NAME: _____

Projectile Handout

Assignment

1. Which one of the following **best** describes the motion of a projectile close to the surface of the Earth? (assume no friction)

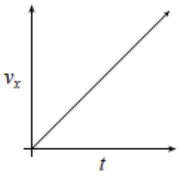
	VERTICAL ACCELERATION	HORIZONTAL SPEED
A.	constant	constant
B.	constant	changing
C.	changing	constant
D.	changing	changing

2. If friction is negligible, which of the following is true for the velocity components of projectiles?

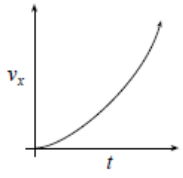
	HORIZONTAL VELOCITY COMPONENT	VERTICAL VELOCITY COMPONENT
A.	constant	constant
B.	constant	changes
C.	changes	constant
D.	changes	changes

3. Which of the following graphs represents the horizontal velocity component v_x versus time for a projectile thrown horizontally off a cliff? (Ignore air resistance.)

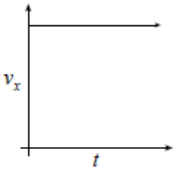
A.



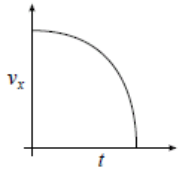
B.



C.



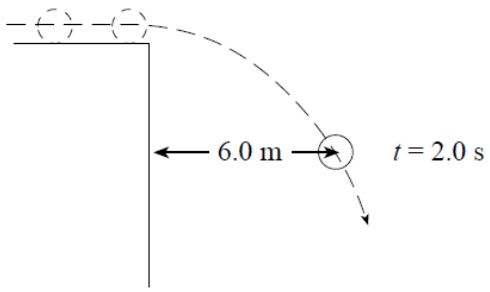
D.



4. Which of the following remain(s) constant for a projectile: its horizontal velocity component, v_H, its vertical velocity component, v_V, its vertical acceleration, g?
   A. v_V
   B. g and v_V
   C. g and v_H
   D. g, v_H and v_V

5. A ball is rolled off a horizontal roof at 16 m/s. After leaving the roof, how long will the ball take to reach a speed of 18 m/s?
   A. 0.20 s
   B. 0.84 s
   C. 1.8 s
   D. 2.5 s

6. At $t = 0$ s a ball rolls off the edge of a vertical cliff. At $t = 2.0$ s the ball is 6.0 m from the cliff as shown. How far is the ball from the cliff at $t = 4.0$ s?



7. A projectile is launched over level ground with a speed of 240 m/s at 35° to the horizontal. If friction is negligible, what is the height of the projectile 17 s after launch?
   A. 9.2×10^2 m
   B. 1.9×10^3 m
   C. 2.7×10^3 m
   D. 5.5×10^3 m

8. A projectile is launched over level ground at 35 m/s at an angle of 40° above the horizontal. What is the projectile's time of flight?
   A. 2.3 s
   B. 4.6 s
   C. 5.5 s
   D. 7.1 s

9. A 1.50 kg projectile is launched at 18.0 m/s from level ground. The launch angle is 26.0° above the horizontal. (Assume negligible friction.)
   a) What is the maximum height reached by this projectile?

   b) How fast will the projectile be travelling when it is at its maximum height?

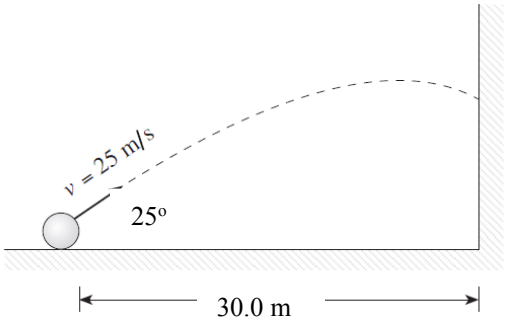
10. A projectile is launched over level ground at 35 m/s at an angle of 24° above the horizontal. Friction is negligible.
    a) What is the time of flight of this projectile?

    b) What is the velocity (magnitude and direction) of this projectile 2.5 s after launch?

11. A soccer ball is kicked over level ground with an initial velocity of 18 m/s, 24° above the horizontal. What is the range of the ball?

12. A baseball is thrown towards a house 30 m away with a velocity of 20 m/s at an angle of 35° from ground level. If the house has a large window on the 2nd floor between 2.5m and 3.5m above the ground does the baseball hit the window? (Show all work)

13. A projectile is launched towards a wall as shown in the diagram below. How high up the wall does the projectile hit?

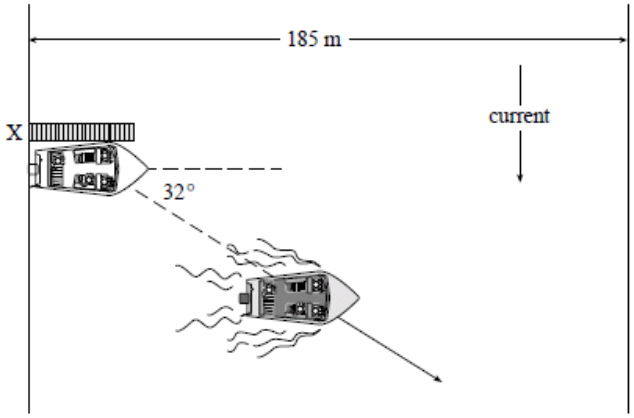


Enrichment

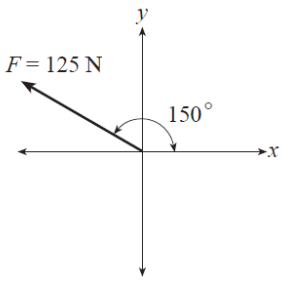
14. A boat, which can travel at 5.6 m/s in still water heads due east across a river from a dock at **X**. The boat's resultant path is 32° south of east.

a) What is the speed of the current?

b) How long will it take the boat to reach the far shore if the river is 185 m wide?



15. Consider the diagram below. What are the components of the 125 N force?



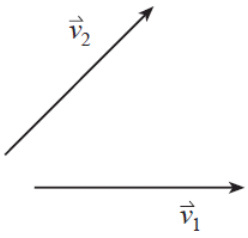
	x–COMPONENT	y–COMPONENT
A.	−62.5 N	72.2 N
B.	−72.2 N	62.5 N
C.	−62.5 N	108 N
D.	−108 N	62.5 N

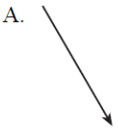
16. Which of the following contains scalar quantities only?
    A. speed, energy
    B. velocity, energy
    C. speed, displacement
    D. velocity, momentum

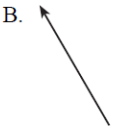
17. An aircraft heads due south with a speed relative to the air of 44 m/s. Its resultant speed over the ground is 47 m/s. The wind blows from the west.
    a) What is the speed of the wind?

    b) What is the direction of the aircraft's path over the ground?

18. Two velocity vectors, v_1 and v_2 are shown. Which of the following best represents the resultant of the addition of the two velocity vectors?



A.


B.


C.


D.


Answers: 1. A, 2. B, 3. C, 4. C, 5. B, 6. 12 m, 7. A, 8. B, 9. 12 m, 9a. 3.2 m, b. 16.2 m/s, 10a. 2.9 s, b. 33.6 m/s @ 18° below the horizontal, 11. 24.4 m, 12. misses target, h=4.5 m, 13. 3.4 m, 14.a. 3.5 m/s, b.33.0 s 15. D 16. A 17a. 17 m/s b. 69° south of east, 18. C