

2 Vectors / 3 Falling Bodies

Quiz Practice



Name _____

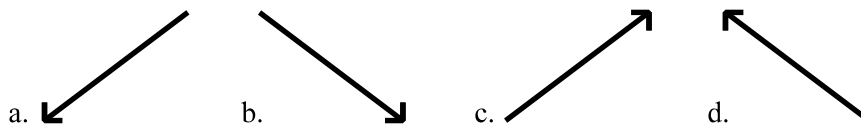
AP Physics B

Answers are given on the back of this sheet. You are advised to answer all concept questions and *then* check the answers.

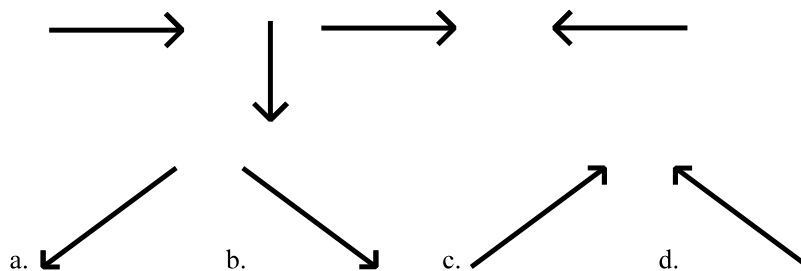
- _____ 1. Your experiment with the force table showed that when three vectors are balanced...
- A. one vector must be larger than the other two.
 - B. each vector must be equal to the scalar sum of the other vectors' magnitudes.
 - C. the resultant of any two vectors must be smaller than the remaining vector.
 - D. each vector is an equilibrant for the other two.

- _____ 2. It is technically incorrect to say that "5.00 m/s" is a velocity vector because velocity...
- A. must include a direction.
 - B. is a scalar quantity.
 - C. would have different units.
 - D. is the same thing as speed.

- _____ 3. The resultant vector when  is added to  is:



- _____ 4. The resultant when the four vectors shown below are added is:



- _____ 5. When you add two vectors having magnitudes of 2 and 8, it is impossible for the resultant to have a magnitude of:
- A. 6
 - B. 7
 - C. 10
 - D. 12
- _____ 6. Which of the following quantities is a vector which changes signs (directions) when an object that was thrown upward stops rising and begins to fall?
- A. velocity
 - B. speed
 - C. acceleration
 - D. time
- _____ 7. Two balls, one twice as heavy as the other, are tossed upward with the same initial velocity. Ignoring the effects of air resistance, which ball will take more time to return to the starting point?
- A. the heavier ball will take longer
 - B. the lighter ball will take longer
 - C. each ball takes the same time to return

- _____ 8. When an object that was thrown upward reaches its highest point, which statement is true?
 A. The acceleration switches from positive to negative.
 B. The acceleration is zero.
 C. The total displacement is zero.
 D. The velocity is zero.
- _____ 9. A ball is dropped (near the earth). How fast is it moving at the end of its first second of free-fall?
 A. 0 m/s B. 4.90 m/s C. 9.80 m/s D. 19.6 m/s
- _____ 10. How far has the ball in the previous question moved at the end of its first second of free-fall?
 A. 0 m B. 4.90 m C. 9.80 m D. 19.6 m
- _____ 11. A stone is thrown upward, hits its peak, and then falls to land on top of a cliff. Which statement about its freefall motion is true if the upward direction is considered "positive"?
 A. The initial velocity of the stone is negative.
 B. The acceleration of the stone is positive.
 C. The final velocity of the stone is negative.
 D. The final displacement of the stone is negative.

Answers: 1. D 2. A 3. B 4. B 5. D 6. A 7. C 8. D 9. C 10. B 11. C

VECTORS: Solve these problems trigonometrically.

12. A hiker walks 17 m due west and then turns and walks 9.5 m at 35° S of W. What is her displacement?

13. Two children fight over a toy. One applies a 150 gram force at 60.0° north of east while the other pulls with 180 grams at 33.7° south of west. What is the resultant force?

14. A river flows west. A riverboat is headed at 27.0° N of E and because of the current ends up moving due north at 6.00 m/s. What is the velocity of the current?

THE 6-STEP METHOD WILL NOT WORK; SKETCH THIS VECTOR ADDITION PROBLEM USING ALL AVAILABLE DATA TO DRAW WHAT YOU DO KNOW ABOUT THE ADDED VECTORS AND THE RESULTANT - TRIANGLE TRIGONOMETRY CAN THEN SOLVE IT

FALLING BODIES: Assume $g = -9.80$ m/s² and negligible air resistance.

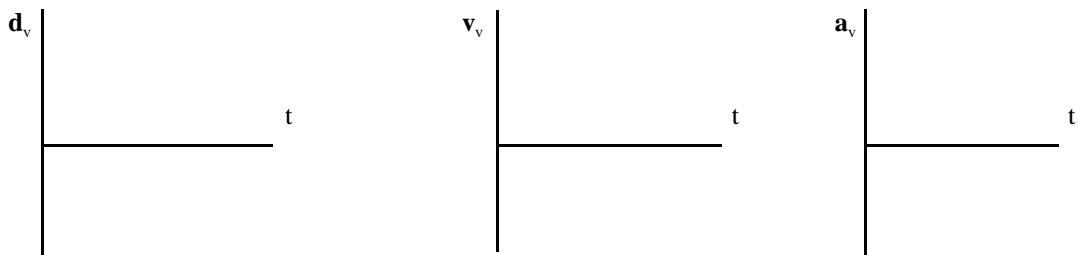
15. A nut comes loose from a bolt on the bottom of an elevator as the elevator is moving up the shaft at 3.00 m/s. The nut strikes the bottom of the shaft in 2.00 seconds.

a) How far from the bottom of the shaft was the elevator when the nut fell off?

b) How far above the bottom was the nut 0.250 seconds after it fell off?

16. Wile E. Coyote fired himself upward from a cannon and rose to a height of 12.8 m.
- What was his initial velocity?
 - How much time elapsed between his launch and when he was later moving at 2.00 m/s downward?
 - The coyote tried again. This time he launched upward at 15.0 m/s, but a slight breeze caused him to miss his cannon. He compressed the desert sands 25.0 cm before coming to rest. What was his acceleration during the time he was being stopped by the ground?

17. On the axes below, draw the freefall vertical displacement, velocity, and acceleration graphs for an object that is thrown straight upward and caught at its starting point.



<p>12. 25 m at 12° S of W 13. 80.6 g at 21.9° N of W 14. 11.8 m/s west 15. a) 13.6 m 16. a) 15.8 m/s upward 17. </p>	<p>b) 14.0 m (which is 0.444 m above starting position) b) 1.82 s c) 450. m/s² upward</p>
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