PHYSICS CAPACITY TRANSCRIPT

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Purpose & Vision: Understand and Apply Physics Concepts

			LEARNING PROCESS				
CAPACITY	CAPACITY BREAKDOWN	TOTAL 0	INFORMATION	KNOWLEDGE	KNOW-HOW	WISDOM	3-D PORTFOLIO
Measurement and Data Analysis	Use Scientific Notation	1	⃠				
	Estimate results	2	x				
	Know metric system and how to convert units	3	⃠				
	Know what measurements are needed to perform specific calculations	4	⃠				
	Use dimensional analysis in problem solving	5	⃠				
	Develop personal estimates of length, area, vol., speed measurements	6	⃠				
Motion	Define speed and give units	8	⃠				
	Distinguish between speed & velocity	9	⃠	x			Throwing up at School
	Define acceleration and provide units	10	⃠				
	Describe the motion of an object in free fall from rest	11	⃠	x			Throwing up at School
	Calculate velocity, average velocity, & acceleration	12	⃠	x			Throwing up at School
	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	⃠	x			Throwing up at School
	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 invloved whenever a force acts	27	⃠				
			LEARNING PROCESS				
		TOTAL	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 Motion	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	⃠	x			Equation Booklet
	Resolve complex force or motion problems involving several vectors	38	⃠	x			Equation Booklet
	Solve projectile motion problems	39	⃠				
Momentum	Define momentum	40	⃠				
	Define impulse and relate to momentum	41	⃠				
	Give examples of when size of force & time affect momentum	42	⃠				
	Relate impulse to sports swings/throws/kicks and air bags	43	⃠				
	State law of conservation of momemtum	44	⃠				
	Distinguish between inelastic & elastic collisions	45	⃠				
	Solve elastic, inelastic, and explosion collision problems	46	⃠	x			Equation Booklet
	Solve impulse and conservation of momentum problems	47	⃠	x			Equation Booklet
Energy	Determine work done, given force & distance moved	48	⃠				
	Determine amount of power required, given work & time	49	⃠				
	Solve work and power problems	50	⃠				

	Define work in terms of energy	51	⃠				
	Distinguish between mechanical, gravitational, potential, & kinetic energy	52	⃠				
	Explain when grav. PE changes & not	53	⃠				
	Describe how kinetic energy depends on speed	54	⃠				
	State the law of conservation of energy	55	⃠				
	Solve conservation of energy problems	56	⃠				
	Describe the function of a lever, pulley, inclined plane, & wedge	57	⃠				
	Give examples when mechanical advantage > 1 and < 1	58	⃠				
	Explain why no machine can have efficiency of 100%	59	⃠				
	Solve mechanical advantage & efficiency problems	60	⃠				
Circular Motion	Distinguish between rotate & revolve	61	⃠				
Center of	Distinguish between linear speed & rotational speed	62	⃠				
Gravity &	Give examples of centripetal force and acceleration	63	⃠				
Rotational	Describe resulting motion if centripetal force stops	64	⃠				
Mechanics	Explain why incorrect to say centifugal force pulls outward	65	⃠				
	Describe how you can simulate gravity in a space colony	66	⃠				
	Solve period, frequency, & speed problems	67	⃠				
	Solve centripetal acceleration & centripetal force problems	68	⃠				
	Describe center of gravity (COG)	69	⃠				
	Use a plumb line & bob to find center of gravity	70	⃠				
	Given center of gravity and area of support, predict if will topple	71	⃠				
	State equilibrium conditions	72	⃠				
	Define torque & describe what it depends on	73	⃠				
	Describe the conditions for one torque to balance another	74	⃠				
	Given COG & position & direction of forces, tell whether rotation	75	⃠				
	Solve torque problems	76	⃠				
	Describe what rotational inertia depends on	77	⃠				
	Define angular momentum and when it reamins the same & changes	78	⃠				
	Solve angular momentum problems	79	⃠				
Materials	Understand density and perform related calculations	80	⃠				
	Define elasticity	81	⃠				
	Solve stress, strain and Young's modulus problems	82	⃠				
	Solve shear modulus problems	83	⃠				

	Describe hydrostatic pressure and solve related problems	84	⃠				
	Use Archimede's Principle to solve buoyancy problems	85	⃠				
	Use Pascal's Principle to solve hydraulic cylinder problems problems	86	⃠				
	Use the Ideal Gas Law to solve gas pressure, temperature and volume p	87	⃠				
	Convert between temperture units of Kelvin, Celcius and Fahrenheit	88	⃠				
	Calculate linear, area and volume expansion given related information	89	⃠				
	Use specific heat, heat of fusioon and heat of vaporization to calculate h	90	⃠				
	Use Hooke's Law to solve force constant/elasticity problems	91	⃠				
			⃠				
Universal Gravitation	Explain Newton's idea that the moon, like an apple falls towards earth	92	⃠				
	Explain why moon does not fall into earth, nor planets into the sun	93	⃠				
	State Newton's law of universal gravitation	94	⃠				
	Explain the significance of the inverse-square law	95	⃠				
	Distinguish between g (accel. gravity) and G (gravitational constant)	96	⃠				
	Describe gravitational field	97	⃠				
	Solve universal gravitation problems	98	x				
	Solve gravitational field problems	99	x				

	LEARNING PROCESS				
TOTAL	Inform.	Knowledge	KnowHow	Wisdom	3-D PORTFOLIO
0					

CAPACITY	CAPACITY BREAKDOWN						
Electric Charge, Fields, and Potential	Discuss electrical forces and charges	100	☒				
	Discuss conservation of charge	101	☒				
	Introduce Colomb's Law and do problems	102	☒				
	Describe the nature of conductors and insulators	103	☒				
	Discuss different types of charging	104	☒				
	Define electric field and electric field lines	105	☒				
	Explain electron shielding	106	☒				
	Solve electric potential and energy storage problems	107	☒				
	Describe how a Van de Graff Generator works	108	☒				
Electric Current an	Introduce current as a flow of charge	109	☒				
and Circuit	Discuss voltage sources	110	☒				
Analysis	Describe electric resistance and solve Ohm's law problems	111	☒				
	Distinguish between AC and DC	112	☒				
	Speed and source of electrons in a circuit	113	☒				
	Discuss Electric Power and solve problems	114	☒				
	Introduce electric circuits and distinguish between series and parallel	115	☒				
	Discuss schematic diagrams	116	☒				
	Explain how to combinge resistors in a compound circuit	117	x				
	Solve for voltage, current, resistance and capacitance in circuits	118	x				
Magnetism and Magnetic Fields	Explain magnetic poles and magnetic fields	119	x				
	Discuss electric currents and magnetic fields	120	x				
	Explain magnetic forces on moving charged particles and current	121	x				
	Introduce electromagnetic Induction	122	x				
	Explain Faraday's Law	123	x				
	Discuss the properties of transformers	124	x				
	Explain induction of electric and magnetic fields	125	☒				
	Solve magnetic forces, fields, and electromagnetic induction problems	126	☒				
Vibrations and Waves	Explain vibration of a pendulum	127	☒				
	Decribe the nature of waves and motion and speed	128	☒				
	Distinguish between transverse and longitudinal waves	129	☒				
	Explain constructive and destructive interference	130	☒				
	Discuss the Doppler effect	131	☒				
	What are bow and shock waves	132	☒				
	Solve simple harmonic motion problems	133	☒				

	Solve wave motion, Doppler effect, and standing wave problems	134	☒				
Sound	Explain the origin of sound	135	☒				
	Discuss media that transmit sound and the coresponding speeds	136	☒				
	Explain forced vibrations, natural frequency and resonance	137	☒				
	Demonstrate interference and beats	138	☒				
Light, Color, Reflection and Refraction	Solve speed of light problems	139	☒				
	Explain electromagnetic spectrum	140	☒				
	Distinguish between color by reflection and color by transmission	141	☒				
	Solve Reflection Problems	142	☒				
	Solve Angle of Incidence Problems	143	☒				
Geometric Optics	Solve Lens Problems	144	☒				
	Solve Refraction Problems	145	☒				
	Solve Critical Angle Problems	146	☒				
	Construct Images using Ray Diagrams	147	☒				
	Describe the function of a common optical instrument	148	☒				
Light as a Wave	Describe the defraction of light waves	149	☒				
	Describe how interference applies to light waves	150	☒				
	Solve wave length and slit separation problems	151	x				