Physics 3204
June 2018 Public Exam Outcome Report

This examination follows the specifications, conventions and standards set out in the:
Physics 3204 Provincial Exam Standards

Units 1 – Force, Motion and Energy
2 – Fields
3 – Matter Energy Interface

PART I: Selected Response—Total Value: 50%

Item	Curriculum Guide Page	Outcome	Cognitive Level	Outcome Description
1	28	325-6	L1	Describe the horizontal and vertical components of the velocity of a projectile.
2	28	325-6	L2	Calculate the initial speed of a projectile when launched from ground level given the vertical speed when it hits the ground.
3	28	325-6	L1	Identify the velocity vector of a projectile at maximum height.
4	30	325-6	L2	Calculate the time of flight for a projectile launched at an angle above the horizontal with a vertical displacement of zero.
5	30	325-6	L2	Calculate the time of flight for a horizontally launched projectile given its initial height.
6	28	325-6	L2	Calculate the time it takes a projectile to reach maximum height when launched at an angle above the horizontal.
7	32	325-8	L2	Calculate the normal force acting on an object, given an applied force directed above the horizontal as well as the mass of the object.
8	34	325-8	L2	Calculate the acceleration of a system of masses with a pulley at the end of a frictionless horizontal surface.
9	34	325-8	L1	Calculate the tension in a rope keeping a mass stationary on a frictionless incline.
10	34	325-8	L3	Calculate the tension in a rope keeping a system of masses stationary when one mass is on a frictionless incline.
11	34	325-8	L2	Determine the force of friction acting on a given mass on an incline as it moves with constant velocity on the incline.
12	36	325-12	L1	Identify the direction of the velocity, centripetal force and centripetal acceleration vectors given the path of an object moving with uniform circular motion.

Item	Curriculum Guide Page	Outcome	Cognitive Level	Outcome Description
13	38	325-13	L2	Calculate the maximum speed that a car can negotiate a flat turn given the radius of the turn and the coefficient of friction.
14	36	325-12	L2	Calculate the centripetal acceleration of an object given the period of rotation and radius of the path.
15	40	325-13	L1	Calculate the radius of a frictionless banked curve given the speed and banking angle.
16	38	325-13	L3	Determine the expression that represents the minimum speed of an object swinging in a vertical circle at the top of the path.
17	44	ACP-1	L1	Identify why an object is in translational equilibrium.
18	44	ACP-1	L2	Calculate the tension in one of two ropes (one at an angle) keeping an object in static equilibrium.
19	44	ACP-1	L1	Identify the conditions for rotational and static equilibrium.
20	46	ACP-1	L1	Calculate the torque produced by a force given the distance from the pivot.
21	(Unit 2) 56	308-13,14,15	L1	Identify which explanation describes how a neutral electroscope can obtain the charge distribution in the diagram.
22	56	308-13,14,15	L1	Calculate the charge on an object given the number of electrons it has lost.
23	62	308-13,14,15	L1	Identify the electric field between two unlike charges.
24	60	328-4	L2	Calculate the distance between two identical charges given the repulsive force and the charges.
25	60	328-4	L2	Identify how an electric force between two charges changes when the distance between the charges is reduced.
26	72	ACP-3	L1	Calculate the current given the amount of charge that flows past a point in a given time.
27	64	328-1,2,3	L2	Calculate the force that a given charge experiences in a known electric field.
28	64	328-1,2,3	L2	Calculate the distance from a known charge given the strength of the electric field it produces.
29	68	328-1,2,3	L1	Calculate the electric potential difference given the work and charge.
30	76, 80	ACP-3	L3	Compare the power in two resistors of different resistivities that are connected in both a series and a parallel circuit with the same battery.
31	74	ACP-3	L2	Calculate the resistance given the voltage drop and the current through the resistor.
32	76,80	ACP-3	L3	Calculate the power dissipated in a wire given the current, length, resistivity and cross sectional radius of the wire.

Item	Curriculum Guide Page	Outcome	Cognitive Level	Outcome Description
33	78, 80	ACP-3	L2	Calculate the total current in a combination circuit given all resistors and the voltage of the source.
34	78, 80	ACP-3	L2	Calculate the unknown resistance in a branch of a parallel circuit given the total resistance of the circuit.
35	82	328-1, 2	L1	Identify the magnetic field near the poles of a horseshoe magnet.
36	86	328-5	L2	Determine the force on a moving electron in a magnetic field given the speed of the electron and magnetic field strength.
37	82	328-1, 2	L1	Identify the magnetic field around Earth.
38	86	328-5	L2	Calculate the length of a conductor in magnetic field given the strength of the field, the force on the conductor, the current in the conductor, and the angle between the conductor and the field.
39	88	328-7	L2	Use Lenz's Law to determine which diagram shows the correct polarity of a coil of wire and a moving magnet.
40	86	328-5	L1	Determine the direction of the force on a current-carrying conductor in a magnetic field.
41	(Unit 3) 96	115-7 213-6	L1	Calculate the energy of a photon given the wavelength.
42	96	327-9	L1	Identify the definition of blackbody radiation.
43	100	329-1	L2	Calculate the wavelength of a photon given the momentum of the photon.
44	98, 104 STSE	327-10 329-3	L3	Determine the energy of a photon emitted when an electron falls to a lower energy level and determine if the photoelectric effect would occur when the photon hits a metal with a known work function.
45	100	329-1	L2	Calculate the mass of an object given its de Broglie wavelength and its speed.
46	108	329-4	L1	Identify the type of decay given the decay equation.
47	108	329-4	L2	Given a nuclear reaction, determine whether it is fission or fusion and identify the missing product(s).
48	108	329-5	L2	Calculate the mass defect in a fission reaction given the energy released.
49	110	214-2	L2	Calculate the original mass of a sample given the half-life, time, and final mass.
50	112	115-5 117-11	L1	Identify a property of a CANDU reactor.

PART II: Constructed Response—Total Value: 50%

Item	Curriculum Guide Page	Outcome	Cognitive Level	Value	Outcome Description
51a	28	325-6	L2	3	Calculate the height of an object given the initial velocity and range of a projectile that lands on top of that object.
51b	34	325-8	L2	3	Calculate the acceleration of a system of masses attached by a string passing over a pulley, where there is no friction on the incline but there is friction on the horizontal surface.
51bX				0.5	Science Communication – Significant Figures
51bXX				0.5	Science Communication – Units
51c	38	325-13	L2	3	Calculate the tension in the string attached to a mass that is swung in a horizontal circle given the mass, length of string and information to calculate the period.
51d	40	325-13	L3	3	Calculate the maximum height of an object above point A when spun in a vertical circle and released at point A.
51e	46	ACP-1	L2	4	Calculate the two vertical forces applied to a horizontal beam that is in static equilibrium.
51f	46	ACP-1	L3	3	A beam is held in static equilibrium by a cable attached to a wall. Determine and justify whether the cable will break when the mass of the beam is doubled.
52a	56	308-13,14,15	L2	2	Given two materials and their relative electron affinities, explain how an object becomes charged and explain why it is attracted to neutral objects.

52b	56	308-13,14,15	L2	3	Calculate the net electric field at a point given two charges and their distances from the point.
52bX				0.5	Science Communication – Significant Figures
52bXX				0.5	Science Communication – Units
52c(i)	78, 80	ACP-3	L2	1	In a combination circuit, calculate the voltage drop across a series resistor.
52c(ii)	78, 80	ACP-3	L2	2	For a combination circuit, calculate the power dissipated in an unknown resistor in one of the parallel branches of the circuit.
52c(iii)	78, 80	ACP-3	L2	2	For a combination circuit, calculate the current through a given resistor in one of the parallel branches.
52d	86	328-5	L2	3	Calculate the magnitude and direction of current in a straight current-carrying wire given the magnetic field strength at a given distance from the wire.
52e	88	328-7	L3	3	Explain why two magnets would fall through tubes of different materials at different speeds.
52f	86, 36	328-5, 325-13	L3	3	Calculate the mass of a charged particle that enters a magnetic field and then moves in a circular path due to the magnetic force.
53a	98 STSE	327-10	L2	2	Given the work function of a metal and the wavelength of a photon, calculate the maximum kinetic energy of the ejected electron.
53b	104	329-3	L3	3	Calculate the original energy level of an electron in a Bohr hydrogen atom given the final energy level and the frequency of the emitted photon.
53c	110	214-2	L2	2	Calculate the time elapsed given the original mass, final mass and the half-life of the substance.
53cX				0.5	Science Communication – Significant Figures
53cXX				0.5	Science Communication – Units
53d	108	329-4	L2	2	Calculate the energy released in a nuclear reaction given the mass of the products and the reactants.