

Show your work where necessary

_____ 1. Physics is concerned with which of the following matters?

- a. applying physics principles
- b. describing the physical world
- c. making predictions about a broad range of phenomena
- d. all of the above

_____ 2. A physicist who studies the behavior of submicroscopic particles is working in which area within physics?

- a. mechanics
- b. electromagnetism
- c. relativity
- d. quantum mechanics

5. Express each of the following as indicated:

- a. 2 h 10 min expressed in seconds
- b. 16 g expressed in micrograms
- c. 0.87 km expressed in centimeters
- d. 0.67 mg expressed in grams
- e. 58.6 km/h expressed in meters per second

6. Calculate the area of a room whose length is 17.23 m and width is 8.7 m. Express your answer in scientific notation and with the correct number of significant digits. Show your work.

7. The explosive energy of powerful explosives is measured in terms of “tons.” The ton referred to is a ton of TNT (trinitrotoluene), one of the most powerful of chemical explosives. A ton of TNT will release 59×10^9 J (joules). Show your work.

Express this energy in

a. megajoules.

b. gigajoules.

8. Calculate the following sum, and express the answer in meters. Follow the rules for significant figures.

$$(25.873 \text{ km}) + (1024 \text{ m}) + (3.0 \text{ cm})$$

_____ 3. How many variables may be tested legitimately in any one experiment?

- a. as many as a physicist can handle
- b. three
- c. one
- d. five

_____ 4. Which of the following represents a system?

- a. flag blowing in the wind
- b. ball rolling on the ground
- c. picture hanging on the wall
- d. all of the above

9. Draw a picture or diagram to explain the difference between **accuracy** and **precision**.

10. The photographs below show unit conversions on the labels of some grocery-store items. Check the **accuracy** of these conversions. Are the manufacturers using significant figures correctly? Check only a and c.



11. The value of the speed of light is now known to be 2.99792458×10^8 m/s. Express the speed of light in the following ways:

- a. with three significant figures _____
- b. with five significant figures _____
- c. with seven significant figures _____

12. How many significant figures are in the following measurements?

- | | | | |
|----------------------------|-------|----------------|-------|
| a. 300 000 000 m/s | _____ | d. 0.0060700°C | _____ |
| b. 3.000×10^8 m/s | _____ | e. 1.0040 J | _____ |
| c. 25.03 °C | _____ | f. 1.35200 MHz | _____ |

13. The radius of the planet Saturn is 6.03×10^7 m, and its mass is 5.68×10^{26} kg. Show your work.

a. Find the density of Saturn (its mass divided by its volume) in grams per cubic centimeter.

b. Find the surface area of Saturn in square meters.