Akenten Appiah-Menka University of Skills Training and Entrepreneurial Development

Institute for Teacher Professional Development and Lifelong Learning

End of Second Semester Examinations - October, 2024

College:	
Course Code:	**ECM 122**
Course Title:	**LEARNING, TEACHING AND APPLYING GEOMETRY AND HANDLING DATA**

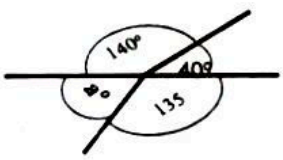
SECTION A (25 MARKS)

For questions 1 – 25, choose the most appropriate answer from the options lettered A, B, C, and D provided.

1. An angle that measures more than 0 but less than 90° is known as

   A. acute
   B. obtuse
   C. reflex
   D. right

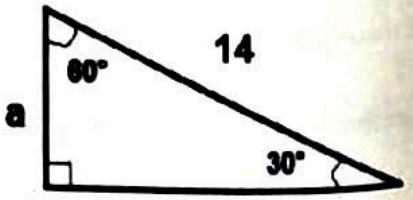
2. Find the values of the lettered angles in the following figures.



$315 + a = 360$

   A. 40^{0}
   B. 45^{0}
   C. 56^{0}
   D. 135

3. Find the letter a of the figure on the next page.



A. 7
B. 14
C. 17
D. 30

4. The vector $\begin{pmatrix}24\\x\end{pmatrix}$ is parallel to $\begin{pmatrix}16\\12\end{pmatrix}$. Find the value of x.

A. 12
B. 18
C. 24
D. 28

5. The following are the masses (in kg) of members in a club: 59, 44, 53, 57, 49, 40, 48 and 50. Calculate the mean mass.

A. 40kg
B. 44kg
C. 50kg
D. 53kg

6. If a fair die is tossed once, find the probability of obtaining a number less than 5.

A. $\frac{2}{3}$
B. $\frac{2}{6}$
C. $\frac{2}{5}$
D. $\frac{5}{6}$

7. What is the range of this set of numbers 2, 3, 3, 5, 5, 5, 8, 10, 12?

A. 2
B. 10
C. 12
D. 14

8. The position vectors of points A and B are $2i + 3j$ and $i - 2j$ respectively. Find $\overrightarrow{AB}$.

A. $2i + 3j$
B. $-2i - 3j$
C. $i + j$
D. $-i - 5j$

9. Find the number of sides of a regular polygon with an interior angle of 150 degrees.

A. 10
B. 12
C. 15
D. 30

10. Find the length of the longest stick that can fit into a box with dimensions 3cm, 5cm and 7cm.

A. 9.11cm
B. 10.25cm
C. 15.00cm
D. 105.00cm

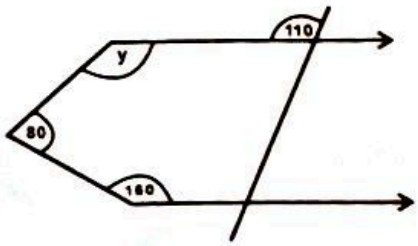
11. If $\sin\theta = \frac{3}{5}$ what is $\cos\theta$?

A. $\frac{3}{4}$
B. $\frac{4}{5}$
C. $\frac{2}{5}$
D. $\frac{3}{5}$

12. The exterior angle of a regular polygon is 40°. Find the sum of its interior angles.

A. 180°
B. 360°
C. 1260°
D. 4203°

13. Find the value of y in the diagram below,



A. 100^0
B. 120^0
C. 150^0
D. 200^0

14. If P (2,5) and Q (12, -8), find $\overrightarrow{PQ}$.

A. $\begin{pmatrix} 14 \\ -3 \end{pmatrix}$

B. $\begin{pmatrix} -10 \\ 13 \end{pmatrix}$

C. $\begin{pmatrix} 14 \\ -13 \end{pmatrix}$

D. $\begin{pmatrix} 10 \\ -13 \end{pmatrix}$

$\begin{pmatrix} 12 \\ -8 \end{pmatrix} - \begin{pmatrix} 2 \\ 5 \end{pmatrix} = \begin{pmatrix} 10 \\ -13 \end{pmatrix}$

15. Given that the mean of the following data; 4, 6, 7, $y + 1$, and 9 is 10. Find the value of y.

A. 16

B. 23

C. 26

D. 27

$\text{Mean} = \frac{\Sigma fx}{\Sigma f}$

$10 =$

16. A ladder 15m long is leaned against a vertical pole, making an angle of 72 with the horizontal. Calculate, correct to the **nearest** whole number, the distance between the foot of the ladder and the pole.

A. 5m

B. 8m

C. 14m

D. 16m

17. If a fair die is tossed once, what is the probability of scoring an even or prime number?

A. $\frac{5}{6}$

B. $\frac{1}{6}$

C. $\frac{1}{2}$

D. $\frac{2}{3}$

1, 2, 3, 4, 5, 6

$\frac{3}{6} = \frac{1}{2}$

18. A group of 20 students earned a class mean of 30 on a quiz. A second group of 30 students had a mean score of 45 on the same test. What is the mean score of the 50 students?

A. 32.5

B. 39.0

C. 41.0

D. 45.0

19. Find the length of the diameter of a circle whose circumference is 157 cm. [Take $\pi = 3.142$]

A. 24.99cm
B. 49.97cm
C. 123cm
D. 493cm

20. The following scores 18 20 15 12 12 10 8 17 20 were available for 9 students in a Statistics test. The score for the 10th student was missing but it was known to be the second highest score. What would be the median for the distribution?

A. 12
B. 13
C. 16
D. 21

8, 10, 13, 12, 17, 18, 20, 20

$\frac{29}{2}$

21. A rectangle has a width of 16 cm and a diagonal of length 20 cm. How long is the rectangle?

A. 10cm
B. 12cm
C. 13cm
D. 15cm

22. If the area of the circle is 360 in^2, what is the area of the sector if its central angle measures 90°?

A. $13in^2$
B. $24in^2$
C. $36\ in^2$
D. $90in^2$

$360 = \frac{\theta}{360} \times 2\pi r$ Area $= 2\pi r$

23. The approximate area of a circle is $38.5cm^2$. Find the length of the radius of the circle. Use $\pi = \frac{22}{7}$

A. 1.32cm
B. 3.5cm
C. 12.25cm
D. 35cm

$A = \pi r^2$

$38.5 = \frac{22}{7}$

24. The area of a rectangle is $18cm^2$. If the width of the figure is 2cm, what is the its perimeter?

A. 18cm
B. 20cm
C. 22cm
D. 36cm

$18 = L \times B$

$2\ 8$

25. Find the length of the diameter of a circle whose circumference is 157 cm. [Take π = 3.142]

A. 24.99cm
B. 49.97cm
C. 123cm
D. 493cm

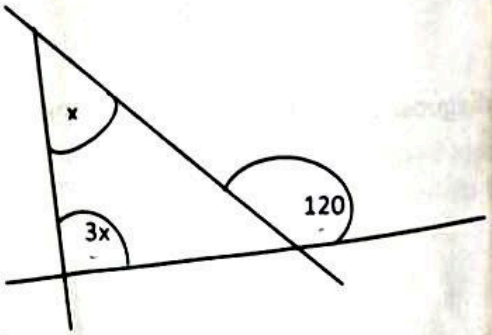
$C = \pi d$

$\frac{157}{3.142} = \frac{3.142d}{3.142}$

SECTION B (10 MARKS)

For questions 26 to 30, show all short responses in the answer booklet provided.

26. Find the value of x in the diagram below.



$3x + x + 120 = 360$

$4x =$

$3x + 120 = 180$

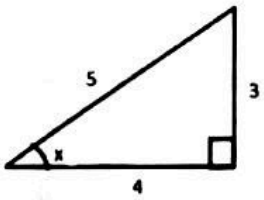
$3x = 180 - 120$

60

27. The scores of pupils in a test are, 3, 5, 7, 9, 8, 6, 4, 7, 11. What is the mean score correct to the nearest whole number?

28. A regular polygon has an exterior angle of 45°, find its interior angle.

29. Find the value of x in the diagram below, leaving your answer to 1 decimal place.



1
2
3
4

30. Find the direction of the vector $\overline{MN} = \begin{pmatrix} 6 \\ 10 \end{pmatrix}$ to the nearest whole number.

5
6

SECTION C (5 MARKS)

For questions 31 to 35, indicate whether each of the following statements is TRUE or FALSE.

31. Similar triangles are subsets of congruent triangles.

32. The second quartile in statistics is the same as the median.

33. Standard deviation is a measure of central tendency. T

34. The mean of a data set is the middle value of the data set. F

35. A line that is equidistant to point A and point B is a perpendicular bisector of $\overline{AB}$. T

SECTION D (20 marks)

Answer ONLY ONE from this section into the answer booklet provided.

36. a) The marks obtained by a group of candidates in an examination are as follows;

10	11	12	36	49	16	69	32	45	63
63	3	45	55	58	45	29	8	43	22
35	42	28	9	54	49	21	47	37	45
16	24	46	32	63	12	68	47	23	18
44	8	33	54	49	56	41	42	57	48

i) Using the group 0 – 9, 10 – 19, 20 – 29, ..., construct a frequency distribution table for the above data. **(10 Marks)**

ii) using an assumed mean of 34. 5, find the: 34.5

α) mean. **(2 Marks)**

β) standard deviation. **(4 Marks)**

b) A fair die is tossed once. What is the probability of obtaining a prime number? **(4 Marks)**

B 37. The following table shows the frequency distribution of the masses to the nearest kg, of 100 teacher trainees in level 100.

21 D
23 B
24 C
25 B

Mass (Kg)	Frequency
55 – 59	2
60 – 64	6
65 – 69	9
70 – 74	23
75 – 79	25
80 – 84	13
85 – 89	10
90 – 94	6
95 – 99	5
100 – 104	1

Marks class boun Tally Freq fx

a) Make a cumulative frequency table for this distribution. **(4 Marks)**

b) Use your table to draw a cumulative frequency curve. **(7 Marks)**

c) Use your graph to estimate:

(i) The median **(3 Marks)**

(ii) The inter-quartile range. **(6 Marks)**

38. (a) Construct ΔABC with $|AB| = 6cm$ $|AC| = 8cm$ and $< BAC = 75°$. Construct

i) The locus L_1 of points equidistant from /AB/ and /AC/

ii) The locus L_2 of points equidistant from A and B

iii) The locus L_3 of points 4.5cm from B. **(10 Marks)**

(b) Locate: **(3 Marks)**

i) P_1 the point of intersection of l_1 and l_2

ii) P_2 the point of intersection of l_1 and l_3

iii) P_3 the point of intersection P_3 of l_2 and l_3 inside the triangle.

(c) Measure **(2 Marks)**

(i) $|P_1P_2|$

(ii) $\angle P_2P_1P_3$

d) In the diagram below, QS is an arc of a circle of center P and a radius $\overline{PQ} = 8\sqrt{3}cm$. $\overline{QR}$ is a tangent of the circle at Q, $\overline{PR}$ is a line segment and $\angle QPS = 60°$. Calculate the length of $\overline{PR}$, leaving your answer to the nearest whole number. **(5 marks)**