



Week 1 Test

11 questions

1
point

1.

Before you start: *Have you done all the practice quizzes, including the one on significant figures? The quizzes do not count for marks, and some of the quiz questions are quite hard. The quizzes are for learning and these tests are for assessment. Because the course runs in on-demand mode, we cannot give solutions to the test questions. But the quizzes have solutions and feedback. So, if you have troubles with these test questions, you should go back to the relevant lesson and then do the relevant quiz to check your understanding.*

Are the answers and the marking algorithm correct? You can be sure that we have checked them thoroughly, and many students on the course have checked them, too. Two common mistakes are giving the wrong number of significant figures and not reading the answer format instructions. Another common mistake is simply being wrong!

[#161] Circle question (an easy one to start)

What is the circumference of a circle with a radius of 2.1 cm?

Enter your answer as a number; do not include units. You must use *the appropriate number of significant figures*. If you have not done lesson 1.2 and practice quiz 1.2, you should go back to them before you go on.

Circumference = ____ cm.

Enter answer here

1
point

2.

[#162] Density

Density is defined as mass per unit volume. A solid cylinder has a diameter of 17.4 mm and a length of 50.3 mm. Its mass is 49 g. What is its density? Give your answer in metric tonnes per cubic metre. (The metric tonne is 1000 kg.)

Enter your answer as a number, *using the appropriate number of sig figs*. Do NOT include units*.

Density = ____ tonnes · m⁻³

* You may think it is odd that we ask you not to enter units: so do we! Unfortunately this is a limitation of the software. In the real world, and in high school and university tests, it is very important to identify units, so we have asked Coursera to fix this.

Enter answer here

1
point

3.

[#163] Sammy's height

In the US, lengths are often measured in inches, feet, yards and miles. Let's do some conversions. The definition of the inch is: 1 inch = 25.4 mm, exactly. A foot is 12 inches and a mile is 5280 ft, exactly. A centimetre is exactly 0.01 m or 10 mm.

Sammy is 5 feet and 5.3 inches tall. Mark all the true statements below (Hint: use the 'multiply by 1' technique. Use the appropriate number of sig figs.):

- ☐ Sammy is 1.66 m tall.
- ☐ Sammy is less than 0.5 m tall.
- ☐ Sammy is between 1600 and 1700 mm tall.
- ☐ Sammy is more than 168 cm tall
- ☐ Sammy is 55.3 inches tall
- ☐

- ☒ Sammy is more than 60 inches tall
- ☐ Sammy is 5.44 feet tall
- ☐ Sammy is 5.4 feet tall
- ☐ It would take about 90000 Sammies, lying head to toe, to span the entire length of Victoria's 90-mile beach
- ☐ It would take over 100000 Sammies, lying head to toe, to span the entire length of Victoria's 90-mile beach

1
point

4.
[#164] Horsepower

A solar racing car* typically has a power of about 1.2 kW (1.2 kilowatts). What is this in horsepower (hp)? (Use the conversion 1 hp = 745.7 watts). For practice, write your answer formally using the 'multiply by 1' technique we've been using.

Give your final answer as a number, with the appropriate number of sig figs. Do NOT include units.

1.2 kW = ____ horsepower.

* For geeks, my blog on a 3000 km solar race across Australia is at <http://newt.phys.unsw.edu.au/~jw/Sunswift2009.html>

Enter answer here

1
point

5.
[#165] Adding vectors

$|\vec{A}| = |\vec{B}| = |\vec{C}|$. Further, $\vec{A} + \vec{B} + \vec{C} = 0$. What is the angle between \vec{A} and \vec{B} ?

Express your answer in degrees, but do not include units. Example: for 30 degrees, write "30".

Important hint: draw one or two diagrams, with arrowheads on the vectors, and think carefully about what the angle between two vectors means. We also suggest that you try acting it out: what path do you make if you change your velocity by say 30° ? To walk around a triangle, what is the sum of the changes in direction you had to make? (If you get the wrong answer, come back and read this hints again.)

Enter answer here

1
point

6.

[#166] Subtracting vectors

What is the direction of North minus West? (Hint: draw a sketch first.)

- ☐ North
- ☐ Northeast
- ☐ East
- ☐ Southeast
- ☐ South
- ☐ Southwest
- ☐ West
- ☐ Northwest

1
point

7.

[#167] Components of vectors

The vector \vec{A} in the (x, y) plane has magnitude $A = 3.8$ and makes angle $\theta = 123^\circ$ with the x axis, where θ is measured in the geometric or anticlockwise sense. What are the components of \vec{A} in the x and y directions? Hint: draw a sketch first.

Write your answer in the form: x, y. For example: 1.5, 2.0

Use the correct number of sig figs.

1
point

8.

[#168] Such stuff as dreams are made of.

How much of you is *not* vacuum? Outside of the nucleus, an atom contains mostly empty space. Estimate the fraction of the volume of an atom that is occupied by the nucleus. Assume that a typical atom has a linear dimension of about 0.1 nm and that a typical nuclear dimension is about 1 fm. (Note that this problem introduces some new prefixes: n is nano or 10^{-9} , p is pico or 10^{-12} , f is femto or 10^{-15}).

Give your answer as a power of ten. For example, enter: 10^{18} , or 10^{-3} (for 10^{18} or 10^{-3}).

Preview

1
point

9.

[#169] Bobby thumbed a diesel down.

How many revolutions does the drive shaft of a truck engine make during its lifetime? Inputs: Let's suppose that the truck travels a million km (1 billion m) at an average speed of 80 km per hour. The engine turns at a rate of 2000 revolutions per minute. Hint: use the 'multiply by 1' technique and be careful: it's not difficult. However, there are several factors involved, so we suggest that you write your answer down formally, showing all units in the working, the way we did in the lesson.

Give your answer as a number (not a power of ten). For example, for 40 million, write 40000000. *Remember to use the appropriate number of significant figures.*

Enter answer here

1
point

10.

[#1610] Heartbeats

How many heartbeats in a typical human lifetime?

No hints for this one, and you will provide the data from your general knowledge.

Enter your answer as a number (NOT as a power of ten), and don't include commas. For example, if you think the answer is 12 million, then enter 12000000 as your answer.

Enter answer here

1
point

11.

[#1611] Nor any drop to drink

Estimate the mass of water on the earth. The density of water is $1000 \text{ kg} \cdot \text{m}^{-3}$. Here are some approximations you can use:

Compared with the oceans, lakes and rivers are tiny. Clouds have very low density. There is (still) lots of ice in the polar regions, but much less area than in the oceans. So neglect all except the oceans, which cover roughly $2/3$ of the earth.

Looking at charts of the oceans, we see that the depth is typically several thousand m (and a serious search tells me the average depth is 4700 m). The radius of the earth is about 6000 km. The surface area of a sphere is $4\pi R^2$.

This is an order of magnitude question. Express your answer in kg, as a power of 10. For example, if you think the answer is 10^4 kg, enter 10^4

This is the last question in the week 1 test. Congratulations on getting this far: we hope you have found the course so far both interesting and challenging.

*You will receive a mark for this test, but, because we run this course on demand, you won't receive the worked answers or other feedback. Apologies for that. For the **quizzes**, however, we do give answers and feedback. So, if you've had problems here, go back and look at the relevant lessons and then do (or re-do) the quizzes. Once you can do all the quiz questions, these test questions should not seem too hard.*

Preview

Enter math expression here

☐

I understand that submitting work that isn't my own may result in permanent failure of this course or deactivation of my Coursera account. Learn more about Coursera's Honor Code

Enter your legal name

10 questions unanswered

Submit Quiz

