Physics 3204
June 2017 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
(Unit 1) 1	28	325-6	L1	Identify the components of the velocity of a projectile at a point on its path.
2	28	325-6	L2	Calculate the flight time for a projectile launched from the ground, given the initial velocity and the range.
3	28	325-6	L2	Calculate the range of a projectile launched horizontally from a given height; initial velocity given.
4	28	325-6	L1	Given the initial velocity, determine the final speed of a projectile that lands at the same height from which it was launched.
5	28	325-6	L2	Calculate the magnitude of the launch velocity of a projectile given the launch angle and the maximum height.
6	32	325-8	L1	Determine the applied force necessary to keep an object moving at a constant velocity along a horizontal surface with friction.
7	34	325-8	L1	Calculate the normal force acting on an object on an inclined plane, given the angle of the incline and the mass of the object.
8	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.
9	34	325-8	L1	Calculate the parallel and perpendicular components of the gravitational force acting on an object on an inclined plane, given the mass of the object and the angle of the incline.
10	34	325-8	L3	Calculate the minimum coefficient of friction for an object at rest on an inclined plane, given the angle of the incline.

Item	Curriculum Guide Page	Outcome	Cognitive Level	Outcome Description
11	34	325-8	L2	Calculate the acceleration of a system of masses connected by a string passing over a pulley that is at the end of a horizontal, frictionless surface.
12	36	325-12	L1	Identify the direction of centripetal acceleration of an object swinging in a circular path.
13	38	325-13	L2	Calculate the speed at which an object undergoing uniform circular motion will lose contact with the road at the top of a hill, given the radius of the hill.
14	36	325-12	L2	Calculate the centripetal acceleration of an object, given its period and radius.
15	38	325-13	L2	Calculate the mass of an object that is attached to a string and is moving in a horizontal circle on a frictionless surface, given the speed, radius, and tension.
16	46	ACP-1	L1	Identify an application of torque.
17	46	ACP-1	L1	Identify which force will produce the greatest torque about a pivot point.
18	46	ACP-1	L2	Calculate the distance from the pivot that a force must be applied in order to balance a seesaw.
19	46	ACP-1	L3	Identify what happens to the force exerted on an object and the torque about a pivot point as the force is applied at differing positions on the object.
20	46	ACP-1	L2	Calculate the tension in a wire attached to the end of a horizontal beam (strut and cable situation), given the length and weight of the beam, and the weight of the load suspended from the end of the beam.
(Unit 2) 21	56	308-13 308-14 308-15	L1	Qualitatively analyze the response of an electroscope in the presence of a charged object.
22	60	328-4	L2	Calculate the charge on an object, given the electric force, separation distance, and the charge on the second object.
23	62	328-1 328-2 328-3	L1	Identify the sign of the charges on two objects, given the electric field lines for the arrangement.
24	64	328-1 328-2 328-3	L2	Calculate the electric field strength at a given distance from a charged object that has an excess of electrons.
25	68	328-1 328-2 328-3	L2	Calculate the work done to raise a charged object to a given potential difference.
26	72	ACP-3	L1	Calculate the current given the amount of charge passing a point in a given time.

Item	Curriculum Guide Page	Outcome	Cognitive Level	Outcome Description
27	60	328-4	L3	Determine how the force between two charged particles changes when the separation distance and charge magnitude changes.
28	80	ACP-3	L1	Given circuit diagrams, identify the correct placement of an ammeter and a voltmeter.
29	76	ACP-3 213-3	L1	Given the resistivity, length, and cross-sectional area of piece of wire, calculate its resistance.
30	80	ACP-3	L1	Calculate power given voltage and current.
31	80	ACP-3	L2	Calculate the total current for a parallel circuit, given the source voltage and power of both resistors.
32	80	ACP-3	L2	Calculate the cost to operate a computer for a year given the power and the electrical rate.
33	70	ACP-3	L2	Calculate the value of a resistor in a series circuit given the total voltage and total current.
34	70	ACP-3	L3	Calculate the voltage across a resistor in a combination circuit.
35	82	328-1 328-2	L1	Identify the direction a compass needle will point when placed near a bar magnet.
36	84	328-6	L1	Identify the magnetic field produced by a current in a straight conductor.
37	86	328-5	L2	Use Left Hand Rule #3 to determine the direction of force on a wire.
38	86	328-5	L2	Calculate the current required in a straight conductor to create a given magnetic field at a distance from the conductor.
39	86	328-5	L2	Calculate the length of a current-carrying wire placed in a magnetic field at an angle, given the current, field strength, angle, and force.
40	88	328-7	L2	Given the direction of motion of a bar magnet and the direction of induced current in coil, use Lenz's Law to determine the polarity of the coil and magnet.
(Unit 3) 41	98	327-10	L1	Given the frequency, calculate energy of electromagnetic waves.
42	98	327-10	L2	Calculate the maximum kinetic energy of an ejected electron, given the frequency of incident light and the work function of the metal.
43	100	329-1	L2	Calculate the wavelength of a photon, given the momentum.
44	100	115-3	L2	Calculate the mass of an object, given its deBroglie wavelength and its speed.
45	102	329-2	L1	Calculate the radius of a Bohr orbit for a given energy level.
46	108	329-5	L2	Calculate the mass defect of a fission reaction, given the energy released.
47	110	214-2	L3	Determine the half-life of a sample from a graph of mass versus time.

Item	Curriculum Guide Page	Outcome	Cognitive Level	Outcome Description
48	108	329-4	L1	Identify the type of nuclear decay, given one of the products.
49	108	329-4	L2	Identify the daughter nucleus produced in a beta minus decay.
50	112	115-5 117-11	L1	Identify the moderator used in the CANDU reactor.

PART II: Constructed Response—Total Value: 50%

Item	Curriculum Guide Page	Outcome	Cognitive Level	Value	Outcome Description
(Unit 1) 51a	28	325-6	L2	3	Calculate the initial velocity of a projectile that is thrown horizontally and lands on an object below its launch point, given the range and vertical displacement. **(Science Communication)**
51b	28	325-6	L3	3	Calculate whether a projectile will travel a given range, given the initial velocity.
51c(i)	34	325-8	L2	3	Calculate the acceleration of a system of masses attached by a string and pulley involving a horizontal surface with friction and a frictionless inclined plane.
51c(ii)	34	325-8	L2	2	Calculate the tension in a string connecting a system of masses on a horizontal surface with friction and a frictionless inclined plane.
51d	40	325-13	L2	2	Calculate the tension in a rope at the top of a vertical circle for an object undergoing uniform circular motion, given the object's mass and speed and the radius of the circle.
51e	38	325-13	L3	3	Determine whether a car will stay on a flat circular path, given the coefficient of friction, radius of the path, speed and mass of the car.
51f	46	ACP-1	L2	4	Calculate the position of a person on a diving board in equilibrium, given the force at one support, distance between the supports, length of the board, and masses of the board and person.
(Unit 2) 52a	60	328-4	L2	4	Calculate the net electric force on a charge due to the presence of two other charges in a triangular arrangement.
52b	44, 56, 60	308-13,14,15 328-4 ACP-1	L3	3	A metal ball is held in static equilibrium by a string and the presence of a second charge. Calculate the tension in the string.

Item	Curriculum Guide Page	Outcome	Cognitive Level	Value	Outcome Description
52c(i)	78	ACP-3	L2	1	Given a combination circuit, calculate the total resistance.
52c(ii)	78	ACP-3	L2	2	Given a combination circuit, calculate the voltage across a parallel resistor.
52c(iii)	80	ACP-3	L2	1	Given a combination circuit, calculate the power dissipated in a parallel resistor.
52d	86	328-5	L2	3	Calculate the magnetic field midway between two parallel current-carrying wires, given the distance between the wires and the current in each wire.
52e	86	328-5	L2	3	Calculate the velocity of an electron moving perpendicular to a given magnetic field when the force on the electron is known. **(Science Communication)**
52f	88	328-7	L3	3	Use Lenz's Law to show the direction of current in each of two coils when given the direction of motion of a bar magnet. Explain why the current direction changes.
(Unit 3) 53a	98	327-10	L3	3	Determine which metals in a given table will eject electrons when illuminated by light whose kinetic energy and frequency is presented in a graph. Explain the answer.
53b	104	329-3	L2	2	Calculate the frequency of a photon emitted when an electron transitions from one orbital level to a lower orbital level in a hydrogen atom.
53c	110	214-2	L2	3	Calculate the time required for a radioactive isotope to decay to a particular amount given its half-life, given the initial mass and half-life. **(Science Communication)**
53d	108	329-5	L2	2	Calculate the energy released in a decay reaction given the masses of each reactant and product.