

Practice - Projectile Motion

Name: _____

Date: _____

1. The path of a projectile fired at a 30° angle to the horizontal is best described as

- A. parabolic B. linear
C. circular D. hyperbolic

2. A projectile is fired from a gun near the surface of Earth. The initial velocity of the projectile has a vertical component of 98 meters per second and a horizontal component of 49 meters per second. How long will it take the projectile to reach the highest point in its path?

- A. 5.0 s B. 10. s C. 20. s D. 100. s

3. An archer uses a bow to fire two similar arrows with the same string force. One arrow is fired at an angle of 60° with the horizontal, and the other is fired at an angle of 45° with the horizontal. Compared to the arrow fired at 60° , the arrow fired at 45° has a

- A. longer flight time and longer horizontal range
B. longer flight time and shorter horizontal range
C. shorter flight time and longer horizontal range
D. shorter flight time and shorter horizontal range

4. Base your answer(s) to the following question(s) on the information.

Projectile *A* is launched horizontally at a speed of 20. meters per second from the top of a cliff and strikes a level surface below, 3.0 seconds later. Projectile *B* is launched horizontally from the same location at a speed of 30. meters per second.

The time it takes projectile *B* to reach the level surface is

- A. 4.5 s B. 2.0 s C. 3.0 s D. 10. s

5. Approximately how high is the cliff?

- A. 29 m B. 44 m C. 60. m D. 104 m

6. A projectile is fired with an initial velocity of 120. meters per second at an angle, θ , above the horizontal. If the projectile's initial horizontal speed is 55 meters per second, then angle θ measures approximately

- A. 13° B. 27° C. 63° D. 75°

7. A projectile launched at an angle of 45° above the horizontal travels through the air. Compared to the projectile's theoretical path with no air friction, the actual trajectory of the projectile with air friction is

- A. lower and shorter B. lower and longer
C. higher and shorter D. higher and longer

8. A ball is thrown vertically upward with an initial velocity of 29.4 meters per second. What is the maximum height reached by the ball? [Neglect friction.]

- A. 14.7 m B. 29.4 m
C. 44.1 m D. 88.1 m

9. Four projectiles, A, B, C, and D, were launched from, and returned to, level ground. The data table below shows the initial horizontal speed, initial vertical speed, and time of flight for each projectile.

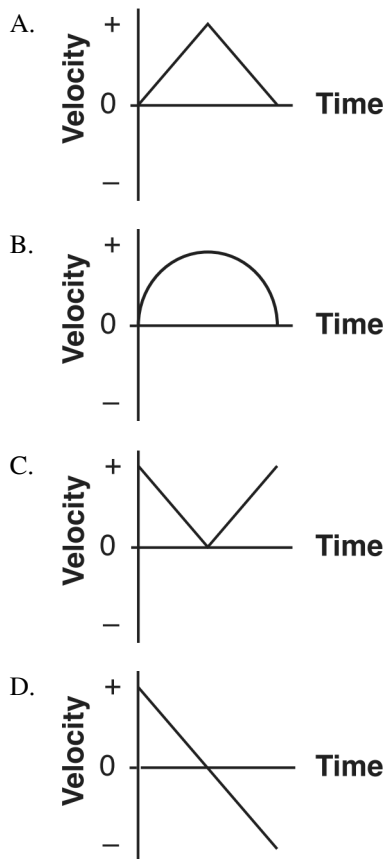
Data Table

Projectile	Initial Horizontal Speed (m/s)	Initial Vertical Speed (m/s)	Time of Flight (s)
A	40.0	29.4	6.00
B	60.0	19.6	4.00
C	50.0	24.5	5.00
D	80.0	19.6	4.00

Which projectile traveled the greatest horizontal distance? [Neglect friction.]

- A. A B. B C. C D. D

10. A student throws a baseball vertically upward and then catches it. If vertically upward is considered to be the positive direction, which graph best represents the relationship between velocity and time for the baseball? [Neglect friction.]



11. A soccer ball kicked on a level field has an initial vertical velocity component of 15.0 meters per second. Assuming the ball lands at the same height from which it was kicked, what is the total time the ball is in the air? [Neglect friction.]

- A. 0.654 s B. 1.53 s
C. 3.06 s D. 6.12 s

12. A baseball is thrown at an angle of 40.0° above the horizontal. The horizontal component of the baseball's initial velocity is 12.0 meters per second. What is the magnitude of the ball's initial velocity?

- A. 7.71 m/s B. 9.20 m/s
C. 15.7 m/s D. 18.7 m/s

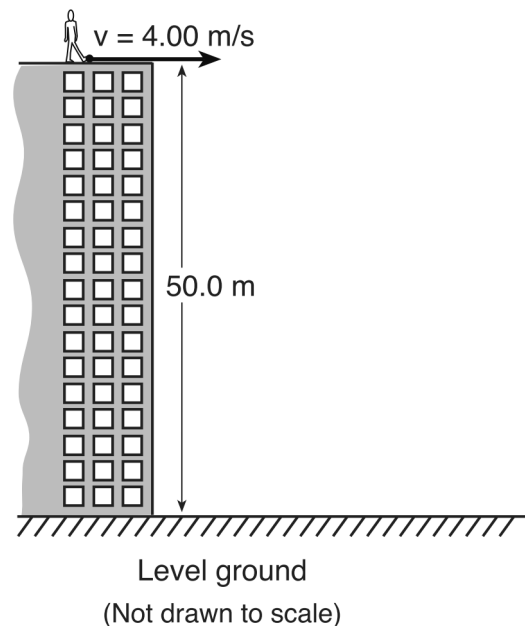
13. A projectile is launched at an angle above the ground. The horizontal component of the projectile's velocity, v_x , is initially 40. meters per second. The vertical component of the projectile's velocity, v_y , is initially 30. meters per second. What are the components of the projectile's velocity after 2.0 seconds of flight? [Neglect friction.]

- A. $v_x = 40. \text{ m/s}$ and $v_y = 10. \text{ m/s}$
B. $v_x = 40. \text{ m/s}$ and $v_y = 30. \text{ m/s}$
C. $v_x = 20. \text{ m/s}$ and $v_y = 10. \text{ m/s}$
D. $v_x = 20. \text{ m/s}$ and $v_y = 30. \text{ m/s}$

14. A ball is thrown with an initial speed of 10. meters per second. At what angle above the horizontal should the ball be thrown to reach the greatest height?

- A. 0° B. 30° C. 45° D. 90°

15. As shown in the diagram below, a student standing on the roof of a 50.0-meter-high building kicks a stone at a horizontal speed of 4.00 meters per second.



How much time is required for the stone to reach the level ground below? [Neglect friction.]

- A. 3.19 s B. 5.10 s C. 10.2 s D. 12.5 s

16. A toy rocket is launched twice into the air from level ground and returns to level ground. The rocket is first launched with initial speed v at an angle of 45° above the horizontal. It is launched the second time with the same initial speed, but with the launch angle increased to 60° above the horizontal. Describe how both the total horizontal distance the rocket travels and the time in the air are affected by the increase in launch angle. [Neglect friction.]

17. Base your answer(s) to the following question(s) on the information and diagram below.

A projectile is launched into the air with an initial speed of v_i at a launch angle of 30° above the horizontal. The projectile lands on the ground 2.0 seconds later.



On the diagram above, sketch the ideal path of the projectile.

18. Base your answer(s) to the following question(s) on the information and diagram below.

A projectile is launched into the air with an initial speed of v_i at a launch angle of 30° above the horizontal. The projectile lands on the ground 2.0 seconds later.



How does the maximum altitude of the projectile change as the launch angle is increased from 30° to 45° above the horizontal? [Assume the same initial speed, v_i .]

19. How does the total horizontal distance traveled by the projectile change as the launch angle is increased from 30° to 45° above the horizontal? [Assume the same initial speed, v_i .]

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- 1.
Answer: A
Points: 1

- 2.
Answer: B
Points: 1

- 3.
Answer: C
Points: 1

- 4.
Answer: C
Points: 1

- 5.
Answer: B
Points: 1

- 6.
Answer: C
Points: 1

- 7.
Answer: A
Points: 1

- 8.
Answer: C
Points: 1

- 9.
Answer: D
Points: 1

- 10.
Answer: D
Points: 1

- 11.
Answer: C
Points: 1

- 12.
Answer: C
Points: 1

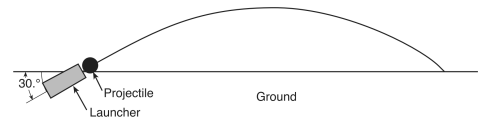
- 13.
Answer: A
Points: 1

- 14.
Answer: D
Points: 1

- 15.
Answer: A
Points: 1

- 16.
Answer: The total horizontal distance would decrease; the time in the air would decrease.
Points: 1

- 17.
Answer:



- Points: 1

- 18.
Answer: projectile's maximum altitude will increase.
Points: 1

- 19.
Answer: total horizontal distance will increase.
Points: 1