Part One: Variable Review

1. How much time does it take for a bike moving with a speed of 15 m/s to cover a distance of 3500m?

2. How much distance is covered by an ant moving at 2×10^{-2} m/s for 60 seconds?

3. What is the acceleration of an object that speeds up from 15 to 35 m/s in a time of 4 seconds?

4. What is the acceleration of a toy rocket that covers a distance of 20m in a time of 0.4 seconds if it experiences a uniform net force?

5. What is the final velocity of a ball that starts from rest and rolls down a hill with an acceleration of 3.5 m/s^2 for a distance of 30m?

6. What is the acceleration due to gravity on a planet where a ball falls a distance of 30m in 6 seconds?

Part One: Variable Review

7. What is the mass of a cart if a net force of 30N causes it to accelerate at 4 m/s^2?

8. What is the weight of a rock with a mass of 5kg on a planet with a gravitational field strength of 12N/kg?

9. A phone is thrown at a wall a momentum of 4kg m/s and hits a wall with a speed of 20 m/s. What is the mass of the phone?

10. A force of 30N acts on a book for a time of 0.4 seconds. What is the impulse acting on the book?

11. A force of 50N is applied to stretch a spring by 0.75m. What is the spring constant of the spring?

12. A force of 60N is applied at an angle of 45 degrees to pull a sled. What is the horizontal component of the force?

Part One: Variable Review

13. A horizontal force of 30N is applied concurrently with a vertical force of 45N. What is the magnitude and direction of the resultant force?

14. A yo-yo wiaht a mass of 1 x $10^{\wedge}2$kg being spun in a circle experiences a centripetal acceleration of 2m/s^2. What is the centripetal force acting on yo-yo?

15. Find the kinetic energy of a 3kg ball moving with a velocity of 4m/s.

16. Find the elastic potential energy stored when a spring with a spring constant of 2N/m is stretched to 0.4m.

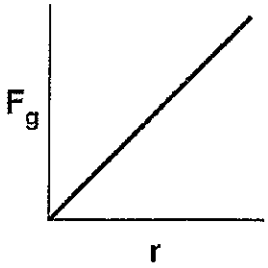
17. A crane with a power rating of 2000W lifts a piano for a time of 4 seconds. How much mechanical work was done by the crane?

Vocab Review: Mechanics

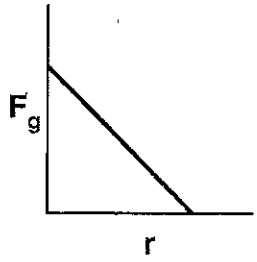
PART B: Direct, Direct square, Inverse and Inverse Square Relationships.

18. Which graph represents the relationship between the magnitude of the gravitational force, F_g, between two masses and the distance, r, between the centers of the masses?

A)



C)



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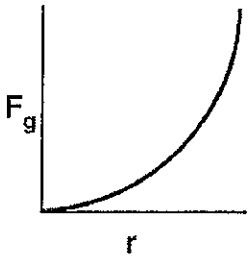
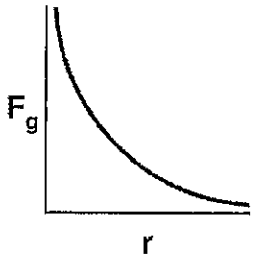


D)



19. A distance of 1.0 meter separates the centers of two small charged spheres. The spheres exert gravitational force F_g and electrostatic force F_e on each other. If the distance between the spheres' centers is increased to 3.0 meters, the gravitational force and electrostatic force, respectively, may be represented as

A) $\frac{F_g}{9}$ and $\frac{F_e}{9}$

B) $\frac{F_g}{3}$ and $\frac{F_e}{3}$

C) $3F_g$ and $3F_e$

D) $9F_g$ and $9F_e$

20. If the speed of a moving object is doubled, the kinetic energy of the object is

A) halved

B) doubled

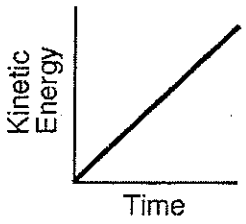
C) unchanged

D) quadrupled

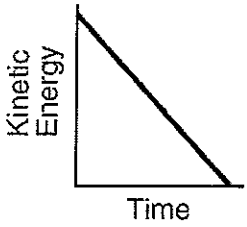
Vocab Review: Mechanics

21. An object falls freely near Earth's surface. Which graph best represents the relationship between the object's kinetic energy and its time of fall

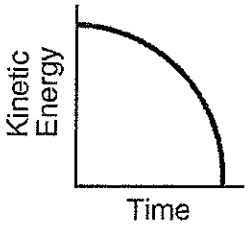
A)



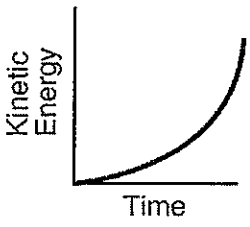
B)



C)

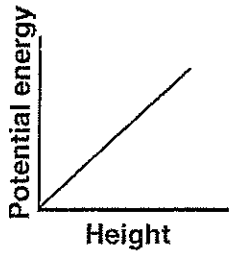


D)

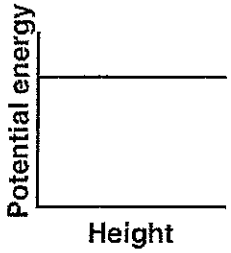


22. Which graph best represents the relationship between the gravitational potential energy of an object near the surface of Earth and its height above Earth's surface?

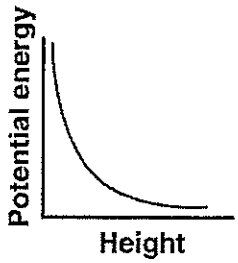
A)



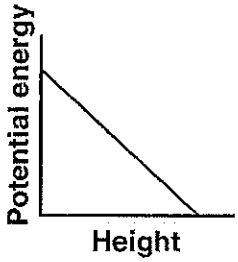
B)



C)

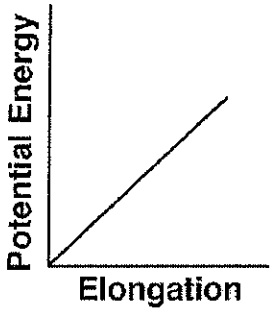


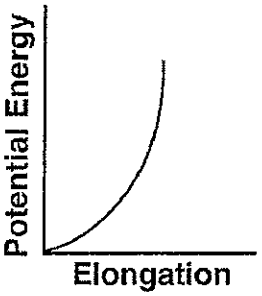
D)

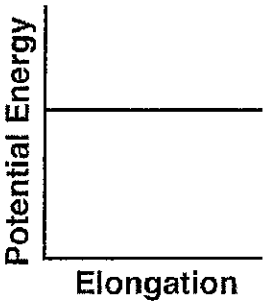


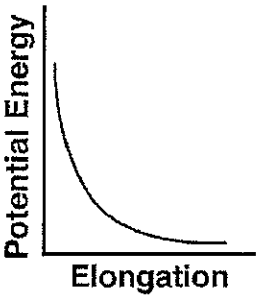
Vocab Review: Mechanics

23. Which graph best represents the relationship between the elastic potential energy stored in a spring and its elongation from equilibrium?

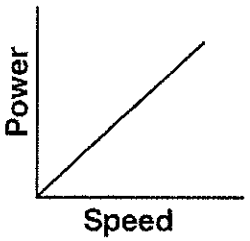
A)


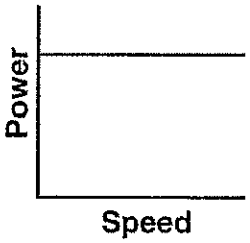
B)


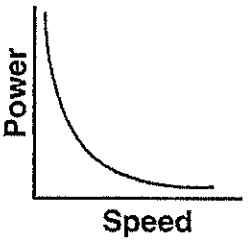
C)


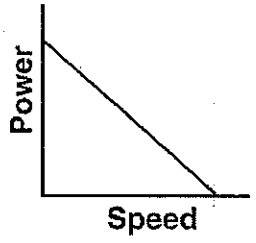
D)


24. Zazu the Hornbill lifts coconut vertically. Which of the following represents the relationship between the power and the speed at which Zazu lifts the coconut?

A)


B)


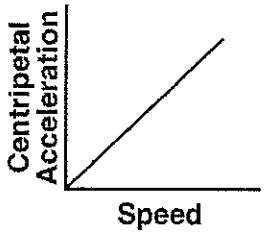
C)


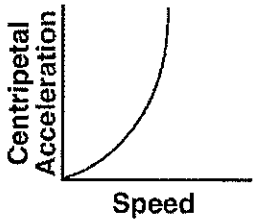
D)


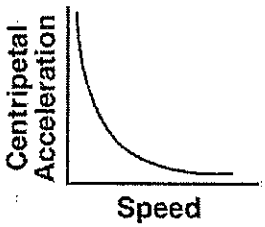
25. A 110-kilogram bodybuilder and his 55-kilogram friend run up identical flights of stairs. The bodybuilder reaches the top in 4.0 seconds while his friend takes 2.0 seconds. Compared to the power developed by the bodybuilder while running up the stairs, the power developed by his friend is

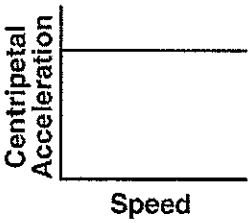
A) the same
B) twice as much
C) half as much
D) four times as much

26. Which graph best represents the relationship between the magnitude of the centripetal acceleration and the speed of an object moving in a circle of constant radius?

A)


B)


C)


D)


27. The magnitude of the centripetal force acting on an object traveling in a horizontal, circular path will *decrease* if the

A) radius of the path is increased
B) mass of the object is increased
C) direction of motion of the object is reversed
D) speed of the object is increased

Vocab Review: Mechanics

28. Centripetal force F_c acts on a car going around a curve. If the speed of the car were twice as great, the magnitude of the centripetal force necessary to keep the car moving in the same path would be

A) F_c B) $2F_c$ C) $\frac{F_c}{2}$ D) $4F_c$

29. A ball of mass M at the end of a string is swinging in a horizontal circular path of radius R at constant speed V. Which combination of changes would require the greatest increase in the centripetal force acting on the ball?

A) doubling V and doubling R
B) doubling V and halving R
C) halving V and doubling R
D) halving V and halving R

30. A child is riding on a merry-go-round. As the speed of the merry-go-round is doubled, the magnitude of the centripetal force acting on the child

A) remains the same
B) is doubled
C) is halved
D) is quadrupled

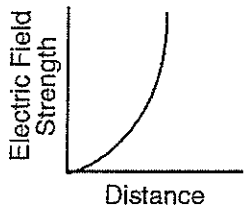
31. An electrostatic force of magnitude F exists between two metal spheres having identical charge q. The distance between their centers is r. Which combination of changes would produce *no* change in the electrostatic force between the spheres?

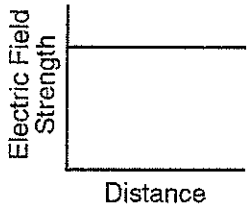
A) doubling q on one sphere while doubling r
B) doubling q on both spheres while doubling r
C) doubling q on one sphere while halving r
D) doubling q on both spheres while halving r

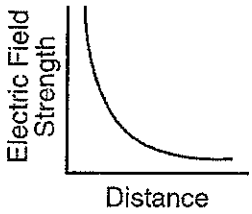
32. If the distance separating an electron and a proton is halved, the magnitude of the electrostatic force between these charged particles will be

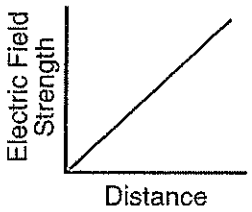
A) unchanged C) quartered
B) doubled D) quadrupled

33. Which graph best represents the relationship between the strength of an electric field and distance from a point charge?

A) 

B) 

C) 

D) 

Part C: Units of measurement. Base Units, Derived Units, Combined Units (based on equations)

34. Which combination of fundamental units can be used to express energy?

A) kg•m/s
B) kg•m^2/s
C) kg•m/s^2
D) kg•m^2/s^2

35. A joule is equivalent to a

A) N•m
B) N•s
C) N/m
D) N/s

36. Which two quantities can be expressed using the same units?

A) energy and force
B) impulse and force
C) momentum and energy
D) impulse and momentum

37. Which combination of fundamental unit can be used to express the weight of an object?

A) kilogram/second
B) kilogram•meter
C) kilogram•meter/second
D) kilogram•meter/second^2

38. One watt is equivalent to one

A) N•m
B) N/m
C) J•s
D) J/s

39. Which term is a unit of power?

A) joule
B) Newton
C) watt
D) hertz

40. The watt•second is a unit of

A) power
B) energy
C) potential difference
D) electric field strength

41. Which two quantities are measured in the same units?

A) velocity and acceleration
B) weight and force
C) mass and weight
D) force and momentum

PART D: ESTIMATION (translating between standard notation, scientific notation, metric notation or in combination).

Vocab Review: Mechanics

42. The approximate length of an unsharpened No. 2 pencil is

A) 2.0×10^{-2} m
B) 2.0×10^{-1} m
C) 2.0×10^{0} m
D) 2.0×10^{1} m

43. The weight of a typical high school physics student is closest to

A) 1500 N
B) 600 N
C) 120 N
D) 60 N

44. What is the approximate mass of an automobile?

A) 10^{1} kg
B) 10^{2} kg
C) 10^{3} kg
D) 10^{6} kg

45. An egg is dropped from a third-story window. The distance the egg falls from the window to the ground is closest to

A) 10^{0} m
B) 10^{1} m
C) 10^{2} m
D) 10^{3} m

46. The thickness of one page of this test booklet is closest to

A) 10^{-4} m
B) 10^{-2} m
C) 10^{0} m
D) 10^{2} m

47. Which measurement is closest to 1×10^{-2} meter?

A) diameter of an atom
B) width of a student's finger
C) length of a football field
D) height of a schoolteacher

Vocab Review: Mechanics

PART E: Scalar and Vector Quantities (be able to identify by term, variable or unit of measurement).

48. Which quantity has both a magnitude and a direction?

A) inertia
B) impulse
C) speed
D) time

49. Which is a vector quantity?

A) speed
B) distance
C) mass
D) displacement

50. Which is a vector quantity?

A) gravitational field strength of Earth
B) mass of a jogger
C) gravitational potential energy
D) kinetic energy of a freely falling body

51. Which term identifies a scalar quantity?

A) displacement
B) acceleration
C) velocity
D) energy

52. Which term identifies a scalar quantity?

A) displacement
B) acceleration
C) velocity
D) time

53. Which terms represent a vector quantity and its respective unit?

A) weight – kilogram
B) mass – kilogram
C) force – newton
D) acceleration – meters per second

54. A unit used for a vector quantity is

A) watt
B) newton
C) kilogram
D) second

55. Which quantity is a vector?

A) power
B) kinetic energy
C) speed
D) weight

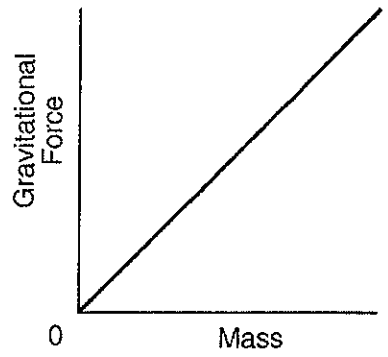
56. Scalar is to vector as

A) speed is to velocity
B) displacement is to distance
C) displacement is to velocity
D) speed is to distance

Vocab Review: Mechanics

PART F: Significance of SLOPE or AREA (equation matching)

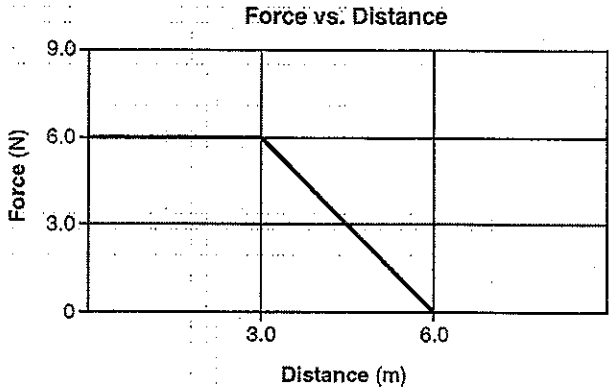
57. Base your answer to the following question on The graph below represents the relationship between gravitational force and mass for objects near the surface of Earth.



The slope of the graph represents the

A) gravitational field strength
B) universal gravitational constant
C) momentum of objects
D) weight of objects

59. A box is pushed to the right with a varying horizontal force. The graph below represents the relationship between the applied force and the distance the box moves.

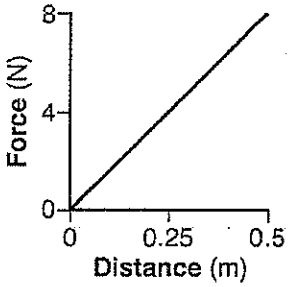


What is the total work done in moving the box 6.0 meters?

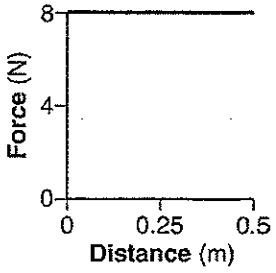
A) 9.0 J
B) 18 J
C) 27 J
D) 36 J

58. Which graph best represents the greatest amount of work?

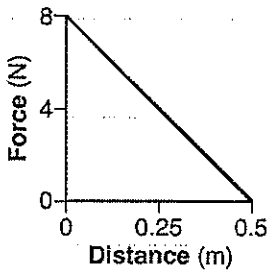
A)



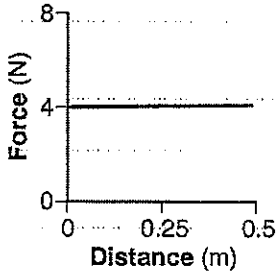
B)



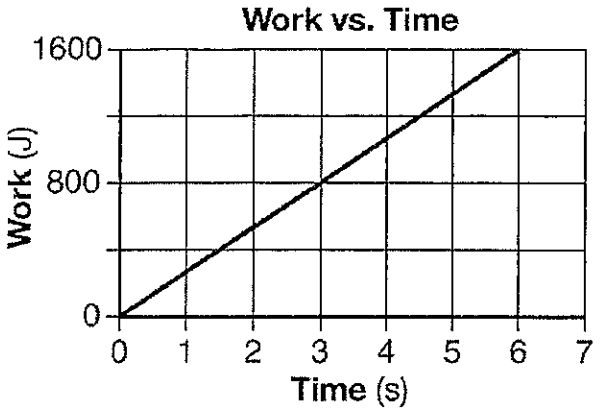
C)



D)



60. The graph below represents the work done against gravity by a student as she walks up a flight of stairs at constant speed.



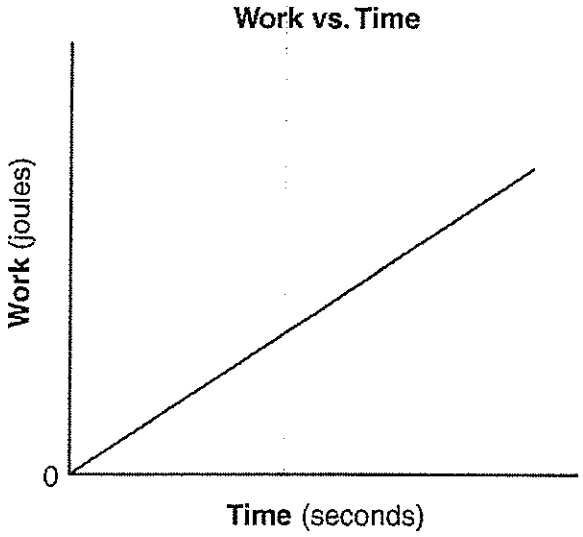
Compared to the power generated by the student after 2.0 seconds, the power generated by the student after 4.0 seconds is

A) the same
B) twice as great
C) half as great
D) four times as great

Vocab Review: Mechanics

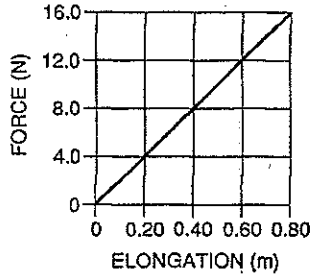
61. The graph below represents the relationship between the work done by a student running up a flight of stairs and the time of ascent.

What does the slope of this graph represent?



A) impulse
B) momentum
C) speed
D) power

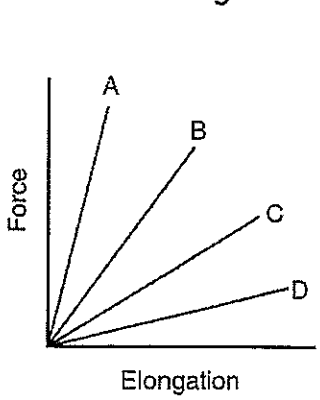
62. The graph below represents the relationship between the force applied to a spring and the elongation of the spring.



How much energy is stored in the spring if it is stretched 0.6m?

A) 3.6 J
B) 7.3 J
C) 20 J
D) 10 J

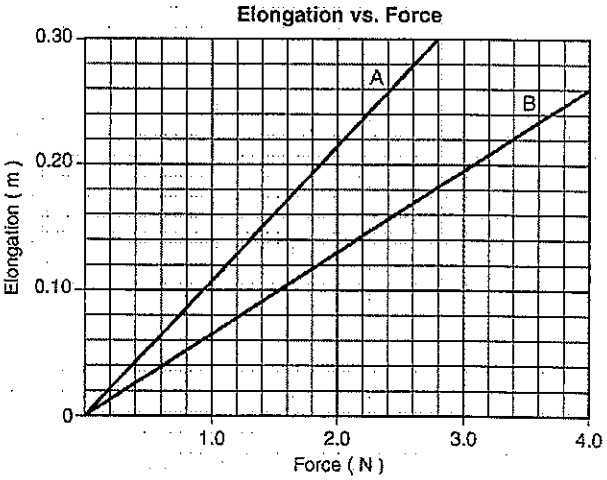
63. The graph below represents the relationship between the force applied to a spring and spring elongation for four different springs.



Which spring has the greatest spring constant?

A) *A* B) *B* C) *C* D) *D*

64. The graph below shows elongation as a function of the applied force for two springs, *A* and *B*.

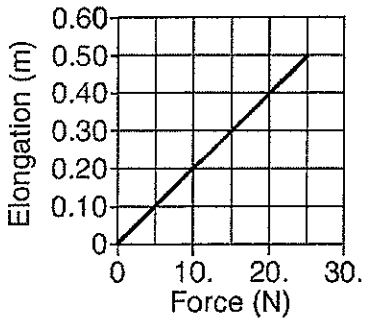


Compared to the spring constant for spring *A*, the spring constant for spring *B* is

A) smaller
B) larger
C) the same

65. The graph below shows the relationship between the elongation of a spring and the force applied to the spring causing it to stretch.

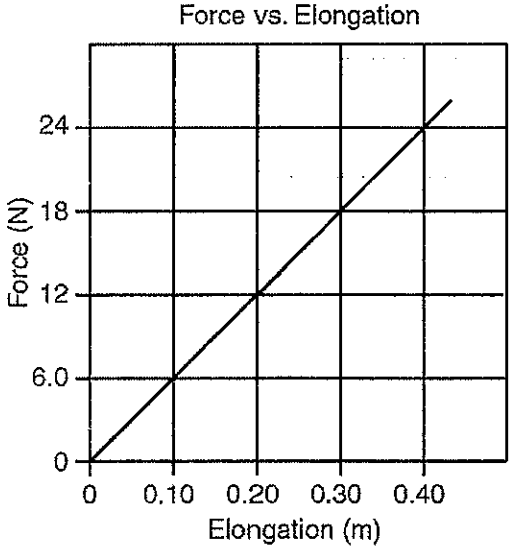
Elongation vs. Applied Force



What is the spring constant for this spring?

A) 0.020 N/m
B) 2.0 N/m
C) 25 N/m
D) 50. N/m

66. The graph below represents the elongation of a spring as a function of the applied force.



How much work must be done to stretch the spring 0.40 meter?

A) 4.8 J
B) 6.0 J
C) 9.8 J
D) 24 J

PART G: Using Vector equations and Pythagorean Theorem

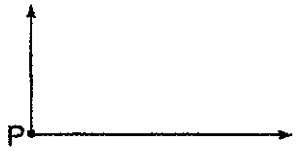
Vocab Review: Mechanics

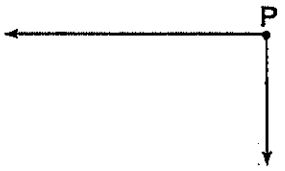
67. The components of a 15-meters-per-second velocity at an angle of 30.° above the horizontal are

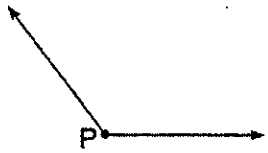
A) 7.5 m/s vertical and 13 m/s horizontal
B) 13 m/s vertical and 7.5 m/s horizontal
C) 6.0 m/s vertical and 9.0 m/s horizontal
D) 9.0 m/s vertical and 6.0 m/s horizontal

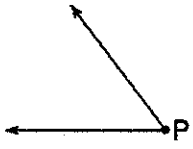
68. The vector below represents the resultant of two velocities acting concurrently on an object at point *P*.

Which pair of vectors best represents two concurrent velocities that combine to produce this resultant vector?

A)


B)


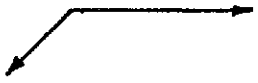
C)


D)


69. A displacement vector with a magnitude of 20. meters could have perpendicular components with magnitudes of

A) 10. m and 10. m C) 12 m and 16 m
B) 12 m and 8.0 m D) 16 m and 8.0 m

70. The diagram below represents two concurrent velocities acting on an object. Which vector best represents their equilibrant?



A)

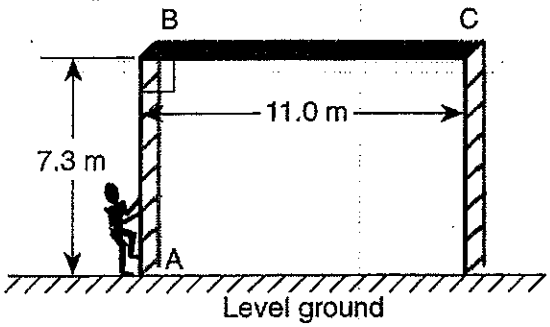

C)


B)


D)


Vocab Review: Mechanics

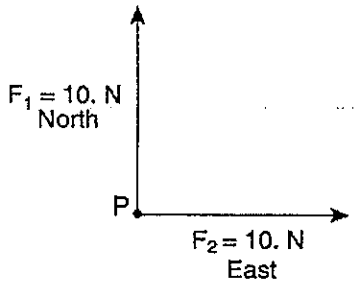
71. As shown in the diagram below, a painter climbs 7.3 meters up a vertical scaffold *A* to *B* and then walks 11.0 meters from *B* to *C* along a level platform



What is the angle of the painter's displacement relative to the horizontal as they move from *A* to *C*?

A) 13.2 degrees
B) 33.6 degrees
C) 56.4 degrees
D) 18.3 degrees

72. Forces F_1 and F_2 act concurrently on point *P*, as shown in the diagram below.



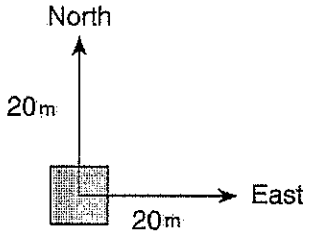
The **equilibrant** of F_1 and F_2 is

A) 14 N southwest
B) 14 N northeast
C) 20. N southwest
D) 20. N southeast

73. As the angle between two concurrent displacements increases from 45° to 90°, the magnitude of their resultant

A) decreases
B) increases
C) remains the same

74. A 20 m displacement due north and a 20m displacement due east are experienced by an object, as shown in the diagram below.



What is the magnitude of the resultant displacement?

A) 20m, northeast
B) 20m, southwest
C) 28m, northeast
D) 28m, southwest

Vocab Review: Mechanics

75. One car travels 40. meters due east in 5.0 seconds, and a second car travels 64 meters due west in 8.0 seconds. During their periods of travel, the cars definitely had the same

A) average velocity
B) total displacement
C) total distance
D) average speed

76. As a cart travels around a horizontal circular track, the cart *must* undergo a change in

A) velocity
B) inertia
C) speed
D) weight

77. Two stones, *A* and *B*, are thrown horizontally from the top of a cliff. Stone *A* has an initial speed of 15 meters per second and stone *B* has an initial speed of 30. meters per second. Compared to the time it takes stone *A* to reach the ground, the time it takes stone *B* to reach the ground is

A) the same
B) twice as great
C) half as great
D) four times as great

78. An object is dropped from rest and falls freely 20. meters to Earth. When is the speed of the object 9.8 meters per second?

A) during the entire first second of its fall
B) at the end of its first second of fall
C) during its entire time of fall
D) after it has fallen 9.8 meters

79. Cart *A* has a mass of 2 kilograms and a speed of 3 meters per second. Cart *B* has a mass of 3 kilograms and a speed of 2 meters per second. Compared to the inertia and magnitude of momentum of cart *A*, cart *B* has

A) the same inertia and a smaller magnitude of momentum
B) the same inertia and the same magnitude of momentum
C) greater inertia and a smaller magnitude of momentum
D) greater inertia and the same magnitude of momentum

80. If the speed of a moving object is doubled, which quantity associated with the object must also double?

A) its momentum
B) its kinetic energy
C) its acceleration
D) its gravitational potential energy

Vocab Review: Mechanics

81. Which quantity has both a magnitude and a direction?

A) energy
B) impulse
C) power
D) work

82. A 1.0-kilogram laboratory cart moving with a velocity of 0.50 meter per second due east collides with and sticks to a similar cart initially at rest. After the collision, the two carts move off together with a velocity of 0.25 meter per second due east. The total momentum of this frictionless system is

A) zero before the collision
B) zero after the collision
C) the same before and after the collision
D) greater before the collision than after the collision

83. A rock is thrown straight up into the air. At the highest point of the rock's path, the magnitude of the net force acting on the rock is

A) less than the magnitude of the rock's weight, but greater than zero
B) greater than the magnitude of the rock's weight
C) the same as the magnitude of the rock's weight
D) zero

84. Which situation represents a person in equilibrium?

A) a child gaining speed while sliding down a slide
B) a woman accelerating upward in an elevator
C) a man standing still on a bathroom scale
D) a teenager driving around a corner in his car

85. Which object has the greatest inertia?

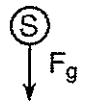
A) a 15-kg mass traveling at 5.0 m/s
B) a 10.-kg mass traveling at 10. m/s
C) a 10.-kg mass traveling at 5.0 m/s
D) a 5.0-kg mass traveling at 15 m/s

86. A carpenter hits a nail with a hammer. Compared to the magnitude of the force the hammer exerts on the nail, the magnitude of the force the nail exerts on the hammer during contact is

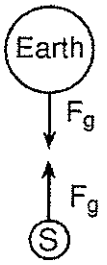
A) less
B) greater
C) the same

87. Which diagram best represents the gravitational forces, F_g, between a satellite, S, and Earth?

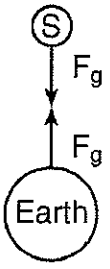
A)



B)



C)



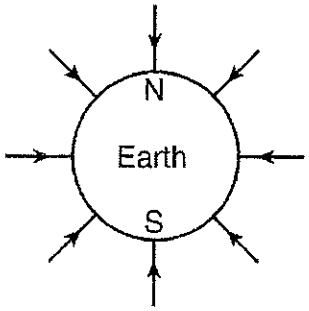
D)

88. Gravitational forces differ from electrostatic forces in that gravitational forces are

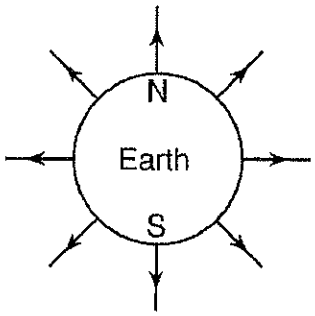
A) attractive, only
B) repulsive, only
C) neither attractive nor repulsive
D) both attractive and repulsive

89. In which diagram do the field lines best represent the gravitational field around Earth?

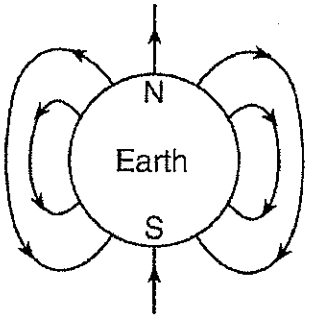
A)



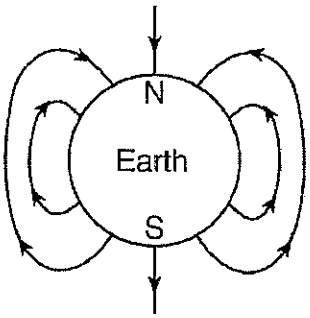
B)



C)



D)



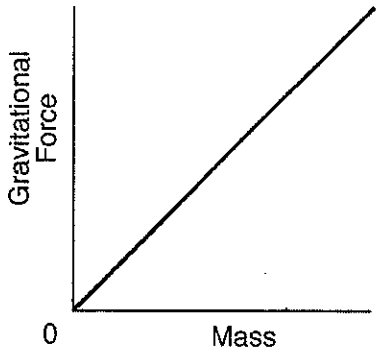
90. A person weighing 785 newtons on the surface of Earth would weigh 298 newtons on the surface of Mars. What is the magnitude of the gravitational field strength on the surface of Mars?

A) 2.63 N/kg
B) 3.72 N/kg
C) 6.09 N/kg
D) 9.81 N/kg

91. As an astronaut travels from the surface of Earth to a position that is four times as far away from the center of Earth, the astronaut's

A) mass decreases
B) mass remains the same
C) weight increases
D) weight remains the same

92. Base your answer to the following question on The graph below represents the relationship between gravitational force and mass for objects near the surface of Earth.

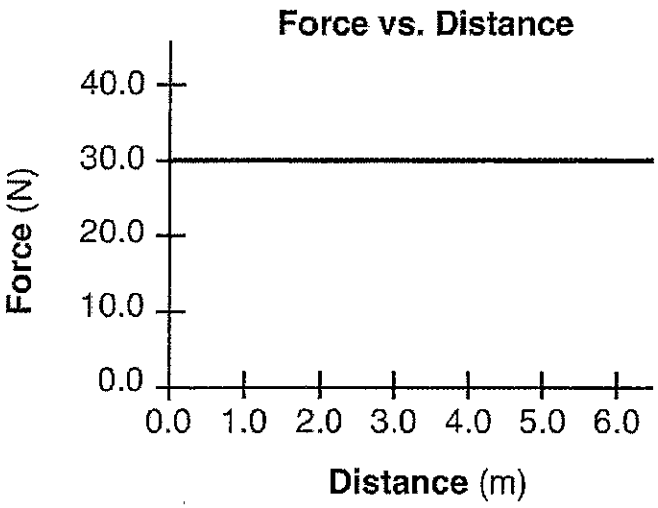


The slope of the graph represents the

A) gravitational field strength
B) universal gravitational constant
C) momentum of objects
D) weight of objects

93. Base your answer to the following question on the information below.

A boy pushes his wagon at constant speed along a level sidewalk. The graph below represents the relationship between the horizontal force exerted by the boy and the distance the wagon moves.



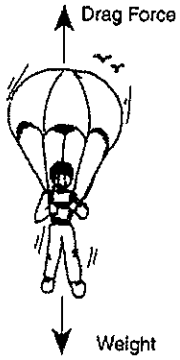
As the boy pushes the wagon, what happens to the wagon's energy?

A) Gravitational potential energy increases.
B) Gravitational potential energy decreases.
C) Internal energy increases.
D) Internal energy decreases.

94. A box is pushed toward the right across a classroom floor. The force of friction on the box is directed toward the

A) left
B) right
C) ceiling
D) floor

95. In the diagram below, the upward drag force acting on a parachute is equal in magnitude but opposite in direction to the weight of the parachutist and equipment.



As a result of the forces shown, the parachutist may be moving

A) downward with decreasing speed
B) downward at constant speed
C) upward with decreasing speed
D) upward with constant acceleration

96. A car's performance is tested on various horizontal road surfaces. The brakes are applied, causing the rubber tires of the car to slide along the road without rolling. The tires encounter the greatest force of friction to stop the car on

A) dry concrete
B) dry asphalt
C) wet concrete
D) wet asphalt

97. Compared to the force needed to start sliding a crate across a rough level floor, the force needed to keep it sliding once it is moving is

A) less
B) greater
C) the same

98. As more force is applied to a steel box sliding on a steel surface, the coefficent of kinetic friction will

A) decrease
B) increase
C) remain the same

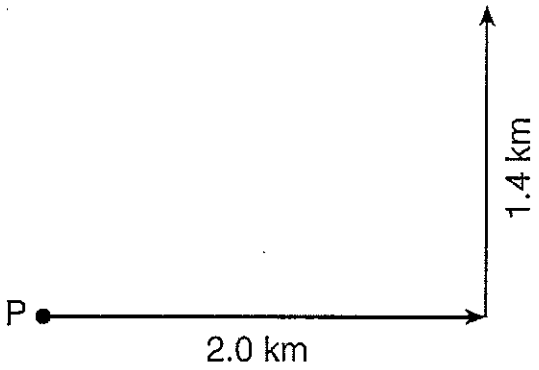
99. Two 20.-newton forces act concurrently on an object. What angle between these forces will produce a resultant force with the greatest magnitude?

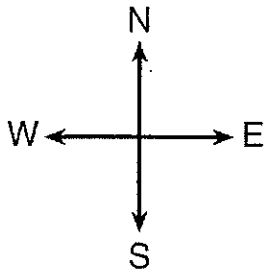
A) 0°
B) 45°
C) 90.°
D) 180.°

Mechanics: Long Answer

Base your answers to questions **100** through **102** on the information and vector diagram below and on your knowledge of physics.

A hiker starts at point *P* and walks 2.0 kilometers due east and then 1.4 kilometers due north. The vectors in the diagram below represent these two displacements.





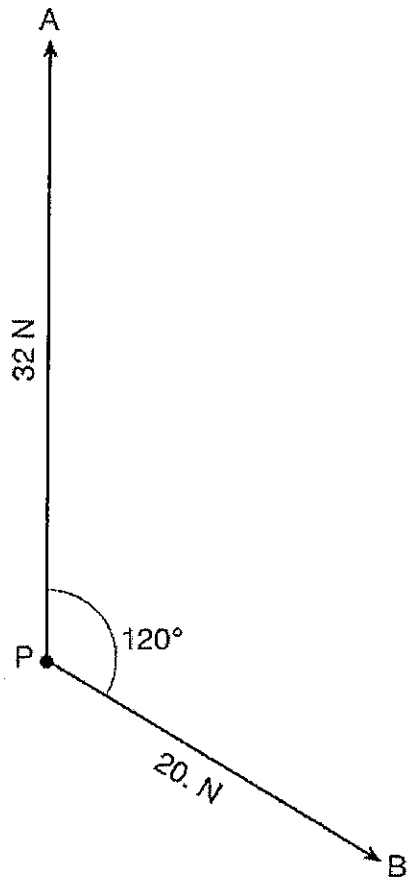
100. On the diagram above, use a ruler to construct the vector representing the hiker's resultant displacement. (2pt)

101. Using a protractor, determine the angle between east and the hiker's resultant displacement. (1pt)

102. Determine the magnitude of the hiker's resultant displacement.

Base your answers to questions **103** and **104** on the information and diagram below.

The scaled diagram below represents two forces acting concurrently at point *P*. The magnitude of force *A* is 32 newtons and the magnitude of force *B* is 20. newtons. The angle between the directions of force *A* and force *B* is 120°.

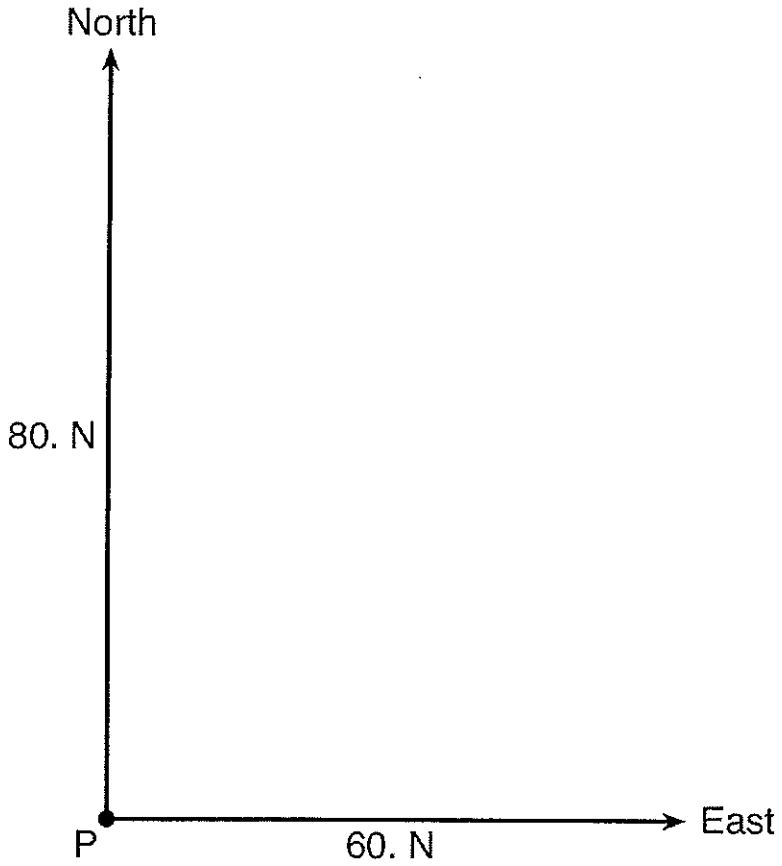


103. Determine the magnitude of the resultant force.

104. On the diagram use a protractor and a ruler to construct a scaled vector to represent the resultant of forces *A* and *B*. Label the vector *R*.

Base your answers to questions **105** and **106** on the information below and the scaled vector diagram below and on your knowledge of physics.

Two forces, a 60.-newton force east and an 80.-newton force north, act concurrently on an object located at point *P*, as shown.

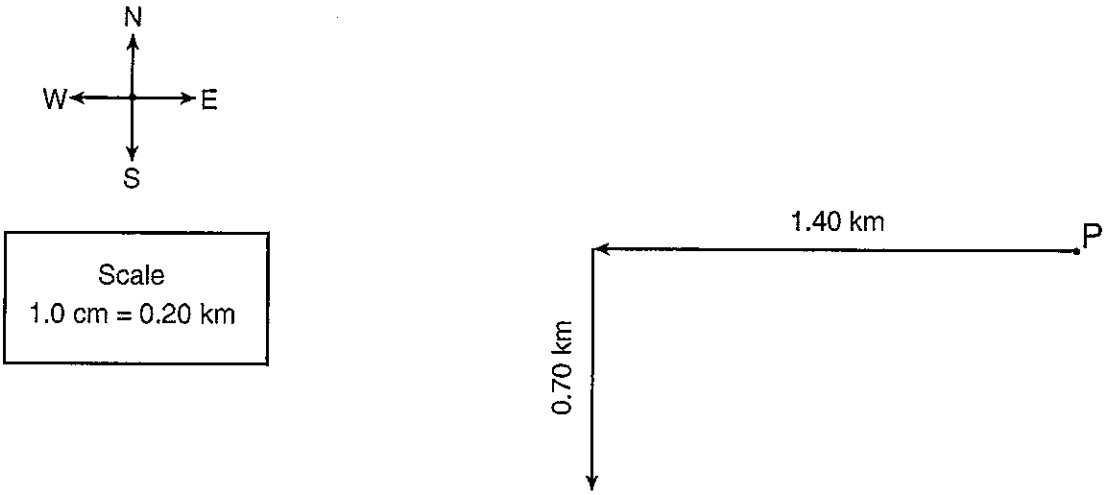


105. Determine the magnitude of the resultant force, *R*.

106. Draw the resultant force vector to scale on the diagram. Label the vector "*R*."

Base your answers to questions **107** through **110** on the information below.

A girl rides her bicycle 1.40 kilometers west, 0.70 kilometer south, and 0.30 kilometer east in 12 minutes. The vector diagram below represents the girl's fist two displacements in sequence from point *P*. The scale used in the diagram is 1.0 centimeter = 0.20 kilometer.



107. Determine the measure of the angle, in degrees, between the resultant and the 1.40-kilometer displacement vector.

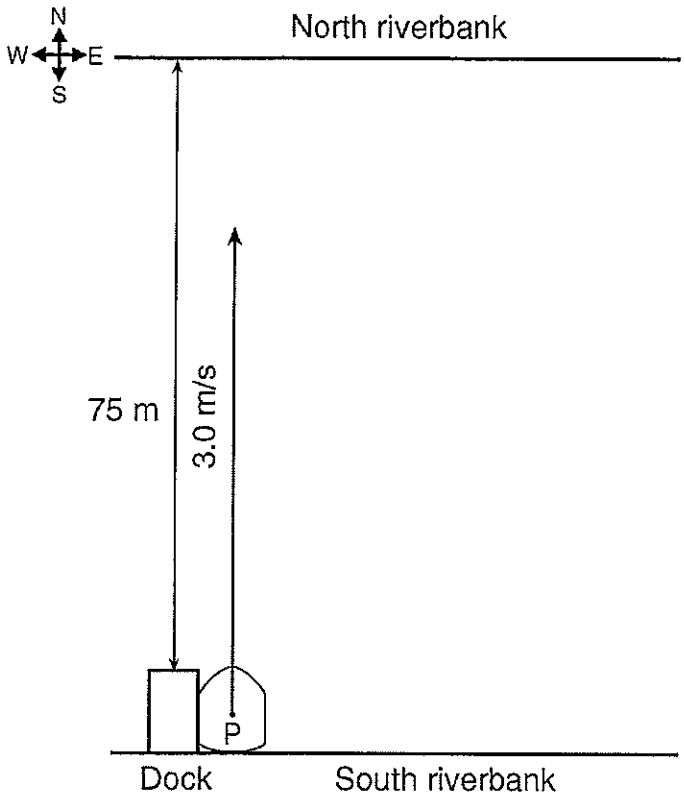
108. Determine the magnitude of the girl's resultant displacement for the entire bicycle trip, in kilometers.

109. Calculate the girl's average speed for the entire bicycle trip. [Show all work, including the equation and substitution with units.]

110. Starting at the arrowhead of the second displacement vector, draw a vector to represent the 0.30 kilometer east displacement. Label the vector with its magnitude.

Base your answers to questions **111** and **112** on the information below.

A river has a current flowing with a velocity of 2.0 meters per second due east. A boat is 75 meters from the north riverbank. It travels at 3.0 meters per second relative to the river and is headed due north. In the diagram below, the vector starting at point *P* represents the velocity of the boat relative to the river water.

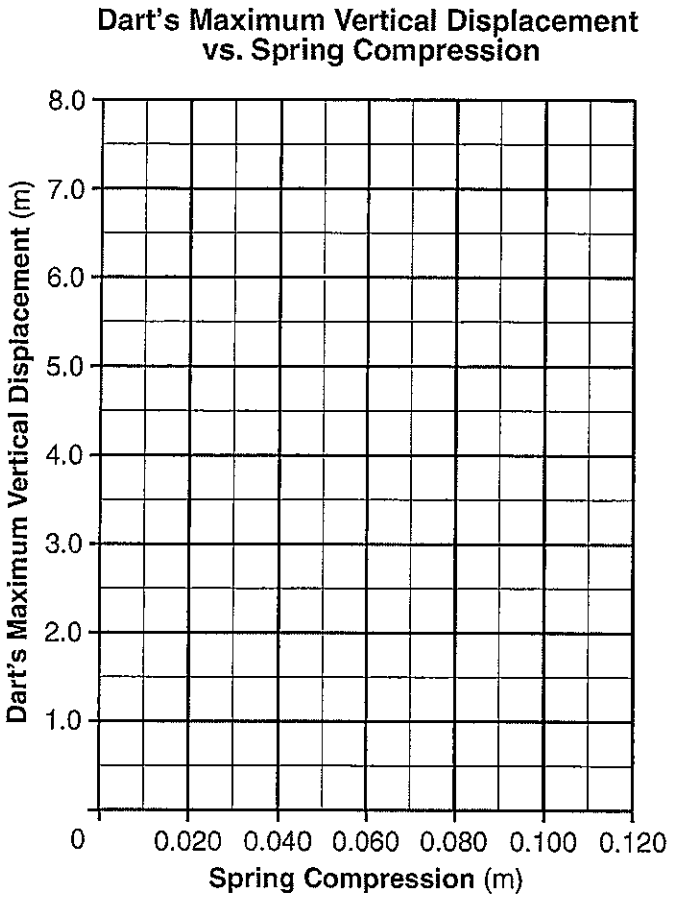


111. Calculate *or* find graphically the magnitude of the resultant velocity of the boat. [Show all work, including the equation and substitution with units *or* construct the resultant velocity vector for the graph, using a scale of 1.0 centimeter = 0.50 meter per second. The value of the magnitude must be written below] (3 pts)

112. Calculate the time required for the boat to cross the river. [Show all work, including the equation and substitution with units.] (3pts)

Base your answers to questions **113** through **116** on the information and data table below.

The spring in a dart launcher has a spring constant of 140 newtons per meter. The launcher has six power settings, 0 through 5, with each successive setting having a spring compression 0.020 meter beyond the previous setting. During testing, the launcher is aligned to the vertical, the spring is compressed, and a dart is fired upward. The maximum vertical displacement of the dart in each test trial is measured. The results of the testing are shown in the table below.



Data Table

Power Setting	Spring Compression (m)	Dart's Maximum Vertical Displacement (m)
0	0.000	0.00
1	0.020	0.29
2	0.040	1.14
3	0.060	2.57
4	0.080	4.57
5	0.100	7.10

113. Determine the magnitude of the force, in newtons, needed to compress the spring 0.040 meter.

114. Using information from your graph, calculate the energy provided by the compressed spring that causes the dart to achieve a maximum vertical displacement of 3.5 meters. [Show all work, including the equation and substitution with units.]

115. Draw the line or curve of best fit.

116. Plot the data points for the dart's maximum vertical displacement versus spring compression on the grid below.

Base your answers to questions **117** through **119** on the information below.

A 1.00-kilogram mass was dropped from rest from a height of 25.0 meters above Earth's surface. The speed of the mass was determined at 5.0-meter intervals and recorded in the data table below

Using the information in the data table, construct a graph on the grid below, following the directions below.

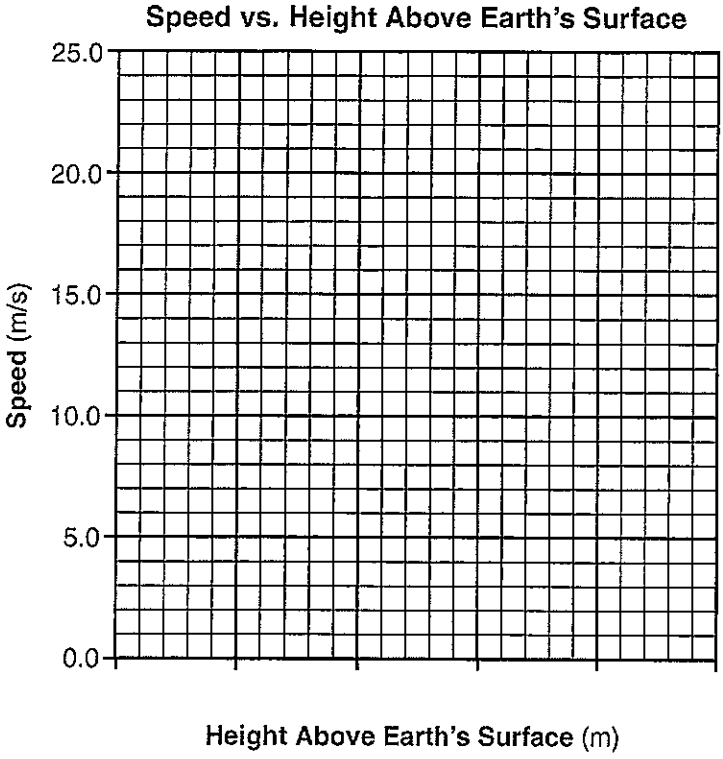
Data Table

Height Above Earth's Surface (m)	**Speed** (m/s)
25.0	0.0
20.0	9.9
15.0	14.0
10.0	17.1
5.0	19.8
0	22.1

117. Using your graph, determine the speed of the mass after it has fallen a vertical distance of 12.5 meters.

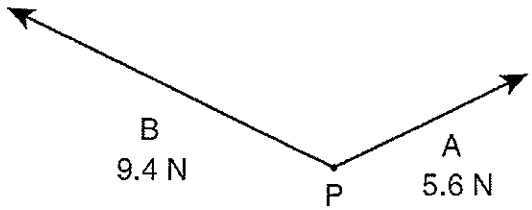
118. Plot the data points for speed versus height above Earth's surface.

119. Mark an appropriate scale on the axis labeled "Height Above Earth's Surface (m)."



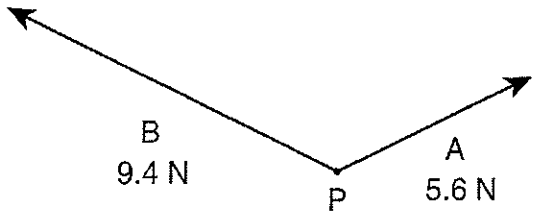
Base your answers to questions **120** through **122** on the information and diagram below.

Force *A* with a magnitude of 5.6 newtons and force *B* with a magnitude of 9.4 newtons act concurrently on point *P*.



120. Determine the magnitude of the resultant force.

121. On the diagram below, use a ruler and protractor to construct a vector representing the resultant of forces *A* and *B*.



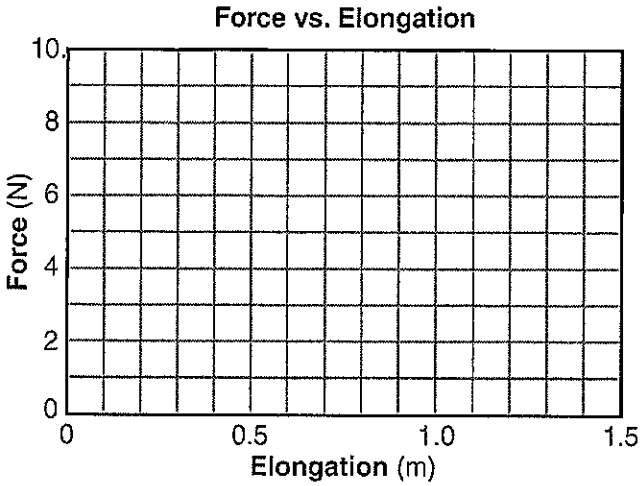
122. Determine the scale used in the diagram.

1.0 cm = _____ N

123. Base your answer to the following question on the information and data table below.

In an experiment, a student applied various forces to a spring and measured the spring's corresponding elongation. The table below shows his data.

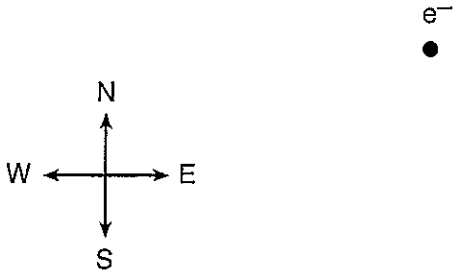
Force (newtons)	Elongation (meters)
0	0
1.0	0.30
3.0	0.67
4.0	1.00
5.0	1.30
6.0	1.50



a On the grid provided above,plot the data points for force versus elongation.
b Draw the best-fit line.
c Using your graph, calculate the spring constant of the spring.

124. Base your answer to the following question on the information below.

A force of 6.0×10^{-15} Newton due south and a force of 8.0×10^{-15} Newton due east act concurrently on an electron, e^-.



a On the diagram, draw a force diagram to represent the *two* forces acting on the electron. (The electron is represented by a dot.) Use a metric ruler and the scale of 1.0 centimeter = 1.0×10^{-15} newton. Begin each vector at the dot representing the electron and label its magnitude in newtons.

b Determine the resultant force on the electron, *graphically*. Label the resultant vector *R*.

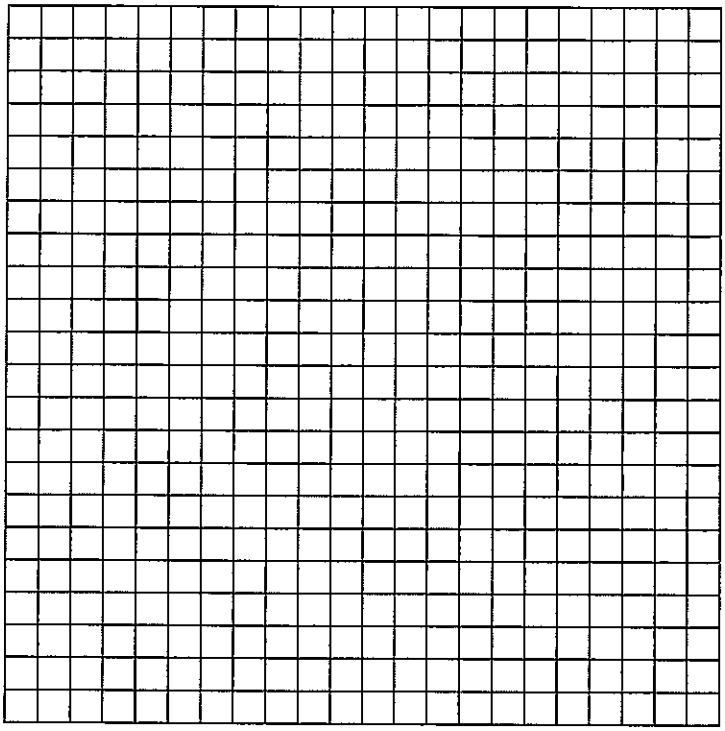
c Determine the magnitude of the resultant vector *R*.

d Determine the angle between the resultant and the 6.0×10^{-15}-newton vector.

125. In a laboratory exercise, a student kept the mass and amplitude of swing of a simple pendulum constant. The length of the pendulum was increased and the period of the pendulum was measured. The student recorded the data in the table below.

Length (meters)	Period (seconds)
0.05	0.30
0.20	0.90
0.40	1.30
0.60	1.60
0.80	1.80
1.00	2.00

Period vs. Length of Pendulum



a Label each axis with the appropriate physical quantity and unit. Mark an appropriate scale on each axis.

b Plot the data points for period versus pendulum length.

c Draw the best-fit line or curve for the data graphed.

d Using your graph, determine the period of a pendulum whose length is 0.25 meter.