

PHYSICS CAPACITY TRANSCRIPT

LEARNER'S NAME: _____

Purpose & Vision: Understand and Apply Physics Concepts

		LEARNING PROCESS					3-D PORTFOLIO
		T O T A L	I N F O R M A T I O N	K N O W L E D G E	K N O W - H O W	W I S D O M	
CAPACITY	CAPACITY BREAKDOWN	0					
Measurement and Data Analysis	Use Scientific Notation	1	✶				The Race without Hast
	Use significant figures in problems	2					The Race without Hast
	Estimate results	3	✶				The Race without Hast
	Know metric system and how to convert units	4	✶				The Race without Hast
	Use dimensional analysis in problem solving	5	✶				The Race without Hast
	Develop personal estimates of length, area, vol., speed measurements	6	✶				The Race without Hast
Motion	Define speed and give units	8	✶				
	Distinguish between speed & velocity	9	✶				
	Define acceleration and provide units	10	✶				
	Describe the motion of an object in free fall from rest	11	✶				
	Calculate velocity, average velocity, & acceleration	12	✶				
	Use distance-time & speed time graphs	13	✶				
	Use kinematic eqns. to solve free fall & uniform accel. problems	14	✶				
Newton's Laws	Define inertia & state Newton's First Law	15	✶				
	Distinguish between mass, volume, & weight	16	✶				
	Distinguish between kilogram and newton as units of measure	17	✶				
	Explain why something not connected to the ground keeps up	18	✶				
	Resolve object on a slope into weight components (parl & perp)	19	✶				
	Define & explain net force	20	✶				
	State relationship between net force, mass, & accel. (2nd Law)	21	✶				
	Describe effect of friction on stationary & moving object	22	✶				
	Determine coefficients of static and kinetic friction	23	✶				
	Determine pressure based on force and unit area	24	✶				

	Apply 2nd Law to explain why free fall accel. not dependent on mass	25	✈				
	Explain & determine terminal velocity	26	✈				
	Explain why at least two objects are involved whenever a force acts	27	✈				
				LEARNING PROCESS			
		T O T A L	Inform.	Knowledge	KnowHow	Wisdom	3-D PORTFOLIO
CAPACITY	CAPACITY BREAKDOWN						
Newton's Laws continued	State Newton's 3rd Law	28	✈				
	Given an action force, identify reaction force	29	✈				
	Explain why accel. caused by action & reaction forces do not have to =	30	✈				
	Explain why an action force is not cancelled by reaction force	31	✈				
Vectors & Projectile	Distinguish between vector & scalar quantity	32	✈				
	Draw vector diagrams for velocity, forces, etc.	33	✈				
	Resolve a vector into horizontal & vertical components	34	✈				
	Use trigonometry to solve for vector components & resultants	35	✈				
	Solve equilibrium vector problems	36	✈				
	Resolve projectile motion into vertical & horizontal components	37	✈				
	Solve projectile motion problems	38	✈				
Momentum	Define momentum	39	✈				
	Define impulse and relate to momentum	40	✈				
	Give examples of when size of force & time affect momentum	41	✈				
	Explain why impulses greater when object bounces than simply to rest	42	✈				
	State law of conservation of momentum	43	✈				
	Distinguish between inelastic & elastic collisions	44	✈				
	Solve sticky, explosion, and bouncing collision problems	45	✈				
	Solve impulse and conservation of momentum problems	46	✈				
Energy	Determine work done, given force & distance moved	47	✈				mechanical Adv.
	Determine amount of power required, given work & time	48	✈				mechanical Adv.
	Solve work and power problems	49	✈				mechanical Adv.
	Define work in terms of energy	50	✈				mechanical Adv.

	Distinguish between mechanical, potential, & kinetic energy	51	✈				mechanical Adv.
	Explain when grav. PE changes & not	52	✈				mechanical Adv.
	Describe how kinetic energy depends on speed	53	✈				mechanical Adv.
	State the law of conservation of energy	54	✈				mechanical Adv.
	Solve conservation of energy problems	55	✈				mechanical Adv.
	Describe the function of a lever, pulley, inclined plane, & wedge	56	✈				mechanical Adv.
	Give examples when mechanical advantage > 1 and < 1	57	✈				mechanical Adv.
	Explain why no machine can have efficiency of 100%	58	✈				mechanical Adv.
	Solve mechanical advantage & efficiency problems	59	✈				
Circular Motion	Distinguish between rotate & revolve	60	✈				
Center of Gravity & Rotational Mechanics	Distinguish between linear speed & rotational speed	61	✈				
	Give examples of centripetal force	62	✈				
	Describe resulting motion if centripetal force stops	63	✈				
	Explain why incorrect to say centrifugal force pulls outward	64	✈				
	Describe how you can simulate gravity in a space colony	65	✈				
	Solve period, frequency, & speed problems	66	✈				
	Solve centripetal acceleration & centripetal force problems	67	✈				
	Describe center of gravity (COG)	68	✈				
	Use a plumb line & bob to find center of gravity	69	✈				
	Given center of gravity and area of support, predict if will topple	70	✈				
	Distinguish between stable, unstable, & neutral equilibrium	71	✈				
	Define torque & describe what it depends on	72	✈				Alloy Project
	Describe the conditions for one torque to balance another	73	✈				Alloy Project
	Given COG & position & direction of forces, tell whether rotation	74	✈				
	Solve torque problems	75	✈				
	Describe what rotational inertia depends on	76	✈				
	Define angular momentum and when it remains the same & changes	77	✈				
	Solve angular momentum problems	78	✈				
Universal Gravitation	State Newton's law of universal gravitation	79	✈				
	Explain the significance of the inverse-square law	80	✈				
	Distinguish between g (accel. gravity) and G (gravitational constant)	81	✈				
	Describe gravitational field	82	✈				
	Solve universal gravitation problems	83	✈				

	Solve gravitational field problems	84	✈				
		85					Alloy Project, Tensile Te
		86					Alloy Project, Tensile Te

CAPACITY BREAKDOWN		LEARNING PROCESS					3-D PORTFOLIO
		TOTAL	Inform.	Knowledge	KnowHow	Wisdom	
CAPACITY							
Electric Charge, Fields, and Potential	Discuss electrical forces and charges	88	✈				
	Discuss conservation of charge	89	✈				
	Introduce Colomb's Law and do problems	90	✈				
	Describe the nature of conductors and insulators	91	✈				
	Discuss different types of charging	92	✈				
	Define electric field and electric field lines	93	✈				
	Solve electric potential and energy storage problems	94	✈				
	Describe how a Van de Graff Generator works	95	✈				
	Introduce current as a flow of charge	96	✈				
Electric Current and Circuit Analysis	Discuss voltage sources	97	✈				
	Describe electric resistance and solve Ohm's law problems	98	✈				
	Distinguish between AC and DC	99	✈				
	Speed and source of electrons in a circuit	100	✈				
	Discuss Electric Power and solve problems	101	✈				
	Introduce electric circuits and distinguish between series and parallel	102	✈				
Discuss schematic diagrams	103	✈					

	Explain how to combine resistors in a compound circuit	104	✈					
	Solve for voltage, current, resistance and capacitance in circuits	105	✈					
	Explain magnetic poles and magnetic fields	106	✈					
Magnetism and Magnetic Fields	Discuss electric currents and magnetic fields	107	✈					
	Explain magnetic forces on moving charged particles and current	108	✈					
	Introduce electromagnetic Induction	109	✈					
	Explain Faraday's Law	110	✈					
	Discuss the properties of transformers	111	✈					
	Explain induction of electric and magnetic fields	112	✈					
	Solve magnetic forces, fields, and electromagnetic induction problems	113	✈					
	Explain vibration of a pendulum	114	✈					
	Vibrations and Waves	Describe the nature of waves and motion and speed	115	✈				
		Distinguish between transverse and longitudinal waves	116	✈				
Explain constructive and destructive interference		117	✈					
Discuss the Doppler effect		118	✈					
What are bow and shock waves		119	✈					
Solve simple harmonic motion problems		120	✈					
Solve wave motion, Doppler effect, and standing wave problems		121	✈					
Explain the origin of sound		122	✈					
Sound	Discuss media that transmit sound and the corresponding speeds	123	✈					
	Explain forced vibrations, natural frequency and resonance	124	✈					
	Demonstrate interference and beats	125	✈					
	Solve speed of light problems	126	✈					
Light, Color, Reflection and Refraction	Explain electromagnetic spectrum	127	✈					
	Distinguish between color by reflection and color by transmission	128	✈					
	Solve Reflection Problems	129	✈					
	Solve Angle of Incidence Problems	130	✈					
	Solve Lens Problems	131	✈					
Geometric Optics	Solve Refraction Problems	132	✈					
	Solve Critical Angle Problems	133	✈					
	Construct Images using Ray Diagrams	134	✈					
	Describe the function of a common optical instrument	135	✈					
	Describe the diffraction of light waves	136	✈					

Light as a Wave	Describe how interference applies to light waves	137	✈			
	Solve wave length and slit separation problems	138	✈			
		139				

TJW 5/99 mta/common/science/physics

e
e
e
e
e
e

st

st