6118
Paper 2

GENERAL COMMENTS

The performance of candidates in this paper had shown that only a small fraction of candidates could demonstrate assessment objectives A and B which are knowledge with understanding and handling of information, application and solving problems. It is worth reminding teachers to teach having in mind the two mentioned above assessment objectives because NSSCO Paper 2 will focus on those assessment objectives only.

The basic competencies brought in from the NSSCH old curriculum as it was highlighted in the examiner's report for the year 2020 still need to be approached with care as most candidates struggled to answer the questions from these basic competencies. Teachers are encouraged to use various teaching and learning resources to help candidates to learn the content with understanding.

COMMENTS ON INDIVIDUAL QUESTIONS

Question 1

(a) The majority of candidates could identify the most appropriate apparatus for the given measurements. Only fewer candidates who could not be awarded due incorrect spelling of the apparatus.

(i) Well answered.

(ii) Well answered.

(iii) Fairly answered. Most candidates confused Micrometer screw gauge with Vernier caliper.

(b) Poorly answered. The majority of candidates have shown that experiment on how to determine the period of a pendulum was not done at all.

1 (a) (i)	Ruler ✓	Correct spelling	1
(ii)	Measuring cylinder ✓	Correct spelling	1
(iii)	Micrometer screw gauge ✓	Correct spelling	1
(b)	Measure the time for (n≥5) complete oscillations and divide the time by n or take average ✓		1

Question 2

(a) Well answered.

(b) (i) Fairly answered as only few candidates could describe the motion of car B correctly by stating the constant deceleration.

(ii) Poorly answered. The majority of candidates could not answer the question correctly by stating that acceleration is non-uniform or non-constant acceleration.

(c) (i) Fairly answered. Most candidates could only score one mark because they stated that the distance is calculated by the area under the graph but failed to use the area under the graph to calculate the distance travelled. Teachers are urged to emphasize this concept with more assessments to avoid candidates losing marks for the content which is manageable.

(ii) Poorly answered. The majority of candidates could not use the correct formula of calculating the resultant force of car B as F = ma.

(iii) Poorly answered. Most candidates could not relate that constant speed means the resultant force on the moving object is zero, since the two horizontal forces are equal in size but differ in direction.

(d) Fairly answered. Only fewer candidates could draw a straight line on the graph.

(e) Fairly answered. Only fewer candidates could use the correct equation of motion of v = u + at to find the final velocity of car B.

2 (a)	50 ✓		1
(b) (i)	Constant/steady/uniform deceleration ✓	Accept uniform decreasing speed	1
(ii)	Non-uniform acceleration	Accept speed increasing non-uniformly owtte	1
(c) (i)	Distance = Area under the graph / formula of area of a trapezium (✓) = 0.5 × 10 x 30 + 0.5 × 2 × 30 + 30 × 28 (✓) = 150 + 30 + 840 (✓) = 1020 ✓✓	Correct formula / correct substitution (✓)	2
(ii)	F = ma (✓) = 1500 ✓ -15 (✓) = -22 500 ✓✓	Give one mark for -15 seen	2
(iii)	= 0 ✓		1
(d)	Straight line from (0,30) to (40,0) ✓		1
(e)	v = u + at (✓) = 0 +(4 ✓ 10) (✓✓) = 40 ✓✓✓		3

Question 3

(a) Fairly answered. Most candidates could not score full marks because they could write the definition of specific heat capacity correctly. The definition of specific heat capacity is given in the syllabus.

(b) Well answered. The majority of candidates could use the correct formula to calculate the specific heat capacity of the block. The emphasis is however needed on the determination of the change in temperature.

3 (a)	Is the heat required to raise the temperature of a 1 kg of a substance ✓ by one kelvin or one degree Celsius. ✓
(b)	c = $\frac{Q}{m\Delta T}$ (✓) $\frac{23000}{0.831 \times 28.2}$ (✓✓) = 981 ✓✓✓

Question 4

(a) (i) Well answered. Few candidates failed to write the correct name of a suitable liquid.

(ii) Poorly answered. The majority of candidates could not identify the correct physical quantity of the liquid as expansion or contraction.

(b) Poorly answered. Fewer candidates could demonstrate that they understand fixed points on the Kelvin temperature scale.

4 (a) (i)	Mercury/Alcohol / ethanol ✓	Correct spelling	1
(ii)	Expansion ✓		1
(b)	373 ✓ 273 ✓		2

Question 5

(a) Well answered.

(b) (i) Well answered. Most candidates could use the formula of weight correctly to get 22 N.

(ii) Poorly answered. The majority of candidates could not calculate the perpendicular distance from the pivot correctly and leads to the wrong answer of the Moment.

(iii) Poorly answered, as only fewer candidates who could use the law of Moment to calculate the distance x.

5 (a)	Is a measure of the matter in an object ✓		1
(b) (i)	22 ✓		1
(ii)	Moment = force ✓ perpendicular distance (✓) = 22 ✓ 1.6 (✓) = 35.2 or 35 ✓✓ Nm ✓	 1.6 seen (✓) Ecf from (b)(i)	3
(iii)	35.2 = 16.5× (✓) x = 2.1 ✓✓	Ecf from (b)(ii) 2 s.f. or more	2

Question 6

(a) Fairly answered. Few candidates could not identify the correct wave effect as they confused it with the other effects.

(b) (i) Fairly answered.

(ii) Fairly answered.

(iii) Fairly answered.

Most candidates have shown little understanding of the wave equation, that why they struggled to get the relationship between speed, wavelength and frequency when water waves enters shallow water.

(c) Most candidates could not score full marks because candidates could not write the correct formula of frequency in terms of speed and wavelength.

(d) (i) Well answered.

(ii) Fairly answered. Few candidates confused Transverse wave with Longitudinal wave.

(iii) Well answered.

(iv) Poorly answered. The majority of candidates could not score marks here because they did not read the question and understand that the question is specific on the safety precautions on the use of x-ray but not general safety precautions of radiations.

6 (a)	Refraction ✓		1
(b) (i)	Decrease ✓	owtte	1
(ii)	Remain the same ✓	owtte	1
(iii)	Decrease ✓	owtte	1
(c)	$f = v/\lambda$ (✓) = 0.12/0.3 (✓) = 0.4 ✓✓		2
(d) (i)	Ultraviolet / UV ✓		1
(ii)	Transverse ✓	Correctly spelled	1
(iii)	Frequency✓	Correctly spelled	1

(d) (iv)	Accept any two from: - Wear lead-lined aprons ✓ - Seat/stand behind the screen when the machine is switched on.✓ - Keep exposure time as short as possible✓		2

Question 7

(a) Fairly answered. Only fewer candidates could give the difference between the scalar and the vector with a correct example.

(b) This question was poorly answered. Most candidates could not use a Triangle method or Parallelogram method to determine the magnitude of the resultant force and its direction.

7 (a)	- Scalar has magnitude and no direction e.g mass ✓, vector has magnitude and direction e.g velocity ✓		2
(b)	- Two vectors drawn tip to tail (either order) for a triangle method / Two vectors drawn tail to tail for a parallelogram method ✓ - Resultant correctly drawn with dotted line or labelled ✓ - Magnitude if resultant force in range 49 000 – 50 000 (N) ✓ - Direction in range 280º – 285º✓		4

Question 8

(a) Most candidates could define the principle of conservation of momentum by stating that Momentum remains constant, however only fewer candidates could the mention the condition in which momentum remains constant as isolated system or when no external resultant force is applied.

(b) Poorly answered. The majority of candidates could not use the correct formula of law of conservation of momentum to calculate the maximum total speed of the vehicles after collision.

8 (a)	- (When two or more objects interact, their) total momentum remain constant, ✓ provided that no external resultant force is acting on them. / in an isolated system ✓		2
(b)	Momentum before collision = Momentum after collision (✓) (1500 ✓ 30) + (450 × 25) = (1500 + 450) v (✓✓) 56 250 = 1950 v (✓✓✓) $\frac{56250}{1950} = v$ (✓✓✓) v = 29 ✓✓✓✓✓	1 mark for 56 250 or 1 950 seen accept 2 s.f. or more	5

Question 9

(a) Poorly answered. Most candidates could not calculate the combined resistance of the combined circuit.

(b) Well answered.

(c) Fairly answered. The majority of candidates struggled to determine the current passing through the 4 which could helped them to calculate the charge passing through the resistor.

9 (a)	$\frac{1}{R_t} = \frac{1}{R_1} + \frac{1}{R_2}$ or $\frac{1}{6} + \frac{1}{12}$ (✓) $\frac{1}{R_T} = \frac{1}{4}$ (✓✓) $R_T = 4$ ✓✓✓	1 mark for 12 seen	3

(b)	$I = \frac{V}{R}$ (✓) $= \frac{24}{6}$ (✓) =4 ✓✓		2
(c)	Charge = Current × Time (✓) = 2 × 300 (✓) = 600 ✓✓	1 mark for 2 seen	2

Question 10

(a) (i) Fairly answered. Few candidates could describe the nature of alpha particles as 2 protons and 2 neutrons or Helium nucleus.

(ii) Well answered.

(b) (i) Poorly answered. The definition of half life is given in the syllabus.

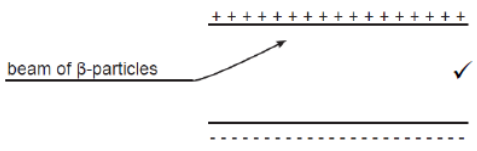
(ii) Fairly answered. Only few candidates could identify that there are four half lives.

(c) (i) Well answered.

(ii) Well answered.

(d) (i) Well answered.

(ii) Poorly answered. Most candidates gave electrons as the answer but did not specify that the electrons are negatively charged.

10 (a) (i)	Helium nucleus or 2 protons and 2 neutrons ✓		1
(ii)	a = 222 ✓ b = 84 ✓		2
(b) (i)	Is the time taken for a half radioactive nuclei to decay. ✓	owtte	1
(ii)	1200 → 600 → 300 →150 →75 or 4 half-lives seen (✓) 6400 ✓✓		2
(c) (i)	Low penetrating ability ✓		1
(ii)	high penetrating ability		1
(d) (i)			1
(ii)	beta particles are negatively charged ✓		1

Question 11

(a) Fairly answered. Most candidates could identify the name of the metal but failed to explain the reason for its suitability.

(b) (i) Fairly answered.

(ii) Fairly answered.

(iii) Poorly answered.

11 (a)	Iron ✓ can be easily magnetised and demagnetised ✓		2
(b) (i)	Prevent energy/power lost ✓		1
(ii)	$V_p = \frac{N_p \times V_s}{N_s}$ (✓) $= \frac{560 \times 78}{910}$ (✓) $V_p = 48$ ✓✓		2
(iii)	$I_p = \frac{I_s \times V_s}{V_p}$ (✓) $= \frac{78 \times 0.5}{48}$ (✓) $I_p = 0.8125$ ✓✓	Ecf from (b)(ii) Allow 1 s.f. or more	2