PHYSICS MCQ BOOKLET

Grade 11 · Chapter 2 · Vectors

FBISE / National Book Foundation Model Textbook companion

by Public Library

Independent MCQs on scalars and vectors, rectangular components, unit vectors, dot product, cross product, and their properties and applications. Not copied from the book exercise. Total: 108 questions. Each item has four options, the correct letter, and a short explanation of why it is correct.

A. Important / Main Topics

1. Which quantity needs both magnitude and direction for a complete description?

(A) Displacement
(B) Mass
(C) Time
(D) Temperature

Correct Answer: A

Explanation: Displacement is a vector because it has magnitude and direction.

2. Which of the following is a scalar quantity?

(A) Force
(B) Distance
(C) Velocity
(D) Acceleration

Correct Answer: B

Explanation: Distance has magnitude only; the others are vectors.

3. Which of the following is a vector quantity?

(A) Speed
(B) Work
(C) Torque
(D) Energy

Correct Answer: C

Explanation: Torque has magnitude and direction; speed without direction is scalar.

4. A vector is represented graphically by:

(A) a point only
(B) a circle
(C) a shaded region
(D) a line with an arrowhead

Correct Answer: D

Explanation: Length shows magnitude and the arrowhead shows direction.

5. In a vector diagram, the length of the arrow is chosen according to:

(A) a chosen scale
(B) color
(C) the page width only
(D) random choice

Correct Answer: A

Explanation: A scale links drawn length to the actual magnitude.

6. Rectangular components of a vector are:

(A) parallel to each other
(B) mutually perpendicular
(C) always equal in size

(D) always opposite

Correct Answer: B

Explanation: Rectangular components of a vector are mutually perpendicular.

7. In 2-D, a vector is usually resolved into:

(A) mass and time parts
(B) only one component
(C) x and y components
(D) three parallel parts

Correct Answer: C

Explanation: Horizontal and vertical components are the standard 2-D resolution.

8. If A = Ax i-hat + Ay j-hat, then Ax and Ay are:

(A) vectors along z-axis
(B) unit vectors
(C) angles only
(D) scalars giving component magnitudes along axes

Correct Answer: D

Explanation: Ax and Ay are scalar magnitudes multiplied by unit vectors i-hat and j-hat.

9. A unit vector has magnitude:

(A) one
(B) zero
(C) equal to the original vector
(D) always negative

Correct Answer: A

Explanation: A unit vector has magnitude one.

10. The unit vector i-hat points along:

(A) the +y axis
(B) the +x axis
(C) the +z axis only
(D) any random direction

Correct Answer: B

Explanation: i-hat is the unit vector along the positive x-direction.

11. The horizontal component of a vector A at angle theta to the x-axis is:

(A) A sin theta
(B) A tan theta
(C) A cos theta
(D) A / cos theta

Correct Answer: C

Explanation: The horizontal component of a vector A at angle theta to the x-axis is A cos theta.

12. The vertical component of a vector A at angle theta to the x-axis is:

(A) A cos theta
(B) A / sin theta
(C) A tan theta
(D) A sin theta

Correct Answer: D

Explanation: The vertical component of a vector A at angle theta to the x-axis is A sin theta.

13. A force of 50 N acts at 30 degrees to the horizontal. Its horizontal component is about:

(A) 43.3 N
(B) 25 N
(C) 50 N

(D) 86.6 N

Correct Answer: A

Explanation: A force of 50 N acts at 30 degrees to the horizontal. Its horizontal component is about 43.3 N.

14. A force of 50 N acts at 30 degrees to the horizontal. Its vertical component is:

(A) 43.3 N
(B) 25 N
(C) 50 N
(D) 12.5 N

Correct Answer: B

Explanation: A force of 50 N acts at 30 degrees to the horizontal. Its vertical component is 25 N.

15. If Fx = 12 N and Fy = 5 N, the magnitude of the force is:

(A) 17 N
(B) 7 N
(C) 13 N
(D) 60 N

Correct Answer: C

Explanation: If Fx = 12 N and Fy = 5 N, the magnitude of the force is 13 N.

16. If Ax = 3 and Ay = 4, the magnitude of vector A is:

(A) 7
(B) 1
(C) 12
(D) 5

Correct Answer: D

Explanation: If Ax = 3 and Ay = 4, the magnitude of vector A is 5.

17. If Ax = 3 and Ay = 4, the direction angle theta = tan^-1(Ay/Ax) is about:

(A) 53 degrees
(B) 37 degrees
(C) 90 degrees
(D) 0 degrees

Correct Answer: A

Explanation: tan theta = 4/3, so theta is about 53 degrees above the x-axis.

18. A position vector to point P(a, b) from the origin is written as:

(A) r = a + b
(B) r = a i-hat + b j-hat
(C) r = sqrt(a + b)
(D) r = a x b

Correct Answer: B

Explanation: Position in the plane is a i-hat plus b j-hat.

19. The magnitude of position vector r = a i-hat + b j-hat is:

(A) a + b
(B) a x b
(C) sqrt(a^2 + b^2)
(D) a - b

Correct Answer: C

Explanation: Its magnitude is the distance from the origin: sqrt(a^2 + b^2).

20. When two vectors are multiplied and the result is a scalar, the product is called:

(A) vector product
(B) null product
(C) tensor product only

(D) scalar or dot product

Correct Answer: D

Explanation: A dot product yields a single number, so it is a scalar product.

21. The dot product of vectors A and B is defined as:

(A) AB cos theta
(B) AB sin theta
(C) A + B
(D) A / B

Correct Answer: A

Explanation: The dot product of vectors A and B is defined as AB cos theta.

22. A dot B can also be written as:

(A) (A sin theta) B
(B) (A cos theta) B
(C) A + B cos theta
(D) AB tan theta

Correct Answer: B

Explanation: It is B times the component of A along B, which is A cos theta.

23. Work done by a constant force is the dot product:

(A) W = F cross d
(B) W = F + d
(C) W = F dot d
(D) W = F / d

Correct Answer: C

Explanation: Work uses the force component along displacement: W = F dot d.

24. Power delivered by an engine is often written as:

(A) P = F cross v only
(B) P = F + v
(C) P = m g h only
(D) P = F dot v

Correct Answer: D

Explanation: Power is the scalar product of force and velocity.

25. The dot product is commutative, meaning:

(A) A dot B = B dot A
(B) A dot B = -B dot A
(C) A dot B = 0 always
(D) A dot B = AB always

Correct Answer: A

Explanation: Order does not matter because cos theta is the same either way.

26. If two nonzero vectors are perpendicular, their dot product is:

(A) maximum
(B) zero
(C) negative AB
(D) AB

Correct Answer: B

Explanation: cos 90 degrees = 0, so A dot B = 0 for perpendicular vectors.

27. i-hat dot j-hat equals:

(A) 1
(B) -1
(C) 0

(D) k-hat

Correct Answer: C

Explanation: i-hat dot j-hat equals 0.

28. The dot product of a vector with itself equals:

(A) 0
(B) A
(C) 2A
(D) A^2

Correct Answer: D

Explanation: The dot product of a vector with itself equals A^2.

29. For parallel vectors pointing the same way, A dot B equals:

(A) AB
(B) 0
(C) -AB
(D) AB sin theta

Correct Answer: A

Explanation: For parallel vectors pointing the same way, A dot B equals AB.

30. For antiparallel vectors, A dot B equals:

(A) AB
(B) -AB
(C) 0
(D) AB sin theta

Correct Answer: B

Explanation: cos 180 degrees = -1, so the dot product is -AB.

31. If A = 5 i-hat + j-hat and B = 2 i-hat + 4 j-hat, then A dot B equals:

(A) 10
(B) 9
(C) 14
(D) 20

Correct Answer: C

Explanation: If A = 5 i-hat + j-hat and B = 2 i-hat + 4 j-hat, then A dot B equals 14.

32. If F = 8 i-hat - 2 j-hat N and v = 3 i-hat + 4 j-hat m/s, power P = F dot v is:

(A) 24 W
(B) 8 W
(C) 32 W
(D) 16 W

Correct Answer: D

Explanation: If F = 8 i-hat - 2 j-hat N and v = 3 i-hat + 4 j-hat m/s, power P = F dot v is 16 W.

33. The angle between vectors can be found from:

(A) cos theta = (A dot B) / (AB)
(B) sin theta = A dot B
(C) theta = A cross B
(D) theta = A + B

Correct Answer: A

Explanation: The angle between vectors can be found from cos theta = (A dot B) / (AB).

34. When the product of two vectors is another vector, the product is called:

(A) dot product
(B) vector or cross product
(C) scalar product

(D) null product

Correct Answer: B

Explanation: When the product of two vectors is another vector, the product is called vector or cross product.

35. The cross product A cross B has magnitude:

(A) AB cos theta
(B) A + B
(C) AB sin theta
(D) A / B

Correct Answer: C

Explanation: Magnitude is AB sin theta; direction is given separately.

36. The direction of A cross B is given by:

(A) the longer vector
(B) the x-axis always
(C) the sum A + B
(D) a unit vector n-hat perpendicular to the plane of A and B

Correct Answer: D

Explanation: The cross product direction is perpendicular to both vectors.

37. The right-hand rule is used to find:

(A) the direction of a cross product
(B) the magnitude of a scalar
(C) the dot product sign only
(D) mass from weight

Correct Answer: A

Explanation: Curl fingers from first vector toward second; thumb gives cross-product direction.

38. Torque is defined as:

(A) r dot F
(B) r cross F
(C) r + F
(D) r / F

Correct Answer: B

Explanation: Torque is the vector product of position vector and force.

39. Angular momentum is defined as:

(A) r dot p
(B) m v
(C) r cross p
(D) F d only

Correct Answer: C

Explanation: L = r cross p, where p is linear momentum.

40. The cross product is anti-commutative, so:

(A) A cross B = B cross A
(B) A cross B = 0
(C) A cross B = AB
(D) A cross B = -(B cross A)

Correct Answer: D

Explanation: The cross product is anti-commutative, so A cross B = -(B cross A).

41. If two vectors are parallel, their cross product is:

(A) zero vector
(B) maximum AB
(C) AB i-hat

(D) AB cos theta

Correct Answer: A

Explanation: sin 0 = 0, so parallel vectors give a null cross product.

42. A cross A equals:

(A) A^2
(B) zero vector
(C) A
(D) 2A

Correct Answer: B

Explanation: Any vector crossed with itself has sin 0 = 0, giving zero.

43. If two vectors are perpendicular, |A cross B| equals:

(A) 0
(B) AB cos theta
(C) AB
(D) -AB

Correct Answer: C

Explanation: sin 90 = 1, so the magnitude is the product AB.

44. i-hat cross j-hat equals:

(A) 0
(B) 1
(C) -k-hat
(D) k-hat

Correct Answer: D

Explanation: Right-hand rule from x toward y gives +z, so i cross j = k.

45. j-hat cross i-hat equals:

(A) -k-hat
(B) k-hat
(C) 0
(D) 1

Correct Answer: A

Explanation: j-hat cross i-hat equals -k-hat.

46. The magnitude |A cross B| equals the area of a parallelogram when A and B are:

(A) perpendicular only
(B) adjacent sides
(C) opposite sides of a triangle only
(D) both unit vectors only

Correct Answer: B

Explanation: The magnitude |A cross B| equals the area of a parallelogram when A and B are adjacent sides.

47. If |A| = 3.2 and |B| = 5.2 and theta = 60 degrees, |A cross B| is about:

(A) 8.3
(B) 16.6
(C) 14.4
(D) 0

Correct Answer: C

Explanation: If |A| = 3.2 and |B| = 5.2 and theta = 60 degrees, |A cross B| is about 14.4.

48. A force of 10 N at 30 degrees to the horizontal has x-component about:

(A) 5 N
(B) 10 N
(C) 4 N

(D) 8.7 N

Correct Answer: D

Explanation: A force of 10 N at 30 degrees to the horizontal has x-component about 8.7 N.

49. If horizontal component of a force is 20 N at 30 degrees to horizontal, the force magnitude is about:

(A) 23.1 N
(B) 20 N
(C) 17.3 N
(D) 40 N

Correct Answer: A

Explanation: If horizontal component of a force is 20 N at 30 degrees to horizontal, the force magnitude is about 23.1 N.

50. A 200 N force at 30 degrees to the x-axis has components about:

(A) 100 N and 173 N
(B) 173 N and 100 N
(C) 200 N and 0 N
(D) 50 N and 150 N

Correct Answer: B

Explanation: A 200 N force at 30 degrees to the x-axis has components about 173 N and 100 N.

51. If |A dot B| = |A cross B| for nonzero vectors, theta is:

(A) 0 degrees
(B) 90 degrees
(C) 45 degrees
(D) 180 degrees

Correct Answer: C

Explanation: cos theta = sin theta at 45 degrees when magnitudes match.

52. The angle between vectors is most directly found using:

(A) cross product alone
(B) adding head to tail only
(C) mass conversion
(D) dot product

Correct Answer: D

Explanation: Dot product gives cos theta directly from A dot B = AB cos theta.

53. If cross product of two nonzero vectors vanishes, the vectors are:

(A) parallel or antiparallel
(B) perpendicular
(C) unit vectors only
(D) always equal

Correct Answer: A

Explanation: sin theta = 0 when theta is 0 or 180 degrees.

54. If both dot and cross products of two nonzero vectors are zero, one vector must be:

(A) perpendicular to the other
(B) a null vector
(C) twice the other
(D) a unit vector

Correct Answer: B

Explanation: Both zero for nonzero vectors implies at least one has zero magnitude.

55. A null vector has:

(A) unit magnitude
(B) fixed direction only

(C) zero magnitude and arbitrary direction
(D) infinite magnitude

Correct Answer: C

Explanation: Zero magnitude means no specific direction is required.

56. How many perpendicular components does a force have in 2-D?

(A) 1
(B) 3
(C) 4
(D) 2

Correct Answer: D

Explanation: In a plane, resolution is into x and y components.

57. Which is an example of scalar product in physics?

(A) work
(B) torque
(C) angular momentum
(D) area vector

Correct Answer: A

Explanation: Work is force dot displacement, a scalar.

58. Which is an example of vector product in physics?

(A) work
(B) torque
(C) power from F dot v
(D) electric charge

Correct Answer: B

Explanation: Torque — this correctly answers the question.

59. If A = i + 6 j + 2 k and B = 7 i + j + 5 k (in metres), A cross B has magnitude useful for:

(A) finding temperature
(B) finding mass
(C) finding parallelogram area
(D) finding time period only

Correct Answer: C

Explanation: If A = i + 6 j + 2 k and B = 7 i + j + 5 k (in metres), A cross B has magnitude useful for finding parallelogram area.

60. Vector F = 5.5 N at 10 degrees and r = 4.3 m at 80 degrees. Their dot product magnitude is about:

(A) 22.2 N m
(B) 0
(C) 43 N m
(D) 8.1 N m

Correct Answer: D

Explanation: Use F dot r = Fr cos(theta between them); textbook answer is about 8.1 N m.

61. If |A cross B| = sqrt(3) |A dot B|, the angle between them is:

(A) 60 degrees
(B) 30 degrees
(C) 45 degrees
(D) 90 degrees

Correct Answer: A

Explanation: AB sin theta = sqrt(3) AB cos theta gives tan theta = sqrt(3), so 60 degrees.

62. If |A dot B| = 6 sqrt(3) and |A cross B| = 6, theta is about:

(A) 45 degrees

(B) 30 degrees
(C) 60 degrees
(D) 90 degrees

Correct Answer: B

Explanation: tan theta = |A cross B| / |A dot B| = 6 / (6 sqrt(3)) = 1/sqrt(3), so 30 degrees.

63. Component of A along B equals:

(A) A sin theta
(B) B cos theta
(C) A cos theta
(D) AB

Correct Answer: C

Explanation: Component of A along B equals A cos theta.

64. Resolution means:

(A) adding random numbers
(B) making all vectors scalars
(C) deleting direction
(D) splitting a vector into components along chosen directions

Correct Answer: D

Explanation: Resolution means splitting a vector into components along chosen directions.

65. In A = Ax i-hat + Ay j-hat, replacing i-hat and j-hat with unit vectors means:

(A) direction is specified without changing magnitudes Ax, Ay
(B) magnitude becomes zero
(C) theta becomes 90 always
(D) A becomes scalar

Correct Answer: A

Explanation: In A = Ax i-hat + Ay j-hat, replacing i-hat and j-hat with unit vectors means direction is specified without changing magnitudes Ax, Ay.

66. Electric flux is an example of:

(A) cross product
(B) dot product
(C) scalar addition only
(D) vector division

Correct Answer: B

Explanation: Flux Phi = E dot A is a scalar product.

67. For perpendicular unit vectors, i-hat cross j-hat gives:

(A) 0
(B) -k-hat
(C) k-hat
(D) 1

Correct Answer: C

Explanation: Right-hand rule from x to y points to +z.

68. The number of rectangular components needed in 3-D is:

(A) 1
(B) 2
(C) 4
(D) 3

Correct Answer: D

Explanation: The number of rectangular components needed in 3-D is 3.

69. If only magnitude is known for speed, the quantity treated as scalar is:

(A) speed
(B) velocity
(C) displacement
(D) force

Correct Answer: A

Explanation: Speed is magnitude of velocity without direction.

70. A vector quantity among the following is:

(A) mass
(B) momentum
(C) distance
(D) temperature

Correct Answer: B

Explanation: Momentum has direction; mass, distance without direction, and temperature are scalars.

71. Adding perpendicular components Ax and Ay gives resultant magnitude:

(A) Ax + Ay
(B) Ax x Ay
(C) sqrt(Ax^2 + Ay^2)
(D) Ax - Ay

Correct Answer: C

Explanation: Adding perpendicular components Ax and Ay gives resultant magnitude sqrt(Ax^2 + Ay^2).

72. If theta is measured from the +x axis, increasing theta rotates the vector:

(A) toward +x
(B) always into the page only
(C) never changes Ay
(D) counterclockwise from +x in standard math setup

Correct Answer: D

Explanation: Standard angle from x-axis increases counterclockwise in the x-y plane.

73. Dot product of any vector with a null vector is:

(A) 0
(B) AB
(C) 1
(D) -1

Correct Answer: A

Explanation: Dot product of any vector with a null vector is 0.

74. Cross product of any vector with a null vector is:

(A) AB n-hat
(B) zero vector
(C) unit vector
(D) A^2

Correct Answer: B

Explanation: Cross product of any vector with a null vector is zero vector.

75. Which pair are both vectors?

(A) speed and mass
(B) work and energy
(C) velocity and acceleration
(D) time and length

Correct Answer: C

Explanation: Velocity and acceleration need direction; the others listed are scalars.

76. The projection of B on A uses:

(A) B sin theta
(B) A sin theta
(C) A + B
(D) B cos theta

Correct Answer: D

Explanation: Component of B along A is B cos theta when theta is between them.

77. For F = 200 N at 30 degrees, Fy equals:

(A) 100 N
(B) 173.2 N
(C) 200 N
(D) 50 N

Correct Answer: A

Explanation: Vertical component is F sin 30 = 200 x 0.5 = 100 N.

78. Head-to-tail addition is used for:

(A) finding dot product only
(B) combining vectors graphically
(C) making scalars from vectors
(D) unit conversion

Correct Answer: B

Explanation: Head-to-tail addition is used for combining vectors graphically.

79. If A dot B = 0 for nonzero vectors, they must be:

(A) parallel
(B) equal
(C) perpendicular
(D) antiparallel always

Correct Answer: C

Explanation: Zero dot product means cos theta = 0, so theta = 90 degrees.

80. In component form, A dot B equals:

(A) Ax + Bx + Ay + By
(B) Ax By - Ay Bx
(C) AB sin theta
(D) Ax Bx + Ay By + Az Bz

Correct Answer: D

Explanation: Multiply matching components and add for the scalar dot product.

B. Less Important / Secondary Topics

81. Which quantity is scalar?

(A) length
(B) displacement
(C) acceleration
(D) force

Correct Answer: A

Explanation: Length without direction is scalar; the others are vectors.

82. Which quantity is vector?

(A) distance
(B) velocity
(C) speed
(D) mass

Correct Answer: B

Explanation: Velocity includes direction; distance and speed are scalars.

83. Unit vectors i-hat dot i-hat equals:

(A) 0
(B) -1
(C) 1
(D) j-hat

Correct Answer: C

Explanation: A unit vector dotted with itself gives 1.

84. k-hat dot k-hat equals:

(A) 0
(B) k-hat
(C) j-hat
(D) 1

Correct Answer: D

Explanation: Self dot product of a unit vector is unity.

85. i-hat cross i-hat equals:

(A) zero vector
(B) i-hat
(C) 1
(D) k-hat

Correct Answer: A

Explanation: i-hat cross i-hat equals zero vector.

86. j-hat cross k-hat equals:

(A) -i-hat
(B) i-hat
(C) 0
(D) j-hat

Correct Answer: B

Explanation: j-hat cross k-hat equals i-hat.

87. k-hat cross j-hat equals:

(A) i-hat
(B) 1
(C) -i-hat
(D) 0

Correct Answer: C

Explanation: k-hat cross j-hat equals -i-hat.

88. If A = 2 i + 3 j and B = 4 i - j, A dot B equals:

(A) 8
(B) 11
(C) 14
(D) 5

Correct Answer: D

Explanation: If A = 2 i + 3 j and B = 4 i - j, A dot B equals 5.

89. If A = 2 i + 3 j and B = 4 i - j, A cross k-hat (in 2-D as scalar z) conceptually relates to:

(A) area-like perpendicular result
(B) zero always
(C) scalar work
(D) mass

Correct Answer: A

Explanation: Cross product in the plane is along k and links to area.

90. For theta = 0 degrees, A dot B equals:

(A) 0
(B) AB
(C) -AB
(D) AB/2

Correct Answer: B

Explanation: For theta = 0 degrees, A dot B equals AB.

91. For theta = 90 degrees, |A cross B| equals:

(A) 0
(B) AB cos theta
(C) AB
(D) -AB

Correct Answer: C

Explanation: For theta = 90 degrees, |A cross B| equals AB.

92. For theta = 180 degrees, A dot B equals:

(A) AB
(B) 0
(C) AB sin theta
(D) -AB

Correct Answer: D

Explanation: For theta = 180 degrees, A dot B equals -AB.

93. Work W = Fd cos theta is zero when:

(A) theta = 90
(B) theta = 0
(C) theta = 0 only
(D) F is large

Correct Answer: A

Explanation: No work when force is perpendicular to displacement.

94. Power P = Fv cos theta is maximum when force and velocity are:

(A) perpendicular
(B) parallel
(C) antiparallel
(D) unrelated

Correct Answer: B

Explanation: Power P = Fv cos theta is maximum when force and velocity are parallel.

95. The magnitude of r = 3 i + 4 j is:

(A) 7
(B) 1
(C) 5
(D) 12

Correct Answer: C

Explanation: The magnitude of r = 3 i + 4 j is 5.

96. If Ax = 0 and Ay = 5, the vector lies along:

(A) +x axis
(B) origin only
(C) diagonal at 45 degrees
(D) +y axis

Correct Answer: D

Explanation: No x-part means the vector is purely vertical.

97. If Ay = 0 and Ax = -3, the vector points:

(A) along -x
(B) along +x
(C) along +y
(D) at 45 degrees

Correct Answer: A

Explanation: Positive Ax would be +x; negative Ax is -x.

98. Two forces 3 N and 4 N at right angles have resultant magnitude:

(A) 7 N
(B) 5 N
(C) 1 N
(D) 12 N

Correct Answer: B

Explanation: Two forces 3 N and 4 N at right angles have resultant magnitude 5 N.

99. Dot product uses:

(A) sin theta
(B) tan theta only
(C) cos theta
(D) 1/sin theta

Correct Answer: C

Explanation: Dot product uses cos theta.

100. Cross product magnitude uses:

(A) cos theta
(B) tan theta
(C) cot theta
(D) sin theta

Correct Answer: D

Explanation: Cross product magnitude uses sin theta.

101. Unit vectors i-hat, j-hat, k-hat carry:

(A) no physical unit, only direction
(B) mass units
(C) seconds
(D) newtons

Correct Answer: A

Explanation: Unit vectors are dimensionless direction indicators.

102. A vector with zero magnitude is called:

(A) unit vector
(B) null vector
(C) position vector only
(D) scalar

Correct Answer: B

Explanation: Zero magnitude defines a null vector.

103. If F_x = F cos theta and F_y = F sin theta, then F equals:

(A) Fx + Fy
(B) Fx x Fy
(C) sqrt(Fx^2 + Fy^2)
(D) Fx - Fy

Correct Answer: C

Explanation: If F_x = F cos theta and F_y = F sin theta, then F equals sqrt(Fx^2 + Fy^2).

104. Scalar product of perpendicular vectors i-hat and j-hat is:

(A) 1
(B) -1
(C) k-hat
(D) 0

Correct Answer: D

Explanation: Scalar product of perpendicular vectors i-hat and j-hat is 0.

105. Which operation is commutative?

(A) dot product
(B) cross product
(C) neither
(D) both

Correct Answer: A

Explanation: Dot product — this correctly answers the question.

106. Which operation changes sign when vectors are swapped?

(A) dot product
(B) cross product
(C) adding magnitudes
(D) finding Ax

Correct Answer: B

Explanation: Cross product — this correctly answers the question.

107. Area of parallelogram with sides A and B equals:

(A) A dot B
(B) A + B
(C) |A cross B|
(D) AB cos theta only

Correct Answer: C

Explanation: Area of parallelogram with sides A and B equals |A cross B|.

108. If vectors are in the xy-plane, A cross B is generally along:

(A) x-axis only
(B) y-axis only
(C) null only
(D) z-axis (perpendicular to plane)

Correct Answer: D

Explanation: Cross product of in-plane vectors is perpendicular to the plane.