MATHEMATICS MCQ BOOKLET

Grade 9 · Chapter 10 · Practical Geometry

FBISE / National Book Foundation Model Textbook companion

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Independent MCQs on triangle constructions (SAS, ASA/AAS, SSA ambiguous case) and concurrency of angle bisectors, altitudes, perpendicular bisectors and medians. 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 SAS construction of a triangle uses two sides and the:

(A) included angle between those two sides
(B) angle opposite the longer side only
(C) exterior angle at a remote vertex
(D) sum of the remote interior angles only

Correct Answer: A

Explanation: SAS means the given angle sits between the two given sides, so the third vertex is uniquely located.

2. To construct ΔABC with AB = 3.4 cm, BC = 4.1 cm and included □B = 70°, the first sensible step is to:

(A) draw AC as the base without using AB
(B) draw AB and then construct 70° at B
(C) guess point C without a compass
(D) draw only the altitude from A

Correct Answer: B

Explanation: Lay down one given side, then copy the included angle at the shared vertex before marking the second side.

3. After drawing AB and constructing ray BX so that □ABX equals the given included angle, the next SAS step is to:

(A) bisect AB first
(B) draw the perpendicular bisector of AB
(C) cut off BC on ray BX with a compass set to the given length
(D) construct 180° at A

Correct Answer: C

Explanation: The compass transfers the second given side onto the ray that already carries the included angle.

4. Two sides and the included angle determine:

(A) no triangle, always
(B) always two non-congruent triangles
(C) a unique square
(D) exactly one triangle (up to congruence)

Correct Answer: D

Explanation: SAS is a uniqueness case: the third vertex is the unique inter.

5. ASA construction uses one side and:

(A) two angles (then the third follows from 180°)
(B) two right angles only
(C) three sides
(D) one exterior angle only

Correct Answer: A

Explanation: Two angles fix the third because the interior angles of a triangle sum to 180°, so the base angles at the given side can both be drawn.

6. If □P = 50° and □Q = 65° in ΔPQR, then □R is:

(A) 115°
(B) 65°
(C) 50°
(D) 180°

Correct Answer: B

Explanation: 50° + 65° = 115°, so □R = 180° − 115° = 65°.

7. Given side QR together with □Q and □P (not at R), a correct construction plan is to:

(A) ignore the angle sum
(B) construct only □P on QR
(C) compute □R = 180° − □P − □Q and construct □Q and □R at the ends of QR
(D) draw three arbitrary arcs

Correct Answer: C

Explanation: The given side needs its two adjacent angles; the missing one is recovered from the 180° sum.

8. Two angles and any side (ASA or AAS) determine:

(A) infinitely many dissimilar triangles
(B) always the ambiguous SSA pair
(C) no triangle if the side is the longest
(D) a unique triangle

Correct Answer: D

Explanation: The shape is fixed by AA similarity of angles, and the given side fixes the scale.

9. If two given angles add to 190°, a triangle:

(A) cannot be constructed because the angle sum would exceed 180°
(B) can still be drawn with a 10° third angle
(C) must be right-angled
(D) must be equilateral

Correct Answer: A

Explanation: Interior angles of a triangle total 180°, so 190° already overshoots and no third positive angle remains.

10. The SSA data set is two sides and:

(A) the included angle
(B) an angle opposite one of those sides
(C) all three angles
(D) a right angle at the unused vertex

Correct Answer: B

Explanation: SSA is not SAS: the given angle is opposite one given side, which is why the number of triangles can vary.

11. SSA is called the ambiguous case because:

(A) a compass cannot draw arcs
(B) angles never sum to 180°
(C) zero, one, or two triangles may result
(D) only squares can be drawn

Correct Answer: C

Explanation: The arc from the far endpoint may miss the given ray, touch it once, or cut it twice.

12. In SSA with acute □A, side a opposite A and side b adjacent, the altitude from the far vertex to side b is:

(A) b + a
(B) a / b
(C) 180° − A
(D) b sin A

Correct Answer: D

Explanation: In the right triangle formed by dropping a perpendicular to the adjacent side, the height is b sin A.

13. If □A = 30°, b = 10 cm and a = 4 cm, then b sin A = 5 cm, so compared with a = 4 cm:

(A) no triangle forms because a is shorter than the altitude
(B) two triangles form
(C) exactly one right triangle forms
(D) infinitely many triangles form

Correct Answer: A

Explanation: When a < b sin A the compass arc never meets the given ray, so construction is impossible.

14. If □A = 30°, b = 10 cm and a = 5 cm, then a equals b sin A, so the construction yields:

(A) two obtuse triangles
(B) exactly one right-angled triangle
(C) no triangle
(D) a unique equilateral triangle

Correct Answer: B

Explanation: The arc is tangent to the ray, giving a right angle at the new vertex.

15. If □A = 30°, b = 10 cm and a = 7 cm, then 5 < 7 < 10, so SSA produces:

(A) no triangle
(B) only a square
(C) two distinct triangles
(D) a unique 30°-60°-90° triangle always

Correct Answer: C

Explanation: When b sin A < a < b the arc cuts the ray twice, which is the classic two-triangle ambiguity.

16. If □A = 30°, b = 10 cm and a = 12 cm, then a > b, so SSA produces:

(A) two triangles
(B) no triangle
(C) a circle only
(D) exactly one triangle

Correct Answer: D

Explanation: When the side opposite the given acute angle is at least as long as the other given side, the arc meets the ray once.

17. If the given SSA angle is obtuse and the opposite side is not longer than the adjacent side, typically:

(A) no triangle can be formed
(B) two acute triangles appear
(C) the figure must be equilateral
(D) three triangles appear

Correct Answer: A

Explanation: If the given SSA angle is obtuse and the opposite side is not longer than the adjacent side, typically no triangle can be formed.

18. SSS construction of ΔABC with three given sides uses compass arcs centred at the ends of the base so that they:

(A) never meet
(B) intersect at the third vertex
(C) meet only at a midpoint of the base
(D) form a square

Correct Answer: B

Explanation: Each arc is the locus of points at a given distance from a base endpoint; their inter.

19. Three given sides determine a unique triangle provided they satisfy:

(A) any three positive lengths
(B) exactly one right angle

(C) the triangle inequality (each pair-sum exceeds the third side)
(D) equal altitudes

Correct Answer: C

Explanation: If one side is as long as or longer than the sum of the other two, the arcs miss and no triangle exists.

20. Sides 3 cm, 4 cm and 8 cm:

(A) form a unique right triangle
(B) form two SSA triangles
(C) form an equilateral triangle
(D) cannot form a triangle because 3 + 4 < 8

Correct Answer: D

Explanation: 3 + 4 = 7, which is less than 8, so the triangle inequality fails.

21. A ray that divides a given angle into two equal angles is an:

(A) angle bisector
(B) altitude of a distant side
(C) right bisector of a segment
(D) median to a non-adjacent side

Correct Answer: A

Explanation: A ray that divides a given angle into two equal angles is an angle bisector.

22. To construct an angle bisector with compass and ruler you first draw an arc centred at the vertex that:

(A) misses both arms
(B) cuts both arms, then equal arcs from those points locate a point on the bisector
(C) must use a protractor only
(D) draws the perpendicular bisector of a side

Correct Answer: B

Explanation: Equal radii from the two arm-points give a point equidistant from the arms, which lies on the bisector.

23. The three angle bisectors of a triangle are:

(A) always parallel
(B) concurrent only in right triangles
(C) concurrent at a single point
(D) collinear

Correct Answer: C

Explanation: They meet at one interior point, which is the in-centre.

24. The in-centre of a triangle is the point where the:

(A) medians meet
(B) altitudes meet
(C) right bisectors of the sides meet
(D) angle bisectors meet

Correct Answer: D

Explanation: In-centre is the concurrency point of the angle bisectors and the centre of the incircle.

25. The in-centre always lies:

(A) inside the triangle
(B) outside every triangle
(C) on a side of every obtuse triangle
(D) at a vertex of every right triangle

Correct Answer: A

Explanation: Each angle bisector stays in the interior, so their common point is interior for every triangle.

26. The in-centre is equidistant from the:

(A) three vertices only

(B) three sides (it is the incentre of the incircle)
(C) midpoints of the sides only
(D) orthocentre only

Correct Answer: B

Explanation: Distance to each side equals the in-radius, which is why the incircle touches all three sides.

27. An altitude of a triangle is the perpendicular segment from a vertex to:

(A) the angle bisector at that vertex
(B) the circumcircle only
(C) the line containing the opposite side
(D) the median of another triangle

Correct Answer: C

Explanation: Altitude means orthogonal drop from a vertex to the opposite side's line (possibly extended).

28. The three altitudes of a triangle are concurrent at the:

(A) centroid
(B) in-centre
(C) midpoint of every median
(D) orthocentre

Correct Answer: D

Explanation: Orthocentre is defined as the meeting point of the altitudes.

29. In an acute-angled triangle the orthocentre lies:

(A) inside the triangle
(B) outside the triangle
(C) always at a vertex
(D) at the midpoint of the longest side

Correct Answer: A

Explanation: All altitudes fall inside an acute triangle, so they meet inside.

30. In a right-angled triangle the orthocentre is at:

(A) the midpoint of the hypotenuse
(B) the vertex of the right angle
(C) a point outside the triangle
(D) the in-centre

Correct Answer: B

Explanation: The two legs are themselves altitudes, so they already meet at the right-angled vertex.

31. In an obtuse-angled triangle the orthocentre lies:

(A) inside the triangle
(B) always at the obtuse vertex
(C) outside the triangle
(D) at the centroid

Correct Answer: C

Explanation: Two altitudes must be drawn to extensions of the sides, and they meet outside.

32. In right ΔABC with right angle at B, sides AB and BC are:

(A) medians to the hypotenuse
(B) right bisectors of AC
(C) angle bisectors of □A and □C
(D) altitudes to each other

Correct Answer: D

Explanation: Each leg is perpendicular to the other, so each is the altitude from B to the other leg's line.

33. A line that passes through the midpoint of a segment and is perpendicular to it is a:

(A) perpendicular bisector (right bisector)

(B) median of an unrelated triangle
(C) angle bisector only
(D) altitude from a remote vertex only

Correct Answer: A

Explanation: Right bisector means both 'through the midpoint' and 'at 90°'.

34. Every point on the perpendicular bisector of a segment is:

(A) closer to one endpoint
(B) equidistant from the two endpoints
(C) on the segment itself
(D) outside every circle

Correct Answer: B

Explanation: That equidistance property is why the circumcentre, lying on all three right bisectors, is the centre of the circumcircle.

35. A line segment has:

(A) exactly one bisector in the plane
(B) no midpoint
(C) infinitely many bisectors, but only one perpendicular bisector
(D) exactly three right bisectors

Correct Answer: C

Explanation: Any line through the midpoint bisects the segment; only one of those lines is perpendicular to it.

36. The three perpendicular bisectors of the sides of a triangle are concurrent at the:

(A) in-centre
(B) centroid
(C) orthocentre
(D) circumcentre

Correct Answer: D

Explanation: Circumcentre is the unique point equidistant from all three vertices.

37. In an acute-angled triangle the circumcentre lies:

(A) inside the triangle
(B) outside the triangle
(C) always at a vertex
(D) at the orthocentre of a different triangle only

Correct Answer: A

Explanation: All three right bisectors meet in the interior when every angle is acute.

38. In a right-angled triangle the circumcentre is:

(A) the in-centre
(B) the midpoint of the hypotenuse
(C) the right-angled vertex
(D) outside on the extension of a leg

Correct Answer: B

Explanation: Thales' theorem: the hypotenuse is a diameter of the circumcircle, so the centre is its midpoint.

39. In an obtuse-angled triangle the circumcentre lies:

(A) inside the triangle
(B) at the obtuse vertex
(C) outside the triangle
(D) at the centroid

Correct Answer: C

Explanation: In an obtuse-angled triangle the circumcentre lies outside the triangle.

40. If O is the circumcentre of right ΔLMN with right angle at M, then O is the midpoint of:

(A) leg LM
(B) leg MN
(C) median from M to LN only if it is also an altitude from L
(D) hypotenuse LN

Correct Answer: D

Explanation: The hypotenuse is the unique longest side and the diameter of the circumcircle.

41. A median of a triangle joins a vertex to the:

(A) midpoint of the opposite side
(B) foot of the perpendicular on the opposite side
(C) in-centre
(D) point that trisects an angle

Correct Answer: A

Explanation: Midpoint, not necessarily the perpendicular foot — that would be an altitude.

42. To locate the midpoint of a side with compass and ruler you construct the:

(A) angle bisector at a remote vertex first
(B) perpendicular bisector of that side (the crossing of equal arcs)
(C) incircle
(D) altitude from another vertex only

Correct Answer: B

Explanation: Equal arcs from the two endpoints intersect on the right bisector, which meets the side at its midpoint.

43. The three medians of a triangle are concurrent at the:

(A) orthocentre
(B) circumcentre
(C) centroid
(D) in-centre

Correct Answer: C

Explanation: Centroid is the concurrency point of the medians.

44. The centroid always lies:

(A) outside an obtuse triangle
(B) on a side of a right triangle
(C) at a vertex of an acute triangle
(D) inside every triangle

Correct Answer: D

Explanation: Each median is an interior segment, so their common point is interior.

45. The centroid divides each median in the ratio (vertex : midpoint):

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

Correct Answer: A

Explanation: The longer part is toward the vertex: the medians trisect one another in the 2 : 1 ratio.

46. If a median is 9 cm long, the centroid is:

(A) 4.5 cm from each end
(B) 6 cm from the vertex and 3 cm from the midpoint
(C) 9 cm from the vertex
(D) 3 cm from the vertex and 6 cm from the midpoint

Correct Answer: B

Explanation: 2 : 1 with total 9 cm splits as 6 cm and 3 cm, longer piece from the vertex.

47. If the centroid is 4 cm from the midpoint of a side, the full median length is:

(A) 4 cm
(B) 6 cm
(C) 12 cm
(D) 8 cm

Correct Answer: C

Explanation: The midpoint-to-centroid piece is one-third of the median, so the median is 3 × 4 = 12 cm.

48. The centre of gravity of a uniform triangular lamina lies at the:

(A) in-centre
(B) circumcentre in every triangle
(C) orthocentre of a right triangle only
(D) centroid (intersection of the medians)

Correct Answer: D

Explanation: Mass balances along medians, so the balance point is the centroid.

49. In an equilateral triangle the in-centre, circumcentre, orthocentre and centroid:

(A) coincide at one point
(B) form a square
(C) are collinear but never coincident
(D) lie on three different Euler lines

Correct Answer: A

Explanation: All those special lines coincide in an equilateral triangle, so the four centres are the same point.

50. In an equilateral triangle a median is also:

(A) never an altitude
(B) an altitude, an angle bisector and a right bisector of the base
(C) only a right bisector of a different side
(D) an exterior-angle bisector

Correct Answer: B

Explanation: Base angles are equal and the apex angle is bisected, and the median meets the base at 90° at its midpoint.

51. In any triangle the circumcentre, orthocentre and centroid are:

(A) never collinear
(B) always the same point
(C) collinear (they lie on the Euler line)
(D) always on the incircle

Correct Answer: C

Explanation: Those three centres lie on one straight line, the Euler line; the in-centre is not on it in general.

52. Concurrent lines are lines that:

(A) are parallel
(B) lie in one line themselves
(C) never meet even if extended
(D) meet at a single common point

Correct Answer: D

Explanation: Concurrency is a point-meeting property of three or more lines.

53. Collinear points are points that:

(A) lie on one straight line
(B) form a right angle
(C) are concurrent
(D) are midpoints of altitudes

Correct Answer: A

Explanation: Do not confuse collinear (points on a line) with concurrent (lines through a point).

54. To construct 60° with compass and ruler a standard method is to:

(A) halve a straight angle without an equilateral
(B) draw an equilateral triangle on the ray
(C) copy a 90° angle twice
(D) use only a protractor as the definition of 60°

Correct Answer: B

Explanation: Each angle of an equilateral triangle is 60°, so the construction copies that angle.

55. A 90° angle can be constructed by drawing a:

(A) median
(B) 30° angle twice without justification
(C) perpendicular to a given ray at a point
(D) circle through three collinear points

Correct Answer: C

Explanation: The perpendicular construction with equal arcs is the compass-and-ruler right angle.

56. A 45° angle is obtained by:

(A) trisecting 180° with two arbitrary rays
(B) adding 30° to 60° without tools
(C) copying 15° three times
(D) bisecting a constructed 90° angle

Correct Answer: D

Explanation: A 45° angle is obtained because bisecting a constructed 90° angle yields 45°.

57. When constructing ΔXYZ with XY given and □X, □Y given, the rays from X and Y:

(A) intersect at Z, the third vertex
(B) stay parallel
(C) meet the midpoint of XY only
(D) form the circumcircle immediately

Correct Answer: A

Explanation: ASA: the two rays from the ends of the given side locate Z as their inter.

58. If only two sides and a non-included acute angle are given, you should expect:

(A) SSS uniqueness always
(B) to check whether the arc meets the ray zero, one or two times
(C) exactly the SAS figure
(D) a unique square

Correct Answer: B

Explanation: That is the SSA checklist before claiming a triangle exists.

59. The included angle in SAS is the angle:

(A) opposite the longest side
(B) exterior to the triangle
(C) formed by the two given sides
(D) at the unused vertex

Correct Answer: C

Explanation: 'Included' means the angle is between those sides.

60. AAS is still a unique-triangle case because:

(A) SSA is unique
(B) three sides are given
(C) the triangle must be right-angled
(D) the third angle is determined, reducing the data to ASA

Correct Answer: D

Explanation: AAS is still a unique-triangle case because the third angle is determined, reducing the data to ASA.

61. In SSA, the side opposite the given angle is the side whose compass arc is drawn from the:

(A) other end of the adjacent side, with radius equal to the opposite side
(B) vertex of the given angle only, with radius equal to the adjacent side
(C) midpoint of the base
(D) orthocentre

Correct Answer: A

Explanation: You swing an arc of length a from the far end of side b so it can cut the ray of □A.

62. If an SSA arc cuts the given ray at C and C′, the two triangles share:

(A) no side
(B) the given side between the angle vertex and the far endpoint, plus the given angle
(C) only the opposite side
(D) the orthocentre

Correct Answer: B

Explanation: They share the adjacent side and the given angle; the opposite side reaches two different points on the ray.

63. Angle bisectors of a triangle can be used to locate the centre of the:

(A) circumcircle
(B) nine-point circle only in Grade 9 constructions
(C) incircle
(D) excircle opposite A only

Correct Answer: C

Explanation: The in-centre is the unique centre of the circle tangent to all three sides.

64. Perpendicular bisectors of the sides can be used to locate the centre of the:

(A) incircle
(B) circle tangent to the sides
(C) nine-point circle as a Grade 9 required construction
(D) circumcircle

Correct Answer: D

Explanation: Equidistance from vertices is the circumcircle property.

65. If you need a point inside a triangle that is equally far from all three sides, construct the:

(A) angle bisectors (in-centre)
(B) medians
(C) right bisectors of the sides
(D) altitudes

Correct Answer: A

Explanation: Equal perpendicular distances to the sides means the in-centre.

66. If you need a point equally far from all three vertices, construct the:

(A) angle bisectors
(B) perpendicular bisectors of the sides (circumcentre)
(C) medians only
(D) altitudes only

Correct Answer: B

Explanation: Equidistance from vertices is the circumcentre.

67. The centroid is the intersection of medians; it is not in general the centre of the:

(A) mass of a uniform triangular sheet
(B) triangle’s interior
(C) incircle or the circumcircle
(D) 2 : 1 division of a median

Correct Answer: C

Explanation: The centroid is the intersection of medians; it is not in general the centre of the incircle or the circumcircle.

68. In an isosceles triangle that is not equilateral, the median to the base is also:

(A) never an altitude
(B) a right bisector of a leg
(C) the Euler line of a different triangle
(D) an altitude and an angle bisector of the vertex angle

Correct Answer: D

Explanation: The apex-to-base median of an isosceles triangle is a line of symmetry.

69. To verify concurrency of altitudes in an obtuse triangle you must:

(A) extend sides as needed so the perpendiculars can meet outside
(B) refuse to draw any altitude
(C) use only medians
(D) place the orthocentre at the centroid

Correct Answer: A

Explanation: To verify concurrency of altitudes in an obtuse triangle you must extend sides as needed so the perpendiculars can meet outside.

70. A practical-geometry construction is done with:

(A) freehand curves only
(B) unmarked ruler (straightedge) and compass, as in the unit's constructions
(C) a protractor as the only allowed tool
(D) a set square as the only allowed tool

Correct Answer: B

Explanation: The unit's triangle constructions are compass-and-straightedge procedures (a protractor may check, but the method is classical).

71. When copying a length with a compass, the radius must stay:

(A) changing while you move
(B) equal to 180°
(C) fixed until the arc is drawn
(D) equal to the included angle

Correct Answer: C

Explanation: A compass is a rigid-radius transfer tool; opening it mid-arc spoils the given length.

72. If ΔABC is constructed with AB = AC and □A = 80°, then □B equals:

(A) 80°
(B) 100°
(C) 40°
(D) 50°

Correct Answer: D

Explanation: Base angles of an isosceles triangle are equal: (180° − 80°)/2 = 50°.

73. Constructing a right isosceles triangle given the hypotenuse uses the fact that the right angle is at:

(A) the other vertex, which lies on the circle with the hypotenuse as diameter
(B) an endpoint of the hypotenuse
(C) the centroid
(D) the in-centre only

Correct Answer: A

Explanation: Any right triangle's hypotenuse is a diameter of its circumcircle, so the right-angled vertex is on that circle; isosceles adds the perpendicular bisector.

74. If two triangles are constructed from the same SSA data, they are:

(A) always congruent

(B) generally not congruent; they share some parts but differ in another angle
(C) always similar with ratio 2 : 1
(D) both right-angled

Correct Answer: B

Explanation: The ambiguous pair typically has one acute and one obtuse angle opposite the given side.

75. The phrase ‘measures of two sides and included angle’ names the:

(A) SSA case
(B) AAA case, which never fixes size
(C) SAS case
(D) HL case for every scalene triangle

Correct Answer: C

Explanation: ‘Included’ means the given angle is the one formed by the two given sides, which is SAS not SSA.

76. AAA data (three angles) determines:

(A) a unique triangle including size
(B) no triangle
(C) exactly the SSA pair
(D) shape but not size, so it is not a unique construction of a specific triangle

Correct Answer: D

Explanation: Similar triangles can be scaled; a construction also needs a side length.

77. The foot of an altitude may lie:

(A) on a side or on a side’s extension, depending on the angles
(B) only at a vertex
(C) only at a midpoint
(D) only outside every acute triangle

Correct Answer: A

Explanation: The foot of an altitude may lie on a side or on a side’s extension, depending on the angles.

78. Medians are concurrent; altitudes are concurrent; right bisectors are concurrent; angle bisectors are concurrent. These four points:

(A) always coincide
(B) coincide in an equilateral triangle but are distinct in a general scalene triangle
(C) never coincide
(D) coincide only in a right scalene triangle

Correct Answer: B

Explanation: Equilateral is the coincidence case; a scalene acute triangle has four distinct centres.

79. A student constructs equal arcs from B and C to find A on SSS. The radii must be:

(A) both equal to BC
(B) both half of BC
(C) BA and CA, the other two given sides
(D) the included angle

Correct Answer: C

Explanation: Arc from B has radius AB; arc from C has radius AC.

80. If the given ASA angles at the base are 90° and 90°, the construction:

(A) gives an equilateral triangle
(B) gives a unique acute triangle
(C) gives two SSA triangles
(D) fails because 90° + 90° already uses the full 180°

Correct Answer: D

Explanation: If the given ASA angles at the base are 90° and 90°, the construction fails because 90° + 90° already uses the full 180°.

B. Less Important / Secondary Topics

81. Egyptian pyramids are mentioned in the unit opener to motivate:

(A) practical geometry in large-scale construction
(B) statistics of lambs
(C) logarithms
(D) coordinate slope only

Correct Answer: A

Explanation: Egyptian pyramids are mentioned in the unit opener to motivate practical geometry in large-scale construction.

82. Practical geometry in this unit is mainly about constructing:

(A) circles of arbitrary radius without triangles
(B) triangles and their special lines (bisectors, altitudes, medians)
(C) bar graphs
(D) histograms with unequal classes

Correct Answer: B

Explanation: The SLOs are triangle constructions plus concurrency of the four classical cevians/bisectors.

83. A protractor can measure an angle; constructing the same angle with compass and ruler is a:

(A) graphing skill from statistics
(B) probability experiment
(C) classical geometric construction
(D) mean calculation

Correct Answer: C

Explanation: A protractor can measure an angle; constructing the same angle with compass and ruler is a classical geometric construction.

84. The word 'ray' in a construction step such as drawing ray BD means:

(A) a finite segment only
(B) a circle
(C) a median
(D) a half-line starting at B and passing through D

Correct Answer: D

Explanation: An angle is drawn as two rays; the third vertex is then marked on a ray.

85. 'Join C to A' at the end of a construction means:

(A) draw segment CA to close the triangle
(B) draw the circumcircle
(C) bisect □C
(D) drop an altitude

Correct Answer: A

Explanation: The last given side is the remaining side of the triangle.

86. If a construction says 'with centre B draw an arc of radius 2.8 cm', the compass point is placed:

(A) at A
(B) at B, with opening 2.8 cm
(C) at the orthocentre
(D) at a random interior point

Correct Answer: B

Explanation: In construction language, the centre is the point where the compass pivot is placed.

87. Concurrency of medians can be checked in an obtuse triangle because medians:

(A) escape outside
(B) become altitudes
(C) still meet inside

(D) become right bisectors

Correct Answer: C

Explanation: Concurrency of medians can be checked in an obtuse triangle because medians still meet inside.

88. Concurrency of angle bisectors can be checked in a right triangle because the in-centre is:

(A) at the right vertex
(B) the midpoint of the hypotenuse
(C) outside
(D) still inside, near the right angle but not at a vertex in general

Correct Answer: D

Explanation: Concurrency of angle bisectors can be checked in a right triangle because the in-centre is still inside, near the right angle but not at a vertex in general.

89. A 'right bisector' in this unit is another name for a:

(A) perpendicular bisector
(B) median that is not perpendicular
(C) angle bisector
(D) altitude that does not bisect the opposite side

Correct Answer: A

Explanation: A 'right bisector' in this unit is another name for a perpendicular bisector.

90. An altitude bisects the opposite side if and only if the triangle is:

(A) obtuse
(B) isosceles with that side as base (including equilateral)
(C) scalene acute
(D) right-scalene with that side a leg

Correct Answer: B

Explanation: Only then is the altitude also a median.

91. The Euler line of a scalene triangle contains the centroid and also the:

(A) in-centre in general
(B) midpoint of every side
(C) orthocentre and circumcentre
(D) in-radius

Correct Answer: C

Explanation: In-centre is off the Euler line except in isosceles special cases.

92. On the Euler line the centroid divides the segment from orthocentre to circumcentre in the ratio:

(A) 1 : 1
(B) 3 : 1 toward the in-centre
(C) 1 : 2 toward a vertex
(D) 2 : 1 (closer to the circumcentre)

Correct Answer: D

Explanation: A standard Euler-line fact: HG = 2 GO if H, G, O are orthocentre, centroid, circumcentre.

93. Drawing three medians is enough to locate the centre of gravity; you do not need:

(A) the incircle construction
(B) any midpoint
(C) the triangle itself
(D) segments from vertices

Correct Answer: A

Explanation: Two medians already determine the centroid; the third is a check.

94. If a student confuses orthocentre with circumcentre in a right triangle, the two points are:

(A) the same
(B) the right vertex versus the midpoint of the hypotenuse

(C) both inside
(D) both the in-centre

Correct Answer: B

Explanation: If a student confuses orthocentre with circumcentre in a right triangle, the two points are the right vertex versus the midpoint of the hypotenuse.

95. In a right triangle the centroid lies:

(A) at the right vertex
(B) outside
(C) inside, two-thirds of the way along the median to the hypotenuse's midpoint (which is also the circumcentre)
(D) at the circumcentre

Correct Answer: C

Explanation: The median to the hypotenuse runs from the right vertex to the circumcentre, and G divides it 2 : 1.

96. Construction arcs left on a finished diagram are:

(A) errors that must be erased for the proof to count
(B) frequency densities
(C) class boundaries
(D) the usual record of compass work in practical geometry

Correct Answer: D

Explanation: Visible arcs show that a compass, not a guess, located the point.

97. 'Verify concurrency' in an exercise means you construct the three lines and:

(A) observe that they pass through one point
(B) compute a mean
(C) prove SSA uniqueness
(D) draw a histogram

Correct Answer: A

Explanation: The unit treats concurrency as a construction check, not a coordinate calculation.

98. A scalene triangle has:

(A) all sides equal
(B) all sides of different lengths, so its four classical centres are generally distinct
(C) two equal sides
(D) a right angle always

Correct Answer: B

Explanation: A scalene triangle has all sides of different lengths, so its four classical centres are generally distinct.

99. To construct an angle bisector you do not need:

(A) a compass
(B) the vertex of the angle
(C) the midpoint of the opposite side first
(D) both arms of the angle

Correct Answer: C

Explanation: To construct an angle bisector you do not need the midpoint of the opposite side first.

100. Dropping a perpendicular from a point to a line with compass uses two equal arcs on the line and then:

(A) the in-centre
(B) a median
(C) SSA ambiguity
(D) equal arcs from those two points whose chord is perpendicular to the line

Correct Answer: D

Explanation: That is the standard perpendicular-from-a-point construction, used for altitudes.

101. If AB = 5 cm, □A = 60°, □B = 60°, the triangle is:

(A) equilateral with all sides 5 cm
(B) right-angled
(C) obtuse
(D) impossible

Correct Answer: A

Explanation: If AB = 5 cm, □A = 60°, □B = 60°, the triangle is equilateral with all sides 5 cm.

102. HL (hypotenuse-leg) uniqueness for a right triangle is a special case of:

(A) AAA
(B) congruence that still yields one triangle, unlike generic SSA
(C) the ambiguous acute SSA pair always doubling
(D) median concurrency

Correct Answer: B

Explanation: HL (hypotenuse-leg) uniqueness for a right triangle is a special case of congruence that still yields one triangle, unlike generic SSA.

103. The in-radius is the perpendicular distance from the in-centre to:

(A) a vertex
(B) the circumcentre
(C) a side
(D) the Euler line

Correct Answer: C

Explanation: The incircle is tangent to the sides.

104. The circumradius of a right triangle with hypotenuse 10 cm is:

(A) 10 cm
(B) 20 cm
(C) 2.5 cm
(D) 5 cm

Correct Answer: D

Explanation: The hypotenuse is the diameter, so R = 5 cm.

105. Three lines that meet pairwise at three different points are:

(A) not concurrent; they form a triangle
(B) concurrent
(C) collinear
(D) medians

Correct Answer: A

Explanation: Concurrency requires a single common point for all three.

106. A median is a segment; an angle bisector drawn in constructions is often drawn as a:

(A) circle
(B) ray or line through the vertex
(C) class mark
(D) frequency polygon

Correct Answer: B

Explanation: A median is a segment; an angle bisector drawn in constructions is often drawn as a ray or line through the vertex.

107. If you only construct two altitudes of an acute triangle, the orthocentre is already their:

(A) midpoint
(B) centroid
(C) intersection; the third altitude is a check
(D) circumcentre

Correct Answer: C

Explanation: Any two altitudes determine H; the third must pass through H.

108. The unit's key distinction between SAS and SSA is whether the given angle is:

(A) acute or obtuse only

(B) constructed with a protractor

(C) equal to 60°

(D) included between the two sides, or opposite one of them

Correct Answer: D

Explanation: Location of the angle relative to the sides is the whole difference between unique and ambiguous.