SEC 3NA SCIENCE (PHYSICS) EYE 2019

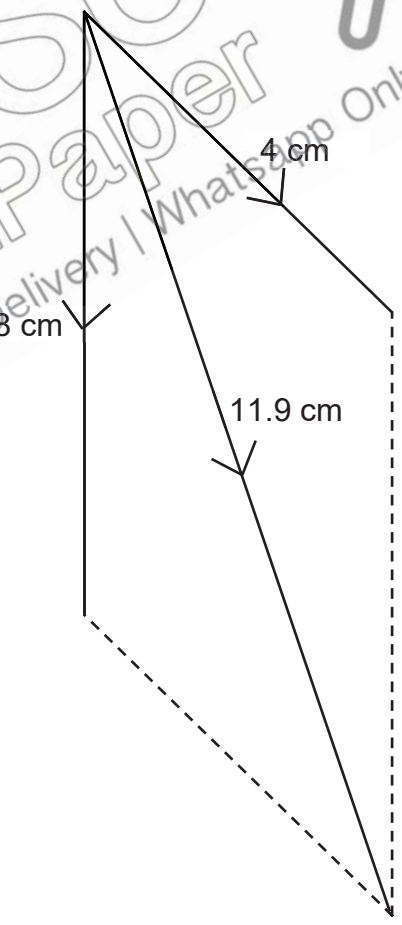
Solution and Mark Scheme

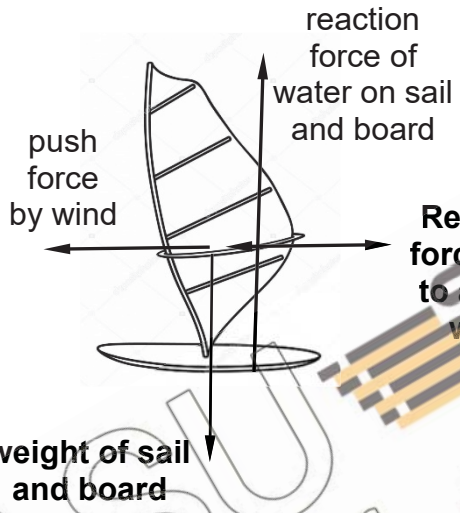
Paper 1: Multiple Choice Questions

Q1.	Q2.	Q3.	Q4.	Q5.
B	**D**	**D**	**D**	**A**
Q6.	Q7.	Q8.	Q9.	Q10.
C	**D**	**B**	**B**	**C**
Q11.	Q12.	Q13.	Q14.	Q15.
C	**B**	**A**	**D**	**C**
Q16.	Q17.	Q18.	Q19.	Q20.
B	**C**	**A**	**C**	**D**

Paper 2 Section A: Short-structured Questions

Q/N			Solution	Remarks
A1	**(a)**		1 cm rep 500 N	



	(b)		Using the given scale 11.9 cm = 5950 N Magnitude of resultant force = 5950 N [1] Direction = accept range of 17º to 19º anticlockwise from 4000 N force [1] (if only angle given still accept)	
A2	**(a)**		 No marks if only one of two is given. No marks if no label written	
	(b)		Resultant force is zero. [1] Forward force (by the wind) = backward drag/friction forces in the water [1]	
A3	**(a)**		Pressure differs because the cross-sectional area of 4 legs are in contact with the ground in Fig. 2.1 instead of only 2 in Fig. 2.2.	
	(b)		His line of weight will act outside the legs of the chair which will create an anti-clockwise moment to the chair causing Peihua to topple over.	
A4	**(a)**		Particles move in clusters sliding over one another. But movement still limited due to intermolecular forces.	
	(b)		Particles more closely packed in solids. [1] [1] Since there is greater mass per unit volume in solids compared to gases, density of solids is generally higher.	

[Turn over

Paper 2 Section B: Free Response Questions

Q/N			Solution	Remarks
B5	**(a)**		At 20 s – parachute opens or speed drops from (50 to 5 m/s) or decelerates (e.g. uniformly) At 55 s - parachutist lands/hits ground or speed becomes 0 or stops (e.g. decelerates)	
	(b)		Parachutist falls with <u>increasing speed</u> but acceleration not constant. [1] <u>Acceleration decreases until speed becomes constant</u> [1]	
	(c)		Weight = drag/resistive forces [1] Resultant force zero [1]	
	(d)		Distance travelled = 5 X (55-25) = 150 m	
B6	**(a)**		Pressure from master cylinder piston transmitted to slave piston. [1] Pressure produces force to push piston [1]	
	(b)	**(i)**	$P = F/A = 140/2 = 70\ N/cm^2$ [1] [1]	
		(ii)	$F = P \times A = 70 \times 2.8 = 196\ N$ [1] [1]	
		(iii)	The <u>distance from pivot to piston is smaller</u> than [1] distance from pivot to line of force applied at the brake pedal. And for moment clockwise equal to anticlockwise, the corresponding <u>applied force must be greater at the piston</u>. [1]	
B7	**(a)**	**(i)**	KE = ½ X 900 X 5^2 [1] = 11250 J	
		(ii)	Since total energy remains constant, KE at B = KE at A + GPE at A = 11250 + 900(10)(5) [1] = 56250 J	
		(iii)	Minimum energy required to move from A to C = GPE at C – GPE at B = 900(10)(8) – 45000 [1] = 27000 J [1]	

[Turn over

	(b)		No. [1] The additional energy of 11250 J it possesses is insufficient compared with minimum energy required of 27000 J [1]	
	(c)		GPE increases, KE decreases [1]	
	(d)		Subsequent hills after the first hill must be lower in height so that coaster can move up without any additional fuel required. [1]	

[Turn over