



PHYSICS

BOOKS - PRINCETON PHYSICS (ENGLISH)

KINEMATICS

Solved Example

1. A rock is thrown straight upward from the edge of a 30 m cliff, rising 10 m then falling all

the way down to the base of the cliff. Find the rock's displacement.



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2. In a track and field event, an athlete runs exactly once around an oval track, a total distance of 500 m. Find the runner's displacement for the race.



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3. Assume that the runner in sample question completes the race in 1 hour and 20 seconds. Find her average speed and the magnitude of her average velocity.



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4. Is it possible to move with constant speed but not constant velocity ? Is it possible to move with constant velocity but not constant speed ?



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5. A car is traveling in a straight line along a highway at a constant speed of 80 miles per hour for 10 seconds. Find its acceleration.



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6. A car is traveling in a straight line along a highway at a speed of $20m/s$. The driver steps on the gas pedal, and 3 seconds later, the car's speed is $32m/s$. Find its average acceleration.



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7. Spotting a police car ahead, the driver of the car in the previous example slows from 32m/s to 20m/s in 2 sec. Find the car's average acceleration.



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8. An object with an initial velocity of 4m/s moves along a straight axis under constant

acceleration. Three seconds later, its velocity is $14\text{m} / \text{s}$. How far did it travel during this time ?



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9. A car that's initially traveling at $10\text{m} / \text{s}$ accelerates uniformly for 4 seconds at a rate of $2\text{m} / \text{s}^2$ in a straight line. How far does the car travel during this time ?



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10. A rock is dropped off a cliff that's 80 m high. If it strikes the ground with an impact velocity of 40 m/s , what acceleration did it experience during its descent ?



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11. The velocity of an object as a function of time is given by the following graph :



At which point (A, B, C, D or E) is the magnitude of the acceleration the greatest ?



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12. The velocity of an object as a function of time is given by the following graph :



How would you answer this same question if the graph shown were a position-versus time graph ?



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13. A rock is dropped from an 80- meter cliff.
How long does it take to reach the ground ?



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14. One second after being thrown straight down, an object is falling with a speed of $20m/s$. How fast will it be falling 2 seconds later ?



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15. If an object is thrown straight upward with an initial speed of $8m/s$ and takes 3 seconds to strike the ground, from what height was the object thrown ?



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16. An object is thrown horizontally with an initial speed of $10m/s$. How far will it drop in 4 seconds ?



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17. From a height of 100 m, a ball is thrown horizontally with an initial speed of 15m/s . How far does it travel horizontally in the first 2 seconds ?



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18. A projectile is traveling in a parabolic path for a total of 6 seconds. How does its horizontal velocity 1 s after launch compare to its horizontal velocity 4 s after launch ?



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19. An object is projected upward with a 30° launch angle and an initial speed of 60m/s . How many second will it be in the air ? How far will it travel horizontally ?



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Mcq

1. An object that's moving with constant speed travels once around a circular path. True statements about this motion include which of the following ?

I. The displacement is zero.

II. The average speed is zero.

III. The acceleration is zero.

A. I only

B. I and II only

C. I and III only

D. III only

Answer: A



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2. At time $t = t_1$, an object's velocity is given by the vector v_1 shown below.



A short time later, at $t = t_2$, the object's velocity is the vector v_2



If v_1 and v_2 have the same magnitude, which one of the following vectors best illustrates the object's average acceleration between $t = t_1$ and $t = t_2$?

A. 

B. 

C. 

D. 

Answer: C



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3. Which of the following must always be true ?

I. If an object's acceleration is constant, then it must move in a straight line.

II. If an object's acceleration is zero, then its speed must remain constant.

III. If an object's speed remains constant, then its acceleration must be zero.

A. I and II only

B. I and III only

C. II only

D. III only

Answer: C



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4. A baseball is thrown straight upward. What is the ball's acceleration at its highest point ?

A. 0

B. $\frac{1}{2}g$, downward

C. g , downward

D. $\frac{1}{2}g$, upward

Answer: C



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5. How long would it take a car, starting from rest and accelerating uniformly in a straight line at $5m/s^2$, to cover a distance of 200 m ?

A. 9.0 s

B. 10.5 s

C. 12.0 s

D. 15.5 s

Answer: A



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6. A rock is dropped off a cliff and strikes the ground with an impact velocity of 30m/s .

How high was the cliff ?

A. 15m

B. 20m

C. 30m

D. 45 m

Answer: D



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7. A soccer ball, at rest on the ground, is kicked with an initial velocity of 10m/s at a launch

angle of 30° . Calculate its total flight time, assuming that air resistance is negligible.

A. 0.5 s

B. 1s

C. 1.7 s

D. 2 s

Answer: B



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8. A stone is thrown horizontally with an initial speed of $30\text{m} / \text{s}$ from a bridge. Find the stone's total speed when it enters the water 4 seconds later. (Ignore air resistance).

A. $30\text{m} / \text{s}$

B. $40\text{m} / \text{s}$

C. $50\text{m} / \text{s}$

D. $60\text{m} / \text{s}$

Answer: C



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9. Which one of the following statements is true concerning the motion of an ideal projectile launched at an angle of 45° to the horizontal ?

A. The speed at the top of the trajectory is zero.

B. The object's total speed remains constant during the entire flight.

C. The horizontal speed decreases on the way up and increases on the way down.

D. The vertical speed decreases on the way up and increases on the way down.

Answer: D



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