1. If an object is launched vertically at 20 m/s straight up, and returns to the launch point in 4.0 s, how high (in meters) did it go?

2. A student on Planet 'X' produced the section of tape shown below by allowing a 2.2 kg mass to fall from rest. The attached tape passed through a 20 Hz ticker tape timer. If frictional forces are considered negligible, what is the acceleration of gravity on this planet?
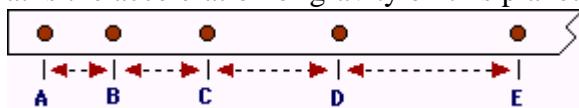

    Distances measured from A:

AB = 0.015 cm	AC = 0.060 cm
AD = 0.135 cm	AE = 0.24 cm

    A. 1.2 cm/s^2
    B. 190 cm/s^2
    C. 12 cm/s^2
    D. 1.1 cm/s^2

3. A beam containing 1.0 x 10^{18} molecules/sec enters a vacuum chamber. After tracing out the path shown each molecule is absorbed by the detector. Each molecule has a mass of 5.0 x 10^{-26} kg and travels at a speed of 2.0 x 10^3 m/s. (NOTE: the only function of the reflecting plate is to change the direction of the beam of molecules).
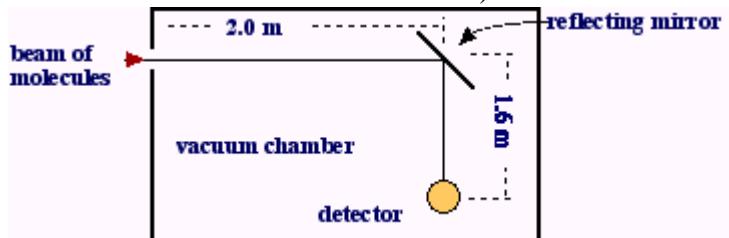
   The time required for a molecule after it enters the chamber to reach the detector is:

    A. 7.2 x 10^3 s
   B. 8.0 x 10^{-4} s
    C. 1.0 x 10^{-3} s
    D. 1.8 x 10^{-3} s
    E. 5.6 x 10^2 s

4. The graph shown in the diagram represents the position **X** versus time **T** for an object moving along a straight path with constant, non-zero speed.
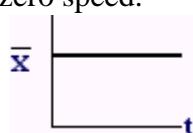
    A. False
    B. True

5. If a body has an instantaneous acceleration of +5 m/s^2, it **MUST** be moving.
   A. False
   B. True

6. A man walks 4.0 km north and then 3.0 km south. His position, relative to the starting point is:
   A. 7.0 km north
   B. 1.0 km
   C. 1.0 km north
   D. 1.0 km south
   E. 7.0 km

7. The graph below shows the displacement of a cart as a function of time. It is a parabola with a constantly increasing slope. Which is the acceleration graph for the cart?

A.

B.

C.

D.
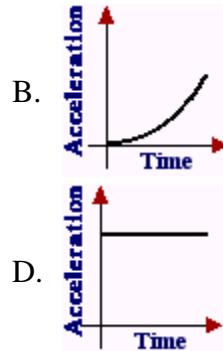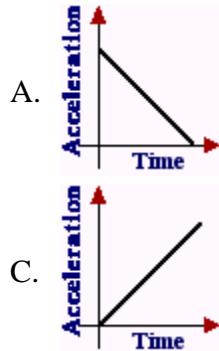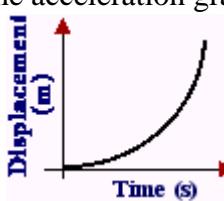
8. A ball moving with an initial velocity of 100 m/s north is given an acceleration of 10 m/s^2 south. What will its velocity be after 6.0 s?
   A. 40 m/s south
   B. 40 m/s north
   C. 60 m/s north
   D. 60 m/s south

Use the following information to answer the next 2 question(s).

A plane moves relative to the Earth at 210 m/s and 23° west of north. There is a 45 m/s wind **from** the west.

9. What direction is the pilot aiming?

10. What is the plane's velocity relative to the air?

11. A light plane attains an airspeed of 500 km/h. The pilot sets out for a destination 800 km to the north, but discovers that the plane must be headed 20° east of north to fly there directly. The plane arrives in 2.0 h. What was the vector wind velocity?

12. An aircraft heading due north at 48 m/s encounters a wind blowing towards the east at 27 m/s. What is the aircraft's resultant direction of travel?

    A. 34° E of N
    B. 29° E of N
    C. 61° E of N
    D. 56° E of N

13. If a person travels 12.5 m north and then 7.8 m east, what is the magnitude of his displacement from the starting point?

    A. 20.3 m
    B. 4.7 m
    C. 9.8 m
    D. 14.7 m

14. A ship is travelling 8.0 m/s due west in still water. A passenger is walking along the deck at 3.0 m/s toward the back end of the ship. He throws an apple core north at 12 m/s. The velocity of the apple core relative to the water is:

    A. 17 m/s in a direction between north and northwest
    B. 13 m/s in a direction between west and northwest
    C. 13 m/s in a direction between north and northwest
    D. $\sqrt{265}$ m/s in a direction between west and northwest
    E. $\sqrt{265}$ m/s in a direction between north and northwest

15. Two cars approach an intersection at right angles. Car A is travelling with a velocity of 30 km/h east, and car B is travelling with a velocity of 30 km/h north.
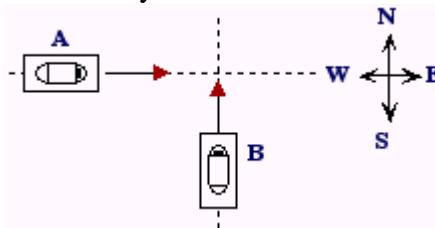

    If you are driving car A, the relative velocity of car B would appear to be:

    A. 42 km/h heading towards the NW
    B. 42 km/h heading towards the SE
    C. 42 km/h heading towards the N
    D. 60 km/h heading towards the NW
    E. 60 km/h heading towards the SE

16. Which of the following contains vector quantities only?

    A. displacement, velocity
    B. displacement, energy
    C. energy, velocity
    D. mass, speed

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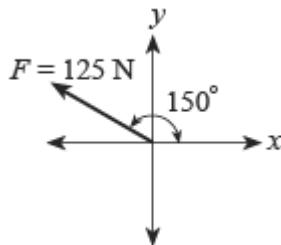
What are the components of the 125 N force?

	x-COMPONENT	y-COMPONENT
A.	− 108 N	62. 5 N
B.	− 62. 5 N	108 N
C.	− 72. 2 N	62. 5 N
D.	− 62. 5 N	72. 2 N

18. A rock is thrown from ground level at 18 m/s, 25° above horizontal. What are the vertical and horizontal components of its launch velocity?

	Vertical Component	Horizontal Component
A.	9.3 m/s	20 m/s
B.	20 m/s	9.3 m/s
C.	7.6 m/s	16 m/s
D.	16 m/s	7.6 m/s

19. What is the <u>vertical component</u> of the velocity of a projectile fired at 95 m/s at an angle of 22° above the horizontal?
    A. 95 m/s
    B. 36 m/s
    C. 59 m/s
    D. 88 m/s

20. A car travelling north at 20 m/s is later travelling west at 30 m/s.
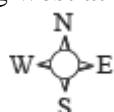
What is the direction of the change in velocity?

A.   B.

C.   D.

21. The diagram shows the vertical and horizontal components of a force, F_V and F_H.

$$\vec{F_V}\uparrow \qquad \overleftarrow{\vec{F_H}}$$

Which of the following is their resultant force F ?

A. $\overleftarrow{\vec{F}}$

B. $\overleftarrow{\vec{F}}$

C. $\vec{F}$

D. $\vec{F}$
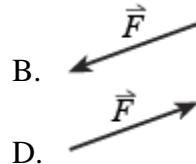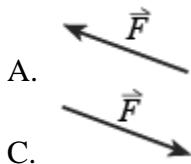
22. Refer to the following diagram for this question.
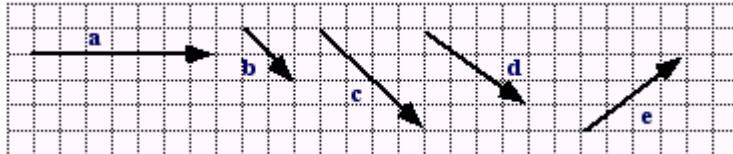
Find the magnitude and direction of the resultant of the vector operation vector **a** plus vector **b** subtract vector **d.**

A.

B.

C.

D.
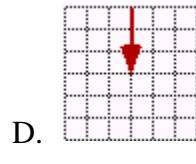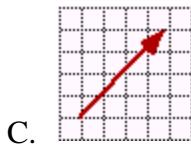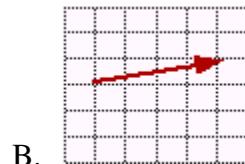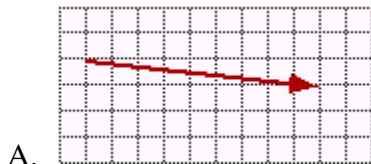
23. Which answer best shows the vector addition of 'X' and 'Y'?

A.

B.

C.

D.
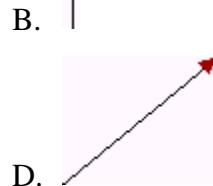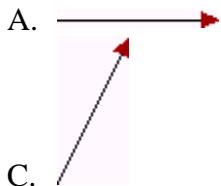
24. What is the magnitude of the final displacement of a car which travels 10 km south, 2 km west, and then 5 km east?
   A. 13.0 km
   B. 10.4 km
   C. 109.0 km
   D. 17.0 km

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Use the following information to answer the next 1 question(s).

The vectors **A**, **B** and **C** are shown below.

25. Which of the following best represents (**A** + **B** + **C**)?

A.

B.

C.

D.