MIZORAM PUBLIC SERVICE COMMISSION

COMPETITIVE EXAMINATIONS FOR RECRUITMENT TO THE POST OF SURVEYOR-I UNDER LAND REVENUE & SETTLEMENT DEPARTMENT, GOVERNMENT OF MIZORAM, JUNE -2019

TECHNICAL PAPER - II

Time Allowed : 2 hours Full Marks : 150

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

1. The point of intersection of the altitude of a triangle is called its :
(a) Incentre (b) Excentre
(c) Orthocentre (d) Centroid

2. Two right angled triangles are congruent if :
i) The hypotenuse of one triangle is equal to the hypotenuse of the other
ii) A side for one triangle is equal to the corresponding side of the other
iii) Sides of the triangle are equal
iv) An angle of the triangles are equal
Of these statements, the correct ones are combination of :
(a) i & ii (b) ii & iii
(c) i & iii (d) iv only

3. In $\Delta ABC, AD \perp BC$, then :
(a) $AB^2 - BD^2 = AC^2 - CD^2$ (b) $AB^2 + BD^2 = AC^2 - CD^2$
(c) $AB^2 - BD^2 = AC^2 + CD^2$ (d) $AB^2 - AC^2 = BD^2 + CD^2$

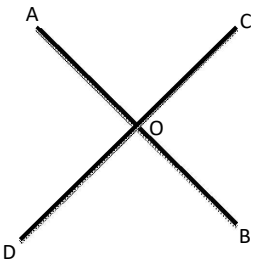
4. If in two triangles, their corresponding angles are equal, then the two triangles are :
(a) Equilateral triangles (b) Equiangular triangles
(c) Isosceles angular triangle (d) Right angled triangle

5. DABC is a right angled at B. BD is perpendicular upon AC. If AD=a, CD=b, then AB^2=?
(a) (a+b)b (b) $(a^2 + b)$
(c) $(a + b^2)$ (d) a(a+b)

5. A man goes 150m due east and then 200m due north. How far is he from the starting point?
(a) 170m (b) 200m
(c) 250m (d) 155m

7. Consider the following statements :
i) Every equilateral triangle is necessarily an isosceles triangle
ii) Every right-angled triangle is necessarily an isosceles triangle
iii) A triangle in which one of the median is perpendicular to the sides it meets, is necessarily an isosceles triangle
Then, the correct statements are :
(a) i & ii (b) ii & iii
(c) i & iii (d) i, ii & iii

8. AB and CD bisect each other at O. If AD = 6cm, then BC is :



(a) 5.9cm (b) 4.8cm
(c) 6cm (d) 7cm

9. The longest chord of a circle is a_____of the circle :

(a) Perimeter (b) Diameter
(c) Radius (d) Segment

10. An arc is a_____when its ends are the ends of a diameter :

(a) Sphere (b) Segment
(c) Semi-circle (d) Chord

11. The angle in a semi circle is a :

(a) Right angle (b) Acute angle
(c) Straight angle (d) Obtuse angle

12. There is/are _____tangent(s) at a point on a circle.

(a) One (b) Two
(c) Three (d) None of these

13. Segment of a circle is the region between an arc and_____of the circle.

(a) Diametre (b) Perimetre
(c) Radius (d) Chord

14. A line which intersects a circle in two distinct points is called a_____of the circle.

(a) Secant (b) Cosecant
(c) Tangent (d) Cotangent

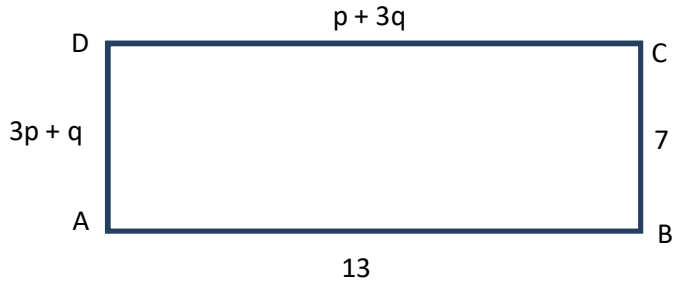
15. The most common tool used for construction in geometry is :

(a) Compass (b) Protactor
(c) Pen (d) None of these

16. Consider the following statements and choose the correct option:
Statement I : Two triangles are similar if their corresponding angles are equal.
Statement II :Two triangles are similar if their corresponding sides are in the same ratio.

(a) Only I (b) Only II
(c) Both I & II (d) None of these

17. Find the value of p and q in the given figure, if ABCD is a rectangle :



(a) 1,4 (b) 4,1
(c) 2,2 (d) 3,3

18. The most used theorem for finding the length of the side of a right angled triangle is :
(a) Bernouli's theorem (b) Pythagoras theorem
(c) Euler's formula (d) All of the above

19. A triangle in which all the three sides have different length is called :
(a) Equilateral (b) Isosceles
(c) Right angled triangle (d) Scalene triangle

20. P is the point (4,-2). Q is the point (-3,-5). What is the length of PQ?
(a) 45 (b) 60
(c) $\sqrt{58}$ (d) $\sqrt{50}$

21. Find the coordinate of the point on x-axis which is equidistant from (2,-5)and (-2,9)
(a) (-7,0) (b) (2,5)
(c) (3,0) (d) (4,-3)

22. The distance between two points A(x_1,y_1) and B (x_2,y_2) is given by the formula :
(a) $AB = \sqrt{(x_2 - x_1)} + \sqrt{(y_2 - y_1)}$ (b) $AB = \sqrt{(x_2 - x_1)^2} + \sqrt{(y_2 - y_1)^2}$
(c) $AB = \sqrt{(x_2 - x_1)^2} - \sqrt{(y_2 - y_1)^2}$ (d) $AB = \sqrt{(x_2 - x_1)^3} - \sqrt{(y_2 - y_1)^2}$

23. The distance of the point P(x,y) from the origin O(0,0) is given by
(a) $\sqrt{y^2 - x^2}$ (b) $\sqrt{y - x}$
(c) $\sqrt{x^2 + y^2}$ (d) $\sqrt{x - y}$

24. If the distance between the points $(4,p)$ and (1,0) is 5. Then the value of p is :
(a) 3 (b) -4
(c) 4 (d) ±4

25. The coordinates of a point in the third quadrant are in the form :
(a) +,+ (b) +,−
(c) −,− (d) −,+

26. The distance of a point from the x-axis is called its :
(a) Origin (b) Abscissa
(c) Ordinate (d) None of these

27. The distance of a point from the *y*-axis is called its :

(a) Origin (b) None of these

(c) Ordinate (d) Abscissa

28. The midpoint P of the join of the points A(x_1, y_1) and B(x_2,y_2) is :

(a) $\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$ (b) $\left(\frac{x_1-x_2}{2}, \frac{y_1-y_2}{2}\right)$

(c) $\left(\frac{x_1-x_2}{4}, \frac{y_1+y_2}{4}\right)$ (d) $\left(\frac{x_1+x_2}{3}, \frac{y_1-y_2}{3}\right)$

29. The abscissa and ordinate of a point together are called :

(a) Quadrant (b) Coordinates

(c) Origin (d) None of these

30. The co-ordinates of the centroid of a triangle whose vertices are $P(x_1,y_1)$, $Q(x_2,y_2)$ and $R(x_3,y_3)$ are

(a) $\frac{x_1-x_2+x_3}{3}, \frac{y_1-y_2+y_3}{3}$ (b) $\frac{x_1+x_2+x_3}{3}, \frac{y_1+y_2+y_3}{3}$

(c) $\frac{x_1+x_2-x_3}{3}, \frac{y_1+y_2-y_3}{3}$ (d) $\frac{x_1+x_2+x_3}{2}, \frac{y_1+y_2+y_3}{2}$

31. The lines $y = 5x - 3$ and $y = 2x + 9$ intersect at P. What are the coordinates of P?

(a) (2,7) (b) (2,13)

(c) (4,17) (d) (5,3)

32. Find the distance of the point (–6, 8) from the origin.

(a) 8 (b) 11

(c) 9 (d) 10

33. Find the value of p for which the points (–5, 1), (1, p) and (4, –2) are collinear.

(a) –3 (b) –2

(c) 0 (d) –1

34. *Section formula* in coordinates geometry is :

(a) $\left(\frac{m_1x_2+m_2x_1}{m_1+m_2}, \frac{m_1y_2+m_2y_1}{m_1+m_2}\right)$ (b) $\left(\frac{m_1x_2-m_2x_1}{m_1+m_2}, \frac{m_1y_2-m_2y_1}{m_1+m_2}\right)$

(c) $\left(\frac{m_1x_2+m_2x_1}{m_1-m_2}, \frac{m_1y_2+m_2y_1}{m_1-m_2}\right)$ (d) None of these

35. In DABC right angled at B, AB = 24 cm, BC = 7 m. Determine *Sin*A :

(a) $\frac{3}{25}$ (b) $\frac{6}{25}$

(c) $\frac{7}{25}$ (d) $\frac{5}{30}$

36. $\sin\theta = ?$

(a) $\frac{Hypotenuse}{Perpendicular}$ (b) $\frac{Perpendicular}{Base}$

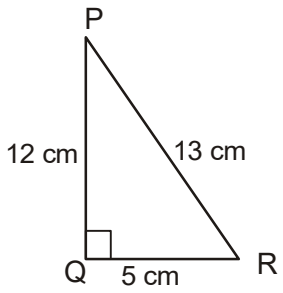
(c) $\frac{Perpendicular}{Hypotenuse}$ (d) $\frac{Hypotenuse}{Base}$

37. $Tan\theta = ?$

(a) $\frac{\sec\theta}{\cot\theta}$ (b) $\frac{\sin\theta}{\cos\theta}$

(c) $\frac{\sin\theta}{\cot\theta}$ (d) $\frac{\sec\theta}{\cos\theta}$

38. From the following figure, find *tan P* :



(a) $\frac{25}{12}$ (b) $\frac{7}{12}$

(c) $\frac{4}{5}$ (d) $\frac{25}{12}$

39. $Sin^2\theta + Cos^2\theta = ?$

(a) 2 (b) 3

(c) 1 (d) 4

40. $1 + \tan^2\theta = ?$

(a) $cot^2\theta$ (b) $Sec^2\theta$

(c) $Cos^2\theta$ (d) $Cosec^2\theta$

41. Sin $(90° - \theta)$ = ?

(a) $\cos\theta$ (b) $\cot\theta$

(c) $\text{cosec}\,\theta$ (d) $\tan\theta$

42. Find the value of $\frac{Cos\,30° + Sin\,60°}{1 + Cos\,60° + Sin\,30°}$

(a) 5 (b) 2.5

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

43. Evaluate the following : $\sin^2 25° + \sin^2 65° + \sqrt{3}(\tan 5° \tan 15° \tan 30° \tan 75° \tan 85°)$

(a) 1 (b) 2

(c) 3 (d) 5

44. Find the value of $\text{cosec}^2 30° - \sin^2 45° - \sec^2 60°$

(a) 4 (b) -3

(c) 6 (d) -2

45. A pole 6cm high casts a shadow of 2Ö3 m long on the ground, then find the sun's elevation?

(a) 30° (b) 60°

(c) 90° (d) 45°

46. An observer 1.5m tall is 20.5 metres away from a tower 22m high. Determine the angle of elevation of the top of the tower from the eye of the observer.

(a) 0° (b) 30°

(c) 45° (d) 60°

47. A ladder 15m long just reaches the top of vertical wall. If the ladder makes an angle with the wall, find the height of the wall :

(a) 7.5m (b) 12m

(c) 5.6m (d) 2.5m

48. From a point 20m away from the foot of a tower, the angle of elevation of top of the tower is 30°,find the height of the tower :

(a) 35m (b) $12\sqrt{3}m$

(c) $\frac{20}{\sqrt{3}}m$ (d) $\frac{\sqrt{3}}{12}m$

49. The angle of depression of the top and bottom of a tower as seen from the top of a 100m high cliff are 30° and 60° respectively. Find the height of the tower.

(a) 60m (b) 55.67m

(c) 67.45m (d) 66.67m

50. A wheel has diameter 84 cm. The number of complete revolution it will take to cover 792 m is.

(a) 100 (b) 150

(c) 200 (d) 300

51. If the perimeter of a circle is equal to that of square, then the ratio of their areas is

(a) 22:7 (b) 14:11

(c) 7:22 (d) 11:14

52. The formula for finding the area of a semi-circle is :

(a) πr^2 (b) $\frac{1}{2}\pi r^2$

(c) $2\pi r$ (d) $2\pi rh$

53. The perimeter of a circle is given by :

(a) πr^2 (b) $\pi^2 r$

(c) $2\pi r$ (d) None of these

54. The circumference and area of a circle of diameter 28cm is :

(a) 67cm, 676cm^2 (b) 88cm, 616 cm^2

(c) 45cm, 225cm^2 (d) 57cm, 215cm^2

55. The curved surface area of right circular cylinder is :

(a) $2\pi r(h+r)$ (b) $2\pi r$

(c) $2\pi r^2 h$ (d) $2\pi rh$

56. The volume of sphere can be measured by using :

(a) $\frac{4}{3}\pi r^3$ (b) $\frac{3}{4}\pi r^3$

(c) $\frac{4}{3}\pi r^2$ (d) $\frac{2}{3}\pi r^2$

57. The slant height of a right circular cone *'l'* can be found by :

(a) $\sqrt{q^2-h^2}$ (b) $\sqrt{r^2+h^2}$

(c) $\sqrt{r^2-p^2}$ (d) $\sqrt{q^2+h^2}$

58. The slant height of a frustum of a cone is 4cm and the perimeter of its circular ends are 18cm and 6cm. Find the curved surface area of the frustum. Use $\pi = \frac{22}{7}$

(a) 65 cm^2 (b) 52 cm^2

(c) 36 cm^2 (d) 48 cm^2

59. A plumbline is a combination of which geometric shapes?

(a) A cylinder with sphere (b) A cone with hemisphere

(c) A circle with cone (d) A cone with sphere

60. A toy is in the form of a cone mounted on a hemisphere of common base radius of 7cm. The total height of the toy is 31cm. Find the total surface area of the toy.

(a) 465 (b) 912

(c) 769 (d) 858

61. The lengths of the diagonals of a rhombus are 16cm and 12cm.Then, find the length of the side of the rhombus :

(a) 16cm (b) 20cm

(c) 12cm (d) 10cm

62. The formula for finding the area of a triangle is :

(a) $l \times b \times h$ (b) $4a^2$

(c) $\frac{1}{2} \times b \times h$ (d) $2(l+b+h)$

63. The side of a square whose diagonal is 16cm is :

(a) $16\sqrt{5}\,cm$ (b) $8\sqrt{2}cm$

(c) $5cm$ (d) $7.5cm$

64. Length of an altitude of an equilateral triangle whose side is *2a* is :

(a) 3 (b) 3a

(c) $3\sqrt{a}$ (d) $\sqrt{3}a$

65. In an isosceles triangle ABC, AB=AC=25cm and BC =14cm. The altitude from A on BC is:

(a) 24cm (b) 22cm

(c) 27cm (d) 25.5cm

Directions (Questions 66 & 67) : What number comes next in the series?

66. 5, 9, 17, ... , 65, 129

(a) 23 (b) 29

(c) 33 (d) 49

67. 36 : ....?..... : : 64 : 512

(a) 125 (b) 216

(c) 135 (d) 120

Directions (Questions 68 & 70) : Read the following passage carefully and choose the best answer to each of the questions out of the four alternatives*:*

Life skills include psychosocial competencies and interpersonal skills that help people make informed decisions, solve problems, think critically and creatively, communicate effectively, build healthy relationships, empathize with others, and cope with managing their lives in a healthy and productive manner. Essentially, there are two kinds of skills - those related to thinking termed as *"thinking skills"*; and skills related to dealing with others termed as *"social skills"*. While thinking skills relate to reflection at a personal level, social skills include interpersonal skills and do not necessarily depend on logical thinking. It is the combination of these two types of skills that are needed for achieving assertive behaviour and negotiating effectively. "*Emotional"* can be perceived as a skill not only in making rational decisions but also in being able to make others agree to one's point of view. To do that, coming to terms first with oneself is important. Thus, self management is an important skill including managing/coping with feelings, emotions, stress and resisting peer and family pressure. Young people as advocates need both thinking and social skills for consensus building and advocacy on issues of concern.

68. Which of the following has the same meaning as "advocacy"?

(a) justice (b) support

(c) lawful (d) fairness

69. What is needed for achieving assertive behaviour?

(a) thinking and social skills (b) thinking creatively and critically

(c) empathy (d) self management

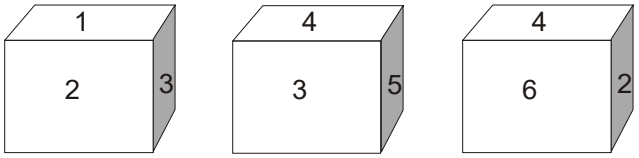
70. What is the antonym of "consensus" as used in this passage?

(a) harmony (b) compromise

(c) disagreement (d) accord

Directions (Questions 71 & 72) :In the following questions, choose the correct answer from the four choices given below:

71. Point out which number will be on the opposite face to the number 3.



(a) 1 (b) 4
(c) 6 (d) 5

72. A large cube painted white on all six faces, is cut into 27 smaller identical cubes. How many of the smaller cubes have at least one face painted white?

(a) 20 (b) 23
(c) 24 (d) 26

Directions (Questions 73 & 75) :In the following questions, choose the correct answer from the four options given below:

73.

OOOOOOO ##	### OOOOO	OOOOO ####	##### OOOO	OOO ######

OO #######	###### OO	OOO #######	######## OO
(a)	(b)	(c)	(d)

74.

A	a A	a A	a a A	aa A

a A	aa A	aa aa A	aa a A
(a)	(b)	(c)	(d)

75.

PQ RS	RS PQ	SP QR	QR SP	RS PQ

SP QR	PQ SR	PQ RS	SP QR
(a)	(b)	(c)	(d)

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