

Vectors and Forces in Physics

Physics · Answer Key · 20 Questions

1. What is a resultant vector?

- A) A vector with the same magnitude but opposite direction.
- B) A vector sum of two or more vectors, having the same effect as the original vectors.**
- C) A vector perpendicular to the original vectors.
- D) A vector representing the difference between two vectors.

2. Which method is used to determine the resultant of vectors on a Cartesian plane by finding vertical and horizontal components?

- A) Graphical method
- B) Tail-to-head method
- C) Component method**
- D) Parallelogram method

3. To calculate the magnitude of the resultant vector, which theorem is used?

- A) Pythagorean theorem**
- B) Sine rule
- C) Cosine rule
- D) Law of Sines

4. How is the direction of the resultant vector determined?

- A) Using the Pythagorean theorem
- B) Using simple trigonometric ratios**
- C) By graphical representation only
- D) By adding the angles of the original vectors

5. What is the parallelogram method used to determine?

- A) The magnitude of a single vector
- B) The resolution of a vector
- C) The resultant of two vectors graphically**
- D) The components of a vector

6. What does a closed vector diagram represent?

- A) A vector that is zero.
- B) A vector that is perpendicular to the resultant.
- C) A resultant vector that returns to the starting point.**
- D) A set of non-collinear vectors.

7. If θ is the angle between a resultant vector R and the x -axis, which formula is used for the resultant x -component?

- A) $R_x = R \sin \theta$
- B) $R_x = R \cos \theta$**
- C) $R_x = R \tan \theta$
- D) $R_x = R / \cos \theta$

8. If θ is the angle between a resultant vector R and the x -axis, which formula is used for the resultant y -component?

- A) $R_y = R \cos \theta$
- B) $R_y = R \tan \theta$
- C) $R_y = R \sin \theta$**
- D) $R_y = R / \sin \theta$

9. Which of the following is NOT a type of force mentioned in the text?

- A) Weight
- B) Centripetal force**
- C) Normal force
- D) Frictional force

10. What is the normal force (N)?

- A) The force that opposes motion.
- B) The force exerted by a surface on an object in contact with it, perpendicular to the surface.**
- C) The force of gravity acting on an object.
- D) The force applied by pushing or pulling.

11. The normal force acts perpendicular to the surface, regardless of whether the plane is:

- A) Horizontal or inclined**
- B) Smooth or rough
- C) Moving or stationary
- D) Flat or curved

12. What is frictional force (f)?

- A) The force that causes motion.
- B) The force that opposes the motion of an object and acts parallel to the surface.**
- C) The force exerted by a string or cable.
- D) The force due to gravity.

13. Frictional force is proportional to:

- A) The area of contact
- B) The normal force**
- C) The velocity of the object
- D) The applied force

14. Frictional force is independent of:

- A) The normal force
- B) The applied force
- C) The area of the surfaces in contact**
- D) The type of surfaces

15. What is static frictional force (f_s)?

- A) The force that opposes motion when an object is moving.
- B) The force that opposes the tendency of motion of a stationary object relative to a surface.**
- C) The force that causes an object to accelerate.
- D) The maximum possible frictional force.

16. The static frictional force can have a range of values from zero up to a maximum value of:

- A) $f = \mu N$**
- B) $f = N/\mu$
- C) $f = \mu/N$
- D) $f = N - \mu$

17. If an applied force parallel to the surface does not cause a stationary object to move, what is the magnitude of the applied force equal to?

- A) The maximum static frictional force
- B) Zero
- C) The static frictional force**
- D) Twice the static frictional force

18. What is the definition of 'resultant' in the context of vectors?

- A) The difference between two vectors.
- B) A single vector having the same effect as two or more vectors together.**
- C) A vector perpendicular to the sum of vectors.
- D) The average of multiple vectors.

19. Which of the following is a graphical method for determining the resultant of two vectors?

- A) Component method
- B) Pythagorean theorem
- C) Tail-to-head method**
- D) Trigonometric ratios

20. For inclined planes, what are the forces perpendicular to the plane?

- A) Weight and normal force
- B) Component of weight ($W\cos\theta$) and normal force (N)**
- C) Frictional force and normal force
- D) Applied force and weight