Dawson College

Physics 203-001-50
Remedial Activities for Secondary V Physics

Sample

Part I: Problems (10 marks each)

Solve all seven problems. Show all of your work, clearly and in order, to receive full marks. If you use a formula not given on the formula sheet, a derivation must be shown.

1. A car slows down from an initial velocity of 90.0 km/h to a final velocity of 36.0 km/h at a constant rate while undergoing a displacement of 105 m.

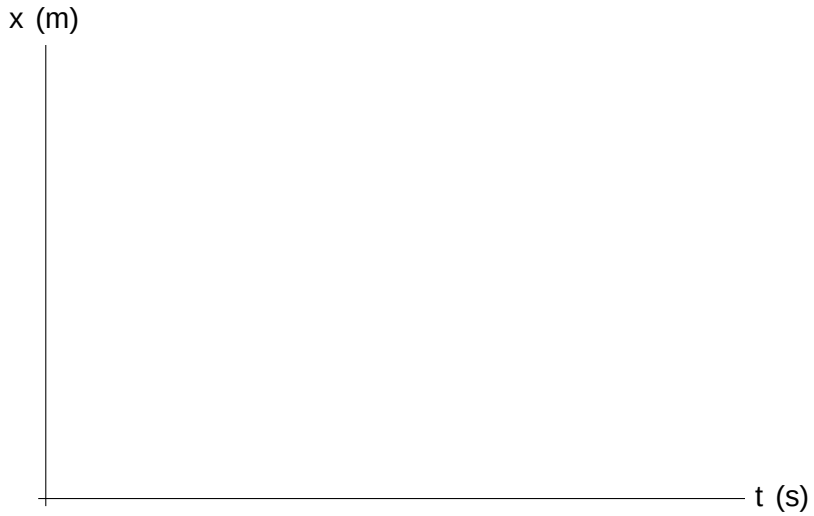
   (a) What is the acceleration of the car?

   (b) If the car continues with the same acceleration, how much additional time will it take to come to a stop?

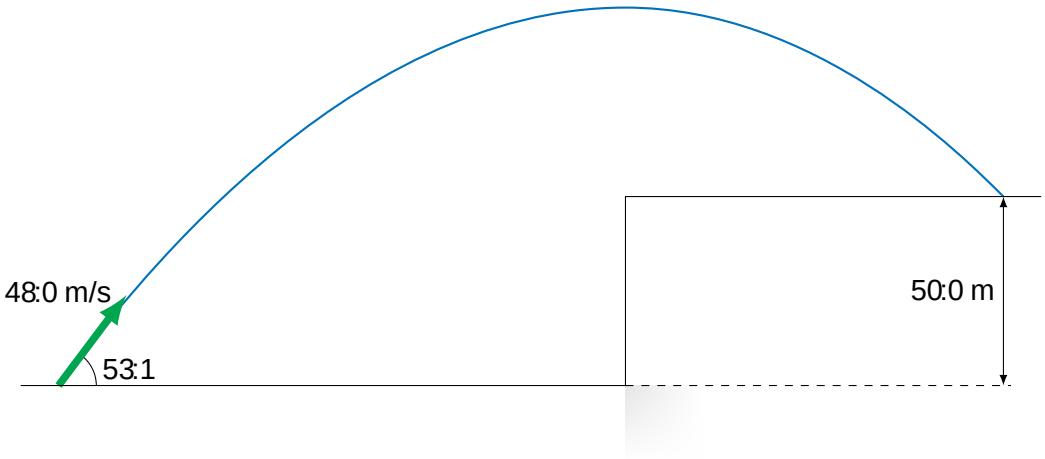
   (c) What is the total displacement of the car from the instant when it's travelling at 90 km/h until it stops?

   (d) Sketch the position-time curve for the car on the empty graph on the next page. Indicate the time and position at which it stops

   .


x (m)
t (s)

2. A projectile is launched at an angle of 53.1° above the horizontal at a speed of 48.0 m/s. The projectile lands on a 50.0 m high ledge.

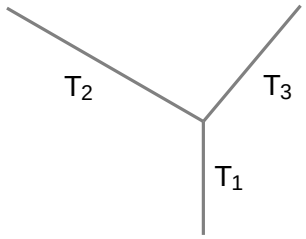


(a) What is the horizontal distance from the launch point to the landing point?

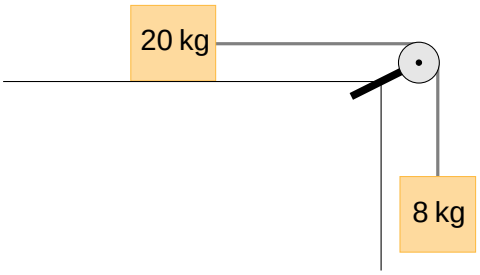
(b) What are the magnitude and direction of the projectile's velocity when it lands?

(c) What is the maximum height reached by the projectile?

3. An 18.0 kg block is suspended from three cables as shown below. What are the tensions, T_1, T_2, and T_3?

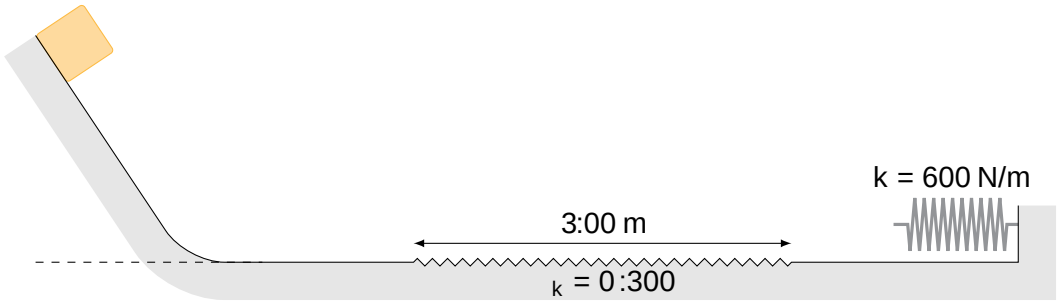


4. A 20.0 kg block on a horizontal surface is connected to a hanging 8.0 kg block by a string, as shown below.

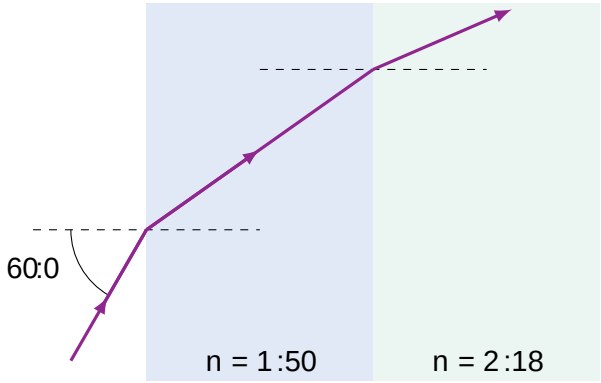


(a)

5. A 1:60 kg block starts from rest and slides along the surface shown below. The surface is frictionless except for the rough patch indicated. After crossing the rough patch the block hits a spring.



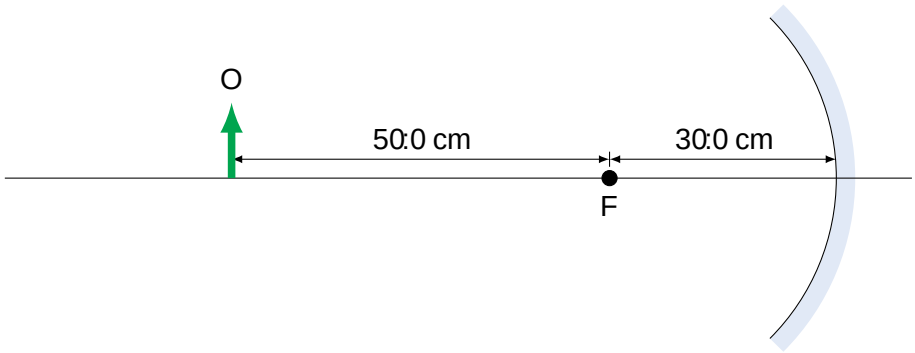
6. A stack of two transparent plates is surrounded by air. The indices of refraction of the plates are 1:50 and 218, respectively. Light in air is incident on the rst plate at an angle of 60:0 relative to the normal.



(a) What is the angle of refraction when the light enters the second plate?

(b) When the light reaches the top of the second plate will it pass through the boundary? Justify your answer with a calculation.

7. A 10.0 cm tall object is placed 80.0 cm in front of a concave mirror with a focal length of 30.0 cm.



(a) What are the image distance and the image type (real or virtual)?

(b) What are the image height and the orientation of the image (upright or inverted)?

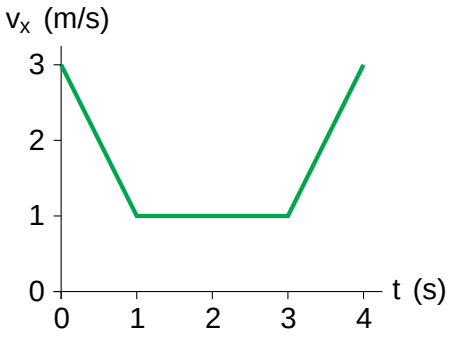
(c) Where does the object need to be placed in order to produce an image that is upright and magni ed by 3 times?

Part II: Multiple Choice Questions (2 marks each)

Answer all fteen questions. Circle the best response from the choices given. If your nal selection is unclear you will not be given the marks. No marks will be awarded for diagrams, calculations, or reasoning.

1. The density of water is 1 g/cm^3. What is the density of water in kg/(g/cm)]TJ/F22 7.9701 Tf 160.1589.243

3. The velocity-time graph for an object is shown below. Which of the following statements is correct?

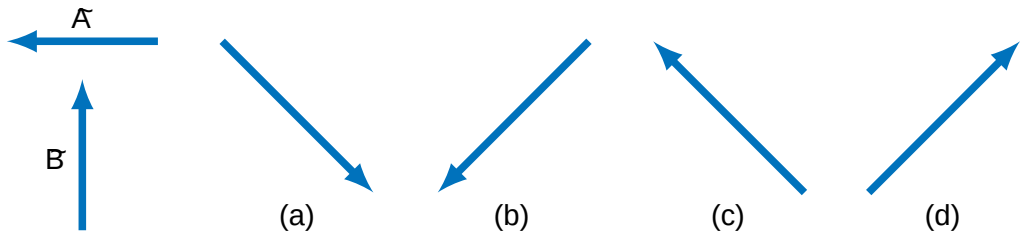


(a) The object has a negative displacement between $t = 0$ s and $t = 4$ s
(b) The object has a positive displacement between $t = 0$ s and $t = 4$ s
(c) The object has zero displacement between $t = 0$ s and $t = 4$ s
(d) We need to know the mass of the object to determine its displacement
(e) Displacement cannot be determined from a velocity-time graph

4. The motion diagram of a particle is shown below. What is the sign of the acceleration?

(a) Acceleration is positive
(b) Acceleration is negative
(c) Acceleration is zero
(d) Acceleration is positive then negative
(e) Acceleration is negative then positive

5. Two vectors $\vec{A}$ and $\vec{B}$ are shown below. Which of the choices is the resultant of the operation $\vec{B} - \vec{A}$?



6. A ball is thrown straight up into the air. It rises to its maximum height, then falls back to its starting point. Assuming no air resistance, which of the following is true?

   (a) It takes less time to go up than to come back down

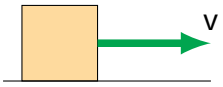
   (b) It takes more time to go up than to come back down

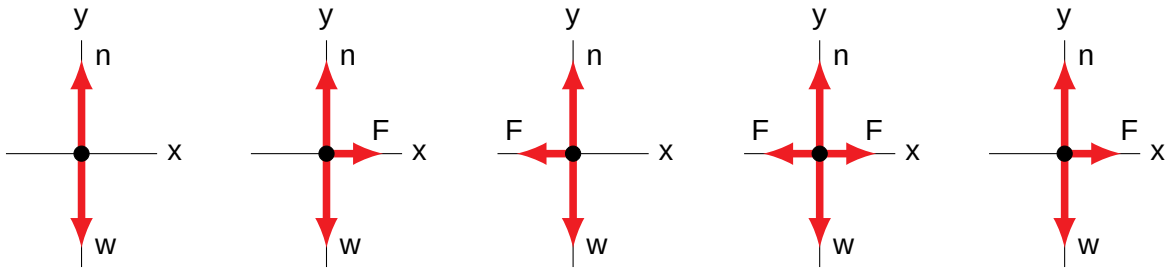
   (c) It takes equal time to go up and to come back down

   (d) It depends on the mass of the ball

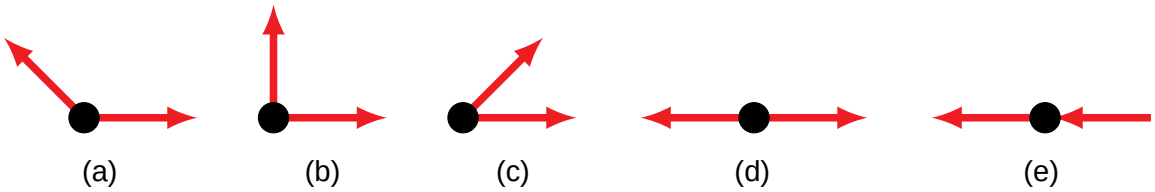
   (e) It depends on how fast the ball is initially thrown

7. A block slides across a frictionless, horizontal surface with constant speed. Which of the choices is the correct free-body diagram for the block?





8. Five identical hockey pucks are shown below. Which puck has the acceleration with the greatest magnitude? [All the forces have the same magnitude]



9. You throw a rock against a window. The rock does not break the window, instead it bounces o . Which of the following statements is correct?

   (a) The force of the rock on the window is greater than the force of the window on the rock

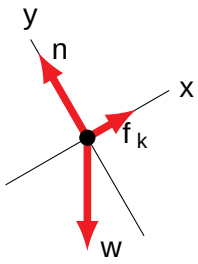
   (b) The force of the rock on the window is less than the force of the window on the rock

   (c) The force of the rock on the window is equal to the force of the window on the rock

   (d) The rock exerts no force on the window

   (e) The window exerts no force on the rock

10. Which of the following situations does the free-body diagram shown below best represent?



(a) A block sliding up a slope

(b) A block sliding down a slope

(c) A block at rest on a slope

(d) A block sliding to the left across a horizontal surface

(e) A block sliding to the right across a horizontal surface

11. Each of the four blocks shown below is pushed 10 m across a horizontal, frictionless surface by a 5 N force. How does the work done on each block compare?

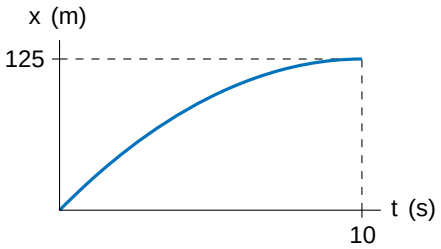
Block A Block B Block C Block D

(a) W

Answers

Problems

1. (a) $a_x =$ 2:50 m/s^2 (b) t = 4 :00 s (c) x_f = 125 m
   (d)



2. (a) x_f = 178 m (b) v_f = 36 :4 m/s, $_f$ = 37:6 (c) y_{max} = 75 :2 m
3. T_1 = 176 N, T_2 = 115 N, T_3 = 155 N
4. (a) $_s$ = 0 :400 (b) a_x = 2 :8 m/s^2, T = 56 :0 N
5. (a) v_f = 5 :42 m/s (b) v_f = 3 :43 m/s (c) x = 0 :177 m
6. (a) $_2$ = 23 :4 (b) No, because $_1$ = 66 :6 > $_c$ = 27 :3
7. (a) s^0 = 48 :0 cm (real) (b) h^0 = 6:00 cm (inverted, reduced) (c) s = 20 cm

Multiple Choice

1. (a)
2. (e)
3. (b)
4. (b)
5. (d)
6. (c)
7. (a)
8. (e)
9. (c)
10. (b)
11. (a)
12. (e)
13. (d)
14. (d)
15. (c)