

**Introduction to MasteringPhysics****Due: 11:56pm on Tuesday, October 21, 2014**You will receive no credit for items you complete after the assignment is due. [Grading Policy](#)

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**A message from your instructor...**

The purpose of the following exercises is to familiarize you with the system you will be using for the rest of your course. These exercises are not intended to teach or test your knowledge of any specific subject material. Therefore, you will not be penalized for using hints or submitting incorrect answers.

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**Welcome!**

Mastering presents homework items assigned by your instructor and *works with you* to answer them. Homework items typically have an introduction, possibly figures, and one or more parts for you to answer.

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**Type of help offered**

- Mastering tells you immediately whether or not your answers are correct. Usually, you will have multiple chances to arrive at the correct answer. Your instructor will determine how many tries you have available.
- In many items, hints are available to help you if you get stuck. If you don't need the hints to solve the problem, you can still use them for review later on.
- If you submit an incorrect answer, Mastering often responds with specific, helpful feedback.
- Mastering is forgiving of many typos and formatting mistakes. If it can't figure out what you entered, it will let you know and give you another chance.

These exercises were chosen specifically to lead you through the key features of Mastering and are not intended to test your knowledge of any specific subject material. Therefore, on this item you will not be penalized for using hints and submitting incorrect answers. In fact, you should submit incorrect answers and use the hints to see what happens!

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**Part A**

How many squares are in this  $2 \times 2$  grid? Note that the figure link lets you know that a figure goes along with this part. This figure is available to the left.

**Enter your answer as a number in the box below and then submit your answer by clicking Submit.**



ANSWER:

**Correct**

What you are reading now is called a "follow-up comment." These comments typically offer more information or provide an interpretation of the answer you just obtained.

Before you move on to a slightly more challenging question, have a quick look at the other buttons available around the answer box.

- **Give Up** allows you to complete the question if you can't solve it on your own. Your instructor controls whether or not the correct answer is displayed to you.
- **My Answers** brings up a new window that lists all of the answers you have submitted for this question, along with any helpful feedback you received for incorrect submissions.

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**Grading**

See the help file available by clicking the **Help** link at the top right corner, if you want to know more about how grading works in general. Here is the most important information you'll need.

You must complete every part to get credit for an item. To complete a part, either answer the main part question correctly or click the **Give Up** button.

In a graded homework item, each part counts equally toward your score on the overall item. If you get full credit on each part, you will receive full credit for the problem. You *may* lose a fraction of the credit for a part when you submit an incorrect answer. Whether you do lose credit and how much you lose are set by your instructor. However, you won't lose credit for most types of formatting mistakes or for submitting a blank answer.

As you might expect, you will receive no credit for a part if you use the **Give Up** button. If you just can't figure out a question, there is a way to get partial credit by using hints, as the following part will illustrate.

## Part B

What is the magic number?

Note that there is a figure also associated with this part. However, the figure for Part A may still be visible on the left. To view the figure associated with Part B, click on the figure link. A new figure should appear on the left.

**You could try to guess the magic number but you would probably use up all your tries before getting the answer. Notice the *new Hints* button underneath the answer box for this question. Clicking this button will open up a list of hints that will guide you to the correct number.**



### Hint 1. Different types of hints and their impact on grading

Notice that there are three hints for this question. You are not required to use all of the hints or to use them in order. Each hint has a tagline that describes its contents. Based on the tagline you can decide whether or not a particular hint will be useful to you.

There are two kinds of hints. Some hints, such as Hint 2 below, just provide you with information. Other hints, such as Hint 3 below, give you an opportunity to answer a simpler question that is related to the main question you are solving. These hints either have questions in the tagline or tell you to do something (e.g., Find..., Determine..., Identify..., etc.). There are two ways that this type of hint can help you:

- Answering the simpler question gives you a chance to check that you are on the right track.
- If you correctly answer the simpler question, you will receive partial credit for the part even if you are unable to answer the main question.

Your instructor *may* choose to give you a bonus for not using hints or to deduct a small penalty for using hints. If you are stuck, *using the hints will usually result in a higher score than simply trying to guess* because you *may* lose fewer points for opening a hint than for getting the answer to the main question incorrect. There is a more detailed explanation of how hints are graded in the help available by clicking the **Help** link at the top right corner of your screen in the main Mastering window. In this problem, however, you will not lose any credit for using the hints.

Now, open up the second hint for some help finding the magic number.

### Hint 2. How to approach the problem

Although you could try to guess the magic number you would most likely exhaust your tries before getting the correct answer. To help you, the magic number is  $15 \times x$ , where  $x$  is a number between 1 and 10.

### Hint 3. What is $x$ ?

Recall that the previous hint stated that the magic number is  $15 \times x$ , where  $x$  is a number between 1 and 10. Specifically  $x$  is an even number between 1 and 10. Try to guess the value of  $x$ .

**You may submit as many guesses as you need. Enter each guess into the answer box that follows.**

ANSWER:

$x = 4$

**Correct**

Now that you have determined  $x$ , compute  $15 \times 4$  to find the magic number.

ANSWER:

magic number = 60

**Correct**

Your instructor *may* choose to give you a bonus for not using hints or to deduct a small penalty for using hints. If you are stuck, *using the hints will usually result in a higher score than simply trying to guess* because you *may* lose fewer points for opening a hint than for getting the answer to the main question incorrect. Note that you are never required to use the hints; if you want to figure the question out on your own, go ahead!

Notice that a new button, **Review Part**, appears when you correctly answer a part with hints. This button allows you to review all of the hints for that part, even if you didn't need them to get the answer. This is a useful way to review the question when studying for a test. *You do not lose any credit for reviewing the hints* after you have answered the question. If you didn't look at all of the hints while answering the last question, you should read through them now for some important information about hints and hint grading.

**Part C**

Multiple-choice questions have a special grading rule determined by your instructor. Assume that your instructor has decided to grade these questions in the following way: If you submit an incorrect answer to a multiple-choice question with  $n$  options, you will lose  $1/(n - 1)$  of the credit for that question.

Just like the similar multiple-choice penalty on most standardized tests, this rule is necessary to prevent random guessing.

If a multiple-choice question has five answer choices and you submit one wrong answer before getting the question correct, how much credit will you *lose* for that part of the question?

ANSWER:

- ☐ 100%
- ☐ 50%
- ☐ 33%
- ☒ 25%
- ☐ 20%

**Correct**

Your instructor may choose not to deduct  $1/(n - 1)$  of the credit for a multiple-choice question with  $n$  options. To see how your instructor is grading you, click your instructor's **Grading Policy** on your assignment page.

If you click on the **Continue** button before finishing all the Parts, you will see a message reminding you that you need to complete each Part to get credit. If you have completed the item, clicking **Continue** will take you to the next item on the Assignment. At any time you may click on the **Provide Feedback** link to access a survey page without losing your work.

Once you have completed an item, you may access your score from the assignment. Your score will display below the item title.

**Introduction to Numeric Answers**

This exercise is not intended to test your knowledge of any specific subject material. Therefore, on this problem you will not be penalized for using hints or submitting incorrect answers.

**Overview**

When an assignment question requires that you enter a numeric answer, you will see an answer box like the one illustrated here.

To answer this type of question, you will need to type the numeric value for distance in the rectangle between the quantity you are solving for (distance) and the units (meters).

In addition to typing alphanumeric values from your keyboard, you can enter non-numeric information by using either

- the menu tabs above the rectangular answer box (for more information click **?** (Help) button) or
- the equivalent key strokes. (click **⌨** (Keyboard shortcuts) button for the list)

**Grading**

### Tolerance

- For grading, your numeric answers often (but not always) can be within a tolerance range of the official answer. For example, if the answer to a numeric problem with a tolerance of 2% were 105, answers between 103 and 107 would be graded as correct.
- If you submit an answer that is rounded to within the grading tolerance but is not the exact answer, you will receive full credit. If this value is needed in future parts use the full precision value for subsequent parts.

### Significant figures

- Most questions with numeric answers will require your answer to be given to at least three digits or significant figures.
- Your answer *may* be graded as incorrect if you have calculated correctly but then rounded your final answer to too few digits. If a different number of significant figures is required, this will be part of the question's answer instructions.
- When you need to do multiple calculations to get an answer, use more significant figures than required in each calculation and round at the end only. Rounding too early can cause your final answer to be outside the tolerance range.

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### Part A

For most answers, you will simply enter your numeric answer directly into the space provided to the right of the equal sign. Answer the following question by typing the numeric answer into the answer box.

If you have a gross of items, you have 144 items. If you buy a gross of eggs, how many dozen eggs do you have?

**Express your answer in dozens. Do not enter the units; they are provided to the right of the answer box.**

#### Hint 1. How many items are in a dozen?

If you have a dozen items, how many items do you have?

ANSWER:

- ☐ 6 items
- ☒ 12 items
- ☐ 13 items

ANSWER:

number of eggs = 12 dozen

**Correct**

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### Part B

When entering large numbers in the answer box, do not use commas. For example, enter 1276400 for the number 1,276,400. Do not enter 1,276,400. If you accidentally enter commas, you will get a message that your answer has the wrong number of terms. Answer the following question by typing the numeric answer into the answer box.

What is the sum of 9260 and 3240?

**Express your answer numerically to at least three significant figures.**

#### Hint 1. How to compute the sum

Recall that the sum of two numbers is the result you obtain by adding the two numbers together.

ANSWER:

sum = 12500

**Correct**

Note that you can always review exactly what you typed in the answer box by clicking **My Answers**.

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
### Scientific notation

You may want to enter 367,000,000 in scientific notation as  $3.67 \times 10^8$ . There are two ways to do this.

To use a template, click the  button found under the  menu.

To use the keyboard,

- Instead of the  $\times$  symbol, use a multiplication dot ( $\cdot$ ) by typing the keyboard multiplication symbol  $*$  (Shift + 8).
- To input the exponent for numbers written in scientific notation, do either of the following:

- Click the  button found under the  menu.
- Type  $\wedge$  (Shift + 6) from your keyboard.

For example,  $3.67 \cdot 10^8$  can be entered in the answer box by typing  $3.67*10^8$ .

### Part C

Practice entering numbers that include a power of 10 by entering the diameter of a hydrogen atom in its ground state,  $d_H = 10.6 \times 10^{-11}$  m, into the answer box.

**Express the diameter of a ground-state hydrogen atom in meters using a power of 10. Do not enter the units; they are provided to the right of the answer box.**

ANSWER:

$d_H = 1.06 \times 10^{-10}$  m

#### Correct

In some computer programming languages and software, a shorthand scientific notation for a number such as  $3.0 \times 10^{12}$  would be  $3.0E12$ . This notation should be avoided when using the math answer box, because the  $E$  will be interpreted as a variable. To correctly enter  $3.0 \times 10^{12}$  as an answer, follow the advice given above.

### Part D

If you are asked to provide a set of two or more numeric answers, separate them with commas. For example, to provide the year that *Sputnik* (the first satellite to be sent into orbit around the Earth) was launched and the year humans first walked on the Moon, you would enter 1957, 1969 in the answer box.

A rectangle has a length of 5.50 m and a width of 12.0 m. What are the perimeter and area of this rectangle?

**Enter the perimeter and area numerically separated by a comma. The perimeter should be given in meters and the area in square meters. Do not enter the units; they are provided to the right of the answer box.**

#### Hint 1. How to find the perimeter

The perimeter of a two-dimensional shape is the distance around the outside edge of the shape. In the case of a rectangle, there are two sides of length  $L$  and two sides of width  $W$ . Therefore, if you were to walk around the outside of a rectangle, you would walk a distance of  $2L + 2W$  or  $2(L + W)$ .

#### Hint 2. How to find the area

The area  $A$  of a rectangle is given by the product of its length  $L$  and width  $W$ :  $A = L \cdot W$ .

ANSWER:

perimeter, area = 35.0,66.0 m, m<sup>2</sup>

#### Correct

## Introduction to Numeric Answers with Units

This exercise is not intended to test your knowledge of any specific subject material. Therefore, on this problem you will not be penalized for using hints or

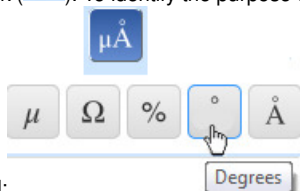
submitting incorrect answers.

## Overview

When an assignment question requires that you enter an answer consisting of a numeric value and its units, you will see an answer box like the one illustrated here.

To answer this type of question, you will need to type the numeric value and the appropriate units in the boxes provided.

- **To enter a numeric value**, click in the Value box and then type in the value. You can enter only numeric values, including scientific notation. You can't enter calculations or algebraic expressions. The same grading, tolerance, and significant figure rules apply to the numeric value of your number and units answer as apply to numeric answers.
- **To enter units**, click in the Units box and then enter the abbreviated unit. You can enter any of the following:
  - A single unit such as m, eV, Å, Ω, or °C.
  - A single unit with a prefix such as cm or MeV.
  - A compound unit such as ft · lb or m/s. Note that you must use explicit multiplication in compound units. For example, newton-meters can be entered as either N · m or N – m, but not Nm.
  - A compound unit with a prefix such as kN · m.
- **To undo your work**, click . **To redo your work**, click .
- **To clear your work (restart)**, click .
- **To view a list of keyboard shortcuts**, click . Here are some of the most common shortcuts:
  - **Compound unit multiplication**: Type \* (Shift + 8) or Type – (a hyphen).
  - **Exponent**: Type ^ (Shift + 6).
  - **Fraction**: Type / (a forward slash).
  - **Degree symbol**: Type \deg.
- **For more information**, click ( ). To identify the purpose of any icon, simply place your cursor over it. For instance, here is an example



showing the degree symbol:

## Part A

Answer the following question by entering the numeric value with appropriate units.

If the length of one side of a square is 12.0 m, what is the perimeter of the square?

**Express the perimeter to three significant figures and include the appropriate units.**

### Hint 1. Definition of a perimeter

The perimeter of a square is the sum of the lengths of all four sides of the square.

ANSWER:

perimeter = 48.0 m

**Correct**

Because a square has four sides of equal length, the perimeter is

$$12\text{ m} + 12\text{ m} + 12\text{ m} + 12\text{ m} = 48.0\text{ m}$$

You could also express the perimeter in equivalent units using prefixes such as cm or km (i.e., 4800 cm or 0.0480 km)

**Part B**

When numbers are very small or very large, it is convenient to either express the value in scientific notation and/or by using a prefix with the unit.

A pain-relieving pill has a mass of 0.005 g. Express the pill's mass in grams using scientific notation or in milligrams.

**Express your answer in scientific notation to one significant figure or use a prefix on the unit.**

**Hint 1. How to interpret the prefix *milli***

The prefix m (milli) implies multiplication by  $10^{-3}$ ; thus, a milligram is  $1 \times 10^{-3}$  g.

ANSWER:



$$\text{mass} = 5 \times 10^{-3} \text{ g}$$

**Correct**

Because 1 milligram =  $10^{-3}$  grams, you can enter your answer as  $5 \times 10^{-3}$  g or 5 mg.

**Part C**

You can also enter units that are combinations of other units. Keep in mind that you have to indicate the multiplication of units explicitly either with a

multiplication dot or a dash. You can add a multiplication dot by selecting the dot  from the symbol  menu.

The weight of an object is the product of its mass,  $m$ , and the acceleration of gravity,  $g$  (where  $g = 9.8 \text{ m/s}^2$ ). If an object's mass is  $m = 10. \text{ kg}$ , what is its weight?

**Express the weight to two significant figures and include the appropriate units.**

**Hint 1. The units for weight**

To calculate the weight of an object, you must multiply its mass by the acceleration due to gravity:

$$\text{weight} = \text{mass of object} \cdot \text{acceleration due to gravity}$$

Because you are multiplying a value with the units kg by a value with the units  $\text{m/s}^2$ , find the resulting units by multiplying both units together:

$$(\text{kg}) \cdot (\text{m/s}^2) = \text{kg} \cdot \text{m/s}^2$$

ANSWER:

$$\text{weight} = 98 \frac{\text{kg} \cdot \text{m}}{\text{s}^2}$$

**Correct**

The weight of the object is  $m \cdot g = 98 \text{ kg} \cdot \text{m/s}^2$ . Because  $1 \text{ kg} \cdot \text{m/s}^2 = 1 \text{ N}$  (1 newton), you can also express the answer as 98 N, in scientific notation as  $9.8 \times 10^1 \text{ N}$ , or with a prefix as 0.098 kN.

**Part D**

You can enter units that are combinations of units with prefixes. However, you must maintain the same unit system given in the problem. For example, this question uses the SI unit system. Therefore an answer in U.S. customary units, such as miles per hour would not be accepted as correct.

A car traveling with constant speed travels 150 km in 7200 s. What is the speed of the car?

**Express the speed to two significant figures and include the appropriate units.**

**Hint 1.** The equation for computing speed

If an object is moving with constant speed, its speed is given by

$$\text{speed} = \frac{\text{distance}}{\text{time}}$$

ANSWER:

$$2.1 \times 10^{-2} \frac{\text{km}}{\text{s}}$$

**Correct**

You can enter your answer in any equivalent combination of SI units representing a distance over any period of time. For example, you could also enter 20.8 m/s.

## Part E

You can enter compound units that are combinations of other units that are multiplied together. To enter the  $\cdot$  explicitly, type (shift + 8) on the keyboard,

or use the template in the Symbols  menu.

Torque can be calculated by multiplying the force ( $N$ ) applied at  $90^\circ$  to the lever arm at a distance ( $m$ ) from the pivot point (point of rotation), the compound SI unit for the torque is  $N \cdot m$ . If the force (at  $90^\circ$  to the lever arm) applied is 15 N and it is applied at 2.0 m from the pivot point (point of rotation), what is the torque on the lever?

**Express the torque using two significant figures and include the appropriate units.**

**Hint 1.** The equation for computing torque

If a lever has a constant force applied at  $90^\circ$  to the lever arm at a fixed distance from the pivot point (point of rotation), the torque on the lever is given by

$$\text{torque} = \text{force (at } 90^\circ \text{ to lever arm)} \times \text{distance to pivot point}$$

ANSWER:

$$30 \text{ N} \cdot \text{m}$$

**Correct**

## Introduction to Significant Figures

Many questions in Mastering require you to enter your answer to a specified number of significant figures. For grading purposes, some numeric answers must be exact. Suppose you are asked "How many days are in a week?" The answer must be "7." Other numeric answers may be graded as correct not only when they match the exact answer but also if they fall within an acceptable range of the exact answer. This range is known as the grading tolerance. Suppose you are asked "How many days are in a year?" The precise answer is 365.24 days. However, a calendar contains 365 days, so the Mastering system will also accept that as correct.

An answer that falls within the Mastering grading tolerance will also be marked as correct and you will be given full credit. You will see a feedback box that looks like the one below:

**Correct**

**Significant Figures Feedback:** Your answer  $11.79 \text{ cm}^2$  was either rounded differently or used a different number of significant figures than required for this part. If you need this result for any later calculation in this item, keep all the digits and round as the final step before submitting your answer.



Because you rounded differently than the system did, your rounded answer might affect your work on further calculations in the same item and could cause your next answer to fall outside of the tolerance. To prevent this, you will be asked to use the unrounded answer for all future parts.

### Part A

Suppose you are asked to find the area of a rectangle that is 2.1-cm wide by 5.6-cm long. Your calculator answer would be  $11.76 \text{ cm}^2$ . Now suppose you are asked to enter the answer to two significant figures. (Note that if you do not round your answer to two significant figures, your answer will fall outside of the grading tolerance and be graded as incorrect.)

**Enter your answer to two significant figures and include the appropriate units.**

ANSWER:

12 cm<sup>2</sup>

#### Answer Requested

This is your final answer, rounded to two significant figures.

To calculate an answer to the correct number of significant figures, you must complete all calculations first and then round your final answer as the very last step. In Part C, you are asked to calculate the volume of a rectangular prism that has a length of 5.6 cm, a width of 2.1 cm, and a height of 6.6 cm. You can calculate the volume of a prism by multiplying the area of the base times the height. You already calculated the area of the base as  $2.1 \text{ cm} \times 5.6 \text{ cm}$  in Part A.

### Part B

What value should you use as the area of the base when calculating the answer to Part C?

ANSWER:

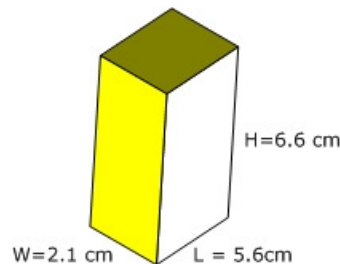
- ☐ 12 cm<sup>2</sup>
- ☐ 11.8 cm<sup>2</sup>
- ☒ 11.76 cm<sup>2</sup>

#### Correct

$11.76 \text{ cm}^2$  is the correct, unrounded value of the area of the base. It is correct to round to the requested number of significant figures in Part A because calculating the area is your final step. If you want to use that information in further calculations you *must* use the unrounded value.

### Part C

Using the correct answer from Part B, calculate the volume of a rectangular prism with a length of 5.6 cm, a width of 2.1 cm, and a height of 6.6 cm.



**Enter your answer to two significant figures and include the appropriate units.**

ANSWER:

78 cm<sup>3</sup>

#### Correct

### Part D

Would an answer that generated the response below be considered correct and give you full credit?

### Correct

Note that you can always review exactly what you typed in the answer box by clicking **My Answers**.

**Significant Figures Feedback:** Your answer 12499 was either rounded differently or used a different number of significant figures than required for this part.

ANSWER:

- ☒ Yes.
- ☐ No.
- ☐ It is impossible to tell.

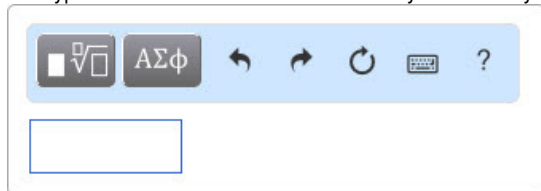
Correct

## Introduction to Symbolic Answers








This exercise is not intended to test your knowledge of any specific subject material. Therefore, on this problem you will not be penalized for submitting incorrect answers.

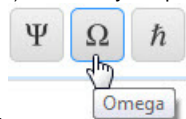
### Overview

The type of answer box illustrated here lets you build a symbolic expression just as it would look in your textbook or as you might write it by hand.



You use the same answer box and menu tabs to enter numeric and symbolic answers.

- **To insert a formatting template**, such as an exponent, square root, or fraction, click  and then select the appropriate template.
- **To insert Greek letters,  $\hbar$  (hbar) and  $\mathcal{E}$  (EMF)**, click  and then select the letter you want.
- **To undo your work**, click . **To redo your work**, click .
- **To clear your work (restart)**, click .
- **To view a list of keyboard shortcuts**, click . Here are some of the most common shortcuts:
  - **Subscript**: Type `_` (an underscore).
  - **Exponent**: Type `^` (Shift + 6).
  - **Fraction**: Type `/` (a forward slash).
  - **Square root**: Type `\sqrt`.
  - **Greek letters**: Type a backslash (`\`) and the name of the Greek character. For example, to display  $\delta$ , you would type `\delta`. For uppercase Greek letters, begin the name with a capital letter. For example, you would type `\Delta` to display  $\Delta$ .
- **For more information**, click (  ). To identify the purpose of any icon, simply place your cursor over it. For instance, here is an example



showing the Greek letter Omega:

### Grading

Your answers are graded according to the standard order-of-operations conventions for evaluating mathematical expressions, as follows:

1. Perform any calculations inside parentheses.
2. Perform all multiplications and divisions, working from left to right.
3. Perform all additions and subtractions, working from left to right.

For example, in the expression  $a + b \cdot c$ , first you should multiply  $b$  by  $c$  and then add  $a$  to the total. In other words, the correct expression is

$$a + b \cdot c = a + (b \cdot c) \neq (a + b) \cdot c.$$

### Part A

Similar to what you see in your textbook, you can generally omit the multiplication symbol as you answer questions online, except when the symbol is needed to make your meaning clear. For example,  $1 \cdot 10^5$  is not the same as  $110^5$ . When you need to be explicit, type \* (Shift + 8) to insert the multiplication operator. You will see a multiplication dot (·) appear in the answer box. Do not use the symbol ×. For example, for the expression  $ma$ , typing  $m \cdot a$  would be correct, but  $m \times a$  would be incorrect.

Enter the expression  $ma$ .

ANSWER:

$$ma = ma$$

#### Correct

When entering algebraic expressions, such as  $ma$ , you can enter it using explicit multiplication  $m \cdot a$  or implied multiplication  $ma$ . Both will be accepted as correct.

All trigonometric functions assume angles are in radians by default, unless the use of degrees is specified.

### Part B


Enter the expression  $2\cos^2(\theta) - 1$ , where  $\theta$  is the lowercase Greek letter theta.

ANSWER:

$$2\cos^2(\theta) - 1 = 2\cos^2(\theta) - 1$$

#### Correct

To identify a variable displayed in a specific part, place your cursor over it. For instance, here is an example showing the Greek letter theta used in

this problem: .

### Part C

Enter the expression  $\text{asin}(x) + 15$ , where  $\text{asin}(x)$  is the inverse sine function.

ANSWER:

$$\text{asin}(x) + 15 = \text{asin}(x) + 15$$

#### Correct

Use the same notation to enter other inverse trigonometric functions, for example  $\text{acos}(x)$  and  $\text{atan}(x)$  for the inverse cosine and tangent functions respectively.

### Part D

Enter the expression  $\sqrt{\frac{2g\Delta y}{m}}$ , where  $\Delta$  is the uppercase Greek letter Delta.

ANSWER:

$$\sqrt{\frac{2g\Delta y}{m}} = \sqrt{\frac{2g\Delta y}{m}}$$

Correct

### Part E

Enter the expression  $N_0 e^{-\lambda t}$ , where  $N_0$  is N-naught (an N with a subscript zero) and  $\lambda$  is the lowercase Greek letter lambda.

ANSWER:

$$N_0 e^{-\lambda t} = N_0 e^{-\lambda t}$$

Correct

## Introduction to Sorting Questions

This exercise is not intended to test your knowledge of any specific subject material. Therefore, on this question you will not be penalized for using the hint or submitting incorrect answers.

### Overview

1. Sorting questions require you to place objects into different categories or bins. There will always be at least two bins and each bin is labeled according to the category it represents.
2. An object can only belong to one bin.
3. A bin can remain empty.
4. Before an answer is submitted, it is possible to rearrange the objects by dragging them to new locations. To start over, click **Reset**.
5. Once you're satisfied with your sorting, click **Submit**.

### Part A

Correctly classify the given food items as either a fruit or a vegetable. If you need help, look at the hint available by clicking **Hints**.

**Drag the foods into the appropriate bins. Fruits should be placed in the left bin. Vegetables should be placed in the right bin.**

#### Hint 1. How to distinguish fruits from vegetables

Botanically speaking, anything that grows from a flower and bears seeds is considered a fruit. For example, oranges, grapes, and strawberries are all fruits. True vegetables are those that come from a part of the plant that is not the flower, such as leaves, stems, and roots. Thus lettuce, cabbage, and radishes are all vegetables.

ANSWER:

**Correct**

A tomato comes from a flower and contains seeds, so it is a fruit and is classified as a berry. An avocado contains a large seed in its center similar to peaches, apricots, and mangos. Plants such as cucumbers, squash, green beans, peppers, and eggplants are also fruits by this definition, although they are usually used as vegetables in cooking.

Keep in mind that you can refer to this question or consult the **Help** if you have difficulty using this answer type later on.

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## Introduction to Ranking Questions

This exercise is not intended to test your knowledge of any specific subject material. Therefore, on this question you will not be penalized for submitting incorrect answers.

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### Overview

1. Rankings are *usually* ordered from left to right. Check the problem instructions to be sure.
2. To rank two (or more) objects that are equivalent, drag one object into the ranking bin then drag the second object to overlap it. These objects will then automatically align to be slightly offset (so you can see both of them at once). You will know they are equal because a vertical gray bar will appear behind them to indicate an equivalent ranking group.
3. Sometimes, it will be impossible to rank the objects based on the information given. In such a case, click on the box labeled "The correct ranking cannot be determined" below the ranking window.
4. Before an answer is submitted, it is possible to rearrange the objects by dragging them to new locations. To start over, click **Reset**.
5. Once you're satisfied with your ranking, click **Submit**.

---

### Part A

Each of these geometric shapes has a different number of sides. Arrange the shapes in order from the shape with the greatest number of sides to the shape with the fewest number of sides.

**Rank these shapes from greatest to fewest number of sides. To rank items as equivalent, overlap them.**

ANSWER:

**Correct**

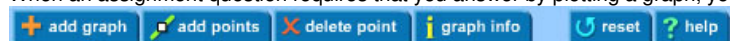
Note that when two or more objects are equivalent they are placed one atop another. They will appear slightly offset, but the background color behind them will change to light gray to indicate that the items are in the same equivalent ranking group. Keep in mind that you can refer to this question or consult the **Help** if you have difficulty using this answer type later on.

## Introduction to Graphing Questions

This exercise is not intended to test your knowledge of any specific subject material. Therefore, on this question you will not be penalized for submitting incorrect answers.

### Overview

When an assignment question requires that you answer by plotting a graph, you will see the following buttons:



- **To add a new graph**, click . You will first be prompted to select a label. Then you can add points. (After adding your first point, the tool automatically changes to **add points** mode.) You can create as many "unlabeled graphs" as you like -- these will not be graded.
- **To add or edit points on a graph**, select or . This button toggles between these two modes.

#### About adding points:

Your cursor appears as a crosshair with  $(x, y)$  coordinates next to it. To add a point, click a location. To add multiple points at a time, click and drag your mouse.

#### About editing a graph:

*Using a mouse:* To move a point, click to select the point and then drag it to the new location. To move the entire graph to a new location, click between points on the graph and then drag.

*Using your keyboard:* With a point or graph selected, press any arrow key to reposition.

**About selecting/deselecting points and graphs:** Click on any point to select it. To select a graph, click between points. Actively selected points and graphs are highlighted. To deselect a point or graph, click an empty area of the workspace.

- **To delete a selected point or graph**, click or . To delete using your keyboard, press *Delete* or *Backspace* after selecting a point or selecting a graph.
- **To change the graph label for the active graph**, click .
- **To reset your graphs to the most recently submitted answer (restart)**, click .

For help with graphing, click .

### Part A

Create a graph of  $y = 2x - 6$ .

Construct a graph corresponding to the linear equation  $y = 2x - 6$ .

### Hint 1. Identify a point to graph

You need to create a plot of

$$y = 2x - 6.$$

To identify points on this graph you must solve for the values of  $y$  when  $x$  takes on different values. What is  $y$  when  $x = 5$ ?

**Express your answer numerically.**

ANSWER:

$y = 4$

ANSWER:

**Correct**

Now that you have some experience with graphing task question types you can tackle harder graphs.

## Introduction to Vector Drawing Questions

When an assignment question requires that you answer by drawing vectors or moments, you will see the following buttons.



- **To draw a new vector**, click **+ add element** and select the label for the vector that you want to draw. You can draw the vector by clicking on the start point and dragging your mouse to the end point.
- **To edit an existing vector**, click to select either the vector, its start point, or its end point. Drag the selected vector or point to a new location.
- Some questions will ask you to mark moments. **To mark a moment**, click once to add a clockwise arrow, again to add counterclockwise arrow, and a third time to return to a state of no moment/torque action (no directional arrow).
- **To deselect a vector or moment**, click on any empty area of the workspace.
- **To view the sum of all the vectors in your drawing**, click **Σ vector sum**. This option is not available in every problem.
- **To delete a selected vector or moment**, click **X delete element**. To delete using your keyboard, press *Delete* or *Backspace* after selecting a vector or moment.
- **To change a label, get information about a vector or moment, to change the length and angle of a vector using the keyboard or to change the direction of a moment**, click **i attributes** to display attribute windows such as the following:

Edit Vector

Label
default : Vector

Length
128.8

Angle
34.9°

Edit Moment

Label
default : Moment

Direction
Counterclockwise

Here you can change a label by selecting another vector or moment. Vector properties (Length and Angle) will display or the moment direction, if they are required for you to complete the drawing.

- To reset your vectors or moments to the most recently submitted answer (restart), click [reset](#).

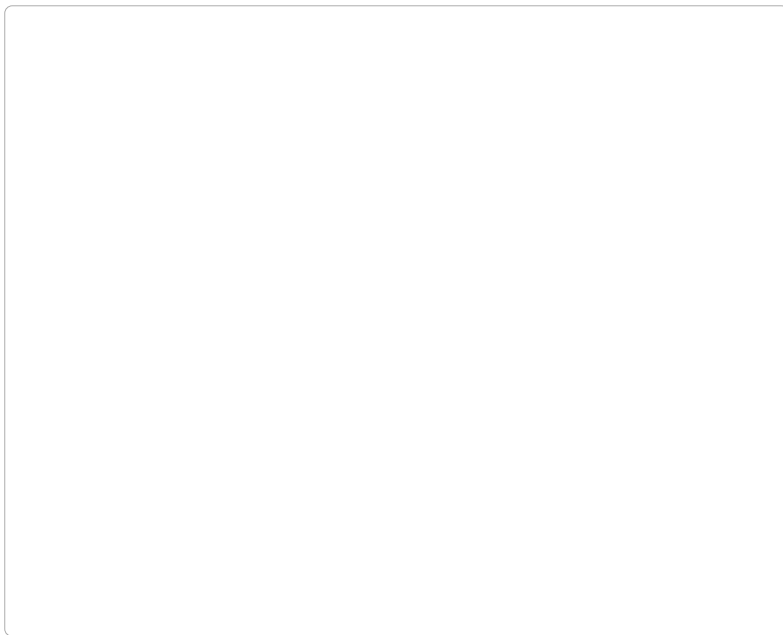
For help with drawing vectors or moments, click [help](#).

## Part A

Every morning Ann walks her dog through the park, shown as a green square on the diagram below. They start at point 1, walk one block up the street, take a turn at the corner labeled 2, and walk diagonally through the park to point 3. To return home, they walk two blocks down the street and turn right at the corner labeled 4. Draw the path  $1 \rightarrow 2 \rightarrow 3 \rightarrow 4 \rightarrow 1$  taken by Ann as she walks her dog. Represent each segment of Anna's walk with a vector.

The vectors should start and end at the centers of the red dots located on the image.

ANSWER:



### Correct

Besides drawing vectors by connecting two given dots, you will often have to draw vectors of a given length or at a specific angle. In these cases, click [attributes](#), then adjust the vector from the properties window to the desired length or angle.

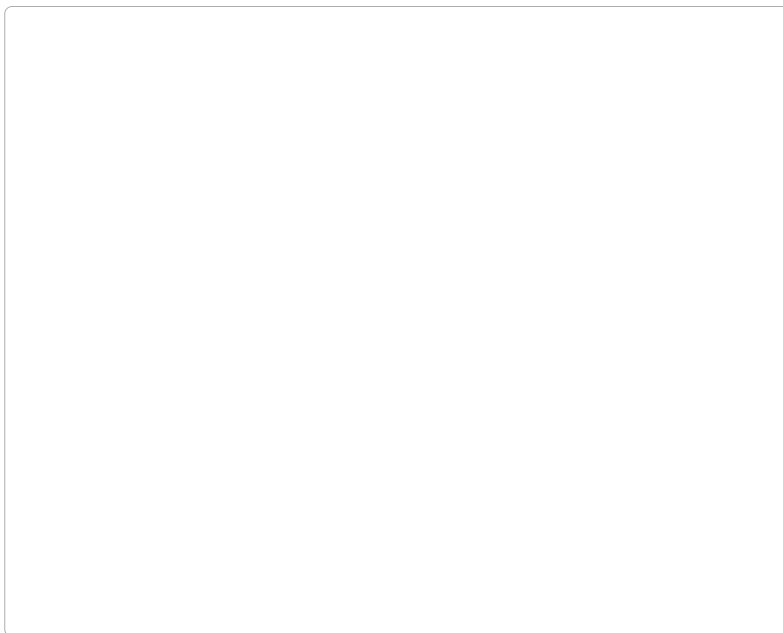
## Part B

Now imagine that instead of walking along the path  $1 \rightarrow 2 \rightarrow 3 \rightarrow 4 \rightarrow 1$ , Ann walks 80 meters on a straight line  $33^\circ$  north of east starting at point 1. Draw Ann's path. Represent Ann's walk with a vector of length 80 meters.

Draw the vector starting at point 1. The length displayed in the **Vector Info** properties window is given in meters.

ANSWER:



**Correct**

You can use the  button to adjust the length, and orientation of a vector:

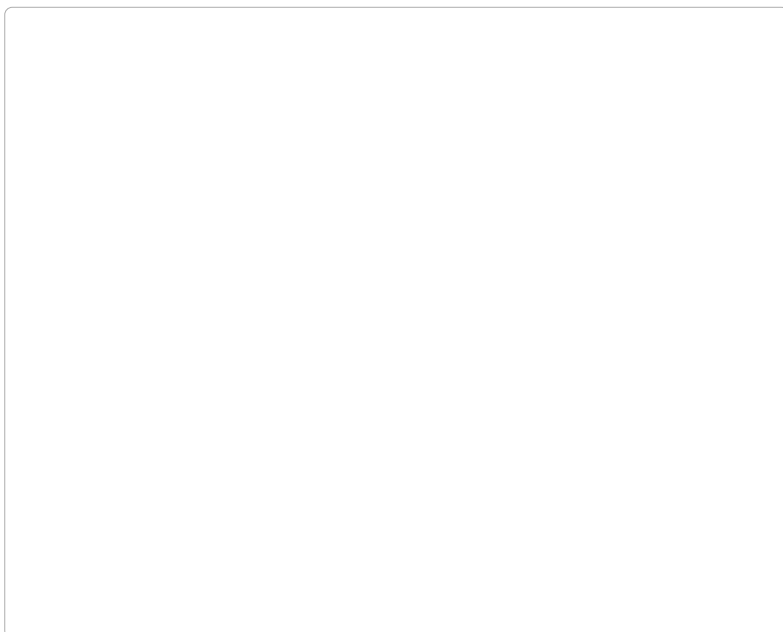
1. Click on the button to display the properties window.
2. Drag the properties window to a location where it will not prevent you from seeing and manipulating the vector.
3. Draw the vector at the desired location. As you draw the vector, notice the information displayed in the properties window (length and angle). Depending on the question, some information may not be available in the properties window. When an angle is displayed, it is the angle, measured counterclockwise, that the vector makes with respect to the positive  $x$  axis pointing toward the right (east).
4. Adjust the vector until the desired length and angle are displayed in the properties window or just manually enter them.

**Part C**

The diagram below shows a force being applied on a beam. Mark the direction of moment at the fulcrum by clicking on the dot indicated by  $M$ .

**Click once to add a clockwise arrow, again to add counterclockwise arrow, and a third time to return to a state of no moment/torque action (no directional arrow).**

ANSWER:



Correct

## Reviewing the Fundamentals

Try this final item to review some of the key concepts you've learned.

### Part A

You are starting a new item and after reading the first part you realize you have no idea how to go about answering it. What should you do?

ANSWER:

- ☐ Request the solution immediately.
- ☐ Guess randomly and hope for some useful feedback.
- ☒ Use the available hints.

Correct

The hints are designed for exactly this reason: to give you something to work with if you are absolutely stuck. You will most likely score higher (and learn more!) if you use the hints when you need them rather than guessing or giving up.

### Part B

You have been working on an item for a while and after a few missteps you've come up with an answer. However, there is one particular thing that you're not 100% sure of. What should you do?

Select all that apply.

ANSWER:

- ☒ Return to the question after you've spoken with an instructor or classmate.
- ☒ Check for any hints that address the part of the calculation you're unsure about.
- ☒ Submit your answer and then adjust it according to any feedback you receive.
- ☐ None of the above.

### All attempts used; correct answer displayed


There is no single right way to proceed if you've made some progress on an item but are not 100% sure of your work. If you submit the answer, you might be right and there is a good chance you will get some useful feedback. There is also a good chance that the hints address whatever issue you are unsure about. Finally, if your instructor allows it, talking over your solution with someone else could be a good way to go. You should do whatever you find works best for you.

### Part C



You've just solved a problem and the answer is the mass of an electron,  $m_e = 9.11 \times 10^{-31}$  kilograms. How would you enter this number into the answer box?

Enter your answer in kilograms using three significant figures. Note that the units are provided for you to the right of the answer box.

#### Hint 1. Multiplication and superscripts

You may use the scientific notation template  to enter your answer, or type the following: 9.11\*10^-31.

The keyboard multiplication symbol \* (Shift + 8) will appear as a multiplication dot, and the carat symbol ^ (Shift + 6) will allow superscript.

Another way to get an exponent is by clicking  in the  menu.

ANSWER:

$$m_e = 9.11 \times 10^{-31} \text{ kilograms}$$

**Correct**

#### Part D

A friend in your class tells you that she never uses hints when doing her Mastering homework. She says that she finds the hints helpful, but when the hint asks another question it increases the chance that her score on the problem will go down. She feels like it isn't worth the risk. You reassure her that there is nothing to fear about opening a hint that asks a question. Which of the following are good reasons for your friend not to worry?

**Select all that apply.**

ANSWER:

- ☒ Getting the correct answer to the question in a hint actually gives you some partial credit, even if you still can't answer the original question.
- ☒ As an incentive for thinking hard about the problem, your instructor may choose to apply a small hint penalty, but this penalty is the same whether the hint simply gives information or asks another question.
- ☒ The only way to lose additional partial credit on a hint is by using the "give up" button or entering incorrect answers. Leaving the question blank will not cost you any credit.
- ☐ None of the above.

**Correct**

That's it! You're done! We hope you enjoy using Mastering.

#### Score Summary:

Your score on this assignment is 100%.

You received 10 out of a possible total of 10 points.