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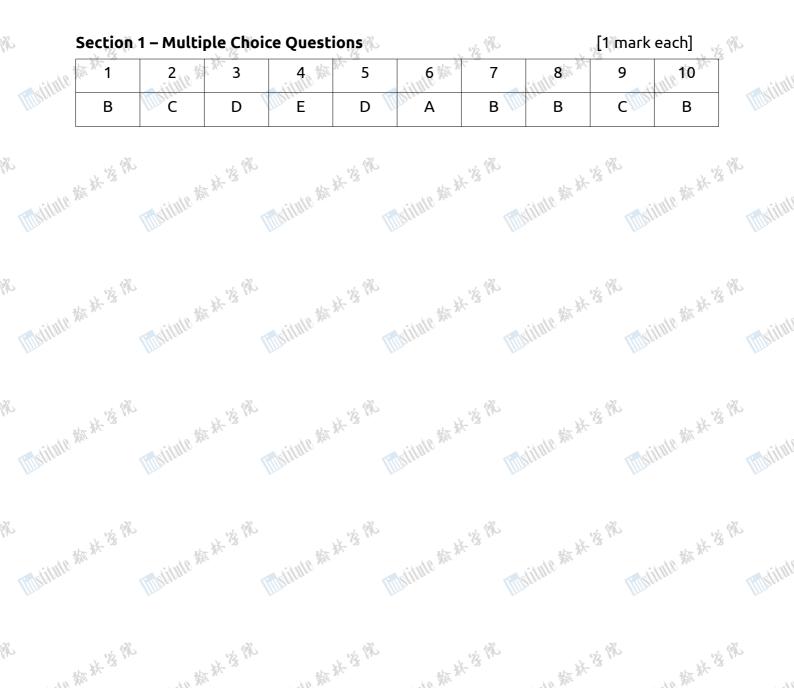
mutitule # Mark-scheme

Preamble:

Equivalent valid reasoning should gain equal credit to the solutions presented here. of the data needed for a subsequent question, providing that the resulting answer is not plainly ridiculous.

If incorrect units are used more than once then **one** mark should be deducted from the total.

If an inappropriate number of significant figures are given more than once in final answers then **one** mark should be deducted from the total.



Institute ## # Physics Challenge Mark-scheme

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Section 2 – Short Answer Questions

Marks for these two questions should be awarded for a clear explanation of the underlying physical principals using correct scientific terminology.

Answers that are incomplete, contain errors in physics or use terminology incorrectly cannot be awarded full credit.

Markers are **encouraged to be generous** and award credit where possible.

	Markers are encou	raged to be generous and award credit where possible.
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8	Award 0 marks:	No valid attempt made to answer question
	Award 1 mark:	Single valid point presented but other-wise incorrect or incomplete
	Award 2 marks:	Partially correct answer but major error(s) or omission(s) in reasoning
	Award 3 marks:	Mostly correct answer, only minor error(s) or omission(s) in reasoning
R	Award 4 marks:	Essentially correct answer, no errors or omissions of reasoning but answer is not clear on first reading, is confused or uses terminology incorrectly
	Award 5 marks:	Completely correct answer, no errors, omissions of reasoning or

completely correct answer, no errors, omissions of reasoning or incorrect use of terminology, clear on first reading ute # # 3 PS

Any valid explanation should be awarded credit

Example solutions might include, but are not limited to:

- 11. 🐀 Walking on Ice 🖄 🎌
 - To start walking (moving) from rest or to maintain motion reduced by a resistance it is necessary to accelerate.
 - For an object to accelerate a resultant force is required. (Newton's Second Law)
 - To provide the necessary resultant force we push our foot backwards across the ground.
 - The motion of our foot across the ground is resisted by a force of friction applied in the opposite direction to the motion of our foot. (Newton's Third Law)
 - The friction force acting on our foot provides the necessary resultant force to enable us to accelerate in the forward direction.
- 12. 👷 Properties of a Thermistor [5 marks] 🔬 🎋 The thermistor is a resistor and as the voltage increases the current increases.
 - The current through the thermistor causes (ohmic) heating and so the resistance of the thermistor decreases. Therefore the current rises more due to both the increase in voltage and the decrease in resistance.
- greater rate than the thermal energy is being transferred to thermal energy at a maintain a thermal equilibrium the temperature continues to the second se
 - Increasing temperature reinforces the reduction in resistance and the subsequent increase in current and thermal runaway occurs.

Physics Challenge Mark-scheme

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	Sectio	on 3 – Longer Answers	. R. Ch.	
mstitute	Ques (a)	correct calculation of volume = 1.3 x 10 ⁻³ m ³	, [1]	mstitute
	(a)	Used with density equation to give mass = 10.05kg	[1]	In
	(b)	Weight or Force = 100N	[1] 🧊	
	the the the	Stress = 80kPa	[1] ¹ /3 (%)	
antitute.	(c)	Reverse of (a) and (b) to give Weight = 503kN	[1]	matitute
IIII.		and Length = 5000 m	[1]	Illa
	(d)	(stated) NO effect	[1]	
	NY B	because Area in Weight term and so cancels (owtte)	[1] %	
atute -	(e)	To support mass, Force = 34,000N	[1]	- stutt
THSUL		To provide acceleration, Resultant Force = 8500N	[1]	mstree
		Maximum force = 42,500N	[1]	
	(f)	Maximum Stress = 100MPa		
	城水飞	Therefore maximum Weight supported = 126kN	[1] 3	
mstitute	<i>I</i>	So maximum weight of cable = 83,500N	[1]	mstitut
		Giving a maximum length of 830m	[1]	In
	• ••••	Non a la la la la la la la		
	Ques	tion 14 3% 3% 3% 3%	·法·法·统	
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