

Midterm Review

1. The speed of sound in iron is 513000 cm/s. Express this number in proper scientific notation.

- a. 5.13×10^{-5}
- b. 5.13×10^5
- c. 513×10^{-3}
- d. 513×10^3

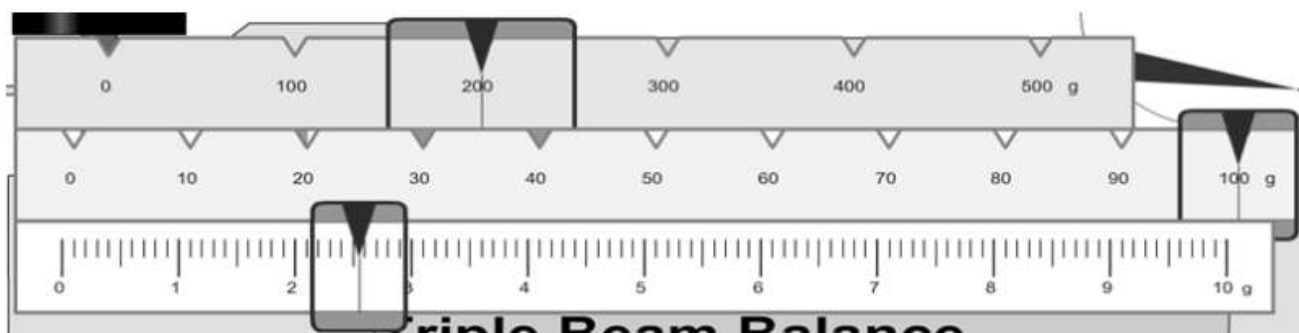
2. How many significant figures exist in the number 7801200?

- a. 4
- b. 5
- c. 6
- d. 7

3. Convert 13 ft/min into m/s.

- a. 6.6×10^{-2} m/s
- b. 7.1×10^{-1} m/s
- c. 240 m/s
- d. 2.6×10^3 m/s

4. Use the following figure to determine the mass of the object with proper significant figures.



- a. 212.55 g
- b. 212.6 g
- c. 302.6 g
- d. 302.55 g

5. Is the color of a leaf qualitative or quantitative?

- a. Qualitative
- b. Quantitative

6. Is the roughness of a basketball qualitative or quantitative?

- a. Qualitative
- b. Quantitative

7. The slope of a positive vs. time graph at any give instant is the same as the object's instantaneous . . .

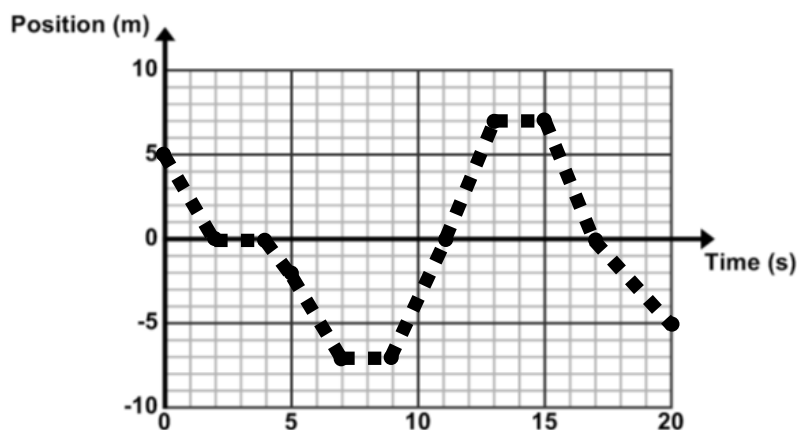
- a. Position
- b. Displacement
- c. Speed
- d. Velocity

8. An object will have a negative distance if the following event occurs.

- a. The object moves to the left
- b. The object moves to the right
- c. The object stands still
- d. The object cannot have a negative distance

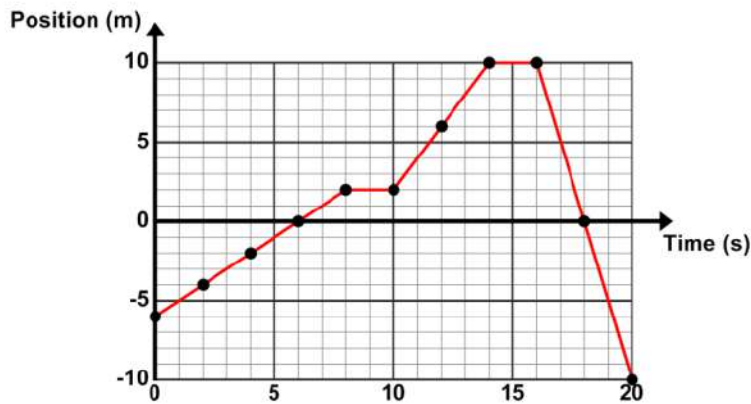
9. A graph shows an object's position over a period of time. The slope of the line is negative. What does this tell you about the motion of the object?
- It is moving to the left.
 - It is moving to the right
 - It is standing still
 - You cannot determine anything without numbers
10. The area bounded by the line of a velocity vs. time graph determines the object's . . .
- Position
 - Displacement
 - Speed
 - Distance
11. An object moves from a position of -5 m to a position of -2 m. The displacement of the object is . . .
- Zero (0)
 - Negative (-)
 - Positive (+)
 - Cannot be determined
12. After plotting data of an object's position over a period of time a student gets an equation of $y = -1.32x + 3.12$. What is the average velocity of the object?
- 3.12 m/s
 - 3.12 m/s
 - 1.32 m/s
 - 1.32 m/s

Use the graph below to answer questions 13 – 18.

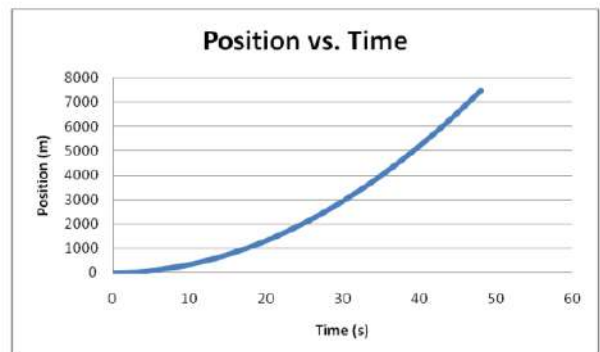


- What is the displacement between 5 and 13 seconds?
- What is the distance traveled between 5 and 13 seconds?
- What is the displacement between 7 and 20 seconds?
- What is the distance traveled between 7 and 20 seconds?
- What is the displacement between 0 and 9 seconds?
- What is the distance traveled between 2 and 17 seconds?

Use the graph below to answer questions 19 – 24.

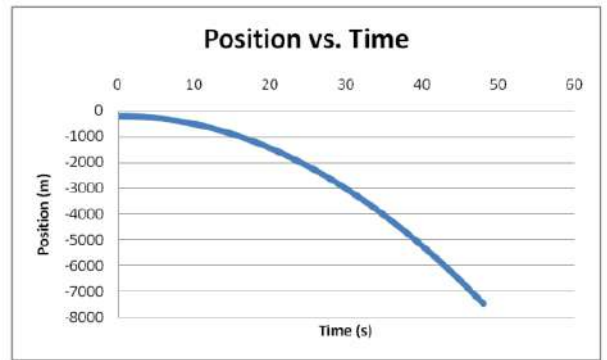


19. What is the average velocity of the object between 4 and 18 seconds?
20. What is the instantaneous velocity of the object at 6 and 12 seconds?
21. What is the speed of the object between 4 and 18 seconds?
22. What is the average velocity of the object between 6 and 20 seconds?
23. What is the instantaneous velocity of the object at 17 seconds?
24. What is the speed of the object between 6.0 and 20 seconds?
25. When there is not air resistance, objects of different masses dropped from rest
 - a. Fall with equal accelerations and with equal displacements
 - b. Fall with different accelerations and with different displacements
 - c. Fall with equal accelerations and with different displacements
 - d. Fall with different accelerations and with equal displacements.
26. When a car's velocity is positive and its acceleration is negative, what is happening to the car's motion?
 - a. The car travels at a constant speed.
 - b. The car slows down.
 - c. The car speeds up.
 - d. The car remains at rest.
27. What will an object do if its initial velocity is 1000 m/s and the acceleration is -200 m/s^2 ?
 - a. Speed up to the right.
 - b. Speed up to the left.
 - c. Slow down to the right.
 - d. Slow down to the left.
28. Based on the graph what is the object doing?
 - a. Speeding up to the right.
 - b. Speeding up to the left.
 - c. Slowing down to the right.
 - d. Slowing down to the left.



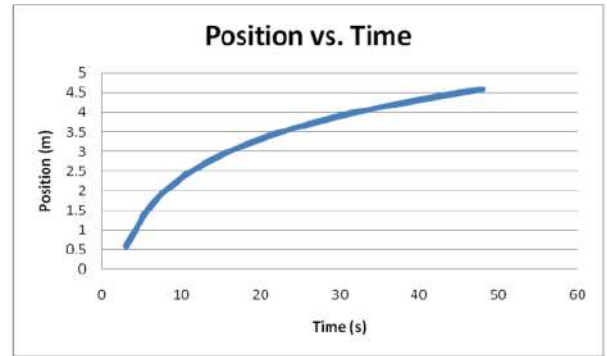
29. Based on the graph what is the object doing?

- a. Speeding up to the right.
- b. Speeding up to the left.
- c. Slowing down to the right.
- d. Slowing down to the left.



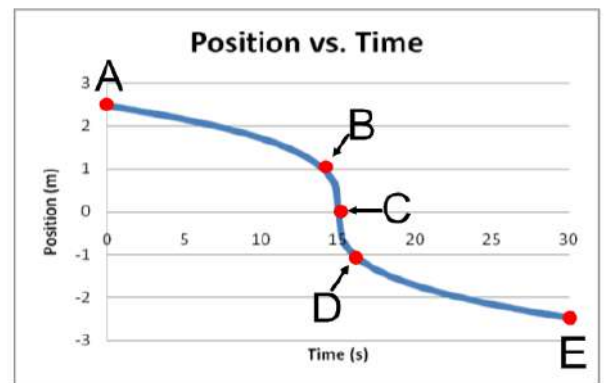
30. Based on the graph what is the object doing?

- a. Speeding up to the right.
- b. Speeding up to the left.
- c. Slowing down to the right.
- d. Slowing down to the left.



31. Based on the graph what is the object doing between points C & E?

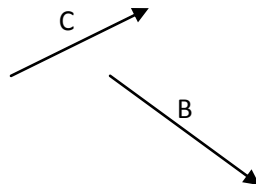
- a. Speeding up to the right.
- b. Speeding up to the left.
- c. Slowing down to the right.
- d. Slowing down to the left.



32. Which of the following are vectors? (Answer all that apply)

- | | |
|-----------------|-----------------|
| a. Distance | e. Time |
| b. Displacement | f. Acceleration |
| c. Speed | g. Mass |
| d. Velocity | |

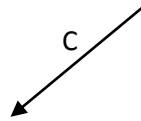
Complete the following vector math problems using the vectors to the below. Redraw and label the vectors and the resultant.



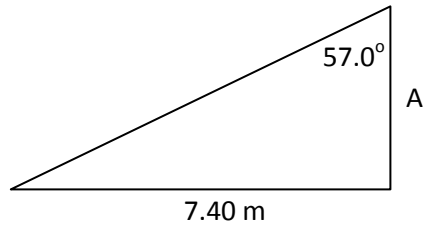
33. $B - C$

34. $B + C$

35. Draw and label the x and y components for the vector to the right.

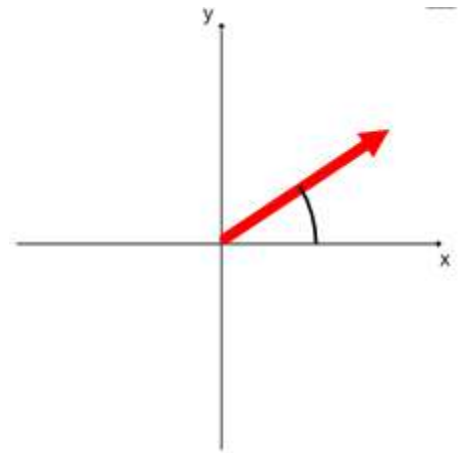


36. Determine A to three significant figures.



37. Which direction is the following vector?

- a. East of North
- b. North of East
- c. South of East
- d. East of South
- e. West of South
- f. South of West
- g. North of West
- h. West of North

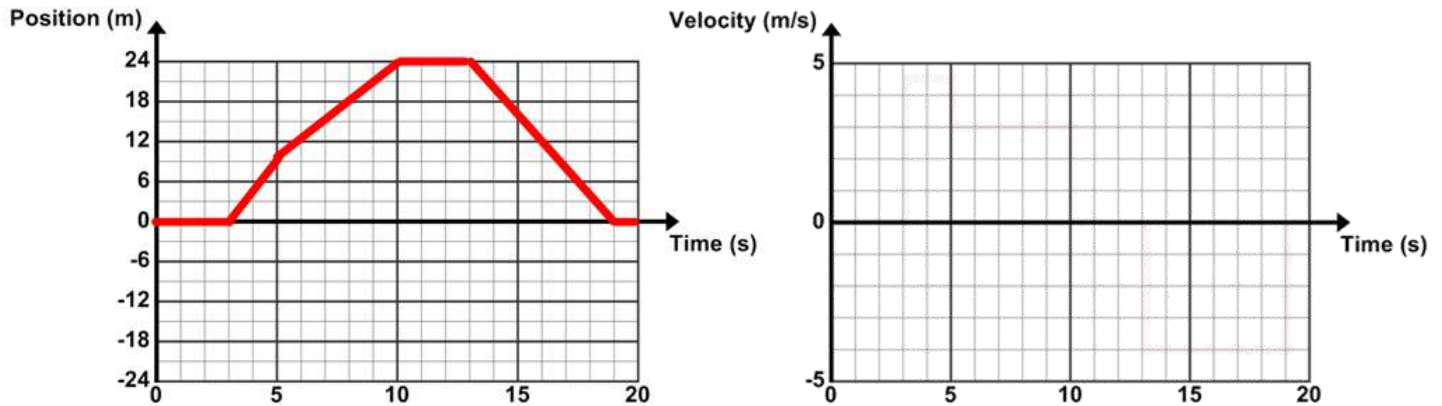


38. At what point a projectile's path is the vertical component of the velocity zero?

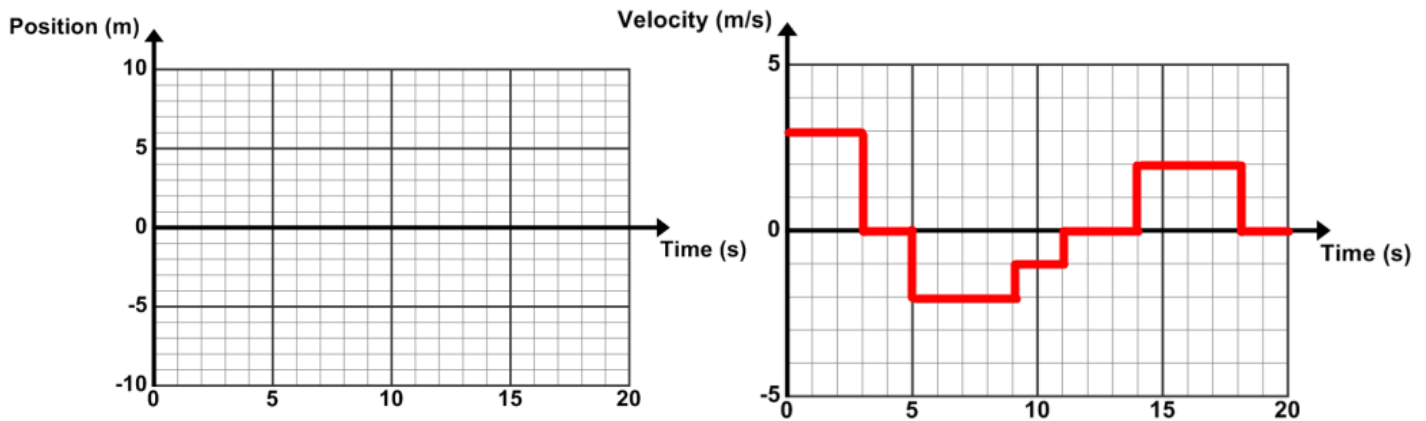
- a. At the beginning
- b. After it hits the ground
- c. At the peak of the path
- d. Never, because the object is always moving.

Relationship:

- The fastest helicopter, the Westland Lynx, can travel 3.33 km in the forward direction in just 30.0 s. What is the average velocity of this helicopter? Express your answer in meters per second.
- Convert the following position vs. time graph into a velocity vs. time graph.

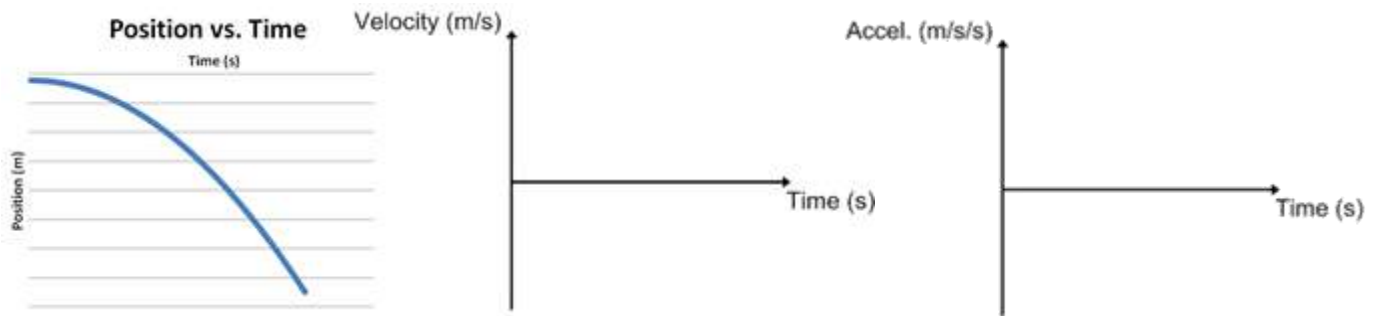


- Convert the following velocity vs. time graph into a position vs. time graph.

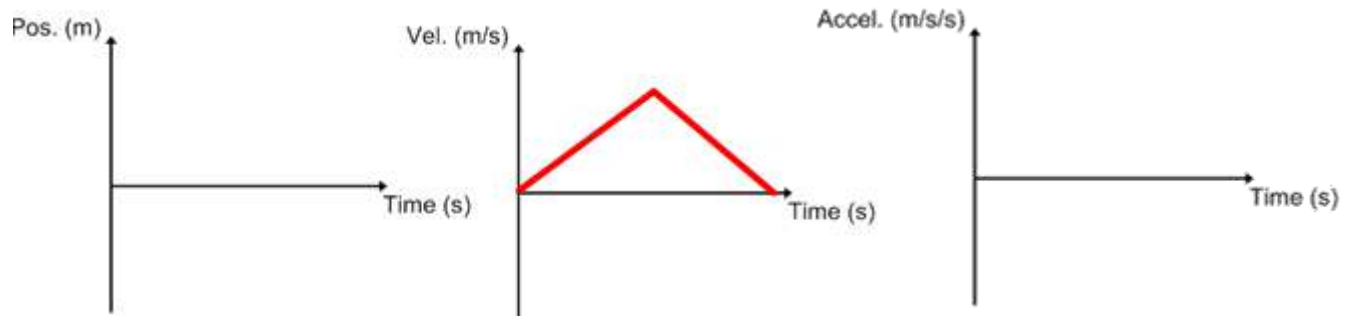


- The solid-fuel rocket boosters used to launch the space shuttle are able to lift the shuttle 45 kilometers above Earth's surface. During the 2.00 min that the boosters operate, the shuttle accelerates from rest to a speed of nearly 7.50×10^2 m/s. What is the magnitude of the shuttle's average acceleration? Watch Units!

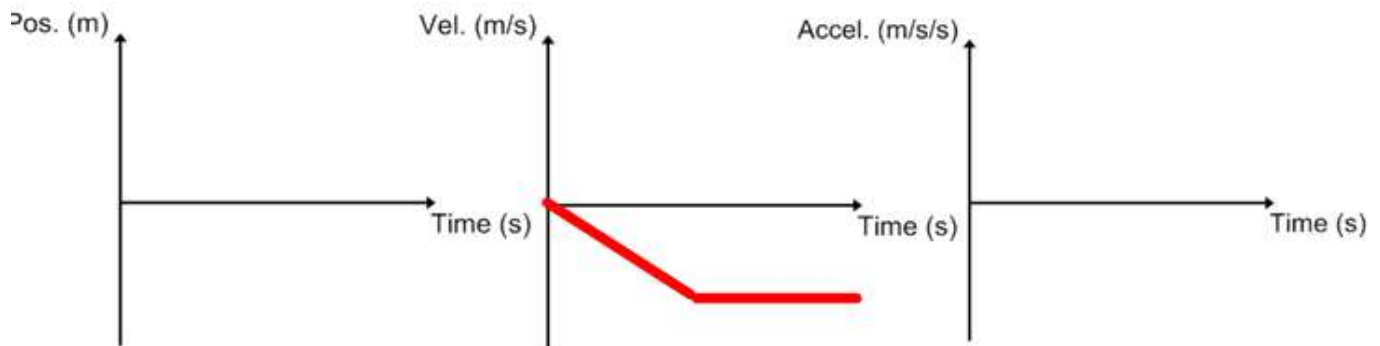
7. Convert the following position vs. time graph into a velocity and acceleration vs. time graph.



8. Convert the following velocity vs. time graph into a position and acceleration vs. time graph.



Convert the following velocity vs. time graph into a position and acceleration vs. time graph.



9. A popular scene in recent action films shows a character in free-fall speed up to catch a freely falling parachute. Suppose a packed parachute is dropped from rest from an airplane and that a daredevil is launched straight down from the plane 3.00 s later. Neglecting air resistance, the daredevil catches up to the parachute 4.00 s after the daredevil leaves the plane. What are the daredevil's initial and final velocities?
10. A plane flies 118 km at 15.0° south of east and then flies 118 km at 35° west of north. Find the magnitude and direction of the total displacement of the plane.
11. A lunch pail is accidentally kicked off a steel beam on a building under construction with an initial horizontal speed is 1.50 m/s. If the building is 2.50×10^2 m tall, and the lunch pail is knocked off the top floor, what is the velocity of the lunch pail when it reaches the ground?