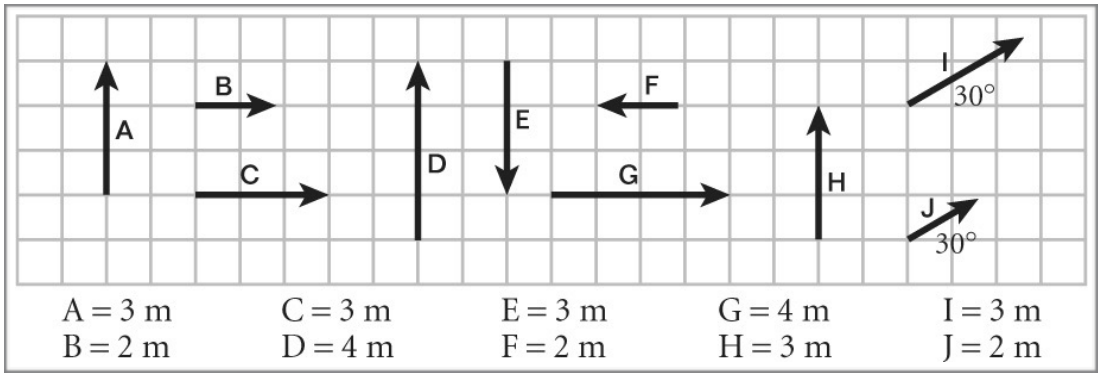
Use the following vectors to answer the questions.



1. Which vectors have the same magnitude?

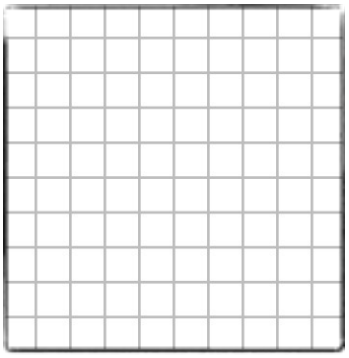
_____

2. Which vectors have the same direction?

_____

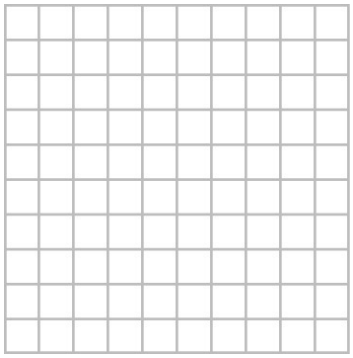
3. Which arrows, if any, represent the same vector?

_____



4. In the space provided, construct and label a diagram that shows the vector sum 2A + B.

5. In the space provided, construct and label a diagram that shows the vector difference A – (B/2).

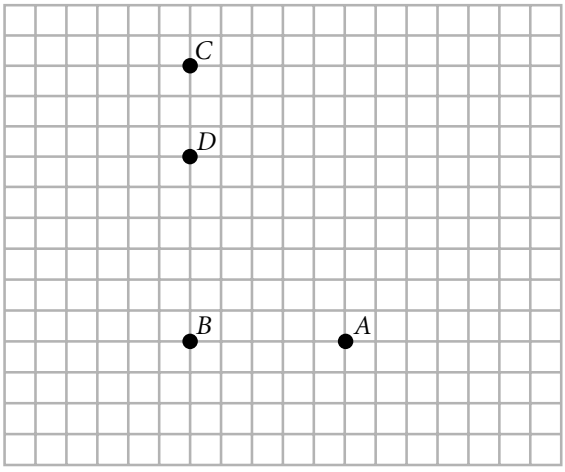


6. Which of the following is a physical quantity that has a magnitude but no direction?
   a. vector
   b. scalar
   c. resultant
   d. frame of reference

7. Which of the following is an example of a vector quantity?
   a. velocity
   b. temperature
   c. volume
   d. mass

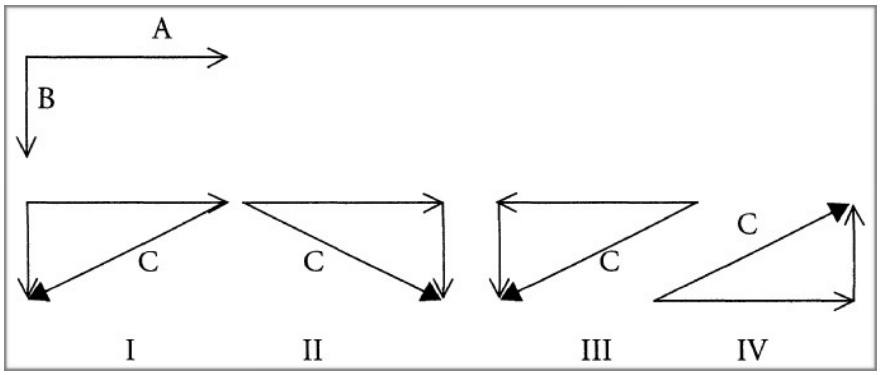
8. The diagram indicates three positions to which a woman travels. She starts at position A, travels 3.0 km to the west to point B, then 6.0 km to the north to point C. She then backtracks, and travels 2.0 km to the south to point D.

a. In the space provided, diagram the displacement vectors for each segment of the woman's trip.



a. What is the total displacement of the woman from initial position, A, to final position, D ?

a. What is the total distance traveled by the woman from her initial position, A, to her final position, D ?



9.In the figure above, which diagram represents the vector addition, C = A + B?

a. I
b. II
c. III
d. IV

10.In the figure above, which diagram represents vector subtraction, C = A – B?

a. I
b. II
c. III
d. IV

11. In a coordinate system, a vector is oriented at angle θ with respect to the x-axis. The x component of the vector equals the vector's magnitude multiplied by which trig function?

a. cos θ b. cot θ c. sin θ d. tan θ

12. In a school playground, a child runs 5 m in the x-direction and then 2.0 m in the –y-direction. Which of the following expressions represents the magnitude of the child's resultant displacement?

a. (5 m) + (–2 m) b. $\sqrt{(5\text{ m})} - \sqrt{(2\text{ m})}$ c. $\sqrt{(5\text{ m})^2 - (2\text{ m})^2}$ d. $\sqrt{(5\text{ m})^2 + (-2\text{ m})^2}$

13. A tiger paces back and forth along the front of its cage, which is 8 m wide. The tiger starts from the right side of the cage, paces to the left side, then back to the right side, and finally back to the left.

What total distance has the tiger paced?

What is the tiger's resultant displacement?

14. A helicopter flies 165 m horizontally and then moves downward to land 45 m below.

What is the helicopter's resultant displacement?

15. A toy parachute is dropped from an open window that is 13.0 m above the ground. The parachute travels 9.0 m horizontally.

What is the resultant displacement?

16. The straightest stretch of railroad tracks in the world extends for 478 km in southwestern Australia. A train traveling along these tracks is displaced to the south by about 42 km.

What is the train's displacement to the west?

What is the direction of the total displacement?

18. The distance from an observer on the plain to the top of a nearby mountain is 5.3 km, and the angle between this line and the horizontal is 8.4°.

How tall is the mountain?

19. A hot-air balloon descends with a velocity of 55 km/h at an angle of 37° below the horizontal.

What is the vertical velocity of the balloon?

20. A billiard ball travels 2.7 m at an angle of 13° with respect to the long side of the table.

What are the components of the ball's displacement?

21. U.S. Highway 212 extends 55 km at 37° north of east between Newell and Mud Falls, South Dakota. It then continues for 66 km nearly due east from Mud Falls to Faith, South Dakota.

If you drive along this part of U.S. 212, what will be your total displacement?

22. The city of Amsterdam has several canals that connect different sections of the city. Suppose you take a trip and sail 2,500 m at 58.5° north of east, 375 m at 21.8° north of east, and 875 m at 21.5° east of north.

What would be your resultant displacement?

23. IN CLASS EXAMPLE

Find the resultant of the following three vectors. The magnitudes of the vectors are

a = 5.00 km

b = 10.0 km

c = 20.0 km.