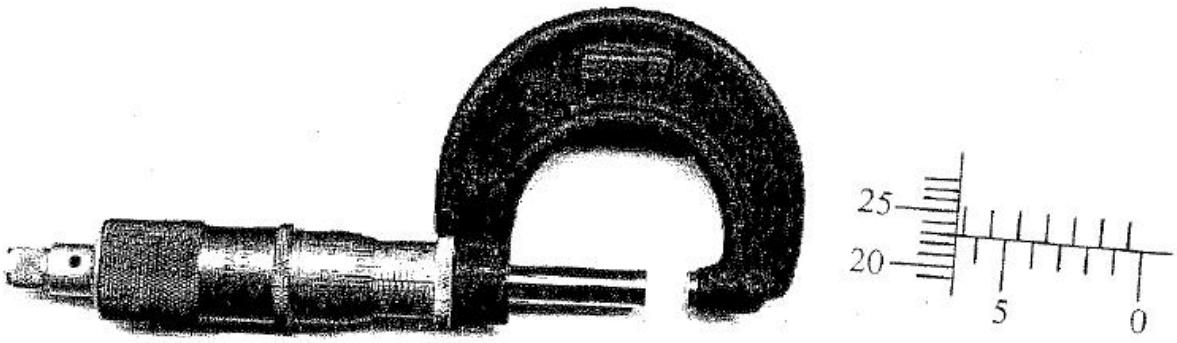

Figure 1.1.3: The Micrometer Caliper

(Updated: September 6, 2017)
A digital version of the lab should be found at http://physics.thomasmore.edu/PHY121Lab/c-meaningful-measurements.html
A PDF version of the write-up might be found at Measurement.pdf (291 kB)

1.2 Standard Deviation

Location	Equipment	Notes
At the front for students to share		
AL32-5	several boxes/bags of pennies	in sufficient number for each student to have up to 50 pennies

Table 1.2.1: Equipment Needed: Standard Deviation

(Updated: September 6, 2017)
A digital version of the lab should be found at http://physics.thomasmore.edu/PHY121Lab/c-standard-deviation.

html

A PDF version of the write-up might be found at StDev.pdf (232 kB)

1.3 Constant Acceleration

Verify Are the carts at AF22 or AF32?

Location	Equipment	Notes
For Each Lab Station		
AF12 (tube)	1 track	.
S224	1 motion sensor (same as "sonic ranger")	Should have a black-yellow plug
AF22-2-13	1 cart with "sail"	these are in a large box labelled "DYNAMIC CARTS AF22-2-13"
AF15	Wood Squares	probably 2-3, used to prop up one end of track
either AF35 (shelf) or AE82 (drawer)	1 metal ball (any size)	used to level the track
AF34-14	ruler	used to level the track
-	Pasco	Computer
At the front for students to share		
AA41 or AA42 (drawers)	1 gravity protractor	This is the large yellow protractor
AF44	1 pendulum bob	.

Table 1.3.1: Equipment Needed: Constant Acceleration

Verify Are the protractors at AA41 or AL14-2?

2-sized blocks??? (AF151-1)

(Updated: September 6, 2017)

A digital version of the lab should be found at http://physics.thomasmore.edu/PHY121Lab/c-acceleration.html

A PDF version might be found at Acceleration.pdf

1.4 Newton's 2nd Law on a Linear Track with the Sonic Ranger

Location	Equipment	Notes
For Each Lab Station		
S224	1 motion sensor (AKA "sonic ranger")	Should have a black-yellow plug
AF12 (tube)	1 track	.
AF22-2-13	1 cart	these are in a large box labelled "DYNAMIC CARTS AF22-2-13"
AF22-2-13	1 wooden cart-block	these are in a large box labelled "DYNAMIC CARTS AF22-2-13"
AF22-2-13	light plastic bucket	These might already be attached to the string in a large box labelled "DYNAMIC CARTS AF22-2-13"
(attached to plastic bucket?)	string	There should be pre-cut string that is long enough to reach from the cart, over the pulley and to a hanging mass. About one meter long. This is likely in a large box labelled "DYNAMIC CARTS AF22-2-13"
AF22-2-13	1 pulley	these are in a large box labelled "DYNAMIC CARTS AF22-2-13"
AF34-14	ruler	used to level the string
either AF35 (shelf) or AE82 (drawer)	1 metal ball (any size)	used to check the level of the track
AF15	2-3 small wooden squares	used to level the track
AF44	larger weights	These are to ride the cart. ***Check with instructor: EITHER*** an assortment of 100-500 gram, cylindrical masses ***OR*** 2 black rectangular masses that fit into the cart (like the 1-wooden block above).
AF44 or AL32-5	tiny weights	These are to transfer between the cart and the basket. ***Check with instructor: EITHER*** an assortment of 7-10 very small masses (2-5 grams) ***OR*** 10 pennies.
-	Pasco	Computer
At the front for students to share		
S224	functioning digital scales	(please verify that these function and are set to metric)
AA41, AA42	Gravity Protractor	Used to level the track. (There are enough to give these to everybody, but it is not clear if there are enough pendulua strings and bobs for everybody.)
AF4-4	Pendulum bob to hang with the gravity-protractor	Used to level the track. (There are enough protractors to give these to everybody, but it is not clear if there are enough pendulua strings and bobs for everybody.)

Table 1.4.1: Equipment Needed: Newton's 2nd Law on a Linear Track with the Sonic Ranger

(Updated: October 9, 2017)
A digital version of the lab should be found at http://physics.thomasmore.edu/PHY121Lab/c-Newton.html
A PDF version might be found at Newton.pdf

1.5 Dry Sliding Friction

Most of this equipment is the same as Newton's 2nd Law on a Linear Track with the Sonic Ranger, but it is not exactly the same.

Location	Equipment	Notes
For Each Lab Station		
S224	1 motion sensor (AKA "sonic ranger")	Should have a black-yellow plug
S224	1 force transducer	Should be the thing shaped to sit on top of the wooden cart-block and it has a loop-screw at one side to tie a string to
AF12 (tube)	1 track	.
AF22-2-13	1 cart	these are in a large box labelled "DYNAMIC CARTS AF22-2-13"
AF22-2-13	1 wooden cart-block	these are in a large box labelled "DYNAMIC CARTS AF22-2-13"
AF22-2-13	light plastic bucket	These might already be attached to the string in a large box labelled "DYNAMIC CARTS AF22-2-13"
(attached to plastic bucket?)	string	There should be pre-cut string that is long enough to reach from the cart, over the pulley and to a hanging mass. About one meter long. This is likely in a large box labelled "DYNAMIC CARTS AF22-2-13"
AF22-2-13	1 pulley	these are in a large box labelled "DYNAMIC CARTS AF22-2-13"
AE21	string	This string is for pulling the force transducer, not the same as the string that is attached to the plastic bucket
AF34-14	ruler	used to level the string
either AF35 (shelf) or AE82 (drawer)	1 metal ball (any size)	used to check the level of the track
AF15	2-3 small wooden squares	used to level the track
AG15	1 thermal glove	***Check with the instructor.*** This is only used as a soft glove to catch the cart in case it accelerates too quickly. Not all instructors want this.
AF44	larger weights	These are to ride the cart. ***Check with instructor: EITHER*** cylindrical masses (2 500-g, 4 200-g, 2 100-g) ***OR*** 2 black rectangular masses that fit into the cart (like the 1-wooden block above).
AF44 or AL32-5	tiny weights	These are to transfer between the cart and the basket. ***Check with instructor: EITHER*** an assortment of 7-10 very small masses (2-5 grams) ***OR*** 10 pennies.
-	Pasco	Computer
At the front for students to share		
S224	functioning digital scales	(please verify that these function and are set to metric)
AA41, AA42	Gravity Protractor	Used to level the track. (There are enough to give these to everybody, but it is not clear if there are enough pendulua strings and bobs for everybody.)
AF4-4	Pendulum bob to hang with the gravity-protractor	Used to level the track. (There are enough protractors to give these to everybody, but it is not clear if there are enough pendulua strings and bobs for everybody.)

Table 1.5.1: Equipment Needed: Dry Sliding Friction

(Updated: October 9, 2017)

A digital version of the lab should be found at http://physics.thomasmore.edu/PHY121Lab/c-friction.html

A PDF version might be found at friction.pdf

1.6 Centripetal Force

This describes the old equipment. New equipment (that plugs into the PASCO interface) has been purchased, but that equipment list has not been itemized yet.

Location	Equipment	Notes
For Each Lab Station		
AF14-1-6	1 centripetal force apparatus	(with card?)
AF46	1 0.5-kg hanger	.
AF46	Large cylindrical masses: 1 2-kg, 2 1-kg, 1 0.5-kg	.
AF44	Additional small cylindrical masses of various sizes	include at least one of each: 200-g, 100-g, 50-g, 20-g
AA13	1 caliper	***Ask instructor*** if they want digital or analog (they might not care)
AA12	1 stop watch	Verify that they work and have good batteries. ***You might need to purchase new batteries for department!!***
AD71	1 C-clamp	***Important:*** There are small pieces of cardboard available to place between the clamp and the lab table so that you do not add dents to the table!
-	1 thick metal rod	Mount horizontally off the table to hang the (spinning) carriage

Table 1.6.1: Equipment Needed: Centripetal Force

(Updated: October 9, 2017)
A digital version of the lab should be found at http://physics.thomasmore.edu/PHY121Lab/c-centripetal.html
A PDF version might be found at centripetal.pdf

1.7 Next Lab

Location	Equipment	Notes
For Each Lab Station		
AF12	1 track	.
At the front for students to share		
.	.	.

Table 1.7.1: Equipment Needed: Next Lab

(Updated: September 8, 2017)
A digital version of the lab should be found at http://physics.thomasmore.edu/PHY121Lab/c-labname.html
A PDF version might be found at labname.pdf

Class 2

PHY122L: General Physics (algebra-based, spring)