MIZORAM PUBLIC SERVICE COMMISSION

COMMON COMPETITIVE EXAMINATION FOR GROUP 'B' NON-GAZETTED (TECHNICAL)

SURVEYOR UNDER LAND REVENUE & SETTLEMENT DEPARTMENT, GOVERNMENT OF MIZORAM, NOVEMBER-2024

PAPER-IV (TECHNICAL SUBJECT)

Time Allowed : 2 hours FM : 200

All questions carry equal mark of 2 each.
Attempt all questions.

1. Which of the following triangles have the same side lengths?
   (a) Scalene (b) Isosceles
   (c) Equilateral (d) Right-angled
2. Area of an equilateral triangle with side length a is equal to:
   (a) $(\sqrt{3}/2)\,a$ (b) $(\sqrt{3}/2)\,a^2$
   (c) $(\sqrt{3}/4)\,a^2$ (d) $(\sqrt{3}/4)\,a$
3. D and E are the midpoints of side AB and AC of an equilateral triangle ABC, respectively and BC = 6 cm. If DE || BC, then the length (in cm) of DE is:
   (a) 2.5 (b) 3
   (c) 5 (d) 6
4. Which of the following is not a similarity criterion for two triangles?
   (a) AAA (b) SAS
   (c) SSS (d) ASA
5. In ΔABC, if $AB^2 + BC^2 = AC^2$, then the angle opposite to AC is:
   (a) 30° (b) 45°
   (c) 60° (d) 90°
6. If two triangles are similar, then their corresponding sides are:
   (a) Equal (b) Proportional
   (c) Unequal (d) Parallel
7. If $\Delta PQR \sim \Delta XYZ$ and $\angle P = 50°$, $\angle Q = 60°$, then $\angle Y$ is:
   (a) 50° (b) 60°
   (c) 70° (d) 80°
8. In ΔABC, if BC is the hypotenuse and $AB^2 + AC^2 = BC^2$, then ΔABC is:
   (a) Right-angled (b) Equilateral
   (c) Isosceles (d) Scalene
9. If ΔPQR is an equilateral triangle and PQ = 6 cm, then the area of ΔPQR is:
   (a) 18 cm^2 (b) $9\sqrt{3}$ cm^2
   (c) 36 cm^2 (d) $27\sqrt{3}$ cm^2

10. Corresponding sides of two similar triangles are in the ratio of 2:3. If the area of the small triangle is 48 cm^2, then the area of large triangle is:

(a) 230 cm^2 (b) 106 cm^2

(c) 107 cm^2 (d) 108 cm^2

11. Sides of two similar triangles are in the ratio 4: 9. Areas of these triangles are in the ratio-

(a) 2: 3 (b) 4: 9

(c) 81: 16 (d) 16: 81

12. In triangles ABC and DEF, $\angle B = \angle E$, $\angle F = \angle C$ and AB = 3 DE. Then, the two triangles are-

(a) congruent but not similar (b) similar but not congruent

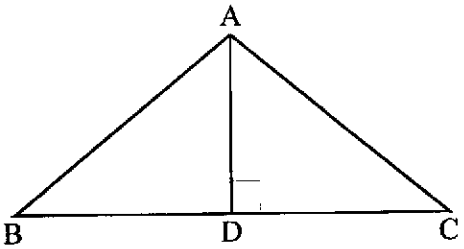
(c) neither congruent nor similar (d) congruent as well as similar

13. In Δ ABC, $AB = 6\sqrt{3}$ cm, AC = 12 cm and BC = 6 cm. The angle B is-

(a) 120° (b) 60°

(c) 90° (d) 45°

14. In triangle ABC, $\angle BAC = 90°$ and $AD \perp BC$. Then -



(a) $BD \cdot CD = BC^2$ (b) $AB \cdot AC = BC^2$

(c) $BD \cdot CD = AD^2$ (d) $AB \cdot AC = AD^2$

15. If ABC is an equilateral triangle, then each angle equals to:

(a) 90° (b) 180°

(c) 120° (d) 60°

16. In a right triangle, the longest side is:

(a) Perpendicular (b) Hypotenuse

(c) Base (d) None of these

17. Height and base of a right angled triangle are 24 cm and 18 cm find the length of its hypotenuse.

(a) 24 cm (b) 30 cm

(c) 15 cm (d) 18 cm

18. Out of the following, which is the Pythagorean triplet?

(a) (1, 5, 10) (b) (3, 4, 5)

(c) (2, 2, 2) (d) (5, 5, 2)

19. A circle has a number of tangents equal to -

(a) 0 (b) 1

(c) 2 (d) Infinite

20. If the area of a circle is 154 cm^2, then its perimeter is -

(a) 11 cm (b) 22 cm

(c) 44 cm (d) 55 cm

21. The area of the square that can be inscribed in a circle of radius 8 cm is -

(a) 256 cm^2 (b) 128 cm^2

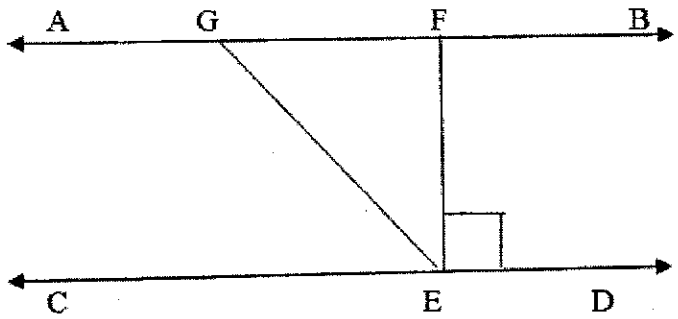
(c) 642 cm^2 (d) 64 cm^2

22. If two lines intersect each other, then the vertically opposite angles are:

(a) equal (b) unequal

(c) cannot be determined (d) none of these

23. If AB || CD, EF ⊥ CD and ∠GED = 135° as per the figure given below.



The value of ∠AGE is:

(a) 120° (b) 140°

(c) 90° (d) 135°

24. A line joining two endpoints is called:

(a) Line segment (b) A ray

(c) Parallel lines (d) Intersecting lines

25. A straight angle is equal to:

(a) 0° (b) 90°

(c) 180° (d) 360°

26. Which of the following is a coordinate point on the y-axis?

(a) (0, 1) (b) (1, 0)

(c) (1, 1) (d) (0, 0)

27. Which of the following is the midpoint of the line segment joining (1, 3) and (5, 9)?

(a) (6, 12) (b) (2, 6)

(c) (3, 6) (d) (3, 4)

28. If the coordinates of a point are (4, 7), then what is the distance between the point and the x-axis?

(a) 4 (b) 7

(c) 11 (d) None of these

29. The equation of x-axis is:

(a) y = 0 (b) x = 0

(c) y = x (d) x = y

30. The slope of a line passing through the points (5, 7) and (-3, -1) is:

(a) 2 (b) 1

(c) -2 (d) -12-12

31. The distance of the point (9, -12) from origin will be -

(a) 13 (b) 15

(c) 14 (d) 17

32. What are the coordinates of the point which divides the line segment joining (3, -2) and (-1, 4) in the ratio 2:3?

(a) (1, 0) (b) (2, 0)

(c) (-2, 3) (d) (0, 2)

33. The equation of the line passing through the points (-4, -1) and (-2, -5) is:

(a) $y = 2x + 7$ (b) $y = -2x - 7$

(c) $y = -2x - 3$ (d) $y = 2x - 7$

34. If the point (2, 5) lies on the line $3x - y = k$, then what is the value of k?

(a) -1 (b) 1

(c) 7 (d) -7

35. The line $y = 2x - 1$ intersects the y-axis at the point:

(a) (0, -1) (b) (1, 0)

(c) (0, 1) (d) (-1, 0)

36. Which of the following is a coordinate point on the x-axis?

(a) (-2, 0) (b) (0, 2)

(c) (3, 3) (d) (0, -5)

37. The area of a rhombus whose vertices are (3, 0), (4, 5), (-1, 4) and (-2,-1) taken in order, is:

(a) 12 sq.units (b) 24 sq.units

(c) 30 sq.units (d) 32 sq.units

38. The area of the triangle formed by the points A(-1.5, 3), B(6, -2) and C(-3, 4) is

(a) 0 (b) 1

(c) 2 (d) 3/2

39. Which of the following is the equation of the line passing through the point (2, 3) and parallel to the x-axis?

(a) $y = 2$ (b) $y = 3$

(c) $x = 2$ (d) $x = 3$

40. The area of a triangle with vertices (-3,0), (3,0) and (0,k) is 9 Sq Units:

(a) 9 (b) 3

(c) - 9 (d) - 3

41. The area of a triangle (in unit^2) whose vertices are A(4,8), B(- 6, 2) and C(5,4) is-

(a) 46 (b) 48

(c) 21 (d) 23

42. Find the area of a triangle with vertices at points A(1,1), B(6,0) and C(3,2)

(a) $\frac{7}{2}$ (b) 7

(c) $\frac{11}{2}$ (d) $\frac{13}{2}$

43. The equation of the line passing through the points (2, -3) and (4, 1) is:

(a) $y = 2x - 7$ (b) $y = -2x + 1$

(c) $y = 1/2x - 2$ (d) $y = -1/2x - 2$

44. The equation of the line passing through the points (-4, -1) and (-2, -5) is:

(a) $y = 2x + 7$ (b) $y = -2x - 7$

(c) $y = -2x - 3$ (d) $y = 2x - 7$

45. Which of the following is the midpoint of the line segment joining (1, 3) and (5, 9)?

(a) (6, 12) (b) (2, 6)

(c) (3, 6) (d) (3, 4)

46. What is the value of cos90°?

(a) 1 (b) 0

(c) -1 (d) Undefined

47. The value of sinè when $\theta = 30°$ is:

(a) 1/2 (b) 1

(c) $\sqrt{3}/2$ (d) $\sqrt{2}/2$

48. In a right-angled triangle, the side opposite to the right angle is called:

(a) Base (b) Hypotenuse

(c) Adjacent (d) Perpendicular

49. If $\sin\theta = 1/2$ and $\cos\theta = \sqrt{3}/2$, then what is the value of $\tan\theta$?

(a) $1/\sqrt{3}$ (b) $\sqrt{3}/3$

(c) $\sqrt{3}$ (d) $1/\sqrt{2}$

50. If $\sin\theta = \sqrt{3}/2$, then what is the value of $\text{cosec}\,\theta$?

(a) $2/\sqrt{3}$ (b) $\sqrt{3}/2$

(c) 2/3 (d) $2/\sqrt{2}$

51. The ratio of the perpendicular and base of a right-angled triangle is called:

(a) Cosine (b) Sine

(c) Tangent (d) Cosecant

52. In a right-angled triangle ABC, if angle B=90° and AB = 6 cm, BC = 8 cm, then what is the value of sin C?

(a) 3/5 (b) 4/5

(c) 5/8 (d) 8/5

53. If $\sin\theta = \cos\theta$, then what is the value of $\tan\theta$?

(a) 1 (b) $\sqrt{2}$

(c) 0 (d) Undefined

54. What is the value of $\sin 0° + \cos 0°$?

(a) 0 (b) 2

(c) 1 (d) ∞

55. Evaluate $\cos 30° \sin 60° + \cos 60° \sin 30°$.

(a) 2 (b) 0

(c) 1 (d) ∞

56. What is the value of $\cos(30° + 60°)$?

(a) 1 (b) 14

(c) 34 (d) 0

57. Cosec 0° is _____

(a) ∞ (b) 1

(c) 0 (d) 2

58. Which among these are complementary angles?

(a) $\angle A + \angle B = 90°$ (b) $\angle A + \angle B = 180°$

(c) $\angle A + \angle B = 60°$ (d) $\angle A + \angle B = 45°$

59. Which trigonometric ratios are positive in the second quadrant?

(a) Cosec, Sin (b) Sec, Tan

(c) Sin, Cot (d) Tan, Cot

60. Sin (90° – x) equals to _____

(a) cos x (b) cot x

(c) cosec x (d) sec x

61. What is the value of tan 48°?

(a) Cot 42° (b) Tan 42°

(c) Tan 16° (d) Cot 16°

62. Find the value of cos 135°.

(a) $1/\sqrt{2}$ (b) $\sqrt{2}$

(c) $-\sqrt{2}$ (d) $-1/\sqrt{2}$

63. Cot(180° – a) is _____

(a) sine of angle A (b) -cosec of angle A

(c) tan of angle A (d) -cot of angle A

64. Find the correct trigonometric identity.

(a) $\tan^2\theta = \sec^2\theta - 1$ (b) $\tan^2\theta + \sec^2\theta = 1$

(c) $\tan^2\theta - \sec^2\theta = 1$ (d) $\tan^2\theta = \sec^2\theta + 1$

65. Evaluate $(\text{cosec}\,\theta + \cot\theta)(\text{cosec}\,\theta - \cot\theta)$.

(a) 0 (b) 1

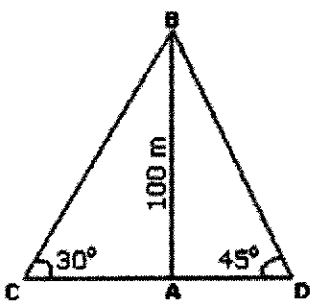
(c) 2 (d) 3

66. $(\sin A - \cos A)^2$ is equal to _____

(a) $1 + 2\sin A \cos A$ (b) $1 - 2\sin A \cos A$

(c) $2\sin A \cos A - 1$ (d) $2\sin A \cos A + 1$

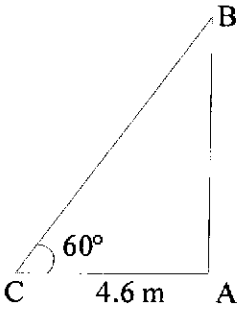
67. Two ships are sailing in the sea on the two sides of a lighthouse. The angle of elevation of the top of the lighthouse is observed from the ships are 30° and 45° respectively. If the lighthouse is 100 m high, the distance between the two ships is:



(a) 173 m (b) 200 m

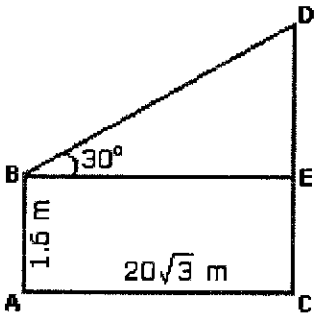
(c) 273 m (d) 300 m

68. The angle of elevation of a ladder leaning against a wall is 60° and the foot of the ladder is 4.6 m away from the wall. The length of the ladder is:



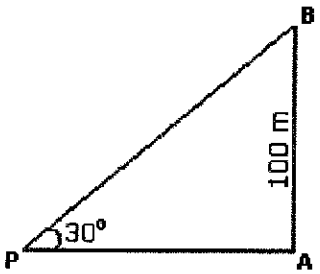
(a) 2.3 m
(b) 4.6 m
(c) 7.8 m
(d) 9.2 m

69. An observer 1.6 m tall is $20\sqrt{3}$ away from a tower. The angle of elevation from his eye to the top of the tower is 30°. The height of the tower is:



(a) 21.6 m
(b) 23.2 m
(c) 24.72 m
(d) 25.75m^2

70. From a point P on a level ground, the angle of elevation of the top tower is 30°. If the tower is 100 m high, find the distance of point P from the foot of the tower is:



(a) 149 m
(b) 156 m
(c) 173 m
(d) 200 m

71. The area of a circle with radius 7 cm is:

(a) 49π cm^2
(b) 98π cm^2
(c) 147π cm^2
(d) 196π cm^2

72. The circumference of a circle with diameter 10 cm is:

(a) 5π cm
(b) 10π cm
(c) 20π cm
(d) 40π cm

73. The area of a circle whose circumference is 44 cm is:

(a) 170 cm^2
(b) 110 cm^2
(c) 144 cm^2
(d) 154 cm^2

74. The area of the square whose perimeter is 45.2 cm:

(a) 250.43 cm^2 (b) 127.69 cm^2

(c) 142 cm^2 (d) 64.8 cm^2

75. If the perimeter of the circle and square are equal, say 220 cm. What is the difference between the areas of these?

(a) 825 cm^2 (b) 900 cm^2

(c) 850 cm^2 (d) 625 cm^2

75. What is the name of the sector with a larger area?

(a) Large (b) Major

(c) Big (d) Wide

77. What is the formula to calculate the area of a sector?

(a) $\pi r^2 \times \frac{\theta}{360°}$ (b) $\pi r^2 + \frac{\theta}{360°}$

(c) $\pi r^2 - \frac{\theta}{360°}$ (d) $\pi r^3 \times \frac{\theta}{360°}$

78. The length of a tangent to a circle of radius 6 cm from a point 10 cm from the centre is:

(a) 6 cm (b) 8 cm

(c) 10 cm (d) 12 cm

79. The length of a chord of a circle of radius 13 cm, which is at a distance of 5 cm from the center is:

(a) 8 cm (b) 10 cm

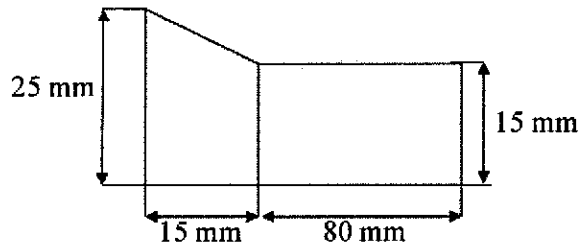
(c) 12 cm (d) 24 cm

80. Find the perimeter of a sector of angle of 60° a circle of radius 21 cm:

(a) 22 cm (b) 11 cm

(c) 64 cm (d) 43 cm

81. What is the area of the irregular surface?



(a) 1400 mm^2 (b) 1450 mm^2

(c) 1500 mm^2 (d) 1200 mm

82. What is the total surface area of conical object where r = 30mm, l= 45mm?

(a) 5100 mm (b) 6120.67 mm^2

(c) 5125mm^2 (d) 7071.42 mm^2

83. The difference between the length and breadth of a rectangle is 23 m. If its perimeter is 206 m. Then its area is:

(a) 1520 m^2 (b) 2420 m^2

(c) 2480 m^2 (d) 2520 m^2

84. What is the area of a right triangle with base 8m and height 16m?

(a) $15\ m^2$ (b) $64\ m^2$

(c) $32\ m^2$ (d) $128\ m^2$

85. There is a rectangular garden of 220m x 70m. A path of width 4m is build around the garden. What is the area of the path?

(a) $2472\ m^2$ (b) $2162\ m^2$

(c) $1836\ m^2$ (d) $2384\ m^2$

86. If r is the radius of the sphere, then the surface area of the sphere is given by;

(a) $4\pi r^2$ (b) $2\pi r^2$

(c) πr^2 (d) $4/3\,\pi r^2$

87. The radius of the top and bottom of a bucket of slant height 35 cm are 25 cm and 8 cm. The curved surface of the bucket is:

(a) 4000 sq.cm (b) 3500 sq.cm

(c) 3630 sq.cm (d) 3750 sq.cm

88. What is the total surface area of a cylinder with a radius of 7 m and a height of 8 m?

(a) $609.73\ m^2$ (b) $659.73\ m^2$

(c) $650.73\ m^2$ (d) $689.73\ m^2$

89. Find the volume of the right prism with an area of base $121\ m^2$ and a height of 23 m.

(a) $4793\ m^3$ (b) $2763\ m^3$

(c) $2783\ m^3$ (d) $4783\ m^3$

90. A 20 m deep well of diameter 7 m is dug, and the earth taken out is evenly spread out to form a platform of 22 m by 14 m. Find the height of the platform (in m).

(a) 7.5 m (b) 2.5 m

(c) 10 m (d) 5 m

91. If the mean of observation x, x+3, x+5, x+7 and x+10 is 11, then the mean of last three observers is:

(a) $12\frac{2}{3}$ (b) $12\frac{1}{3}$

(c) $14\frac{2}{3}$ (d) $13\frac{1}{3}$

92. Find the mean of given data

Class interval	10 -20	20 -30	30 - 40	40 - 50	50 - 60	60 – 70	70 - 80
Frequency	9	13	6	4	6	2	3

(a) 39.95 (b) 35.70

(c) 43.95 (d) 23.95

93. What is the mean of first 99 natural numbers?

(a) 100 (b) 50.5

(c) 50 (d) 99

94. If the mean and the mode are given as 35 and 30. Find the Median.

(a) 75 (b) 33.33

(c) 19 (d) 32

95. If the Mean and Mode are 25, then find the Median.

(a) 13 (b) 9

(c) 25 (d) 0

96. What is the mode in a data set?

(a) The lowest number in a data set (b) The number that occurs less frequently

(c) The number that occurs most frequently (d) The highest number in a data set

97. Below are the results of the students in an exam. Find the mode of given results.

90, 80, 77, 86, 90, 91, 77, 25, 45, 35, 66, 69, 65, 43, 65, 75, 43, 90, 89.

(a) 43 (b) 77

(c) 65 (d) 90

98. What is the mode of 20, 15, 13, 12, 9, 17, 13, 1, 9?

(a) 13 (b) 9

(c) Both 13 and 9 (d) No mode

99. If the frequency of 2nd and 5th observations are the same, then (x-y) will be:

Class	10-20	20-30	30-40	40-50	50-60	60-70
Cumulative Frequency	10	x	24	27	y	38

(a) 6 (b) -17

(c) -10 (d) 9

100. Cumulative frequency distribution for a graph is called:

(a) Ogive (b) Frequency polygon

(c) Pie diagram (d) Frequency curve

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