Projectile Motion Pre-Test Practice

Problem

1. What is the average speed of a cheetah that runs 88 m in 5 seconds?
2. A bicycle travels 15 km in 30 minutes. What is its average speed?
3. What is the average acceleration of a car that goes from rest to 60 km/h in 8 seconds?
4. A jet on an aircraft carrier can be launched from 0 to 40 m/s in 2 seconds. What is the acceleration of the jet?
5. A skateboarder starting from rest accelerates down a ramp at 2 m/s^2 for 2 s. What is the final speed of the skateboarder?
6. An apple falls from a tree and 0.5 second later hits the ground. How fast is the apple falling when it hits the ground?
7. What speed must you toss a ball straight up so that it takes 4 s to return to you?
8. You toss a ball at 5 m/s straight upward. How much time will the ball take to reach the top of its path?
9. What is the hang time of a person who can jump a vertical distance of 0.6 m?
10. What vertical distance can a person with a 0.7 s hang time jump?
11. How much time does a car with an acceleration of 5 m/s^2 take to go from 5 m/s to 40 m/s?
12. Starting from rest, a car undergoes a constant acceleration of 6 $m/s^{2.}$. How far will the car travel in the first second?
13. A crate falls from an airplane flying horizontally at an altitude of 1250 m. Neglecting air drag, how long will the crate take to strike the ground?
14. If a projectile fired beneath the water, straight up, breaks through the surface at a speed of 13 m/s, to what height above the water will it ascend?
15. A stone is dropped from a cliff. After it has fallen 10 m, what is the stone's velocity?
16. A motorboat is driven across a river at 3.0 km/h at right angles to a current that is flowing at 10.0 km/h. What is the resulting speed of the motorboat?
17. A package falls out of a helicopter that is traveling horizontally at 70 m/s. It falls into the water below 8.0 seconds later. Assuming no air resistance, what is the horizontal distance it travels while falling?
18. Kyle throws a ball horizontally from the top of a building that is 5.0 m high. He hopes the ball will reach a swimming pool that is at the bottom of the building, 12.0 m horizontally from the edge the building. If the ball is to reach the pool, with what initial speed must Kyle throw it with?

19. An airplane whose airspeed is 295 km/h flies parallel to the direction of a wind with a speed of 40.0 km/h. What are the two possible speeds of the plane relative to the ground?

20. Consider an escalator at an angle of 45° above the horizontal that moves with a velocity of 2.0 m/s. What is the horizontal component of the escalator's velocity?

21. A ball is thrown horizontally from the top of a tall cliff. Neglecting air drag, what vertical distance has the ball fallen 2.0 seconds later?

22. A snowball rolls off the edge of a horizontal roof at a velocity of 3.0 m/s. What is the speed of the snowball 1.0 s later?

23. A projectile shot with an initial velocity of 51 m/s at an angle of 45° follows a parabolic path and hits a stationary balloon at the top of its trajectory. With what speed does the projectile hit the balloon?

24. A ball is thrown upward. Its initial vertical component of velocity is 20 m/s and its initial horizontal component of velocity is 12 m/s. What is the ball's speed 1.0 s later?

25. A ball is thrown upward. Its initial vertical component of velocity is 30 m/s and its initial horizontal component of velocity is 10 m/s. What is the ball's speed 4 s later?

26. A ball is thrown upward. Its initial vertical component of velocity is 30 m/s, and its initial horizontal component of velocity is 10 m/s. What are the horizontal and vertical components of the ball’s velocity 5 s later?

27. In a standing jump, the hang time of a certain athlete is 0.8 second. What is her hang time when she jumps the same height while moving horizontally?

Projectile Motion Pre-Test Practice
Answer Section

PROBLEM

1. ANS:
   17.6 m/s

   PTS: 1 DIF: L2 OBJ: 4.2 Speed STA: Ph.1.a | Ph.1.b
   KEY: average | speed BLM: application
2. ANS:
   30 km/hr

   PTS: 1 DIF: L2 OBJ: 4.2 Speed STA: Ph.1.a | Ph.1.b
   KEY: average | speed BLM: application
3. ANS:
   7.5 km/h·s

   PTS: 1 DIF: L2 OBJ: 4.4 Acceleration
   STA: Ph.1.c KEY: average | acceleration BLM: application
4. ANS:
   20 m/s^2

   PTS: 1 DIF: L2 OBJ: 4.4 Acceleration
   STA: Ph.1.c KEY: acceleration BLM: application
5. ANS:
   4 m/s

   PTS: 1 DIF: L2 OBJ: 4.4 Acceleration
   STA: Ph.1.c KEY: acceleration | speed BLM: application
6. ANS:
   5 m/s

   PTS: 1 DIF: L2 OBJ: 4.6 Free Fall: How Far?
   STA: Ph.1.a | Ph.2.c KEY: acceleration | speed
   BLM: application
7. ANS:
   20 m/s

   PTS: 1 DIF: L2 OBJ: 4.6 Free Fall: How Far?
   STA: Ph.1.a | Ph.2.c KEY: speed | acceleration
   BLM: application
8. ANS:
   0.5 s

   PTS: 1 DIF: L2 OBJ: 4.6 Free Fall: How Far?
   STA: Ph.1.a | Ph.2.c KEY: acceleration | speed
   BLM: application

9. ANS:
0.7 s

PTS: 1 DIF: L2 OBJ: 4.7 Graphs of Motion
STA: Ph.1.i KEY: hang time BLM: application

10. ANS:
0.6 m

PTS: 1 DIF: L2 OBJ: 4.6 Free Fall: How Far?
STA: Ph.1.a | Ph.2.c KEY: hang time | distance
BLM: application

11. ANS:
7 s

PTS: 1 DIF: L2 OBJ: 4.4 Acceleration
STA: Ph.1.c KEY: acceleration | time BLM: application

12. ANS:
3 m

PTS: 1 DIF: L2 OBJ: 4.4 Acceleration
STA: Ph.1.c KEY: acceleration | distance BLM: application

13. ANS:
15.8 s

PTS: 1 DIF: L2 OBJ: 4.7 Graphs of Motion
STA: Ph.1.i KEY: gravity | acceleration BLM: application

14. ANS:
8.5 m

PTS: 1 DIF: L2 OBJ: 4.6 Free Fall: How Far?
STA: Ph.1.a | Ph.2.c KEY: projectile | speed
BLM: application

15. ANS:
14 m/s

PTS: 1 DIF: L2 OBJ: 4.6 Free Fall: How Far?
STA: Ph.1.a | Ph.2.c KEY: velocity | gravity
BLM: application

16. ANS:
10.4 km/h

PTS: 1 DIF: L2 OBJ: 5.2 Velocity Vectors
STA: Ph.1.j KEY: speed | resultant BLM: application

17. ANS:
560 m

PTS: 1 DIF: L2 OBJ: 5.4 Projectile Motion
STA: Ph.1.f KEY: vector | resistance BLM: application

18. ANS:
12.0 m/s

PTS: 1 DIF: L3 OBJ: 5.6 Projectiles Launched at an Angle
STA: Ph.1.f KEY: projectile | speed BLM: application

19. ANS:
255 and 335 km/h

PTS: 1 DIF: L2 OBJ: 5.2 Velocity Vectors
STA: Ph.1.j KEY: vector | speed BLM: application

20. ANS:
1.4 m/s

PTS: 1 DIF: L2 OBJ: 5.2 Velocity Vectors
STA: Ph.1.j KEY: velocity | horizontal BLM: application

21. ANS:
20 m

PTS: 1 DIF: L2 OBJ: 5.6 Projectiles Launched at an Angle
STA: Ph.1.f KEY: projectile | vertical BLM: application

22. ANS:
10.4 m/s

PTS: 1 DIF: L2 OBJ: 5.4 Projectile Motion
STA: Ph.1.f KEY: speed | velocity BLM: application

23. ANS:
36 m/s

PTS: 1 DIF: L2 OBJ: 5.6 Projectiles Launched at an Angle
STA: Ph.1.f KEY: projectile | velocity BLM: application

24. ANS:
16 m/s

PTS: 1 DIF: L2 OBJ: 5.6 Projectiles Launched at an Angle
STA: Ph.1.f KEY: velocity | horizontal BLM: application

25. ANS:
14 m/s

PTS: 1 DIF: L2 OBJ: 5.6 Projectiles Launched at an Angle
STA: Ph.1.f KEY: velocity | horizontal BLM: application

26. ANS:
horizontal velocity = 10 m/s vertical velocity = –20 m/s

PTS: 1 DIF: L2 OBJ: 5.6 Projectiles Launched at an Angle
STA: Ph.1.f KEY: velocity | horizontal BLM: application

27. ANS:
0.8 s

PTS: 1 DIF: L2 OBJ: 5.6 Projectiles Launched at an Angle
STA: Ph.1.f KEY: hang time | horizontal BLM: application