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ANSWER SHEET

Theoretical Question 1 Particles and Waves

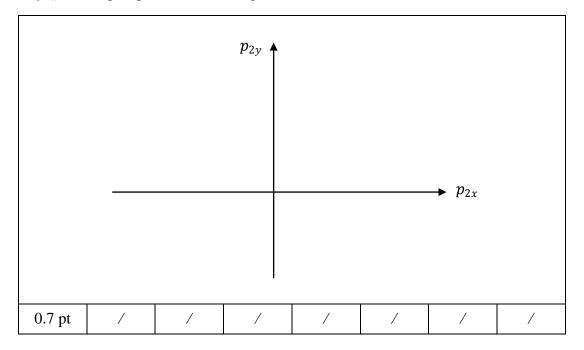
Do not write in any box marked with a solidus (oblique stroke, /).

Part A. Inelastic scattering and compositeness of particles

(a)(i) Q in terms of m, M, p_1 , p_{2x} , and p_{2y}

Expression	on of $Q =$						
0.2 pt	/	/	/	/	/	/	/

(ii) Plot of a condition relating p_1 , p_{2x} , and p_{2y} for an elementary target as a curve with p_{2x} -intercepts specified. Label regions with Q < 0, Q = 0, Q > 0.



Region(s) of Q allowed by a stationary composite target in its ground state before scattering.

Allowed	Q region(s):					
0.2 pt	/	/	/	/	/	/	/

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Thresho	11 1						
	Id value p	p_c of p_2 .					
$p_c =$							
1.1 pt	/	/	/	/	/	/	/
			114 2				C: - 1
t OI O VE	μ_2 10	or given p_1	and $M = 3$	m will fai	ilge of o at	iu p_2 specii	iicu.
			_				
			σ				
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			σ				
			σ				→
			σ				→ p ₂
			σ				$\stackrel{\longrightarrow}{p_2}$
			σ				p_2
1.1 pt			σ	/		/	→ p ₂

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(c)]	Period of v	ribration T			es on a sti	ring		
	T =							
	0.5 pt	/	/	/	/	/	/	/
S	Shape of th	e string at	t = T/8 (s	specify imp	oortant leng	gths and an	gles).	
	1.7 pt	/	/	/	/	/	/	/
(d) '	The total n	nechanical	energy of t	he vibratin	ıg string.			
(4)								
	0.8 pt	/	/	/	/	/	/	/
•								

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) Distance (i	n units of l		The expe		niverse		
$L(t_{\rm e}) =$							
2.2 pt	/	/	/	/	/	/	/
The receding	ng velocity	(in units o	of c) of the	star.			
$v(t_0) =$							
0.8 pt	/	/	/	/	/	/	/