

Refraction Through Glass Slab

ChatGPT said:



Here are 20 multiple-choice questions (MCQs) based on "Prism, Angle of Deviation, Angle of Minimum Deviation, Refractive Index of the Material of the Prism, and Their Numerical Problems":

1. The angle between two refracting surfaces of a prism is called:

- a) Angle of deviation
- b) Angle of incidence
- c) Angle of the prism
- d) Angle of refraction

2. Which of the following defines the angle of deviation in a prism?

- a) The angle between the emergent ray and the incident ray
- b) The angle between the incident ray and the refracted ray
- c) The angle between the emergent ray and the prism
- d) The angle between the refracted ray and the normal

3. For minimum deviation, the angle of incidence is:

- a) 0°
- b) 45°
- c) Equal for both faces of the prism
- d) Less than the angle of refraction

4. The formula for refractive index (n) of the prism in terms of angle of minimum deviation (D_m) and angle of prism (A) is:

- a) $n = \frac{\sin(A)}{\sin(D_m)}$
- b) $n = \frac{\sin\left(\frac{A+D_m}{2}\right)}{\sin\left(\frac{A}{2}\right)}$
- c) $n = \frac{\cos(A)}{\cos(D_m)}$
- d) $n = \frac{\tan(A)}{\tan(D_m)}$

5. In the condition of minimum deviation, the emergent ray is:

- a) Parallel to the incident ray
- b) Perpendicular to the incident ray
- c) Bent toward the normal
- d) Bent away from the normal

6. The angle of minimum deviation for a prism is 40° and the angle of the prism is 60° . What is the refractive index of the prism?

- a) 1.41
- b) 1.52
- c) 1.61
- d) 1.73

7. The refractive index of a prism depends on:

- a) The angle of the prism
- b) The material of the prism
- c) The wavelength of the incident light
- d) All of the above

8. Which of the following is the correct expression for the deviation angle in terms of the angles of incidence (i) and refraction (r)?

- a) $D = i + r - A$
- b) $D = i - r + A$
- c) $D = i + r - 2A$
- d) $D = i + r - 2$

9. For a prism, when the angle of deviation is minimum, the angle of refraction at each face is:

- a) Equal to the angle of incidence
- b) Half the angle of deviation
- c) Greater than the angle of incidence
- d) Equal for both faces of the prism

10. If the angle of prism (A) is 30° and the refractive index (n) of the material is 1.5, what is the minimum deviation?

- a) 30°
- b) 45°
- c) 60°
- d) 90°

11. For a small angle prism, the angle of deviation is approximately:

- a) Directly proportional to the angle of prism
- b) Inversely proportional to the angle of prism
- c) Proportional to the square of the angle of prism
- d) Independent of the angle of prism

12. The formula to calculate the angle of deviation (D) when light passes through a prism is:

- a) $D = i_1 + i_2 - A$
- b) $D = r_1 + r_2 + A$
- c) $D = i_1 - i_2 + 2A$
- d) $D = i_1 + i_2 - 2A$

13. A prism with an angle of 60° produces a minimum deviation of 38° . What is the refractive index of the prism?

- a) 1.33
- b) 1.42
- c) 1.50
- d) 1.62

14. The emergent ray from the prism is:

- a) Always parallel to the incident ray
- b) Deviated toward the base of the prism
- c) Deviated away from the base of the prism
- d) Perpendicular to the base of the prism

15. For a given prism, if the angle of incidence is 50° and the angle of deviation is 30° , what is the angle of the prism (A)?

- a) 60°
- b) 45°
- c) 40°
- d) 30°

16. If the refractive index of the prism is increased, what happens to the angle of minimum deviation?

- a) Increases
- b) Decreases
- c) Remains the same
- d) Becomes zero

17. For a prism with refractive index 1.5, the angle of prism is 60° . What is the angle of minimum deviation?

- a) 30°
- b) 45°
- c) 60°
- d) 50°

18. In a numerical problem, if a prism has an angle of 40° and the refractive index of its material is 1.6, what is the angle of minimum deviation?

- a) 25°
- b) 35°
- c) 45°
- d) 55°

19. What is the relationship between the angle of deviation (D) and the refractive index (n) of the prism?

- a) $n = \frac{\sin(A)}{\sin(D)}$

- b) $n = \frac{\sin\left(\frac{A+D}{2}\right)}{\sin\left(\frac{A}{2}\right)}$
- c) $n = \frac{1}{\sin(D)}$
- d) $n = \sin(A) + \sin(D)$

20. When light is incident normally on one surface of a prism, what will be the deviation caused by the prism?

- a) Zero
- b) Equal to the angle of prism
- c) Less than the angle of prism
- d) Greater than the angle of prism

Key:

1. c) Angle of the prism
2. a) The angle between the emergent ray and the incident ray
3. c) Equal for both faces of the prism
4. b) $n = \frac{\sin\left(\frac{A+Dm}{2}\right)}{\sin\left(\frac{A}{2}\right)}$
5. a) Parallel to the incident ray
6. b) 1.52
7. d) All of the above
8. a) $D = i + r - A$
9. d) Equal for both faces of the prism
10. a) 30°
11. a) Directly proportional to the angle of prism
12. d) $D = i_1 + i_2 - 2A$
13. c) 1.50
14. b) Deviated toward the base of the prism
15. c) 40°
16. a) Increases
17. d) 50°
18. b) 35°
19. b) $n = \frac{\sin\left(\frac{A+D}{2}\right)}{\sin\left(\frac{A}{2}\right)}$
20. b) Equal to the angle of prism