AS Physics Test: Early Hurdle

Bishop Heber High School

1. Express the following fractions as percentages: [4]
   (a) 0.10
   (b) 0.87
   (c) 2.3
   (d) 0.0020
2. What is x in each of the following cases: [3]
   (a) 30% of x is 37.2
   (b) 18% of x is 43.9
   (c) 75% of x is 0.972
3. By definition, one metre is the distance travelled by light in a vacuum in $3.335\,640\,9 \times 10^{-9}$ s. Write this value to 3 significant figures and with an appropriate prefix. [2]
4. Which one of the following is the odd one out? Give a reason for your answer. [2]
   (a) N
   (b) kg
   (c) $\mathrm{m\,s^{-1}}$
   (d) A s
5. Which of the following is not an S.I. unit? [1]
   (a) metre
   (b) second
   (c) pound
   (d) coulomb
6. Express the following in mm: [4]
   (a) 2.7 m
   (b) 22.4 cm
   (c) 330 µm
   (d) 5.6×10^4 nm
7. Calculate the volume in m^3 of a cylinder if the following measurements were taken: length = 45 mm, diameter = 0.9 µm. ($V = \pi r^2 h$) [3]

8. What are the base units for capacitance? Formulas you need to know are: [4]
   (a) Capacitance = Charge/voltage ($C = Q/V$)
   (b) Voltage = Work/Charge ($V = W/Q$)
   (c) Charge = Current $\times$ time ($Q = It$)
   (d) Work = Force $\times$ distance ($W = Fd$)
   (e) Force = mass $\times$ acceleration ($F = ma$)
9. Read the vernier scale and give the measured value. (The scale is in cm) [1]
10. A resistance, R is calculated from a potential difference, V and current, I using the formula $R = V/I$. If V is 12.6 V and $I = 6.0$ A, which is the best answer? [1]
    (a) 2
    (b) 2.1
    (c) 2.10
    (d) 210×10^{-2}
    (e) 20×10^{-1}
11. Dimensions of a cuboid are measured using Vernier callipers with a precision of 0.1 mm as follows: length = 6.0 mm, width = 2.0 mm and height = 5.5 mm.
    (a) Quote each dimension with its absolute uncertainty. [1]
    (b) Calculate the percentage uncertainty for each dimension. [2]
    (c) Find the volume of the cuboid with its absolute uncertainty. [3]
12. Define Ohm's law. [1]
13. What is a radioisotope? [1]
14. Identify the number of neutrons in the following elements: [3]
    - ${}^{20}_{10}\mathrm{Ne}$
    - ${}^{238}_{92}\mathrm{U}$
    - ${}^{14}_{6}\mathrm{C}$
15. What is the 'strong' force and what is its range? [2]
16. What are a, b, c, x and y for the following nuclear reactions? [5]
    - ${}^{235}_{92}\mathrm{U} \longrightarrow {}^{y}_{x}\mathrm{Th} + {}^{4}_{2}\alpha$
    - ${}^{14}_{6}\mathrm{C} \longrightarrow {}^{14}_{7}\mathrm{N} + {}^{a}_{b}\beta + c$
17. Define antimatter. [1]
18. Find the base units for c in Einstein's famous equation, $E = mc^2$. [3]
19. How are antiparticles formed? [3]

TOTAL SCORE = 50