MATHEMATICS MCQ BOOKLET

Grade 9 · Chapter 6 · Trigonometry and Bearing

FBISE / National Book Foundation Model Textbook companion

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Independent MCQs on angle measure, radians, arc and sector, trigonometric ratios, identities, elevation, and bearings. 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. The union of two rays with a common endpoint forms an:

(A) angle
(B) arc
(C) sector area
(D) bearing north only

Correct Answer: A

Explanation: The common endpoint is the vertex of the angle.

2. A positive angle is measured in the:

(A) clockwise direction
(B) anti-clockwise direction
(C) downward direction only
(D) east-west line only

Correct Answer: B

Explanation: The standard convention takes anti-clockwise as positive.

3. A negative angle is measured in the:

(A) anti-clockwise direction
(B) radial direction
(C) clockwise direction
(D) along the y-axis only

Correct Answer: C

Explanation: Clockwise rotation is assigned a negative measure.

4. An angle is in standard position if its vertex is at the origin and its initial arm lies along the:

(A) negative y-axis
(B) line y = x
(C) negative x-axis only
(D) positive x-axis

Correct Answer: D

Explanation: An angle is in standard position if its vertex is at the origin and its initial arm lies along the positive x-axis.

5. The sexagesimal system is also called the:

(A) English system of degree measure
(B) circular system
(C) centesimal system
(D) bearing-only system

Correct Answer: A

Explanation: A full turn is 360°, each degree splitting into minutes and seconds.

6. The circular system measures angles in:

(A) degrees only
(B) radians

(C) grades only
(D) three-figure bearings only

Correct Answer: B

Explanation: Radian measure compares arc length with radius.

7. The centesimal (French) system is:

(A) the main system of this unit
(B) the same as radians
(C) beyond the scope of this book
(D) the same as bearings

Correct Answer: C

Explanation: The centesimal (French) system is beyond the scope of this book.

8. One degree equals:

(A) 60 seconds
(B) 3600 minutes
(C) π radians
(D) 60 minutes

Correct Answer: D

Explanation: 1° = 60′, which matches the chapter rule being tested.

9. One minute of arc equals:

(A) 60 seconds
(B) 60 degrees
(C) 3600 degrees
(D) π/180 radians exactly as a minute

Correct Answer: A

Explanation: 1′ = 60″, which matches the chapter rule being tested.

10. One degree equals how many seconds?

(A) 60″
(B) 3600″
(C) 180″
(D) 90″

Correct Answer: B

Explanation: 1° = 60 × 60″ = 3600″, which matches the chapter rule being tested.

11. 30′ equals:

(A) 30″
(B) 3600″
(C) 1800″
(D) 90″

Correct Answer: C

Explanation: 30 × 60″ = 1800″, which matches the chapter rule being tested.

12. 60° equals how many seconds?

(A) 3600″
(B) 360″
(C) 60″
(D) 216000″

Correct Answer: D

Explanation: 60 × 3600″ = 216000″, which matches the chapter rule being tested.

13. 36° written in minutes is:

(A) 2160′
(B) 36′

(C) 360′
(D) 6′

Correct Answer: A

Explanation: 36 × 60′ = 2160′, which matches the chapter rule being tested.

14. 60.5° in D°M′S″ form is:

(A) 60° 50′
(B) 60° 30′
(C) 60° 5′
(D) 61° 0′

Correct Answer: B

Explanation: 0.5 × 60′ = 30′, so 60° 30′, which matches the chapter rule being tested.

15. 45.125° in D°M′S″ form is:

(A) 45° 12′ 5″
(B) 45° 1′ 25″
(C) 45° 7′ 30″
(D) 45° 75′

Correct Answer: C

Explanation: 0.125 × 60′ = 7.5′ and 0.5′ = 30″, which matches the chapter rule being tested.

16. 60° 30′ 30″ in degrees to 4 d.p. is:

(A) 60.3030°
(B) 60.5300°
(C) 61.0000°
(D) 60.5083°

Correct Answer: D

Explanation: 60° 30′ 30″ in degrees to 4 d.p. is 60.5083°.

17. The radian measure of an angle is the ratio of:

(A) arc length to radius
(B) radius to diameter
(C) area to circumference
(D) chord to radius

Correct Answer: A

Explanation: θ (in radians) = l / r, which matches the chapter rule being tested.

18. One radian is the central angle of an arc whose length equals the:

(A) diameter
(B) radius
(C) circumference
(D) area

Correct Answer: B

Explanation: When l = r the ratio l/r is 1, which matches the chapter rule being tested.

19. A complete turn in radians is:

(A) π
(B) π/2
(C) 2π
(D) 360

Correct Answer: C

Explanation: Circumference 2πr divided by r is 2π, which matches the chapter rule being tested.

20. π radians equal:

(A) 90°
(B) 360°

(C) 1°
(D) 180°

Correct Answer: D

Explanation: Half a turn is 180° and also π radians, which matches the chapter rule being tested.

21. To convert radians to degrees, multiply by:

(A) 180/π
(B) π/180
(C) 2π
(D) 60

Correct Answer: A

Explanation: 1 radian = (180/π)°, which matches the chapter rule being tested.

22. To convert degrees to radians, multiply by:

(A) 180/π
(B) π/180
(C) 60
(D) 2π

Correct Answer: B

Explanation: 1° = π/180 radians, which matches the chapter rule being tested.

23. 45° in radians is:

(A) π/2
(B) π/6
(C) π/4
(D) π/3

Correct Answer: C

Explanation: 45 × π/180 = π/4, which matches the chapter rule being tested.

24. 150° in radians is:

(A) 5π/4
(B) 2π/3
(C) π/6
(D) 5π/6

Correct Answer: D

Explanation: 150 × π/180 = 5π/6, which matches the chapter rule being tested.

25. 300° in radians is:

(A) 5π/3
(B) 5π/6
(C) 3π/2
(D) π/3

Correct Answer: A

Explanation: 300 × π/180 = 5π/3, which matches the chapter rule being tested.

26. π/3 radians in degrees is:

(A) 30°
(B) 60°
(C) 90°
(D) 120°

Correct Answer: B

Explanation: (π/3) × (180/π) = 60°, which matches the chapter rule being tested.

27. 3π/4 radians in degrees is:

(A) 75°
(B) 150°

(C) 135°
(D) 240°

Correct Answer: C

Explanation: (3π/4) × (180/π) = 135°, which matches the chapter rule being tested.

28. 1 radian is about:

(A) 30°
(B) 90°
(C) 180°
(D) 57° 17′ 45″

Correct Answer: D

Explanation: 180/π ≈ 57.2958°, which is about 57° 17′ 45″.

29. The length of a circular arc is l = rθ provided θ is in:

(A) radians
(B) degrees without conversion
(C) minutes
(D) grades

Correct Answer: A

Explanation: The defining ratio l/r is the radian measure.

30. If r = 2 cm and θ = π/4, the arc length is:

(A) π cm
(B) π/2 cm
(C) 2π cm
(D) π/4 cm

Correct Answer: B

Explanation: l = 2 × (π/4) = π/2 cm, which matches the chapter rule being tested.

31. If r = 30 cm and θ = 60°, the arc length is:

(A) 30 cm
(B) 60 cm
(C) 10π cm
(D) π/3 cm

Correct Answer: C

Explanation: 60° = π/3 rad, so l = 30 × π/3 = 10π cm.

32. A sector is the region bounded by an arc and:

(A) one tangent
(B) a chord only
(C) a bearing line
(D) the two corresponding radii

Correct Answer: D

Explanation: A sector is the region bounded by an arc and the two corresponding radii.

33. The area of a sector is A = (1/2)r²θ with θ in:

(A) radians
(B) degrees only
(C) minutes
(D) three-figure form

Correct Answer: A

Explanation: Proportionality with the full disk πr² over 2π yields that formula.

34. If r = 5 cm and θ = 120°, the sector area is:

(A) 25π cm²
(B) 25π/3 cm²

(C) 5π cm²
(D) 10 cm²

Correct Answer: B

Explanation: 120° = 2π/3, so A = (1/2)×25×(2π/3) = 25π/3 cm².

35. If arc length l = 4 cm and sector area A = 16 cm², then r equals:

(A) 4 cm
(B) 2 cm
(C) 8 cm
(D) 16 cm

Correct Answer: C

Explanation: A = (1/2) r l because θ = l/r, so 16 = 2r and r = 8 cm.

36. With l = 4 cm and r = 8 cm, the central angle is:

(A) 4 rad
(B) 2 rad
(C) 8 rad
(D) 1/2 rad

Correct Answer: D

Explanation: θ = l/r = 4/8 = 1/2 radian, which matches the chapter rule being tested.

37. A quadrantal angle has terminal ray along an axis, so its measure is a multiple of:

(A) 90°
(B) 45°
(C) 30°
(D) 1 radian only

Correct Answer: A

Explanation: 0°, 90°, 180°, 270°, 360°, … are the quadrantal cases.

38. A unit circle has radius:

(A) π
(B) 1
(C) 2
(D) 0

Correct Answer: B

Explanation: A unit circle has radius 1.

39. On a unit circle, the point at angle θ has coordinates:

(A) (sin θ, cos θ)
(B) (tan θ, 1)
(C) (cos θ, sin θ)
(D) (θ, 1)

Correct Answer: C

Explanation: cos θ is the x-coordinate and sin θ is the y-coordinate.

40. In a right triangle, sin θ equals:

(A) adjacent / hypotenuse
(B) opposite / adjacent
(C) hypotenuse / opposite
(D) opposite / hypotenuse

Correct Answer: D

Explanation: Sine is perpendicular over hypotenuse, which matches the chapter rule being tested.

41. In a right triangle, cos θ equals:

(A) adjacent / hypotenuse
(B) opposite / hypotenuse

(C) opposite / adjacent
(D) hypotenuse / adjacent

Correct Answer: A

Explanation: Cosine is base over hypotenuse, which matches the chapter rule being tested.

42. In a right triangle, tan θ equals:

(A) adjacent / opposite
(B) opposite / adjacent
(C) opposite / hypotenuse
(D) adjacent / hypotenuse

Correct Answer: B

Explanation: Tangent is perpendicular over base, and also sin θ / cos θ.

43. csc θ is the reciprocal of:

(A) cos θ
(B) tan θ
(C) sin θ
(D) sec θ

Correct Answer: C

Explanation: csc θ is the reciprocal of sin θ.

44. sec θ is the reciprocal of:

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

Correct Answer: D

Explanation: sec θ is the reciprocal of cos θ.

45. cot θ is the reciprocal of:

(A) tan θ
(B) sin θ
(C) cos θ
(D) sec θ

Correct Answer: A

Explanation: cot θ = adjacent / opposite = 1/tan θ, which matches the chapter rule being tested.

46. sin 30° equals:

(A) √3/2
(B) 1/2
(C) 1
(D) 0

Correct Answer: B

Explanation: In a 30°–60°–90° unit-circle triangle the opposite side is 1/2.

47. cos 30° equals:

(A) 1/2
(B) 0
(C) √3/2
(D) 1

Correct Answer: C

Explanation: The adjacent side on the unit circle is √3/2.

48. tan 30° equals:

(A) √3
(B) 1

(C) 0
(D) 1/√3

Correct Answer: D

Explanation: tan 30° equals 1/√3.

49. sin 45° equals:

(A) 1/√2
(B) 1/2
(C) √3/2
(D) 0

Correct Answer: A

Explanation: sin 45° equals 1/√2.

50. tan 45° equals:

(A) 0
(B) 1
(C) √3
(D) undefined

Correct Answer: B

Explanation: Opposite equals adjacent, so the ratio is 1.

51. sin 60° equals:

(A) 1/2
(B) 1/√2
(C) √3/2
(D) 0

Correct Answer: C

Explanation: The unit-circle point at 60° is (1/2, √3/2).

52. cos 60° equals:

(A) √3/2
(B) 0
(C) 1
(D) 1/2

Correct Answer: D

Explanation: The x-coordinate at 60° is 1/2, which matches the chapter rule being tested.

53. tan 60° equals:

(A) √3
(B) 1/√3
(C) 1
(D) 0

Correct Answer: A

Explanation: (√3/2) / (1/2) = √3, which matches the chapter rule being tested.

54. sin 0° equals:

(A) 1
(B) 0
(C) −1
(D) undefined

Correct Answer: B

Explanation: The point is (1, 0), so the y-coordinate is 0.

55. cos 0° equals:

(A) 0
(B) −1

(C) 1
(D) undefined

Correct Answer: C

Explanation: The point is (1, 0), which matches the chapter rule being tested.

56. sin 90° equals:

(A) 0
(B) −1
(C) undefined
(D) 1

Correct Answer: D

Explanation: The point is (0, 1), which matches the chapter rule being tested.

57. cos 90° equals:

(A) 0
(B) 1
(C) −1
(D) undefined

Correct Answer: A

Explanation: The point is (0, 1), so the x-coordinate is 0.

58. tan 90° is:

(A) 0
(B) undefined
(C) 1
(D) −1

Correct Answer: B

Explanation: Division by cos 90° = 0 is undefined, which matches the chapter rule being tested.

59. sin 180° equals:

(A) 1
(B) −1
(C) 0
(D) undefined

Correct Answer: C

Explanation: The point is (−1, 0), which matches the chapter rule being tested.

60. cos 180° equals:

(A) 0
(B) 1
(C) undefined
(D) −1

Correct Answer: D

Explanation: The x-coordinate on the negative x-axis is −1.

61. sin 270° equals:

(A) −1
(B) 0
(C) 1
(D) undefined

Correct Answer: A

Explanation: The point is (0, −1), which matches the chapter rule being tested.

62. cos 270° equals:

(A) −1
(B) 0

(C) 1
(D) undefined

Correct Answer: B

Explanation: The point is (0, −1), which matches the chapter rule being tested.

63. tan 270° is:

(A) 0
(B) 1
(C) undefined
(D) −1

Correct Answer: C

Explanation: cos 270° = 0, so tangent is undefined, which matches the chapter rule being tested.

64. sin 360° equals:

(A) 1
(B) −1
(C) undefined
(D) 0

Correct Answer: D

Explanation: sin 360° equals 0.

65. In quadrant I, all six trigonometric ratios are:

(A) positive
(B) negative
(C) undefined
(D) zero

Correct Answer: A

Explanation: Both x and y are positive, so every ratio built from them is positive.

66. In quadrant II the positive ratios are:

(A) cos and sec
(B) sin and csc
(C) tan and cot
(D) all six

Correct Answer: B

Explanation: y > 0 and x < 0, so sine and its reciprocal stay positive.

67. In quadrant III the positive ratios are:

(A) sin and csc
(B) cos and sec
(C) tan and cot
(D) all six

Correct Answer: C

Explanation: Both x and y are negative, so their quotient is positive.

68. In quadrant IV the positive ratios are:

(A) sin and csc
(B) tan and cot
(C) all six
(D) cos and sec

Correct Answer: D

Explanation: x > 0 and y < 0, so cosine and secant stay positive.

69. The Pythagorean identity is:

(A) $\sin^2\theta + \cos^2\theta = 1$
(B) $\sin\theta + \cos\theta = 1$

(C) $\sin\theta \cdot \cos\theta = 1$
(D) $\tan\theta + \cot\theta = 1$

Correct Answer: A

Explanation: The Pythagorean identity is $\sin^2\theta + \cos^2\theta = 1$.

70. $1 + \tan^2\theta$ equals:

(A) $\sin^2\theta$
(B) $\sec^2\theta$
(C) $\csc^2\theta$
(D) $\cot^2\theta$

Correct Answer: B

Explanation: $1 + \tan^2\theta$ equals $\sec^2\theta$.

71. $1 + \cot^2\theta$ equals:

(A) $\sec^2\theta$
(B) $\sin^2\theta$
(C) $\csc^2\theta$
(D) $\tan^2\theta$

Correct Answer: C

Explanation: $1 + \cot^2\theta$ equals $\csc^2\theta$.

72. $\tan\theta$ equals:

(A) $\cos\theta / \sin\theta$
(B) $1 / \sin\theta$
(C) $\cos\theta \cdot \sin\theta$
(D) $\sin\theta / \cos\theta$

Correct Answer: D

Explanation: This is the quotient identity, which matches the chapter rule being tested.

73. The line from observer to object is the:

(A) line of sight
(B) normal
(C) bearing north
(D) unit circle

Correct Answer: A

Explanation: Elevation and depression are measured from the horizontal to that line.

74. Angle of elevation is the angle between the horizontal and the line of sight when the object is:

(A) below the horizontal
(B) above the horizontal
(C) on the unit circle
(D) due south

Correct Answer: B

Explanation: The observer looks up, which matches the chapter rule being tested.

75. Angle of depression is the angle between the horizontal and the line of sight when the object is:

(A) above the horizontal
(B) at the zenith
(C) below the horizontal
(D) at 90° elevation

Correct Answer: C

Explanation: The observer looks down, which matches the chapter rule being tested.

76. From a point 15 m from a tree, the angle of elevation of the top is 45°. The height of the tree is:

(A) $15\sqrt{3}$ m
(B) $15/\sqrt{3}$ m

(C) 30 m
(D) 15 m

Correct Answer: D

Explanation: tan 45° = 1 = height/15, so height = 15 m.

77. A 10 m pole casts a 10 m shadow. The sun's angle of elevation is:

(A) 45°
(B) 30°
(C) 60°
(D) 90°

Correct Answer: A

Explanation: tan θ = 10/10 = 1, so θ = 45°, which matches the chapter rule being tested.

78. A three-figure bearing is an angle measured clockwise from:

(A) east
(B) due north
(C) south
(D) the x-axis

Correct Answer: B

Explanation: Navigation bearings start at north and run clockwise, written with three digits.

79. The three-figure bearing of due east is:

(A) 045°
(B) 180°
(C) 090°
(D) 270°

Correct Answer: C

Explanation: A right angle clockwise from north is 090°.

80. The three-figure bearing of north-east is:

(A) 090°
(B) 135°
(C) 315°
(D) 045°

Correct Answer: D

Explanation: NE sits halfway from north to east, which matches the chapter rule being tested.

B. Less Important / Secondary Topics

81. Trigonometry studies relations among sides and angles of a:

(A) triangle
(B) circle only
(C) square only
(D) cube only

Correct Answer: A

Explanation: Trigonometry studies relations among sides and angles of a triangle.

82. Similar triangles have equal angles and therefore equal:

(A) areas always
(B) ratios of corresponding sides
(C) perimeters only
(D) bearings only

Correct Answer: B

Explanation: Trigonometric ratios are constant for a given angle because of similarity.

83. A full circle in the sexagesimal system is:

(A) 100°
(B) 400 grades
(C) 360°
(D) 2 radians

Correct Answer: C

Explanation: A full circle in the sexagesimal system is 360°.

84. A quadrant measures:

(A) 45°
(B) 180°
(C) 360°
(D) 90°

Correct Answer: D

Explanation: A quarter of 360° is 90°, which matches the chapter rule being tested.

85. A half-turn measures:

(A) 180°
(B) 90°
(C) 270°
(D) 45°

Correct Answer: A

Explanation: Half of 360° is 180°, which matches the chapter rule being tested.

86. 1″ in degrees is:

(A) 1/60°
(B) 1/3600°
(C) 1°
(D) 60°

Correct Answer: B

Explanation: 1° = 3600", so 1" = 1/3600 of a degree, which matches the chapter rule being tested.

87. π/4 radians equals:

(A) 90°
(B) 30°
(C) 45°
(D) 60°

Correct Answer: C

Explanation: (π/4) × (180/π) = 45°, which matches the chapter rule being tested.

88. 5π/6 radians equals:

(A) 30°
(B) 120°
(C) 210°
(D) 150°

Correct Answer: D

Explanation: (5π/6) × (180/π) = 150°, which matches the chapter rule being tested.

89. The proportion (arc length)/(2πr) = θ/(2π) recovers:

(A) $l = r\theta$
(B) $A = \pi r^2$
(C) $\sin \theta = y$
(D) bearing 000°

Correct Answer: A

Explanation: Cancel 2π to get $l = r\theta$, which matches the chapter rule being tested.

90. csc 30° equals:

(A) 1/2
(B) 2
(C) √3
(D) 2/√3

Correct Answer: B

Explanation: csc = 1/sin and sin 30° = 1/2, which matches the chapter rule being tested.

91. sec 60° equals:

(A) 1/2
(B) √3
(C) 2
(D) 2/√3

Correct Answer: C

Explanation: sec = 1/cos and cos 60° = 1/2, which matches the chapter rule being tested.

92. cot 30° equals:

(A) 1/√3
(B) 1
(C) 0
(D) √3

Correct Answer: D

Explanation: cot = 1/tan and tan 30° = 1/√3, which matches the chapter rule being tested.

93. cot 90° equals:

(A) 0
(B) undefined
(C) 1
(D) −1

Correct Answer: A

Explanation: cos 90° / sin 90° = 0/1 = 0, which matches the chapter rule being tested.

94. sec 0° equals:

(A) 0
(B) 1
(C) undefined
(D) −1

Correct Answer: B

Explanation: 1/cos 0° = 1/1 = 1, which matches the chapter rule being tested.

95. csc 0° is:

(A) 0
(B) 1
(C) undefined
(D) −1

Correct Answer: C

Explanation: sin 0° = 0, so the reciprocal blows up, which matches the chapter rule being tested.

96. The product sin 30° · cos 30° · cos 90° · sin 90° equals:

(A) 1
(B) √3/4
(C) 1/2
(D) 0

Correct Answer: D

Explanation: The product sin 30° · cos 30° · cos 90° · sin 90° equals 0.

97. $1 - \cos^2\theta$ equals:

(A) $\sin^2\theta$
(B) $\sec^2\theta$
(C) $\tan^2\theta$
(D) 1

Correct Answer: A

Explanation: Rearrange $\sin^2\theta + \cos^2\theta = 1$, which matches the chapter rule being tested.

98. $\csc^2\theta - 1$ equals:

(A) $\sin^2\theta$
(B) $\cot^2\theta$
(C) $\tan^2\theta$
(D) $\sec^2\theta$

Correct Answer: B

Explanation: Rearrange $1 + \cot^2\theta = \csc^2\theta$, which matches the chapter rule being tested.

99. In a right triangle with opposite 6 and hypotenuse 12 to angle A, sin A equals:

(A) 2
(B) $\sqrt{3}/2$
(C) 1/2
(D) 1

Correct Answer: C

Explanation: 6/12 = 1/2, so A = 30° in the standard.

100. If □C = 90° and □A = 30° then □B equals:

(A) 30°
(B) 90°
(C) 45°
(D) 60°

Correct Answer: D

Explanation: Angles of a triangle sum to 180°, which matches the chapter rule being tested.

101. Due south as a three-figure bearing is:

(A) 180°
(B) 090°
(C) 270°
(D) 360°

Correct Answer: A

Explanation: Halfway around the compass clockwise from north.

102. Due west as a three-figure bearing is:

(A) 090°
(B) 270°
(C) 180°
(D) 045°

Correct Answer: B

Explanation: Three quadrants clockwise from north, which matches the chapter rule being tested.

103. North-west as a three-figure bearing is:

(A) 045°
(B) 135°
(C) 315°
(D) 225°

Correct Answer: C

Explanation: NW is 45° west of north, which is 360° − 45° = 315°.

104. South-east as a three-figure bearing is:

(A) 045°
(B) 225°
(C) 315°
(D) 135°

Correct Answer: D

Explanation: SE is 90° + 45° clockwise from north, which matches the chapter rule being tested.

105. If the bearing of B from A is 070°, the bearing of A from B is:

(A) 250°
(B) 070°
(C) 110°
(D) 290°

Correct Answer: A

Explanation: Add 180°: 070° + 180° = 250°, which matches the chapter rule being tested.

106. Exact north is written as the three-figure bearing:

(A) 360° only
(B) 000°
(C) 090°
(D) 180°

Correct Answer: B

Explanation: The reference direction itself is 000°, which matches the chapter rule being tested.

107. A car travels 13 km on a bearing of 090°. The northward component is:

(A) 13 km
(B) 13/√2 km
(C) 0 km
(D) 13√3 km

Correct Answer: C

Explanation: A car travels 13 km on a bearing of 090°. The northward component is 0 km.

108. Sailors and pilots use three-figure bearings mainly for:

(A) factorizing cubics
(B) solving |x| = 2
(C) finding HCF
(D) navigation

Correct Answer: D

Explanation: A clockwise angle from north locates a course or a target.