1   Which type of error occurs due to unpredictable variation around the true value?

Circle **one** answer.

A measurement error   **B**   random error

C systematic error   **D**   zero error   **[1]**

2   Which type of error occurs due to using an ammeter that reads 0.03 A when there is no current

passing through it?

Circle **one** answer.

A measurement error   **B**   random error

C systematic error   **D**   zero error   **[1]**

3   What is the specific charge of a proton?

Circle **one** answer.

A $1.76 \times 10^{11} \, \text{C} \, \text{kg}^{-1}$

B $1.67 \times 10^{-11} \, \text{C} \, \text{kg}^{-1}$

C $9.58 \times 10^{7} \, \text{C} \, \text{kg}^{-1}$

D $9.11 \times 10^{-31} \, \text{C} \, \text{kg}^{-1}$ **[1]**

4   Circle **one** answer. An alpha particle is made up of:

A 2 electrons & 2 protons   **B**   2 electrons & 2 neutrons

C 2 neutrons & 2 protons   **D**   2 neutrons, 2 protons, & 2 electrons   **[1]**

5 Match these measurement terms to their definitions**.**

precise   result is close to true vale

reproducible   value in a set of results is ruled out as erroneous

anomaly   measurements are close to a mean value

accurate   original experimenter gets the same results if they do it again

repeatable   another person gets the same results

[2]

5 Draw a line from each quantity to its SI unit.

mass	degree Celsius
	second
length	centimetre
	ampere
time	kilogram
	minute
current	volt
	kelvin
temperature	metre
	gram

[3]

6 Complete the table below

prefix	exponent
micro	
	10^{-3}
centi	
	10^{-9}
kilo	

[2]

7 Write the types of electromagnetic radiation in order of decreasing wavelength.

[2]

8 Complete the sentence below.

Carbon-12 and carbon-14 are _____ of carbon. The difference between them is

the number of _____. They have the same number of protons and _____. **[2]**

9 Carbon-14 decays into nitrogen-14 through beta decay. Name the particle released and write its symbol.

particle released = _____   symbol = _____   **[2]**

10 a Write the equation for the wavelength of electromagnetic radiation.
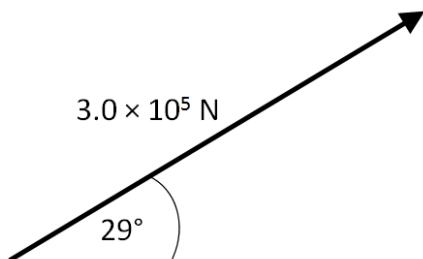
[1]

b Calculate the frequency of light with a wavelength of 725 nm

frequency = _____ units _____   **[3]**

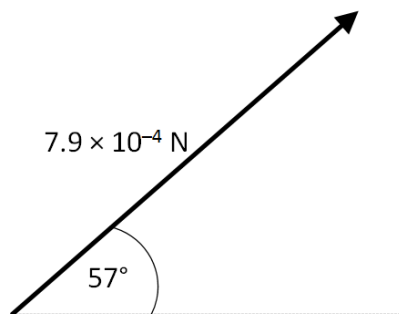**11** Resolve these vectors into their horizontal and vertical components using trigonometry.

a

3.0 × 10⁵ N

29°

horizontal component = _____ N

vertical component = _____ N

[2]

b

7.9 × 10⁻⁴ N

57°

horizontal component = _____ N

vertical component = _____ N

[2]

12 Complete the table below.

	Mass (kg)	Absolute Charge (C)	Relative Charge
proton	1.67×10^{-27}		1
neutron		0	
electron			

[3]

13 Name the four fundamental interactions.

_____

_____

_____

_____

[2]

Total = 30 marks