

Physics

Final Exam Review

Vocabulary you have learned this semester - keep this list to help you review for the graduation test.

1. accuracy
2. precision
3. dependent variable
4. independent variable
5. experiment
6. hypothesis
7. model
8. observation
9. scientific law
10. scientific theory
11. x-axis
12. y-axis
13. slope
14. scalar
15. vector
16. magnitude
17. relative
18. frame of reference
19. distance
20. time
21. direction
22. position
23. rate
24. instantaneous speed
25. average speed
26. displacement
27. velocity
28. acceleration
29. free fall
30. vector
31. projectile
32. resultant
33. parabolic path
34. horizontal component
35. vertical component
36. range
37. inertia
38. mass
39. force
40. net force
41. balanced forces
42. friction
43. static equilibrium
44. dynamic equilibrium
45. gravity
46. weight
47. Newton's 1st Law of motion
48. Newton's 2nd Law of motion
49. Newton's 3rd Law of motion
50. air resistance
51. weightlessness
52. terminal velocity
53. normal force
54. action force
55. reaction force
56. momentum
57. impulse
58. elastic collision
59. inelastic collision
60. law of conservation of momentum
61. energy
62. kinetic energy
63. potential energy
64. gravitational potential energy
65. work
66. mechanical energy
67. law of conservation of energy
68. efficiency
69. fulcrum
70. lever
71. machine
72. mechanical advantage
73. pulley
74. inclined plane
75. centripetal force
76. centrifugal force
77. rotation
78. rotational speed
79. center of gravity
80. lever arm
81. torque
82. rotational inertia
83. effort force
84. resistance force
85. effort distance
86. resistance distance
87. charge
88. electrical force
89. electrically polarized
90. electrostatics
91. grounding
92. conduction
93. conductor
94. electric field
95. electroscope
96. induction
97. insulator
98. Coulomb's law
99. capacitor
100. electric potential
101. electrical potential energy
102. voltage
103. Electric current
104. dry cell
105. potential difference
106. electric resistance
107. wet cell
108. electromagnet
109. magnetic domain
110. magnetic field
111. magnetic pole
112. magnetism
113. magnet
114. ampere
115. circuit
116. electrical power
117. Ohm's law
118. parallel circuit
119. series circuit
120. alternating current
121. ammeter
122. direct current
123. electric motor
124. electromagnetic induction
125. generator
126. transformer
127. voltmeter
128. schematic (circuit) diagram
129. oscillation

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|------------------------|--------------------------------|--------------------------|
| 130. pendulum | 149. loudness | 166. pigment |
| 131. period | 150. decibel | 167. angle of incidence |
| 132. frequency | 151. pitch | 168. normal line |
| 133. natural frequency | 152. resonance | 169. angle of reflection |
| 134. wave | 153. forced vibration | 170. angle of refraction |
| 135. medium | 154. Doppler effect | 171. diffraction |
| 136. reflection | 155. beats | 172. concave |
| 137. refraction | 156. standing wave | 173. convex |
| 138. interference | 157. node | 174. virtual image |
| 139. transverse wave | 158. anti-node | 175. real image |
| 140. rest position | 159. electromagnetic radiation | 176. focal point |
| 141. crest | 160. electromagnetic spectrum | 177. apex |
| 142. trough | 161. photon | 178. optical axis |
| 143. wavelength | 162. opaque | 179. optical center |
| 144. amplitude | 163. translucent | 180. mirror |
| 145. longitudinal wave | 164. transparent | 181. lens |
| 146. compression | 165. light | 182. center of curvature |

Here are some specific questions to focus your preparation for the final exam...you should have answered most them already...they are from your Unit Test review sheets.

Unit 1 - Science approach

1. Differentiate between hypothesis and theory.
2. Describe the scientific method.
3. For a scientific hypothesis to be valid, there must be a way of proving it. True False

Unit 2 - Linear Motion

4. What is the difference between instantaneous and average speed?
5. What is the equation for speed? What are some possible units for speed?
6. Differentiate between speed and velocity.
7. When does an object have constant velocity?
8. What is the motion equation for acceleration?
9. Give an example of an object traveling at a constant velocity and accelerating.
10. What are the three ways an object can accelerate?
11. What is free fall and how does it relate to gravity?
12. What is the value for the acceleration due to gravity?
13. If a ball is thrown up at 10 m/s, what will be the speed of the ball when it's caught back at the original point of the throw?
14. If you throw a ball straight up, what is the ball's instantaneous speed at the top of its path?
15. If you throw a ball straight up, what is the ball's acceleration at the top of its path?

Unit 3 - Projectiles

16. What is a scalar? Give three examples of scalar quantities.
17. What is a vector? Give three examples of vector quantities.
18. Explain how to determine the resultant of two vectors (a) in opposite directions (b) in the same direction, and (c) perpendicular to each other.
19. Define projectile. Give some examples of projectiles.
20. Draw the path of a projectile. Label the horizontal and vertical velocities at a point going up, at a point going down, and at the top of the path.
21. How are a projectile's horizontal velocity and vertical velocity related?

22. Identify the relationship of different launch angles with a projectile's range (the horizontal distance traveled.)

Unit 4 - Newton's Laws

23. What is inertia?

24. How is mass related to inertia?

25. How do you calculate weight?

26. What is the difference between mass and weight?

27. Your mass is 59 Kg, calculate your weight on earth and moon ($g = 1.6 \text{ m/s}^2$)

28. What is Newton's first law of motion? Does it apply to objects at rest, moving objects, or both?

29. What is friction?

30. How do you calculate the net force of two objects acting in the same direction?

31. How do you calculate the net force of two objects acting in opposite directions?

32. What is equilibrium and how does one achieve equilibrium?

33. What is Newton's second law of motion?

34. If you push with 25 N on a 5 kg box and there is a 10 N force of friction, how fast will the box accelerate?

35. If an object moves with a constant velocity, what is the acceleration of the object? What is the net force acting on the object?

36. What is Newton's third law of motion?

37. A bug splatters against the windshield of a moving car. Compare the force of the bug on the car to the force of the car on the bug.

38. A bug splatters against the windshield of a moving car. Compare the acceleration of the bug to the acceleration of the car.

Unit 5 - Momentum and Energy

39. Distinguish between mass and momentum. Which is inertia and which is inertia in motion?

40. When the force of impact on an object is extended in time, does the impulse increase or decrease?

41. In a car crash, why is it a good idea for an occupant to extend the time during which the collision takes place?

42. You are standing on a skateboard.

- a. When you throw a ball, do you experience an impulse?
- b. Do you experience an impulse when you catch a ball of the same speed?
- c. Do you experience an impulse when you catch it and then throw it out again?
- d. Which impulse is greatest?

43. What does it mean to say that momentum is conserved?

44. Distinguish between an elastic and an inelastic collision.

45. What is the momentum of a 6 kg bowling ball rolling at 2 m/s?

46. How many joules of work are done on an object when a force of 10 N pushes it a distance of 10 m?

47. What is power?

48. In which situation is more power required: Slowly lifting a book bag full of books up the stairs or quickly lifting the same book bag full of books up the same stairs?

49. How much power is required to do 100 J of work on an object in a time of 0.5 sec?

50. What are the two main forms of mechanical energy?

51. A boulder is raised above the ground so that its potential energy relative to the ground is 200 J. Then it is dropped. What is its kinetic energy just before it hits the ground?

52. What will be the kinetic energy of an arrow having a potential energy of 50 J after it is shot from a bow?

53. What is the potential energy of a 10 kg box 10 m above the floor?

54. What is the kinetic energy of a 4 kg football traveling at 10 m/s?

Unit 7 - Electrostatics and Electric Fields

55. In terms of attraction and repulsion, how do negative particles affect negative particles? How do negatives affect positives?
56. What happens to electrons in any charging process?
57. Give an example of something charged by friction.
58. Give an example of something charged by simple contact.
59. Give an example of temporarily charging an object by induction.
60. What occurs when we "ground" an object?
61. How does an electrically polarized object differ from an electrically charged object?
62. How does the magnitude of electrical force between a pair of charged objects change when the objects are moved twice as far apart? Three times as far apart?
63. If you put in 10 joules of work to push 1 coulomb of charge against an electric field, what will be its voltage with respect to its starting position?
64. Sketch the electric field around an electron.
65. Why is there no electric field in the middle of a charged spherical conductor?

Unit 8 - Electricity and Magnetism

66. What are the units for electrical potential or potential difference? What are the units for electric current? What are the units for electrical resistance?
67. Define electric current.
68. Give at least two examples of a voltage source.
69. A wire's electrical resistance depends on what three things?
70. True or false and explain: "the source of electrons in a circuit is the voltage source"
71. What surrounds a stationary electric charge? a moving electric charge?
72. What is the cause of magnetism?
73. Sketch and describe the structure and properties of a magnet. Include, label, and define: magnetic domains, magnetic poles, and magnetic field lines.
74. How is a piece of iron temporarily magnetized when near a magnet?
75. Explain how an electromagnet is created. Include all necessary parts and their arrangement. Sketch a simple electromagnet.

Unit 9 - Electric Circuits and Motors

76. What is a series circuit? What is a parallel circuit?
77. State Ohm's law.
78. If the voltage impressed across a circuit is held constant while the resistance doubles, what change occurs in the current?
79. If the resistance of a circuit remains constant while the voltage across the circuit decreases to half its former value, what change occurs in the current?
80. What is the effect on current in a wire if both the voltage across it and its resistance are doubled? If both are halved?
81. A certain device in a 120 V circuit has a current rating of 20 A. What is the resistance of the device?
82. If 6 V are impressed across the above circuit and the voltage across the first lamp is 2 V. what is the voltage across the second lamp? Defend your answer.
83. What is a main shortcoming of a series circuit?
84. In a circuit of two lamps in parallel, if there are 6 V across one lamp. What is the voltage across the other lamp?
85. How does the sum of the currents through the branches of a simple parallel circuit compare to the current that flows through the voltage source?
86. To connect a pair of resistors so their equivalent resistance will be more than the resistance of either one, should you connect them in series or in parallel?
87. To connect a pair of resistors so their equivalent resistance will be less than the resistance of either one, should you connect them in series or in parallel?
88. How many amperes flow through a 60 W bulb connected in a 120 V circuit?

89. What must change in order for electromagnetic induction to occur?
90. Why is a generator shaft harder to rotate when it is connected to a circuit and supplying electric current?
91. What is the primary difference between an electric motor, and an electric generator?

Unit 10 - Waves and Sound

92. Draw and label a transverse wave.
93. Draw and label a longitudinal wave.
94. Distinguish between the *period* and the *frequency* of a vibration or a wave. How do they relate to one another?
95. How does the speed of a wave relate to its frequency and wavelength?
96. As the frequency of sound is increased, does the wavelength increase or decrease?
97. What happens to the speed of sound in air as the air temperature increases?
98. When a wave source moves toward a receiver, does the receiver encounter an increase in frequency, speed, or both? What is this effect called?
99. Distinguish between *constructive* interference and *destructive* interference.

Unit 11 Light and Optics

100. Sketch the electromagnetic spectrum: include all 7 regions in order from low frequency to high frequency.
101. Give an application of each region of the electromagnetic spectrum.
102. What is the speed of light in a vacuum?
103. How is a light wave produced?
104. What are the primary colors of light? What are the primary colors of pigment?
105. Why the sky is blue? Why are sunsets red?
106. State the law of reflection.
107. Draw a light ray that reflects off a flat surface with an angle of reflection of 30° . Label both angles, normal line, and both light rays.
108. Does light speed up or slow down when it leaves water into the air?
109. How is white light separated into the various colors of the rainbow by a prism?