

PHYSICS 11

COURSE REVIEW

1. An object is thrown vertically upward with an initial velocity of 13.0 m/s. What is the velocity after 1.70 s?

(-3.68 m/s)

2. A ball is rolled up a constant slope with an initial velocity of 10.0 m/s, and after 8.7 s the ball is rolling down the slope with a velocity of 5.0 m/s. What is the rate of acceleration of the ball on the slope?

(4.3 m/s²)

5. A heavy object was dropped from a helicopter when the helicopter was moving vertically upward at a velocity of 2.0 m/s. Assuming the helicopter was 25 m above the ground when the object was dropped, how long will it take the object to reach the ground?

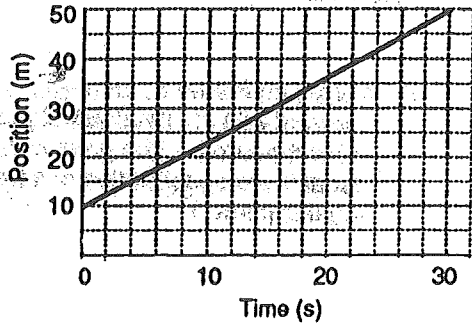
(-1.7 m/s²)

3. An object is thrown vertically upward with an initial velocity of 15.5 m/s. How high is the object when it is traveling down at a velocity at 10.0 m/s?

(7.15 m)

(2.5 s)

6. The following position-time graph describes the motion of an object as it travels along a straight line.



Find

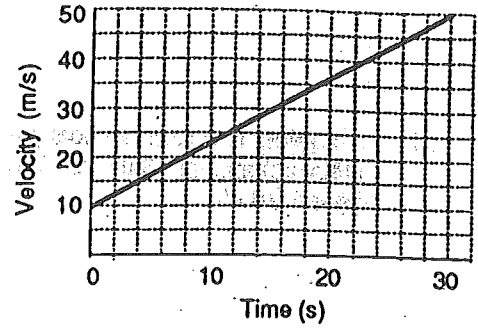
- a) the velocity at 10.0 s

- b) the velocity at 20.0 s

(1.3 m/s)

(1.3 m/s)

7. The following velocity-time graph describes the motion of an object along a straight line.



Find

- a) the velocity at 8.0 s

(20.0 m/s)

- b) the displacement at 8.0 s

(1.2×10^2 m)

- c) the acceleration at

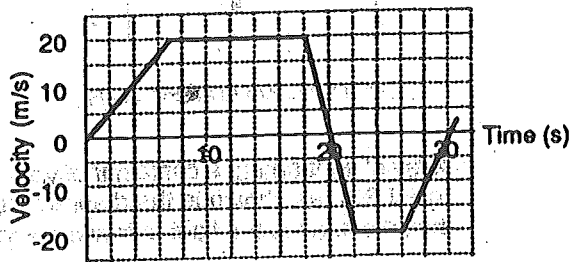
- (i) 10.0 s

(1.3 m/s²)

- (ii) 20.0 s

(1.3 m/s²)

8. The following velocity-time graph describes the motion of an object along a straight line.



Find

- a) the displacement during the first 20.0 s

(177 m)

(3.1×10^2 m)

- b) the acceleration at

(i) 5.0 s

(2.9 m/s²)

(ii) 10.0 s

(0.57 m/s²)

(iii) 20.0 s

(0)

(-10 m/s²)

9. An object is thrown horizontally at a velocity of 15.0 m/s from the top of a building. If the object hits the ground 90.0 m from the base of the building, how high is the building?

10. A 10.0 kg object is pulled with a horizontal force of 7.5 N west across a horizontal table. If the force of friction between the two surfaces is 1.8 N, what is the acceleration of the object?

11. Waves travel from deep water into shallow water. If the speed in the deep water is 5.0 cm/s and 3.0 cm/s in the shallow water, calculate the wavelength in the shallow water when the wavelength in the deep water is 10.0 cm.

(6.0 cm)

12. The wavelength of monochromatic light is $6.30 \times 10^2 \text{ nm}$. What is the period of this light?

13 b.

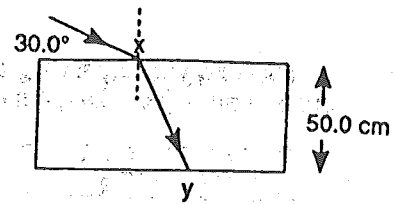


Diagram is not drawn to scale

- A ray of light enters a container of water ($n = 1.33$) as shown in the diagram. Calculate the time it takes the light to travel along the path xy .

($2.10 \times 10^{-15} \text{ s}$)

($2.92 \times 10^{-9} \text{ s}$)

13 a.

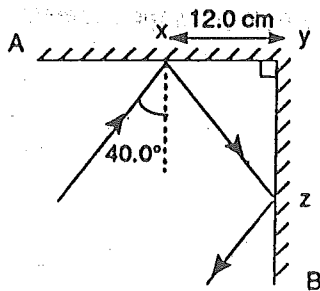


Diagram is not drawn to scale

- A ray of light is reflected in series from two mirrors as shown in the diagram. If the distance xy is 12.0 cm, what is the distance yz ?

14. Waves travel from shallow water into deep water. The angle of incidence is 25.0° , and the angle of refraction is 32.0° . If the speed of the wave is 12.0 cm/s in the shallow water, what is the speed in the deep water?

(15.0 cm/s)

15. Light travels to a distant object and reflects directly back along the same path. How far away is the object if the time for the light to travel to the distant object and reflect back is $3.20 \times 10^{-4} \text{ s}$?

(14.3 cm)

($4.80 \times 10^4 \text{ m}$)

25. A 4.0 cm candle is placed 18 cm from a convex lens with a 12 cm focal length.

a. Calculate the image distance. (36 cm)

b. Calculate the image size. (-8.0 cm)

26. An object is 15 cm in front of a spherical concave mirror of radius 20.0 cm. The object is 3.0 cm high.

a. Find the image distance using the formula. (30 cm)

b. Find the image size. (-6.0 cm)

27. A 2 cm high object is placed 3 cm from a convex lens of focal length 2 cm.

a. Draw the ray diagram to scale and find the image distance and the image size.

b. Use the lens equation to find d_i . (6cm)

c. Use the lens equation to find h_i . (-4 cm)

28. Complete the following table.

Apparatus	Object Location	Image			
		Large or Small	Virtual or Real	Inverted or Erect	Position
Concave mirror	beyond 2 F				
Convex lens	between F and lens				

16. What is the tension in the cable of an 1.0×10^3 kg elevator that is

a) accelerating downward at a rate of 1.0 m/s^2 ?

(8.8×10^3 N)

b) accelerating upward at a rate of 1.0 m/s^2 ?

(1.1×10^4 N)

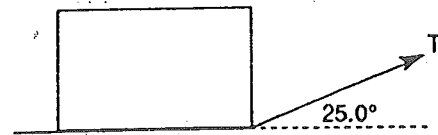
c) moving upward at a constant velocity of 1.0 m/s ?

(9.8×10^3 N)

17. A 2.0 kg object rests on a horizontal frictionless surface. What is the magnitude of the horizontal force that is required to accelerate it at a rate of 2.0 m/s^2 ?

(4.0 N)

18.



A 45.0 N box is pulled along a horizontal surface with a force of 25.0 N acting at an angle of 25.0° as shown in the diagram. If the force of friction on the box is 9.0 N, what is the acceleration?

(2.98 m/s^2)

19. A car travels around a curved path that has a radius of 195 m at a constant speed of 22 m/s. What is the centripetal acceleration of the car?

(2.5 m/s^2)

Physics II - Review Part II:

1. List 2 conservation laws
2. A 1000 kg vehicle is eastbound at 100 km/h. What is its momentum?
3. The momentum of a 300 g ball is 10.0 kg m/s west. What is its velocity?
4. Compare and contrast elastic and inelastic collisions.
5. A 10,000 kg railway car eastbound at 10.0 m/s collides inelastically with a 20,000 kg car which was westbound at 2.00 m/s. What is the velocity of the cars after the collision?
6. A 100 g airtrack glider moving to the left at 0.500 m/s collides elastically with a 150 g glider which was moving right at 0.400 m/s. After the collision the first glider moves to the right at 0.100 m/s. What is the final velocity of the second glider?
7. Compare and contrast Kinetic Energy and potential energy.
8. What is the Kinetic energy of a 10.0 g bullet moving east at 300 m/s?
9. What is the speed of a 20.0 kg rock which has 10.0 J of kinetic energy?
10. What is the potential energy of a spring which has been stretched 10.0 cm by a force of 50.0 N.
11. The spring of question 10 is used to shoot a marble across a table. It gives the marble a speed of 1.00 m/s. What is the mass of the marble?
12. A 10.0 kg rock is lifted 2.00 m from the floor. What is its potential energy?
13. The rock of question 12 is allowed to fall freely. What will be its speed
 - a) 1.00 m from the floor.
 - b) the instant before it strikes the floor.
14. Define work
15. A force of 100 N west acts on a 50.0 kg stone moving it 6.00 m west. How much work is done?
16. How much work is done on a stationary car if a non physics student pushes on it with a force of 200 N for 100 min?
17. A 100 kg sled is moving eastbound at 10.0 m/s. A brave physicist applies a force of 100 N east to stop it. (assume negligible extraneous forces)
 - a) How much work does the physicist do on the sled?
 - b) How much work does the sled do on the physicist?
18. Define friction
19. How much work is done by a hockey player who glides 10.0 m across the ice carrying the Stanley Cup at shoulder height?

20. Describe impulse (using formulae)
21. What is a wave?
22. Compare and contrast longitudinal and transverse waves.
23. Define period, frequency, amplitude, wavelength, damping.
24. What is the frequency of a wave whose amplitude is 10.0 cm, wavelength is 1.00 m and velocity is 10.0 m/s?
25. State the law of reflection.
26. Compare and contrast reflection and refraction.
27. The angle of incidence is 30° and the angle of refraction in crabapple soup is 20° . What is the index of refraction for crabapple soup? Draw a diagram.
28. Describe diffraction and interference.
29. A wave pulse with amplitude +2.00 cm meets a wave pulse with an amplitude of -3.00 cm. What is the amplitude of the resultant wave pulse:
 - a) when they meet.
 - b) a few seconds after they meet.
30. Draw a diagram of standing waves using the following information:
 - wavelength - 4.00 cm
 - amplitude - 2.00 cm
 - draw 3 complete wavelengths
 - indicate nodes and antinodes

2. $2.78 \times 10^3 \text{ kg } \frac{\text{m}}{\text{s}} \text{ west}$

3. $33.3 \frac{\text{m}}{\text{s}} \text{ west}$

5. $2.00 \frac{\text{m}}{\text{s}} \text{ east}$

6. zero

8. 450 J

9. $1.00 \frac{\text{m}}{\text{s}}$

10. 5.00 J

11. 10.0 kg

12. 196 J

13 a) $4.43 \frac{\text{m}}{\text{s}}$

b) $6.26 \frac{\text{m}}{\text{s}}$

15 600 J

16 no work is done

17 a) no work is done since \vec{F} & \vec{d} are in different directions

b) $5.00 \times 10^3 \text{ J}$

19. no work

20. change in momentum: $\Delta p = F \Delta t$

24. $10.0 \frac{\text{m}}{\text{s}} = 10.0 \text{ Hz}$

$\Delta p = m \Delta v$

25. 1.46

1. **Mass of moving electron.** Calculate the mass of an electron when it has a speed of (a) 4.00×10^7 m/s in the CRT of a television set, and (b) $0.98c$ in an accelerator used for cancer therapy.

2. **Painting's contraction.** A rectangular painting measures 1.00 m tall and 1.50 m wide. It is hung on the side wall of a spaceship which is moving past the Earth at a speed of $0.90c$.

(a) What are the dimensions of the picture according to the captain of the spaceship? (b) What are the dimensions as seen by an observer on the Earth?

3. Suppose a news report stated that starship *Enterprise* had just returned from a 5-year voyage while traveling at $0.89c$. (a) If the report meant 5.0 years of Earth time, how much time elapsed on the ship? (b) If the report meant 5.0 years of ship time, how much time passed on Earth?

Answers

1. a) $m = 9.19 \times 10^{-31}$ kg

b) $m = 4.56 \times 10^{-30}$ kg
($5 \times m_0$)

2a) 1.00m by 1.50m

b) only the dimension in the direction of motion is shortened \therefore length changes but height remains unchanged:
1.00m by 0.65m

3. a) 2.3 years

b) 11 years



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 Department of the Interior, Bureau of Land Management, on
 the subject of the above-captioned land.



The land described in the above-captioned instrument is
 situated in the County of _____, State of _____,
 and is more particularly described in the instrument
 referred to in the above-captioned instrument.

