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Expert of Maths

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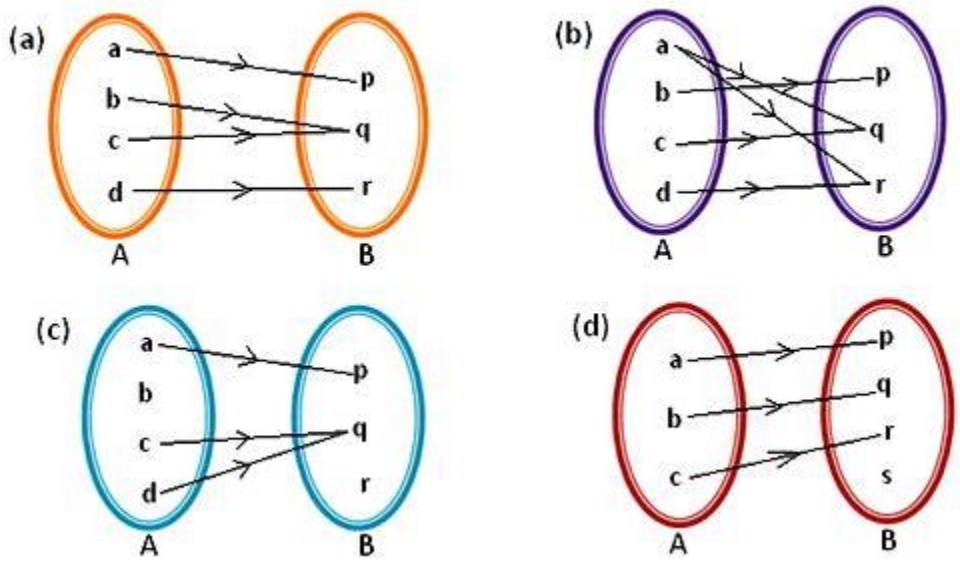
RELATIONS & FUNCTIONS #1, #2

1. **Which of the following diagrams represent a function**



2. **Which set of ordered pairs represent a function among the following?**
   a) **R = { (1, 3), (2, 8), (4, 5), (5, 6), (7, 6)} or S = { (2, 8), (3, 9), (10, 2), (3, 7), (6, 8)}**
   b) **P = { (10, 8), (2, 11), (22, 25), (0, 6), (7,)} or Q = { (, 8), (8, 10), (10, 3), (3, 7), (7, 1)}**

3. **Draw a pictorial diagram for the following ordered pairs**
   {(1,), (2, 8), (4, 5), (5, 6), (7, 6)}

4. **Which of the following set of ordered pairs represent a one to one function?**
   a) **D = { (1, 3), (2, 8), (4, 5), (5, 6), (7, 9)} or E = { (3, 8), (8, 9), (9, 2), (2, 7), (7, 8)}**
   b) **R = { (1, 3), (3, 8), (11, 5), (5, 6), (7, 6)} or S = { (2, 8), (3, 9), (10, 2), (11, 7), (6, 0)}**

5. **Let V denote the set of all ordered pairs (x, y) of even numbers such that $x - y = 4$. Find a set of**

   Any six ordered pairs belonging to this set. Is this set a set of function?
6. **Let f denote the set of all ordered pairs (x, y) of integers such that y is a multiple of x. which of the following ordered pairs belong to f? {(1, 3), (2, 8), (4, 5), (-5, 30), (7, 6), (0.5, 2)}.**

7. Draw the graph of the inverse of each of the followings of the given relations and then find its domain and range of the inverse of the relations

   (a) $R = \{(x, y): y > x^2 + 1 \; and \; y \leq 4\}$
   (b) $R = \{(x, y): x < 0\}$
   (c) $R = \{(x, y): y > x^2 + 1 \; and \; y < 5\}$

8. Given the relation $R = \{(x, y): (2, 3), (0, 1), (-4, 0), (-2, 3)\}$
   (a) Write the inverse of R.
   (b) represent the inverse of R pictorially.

9. A relation R is defined as $R = \{(x, y): x + y \leq 2, x + y > -2\}$
   (a)Draw the graph of R
   (b) State domain and range of R

10. Draw and shade the region described by the following inequalities. (Use the same Pair of axes) and $y \geq 0, y > x - 1, and 2y + x \leq 2$

11. Draw the graph of the inverse of the elation $R = \{(x, y): y \leq 0 \; and \; y \geq x\}$ and state its domain and range

12. Draw the graph of the relation $R = \{(x, y): y = 2x + 1\}$ and its inverse

13. Find the inverse of each of the followings and in each case states its domain and range
   (a) $R = \{(x, y): y = 2x + 10\}$
   (b) $R = \{(x, y): y = 4x2 + 2x + 1\}$
   (c) $R = \{(x, y): y = -= -4x + 12\}$
   (d) $R = \{(x, y): y \leq -x + 4\}$

(e) $R = \{(x,y): y + x > 2\}$
(f) $R = \{(x,y): y < 0\}$
(g) $R = \{(x,y): y > x^2 and\ y \leq 4\}$

14. Given the relation $R = \{(1,4), (2,3), (1,1), (5,2), (4,1)\}$, find R^{-1} and represent R^{-1} pictorially

15. If $R = \{(a,1), (b,2), (c,7), (d,3), (e,5)\}$. Using pictorial representation show R^{-1}

16. Let R denote a set of all ordered pairs (x, y) of real numbers where $R = \{(x,y): y = 2x^2 - 5x - 7\}$ Find the set of all ordered pairs in R^{-1} where
(a) The domain is $(-1, 0, 1, 3, 5)$
(b) The range is 3

17. Given the relation $R = \{(x,y): y < 3x + 5\}$ find
(a) R^{-1}
(b) Domain and range of R^{-1}

18. Write R^{-1} as a set of ordered pairs given that $R = \{(x,y): y = \frac{X}{|X-7|}\}\ for\ x = 0, 1, 2, 3, 4$ hence find the range of R^{-1}

19. Give the domain and range of R^{-1}, if $R = \{(3,2), (1,7), (-5,3), (2,9)\}$

20. A relation R is defined by a set of ordered pairs $R = \{(0,-1), (2,5), 4, \pi), (6,9)\}$ find
(a) R^{-1}
(b) Domain and range of R^{-1}

21. Draw the graph of the followings relations and then find the domain and range.
(a) $R = \{(x,y): y = -x + 4\}$
(b) $R = \{(x,y): y < x + 3\}$
(c) $R = \{(x,y): y + x < 9, x - y \leq 3\}$
(d) $R = \{(x,y): y \geq x - 1\ and\ y < 3\}$
(e) $R = \{(x,y): y - 2x \geq 0\ and\ x \leq -1\}$
(f) $R = \{(x,y): y \leq x^2 and\ x + y \leq 4\}$
(g) $R = \{(x,y): y > x^2 + 1\ and\ y < 4\}$
(h) $R = \{(x,y): 2x - y \geq 10\ and\ x + y \leq 5\}$

22. Find the domain and range of each of the followings relations
(a) $R = \{(x,y): y = -x + 4\}$
(b) $R = \{(x,y): y = \sqrt{x+9}\}$
(c) $R = \{(x,y): y = 3x^2 - 27x\}$
(d) $R = \{(x,y): y = 5x + 4\}$
(e) $R = \{(x,y): y = -x^2 + 6x + 10\}$
(f) $R = \{(x,y): y = 2x^2 - 6\}$

(g) $R = \{(x, y): x = 2y + 8\}$
(h) $R = \{(x, y): x = y^2 - 3y\}$
(i) $R = \{(x, y): x = 2y^2 + 10\}$
(j) $R = \{(x, y): x = \sqrt{y^2 - 6}\}$
(k) $R = \{(x, y): x^2 - y^2 = 1\}$

23. The relation $R = \{(x, y): y = x^2 + 4\}$ is defined over the domain$(-2, -1, 0, 1, 2)$. Write the range of this relation

24. Given the relation $R = \{(-2,6), (2,3), (4,2),6,5), (0, -4), (4,9)\}$ write the domain and co-domain of this relation

25. If the relation R is defined as $R = \{(x, y): y = -x + 6\}$, find
    (a) A set of ordered pairs belongs to R under the domain $A = (-4, -3, -2, -1, 0, 1, 2)$
    (b) The ordered pairs belongs to R under the range $B = (8, 10, 12, 14, 16)$

26. Write down the image of 8 in the followings mappings
    a) $x \to x^2$
    b) $x \to -x^2$
    c) $x \to 4x - 4$
    d) $x \to 12x + 4$

27. Find the image of the relation $R = \{(x, y): y = 4x + 2\}$, where the domain of the relation is $\{2,4,6,7\}$

28. Let R denote a set of all ordered pairs (x, y) of real numbers where $y = x^3$. find set of all ordered pairs in R where :
    (a) The domain is $(0, -1, -2, 3/2, 4)$
    (b) The range is $(-1, -27, 8, 1/27)$

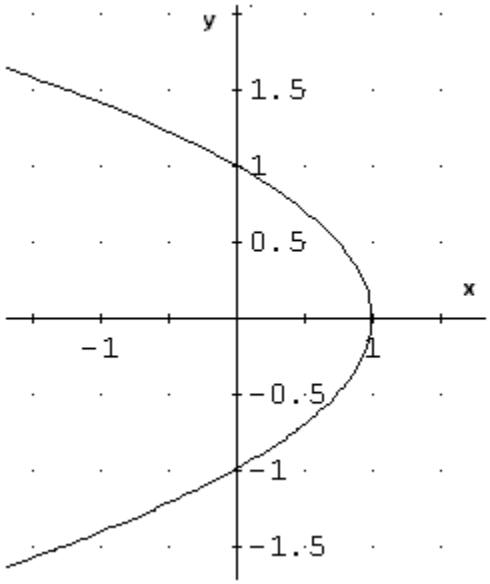
29. Let R denote a set of all ordered pairs (x, y) of integers such that $x - y$ is an integral multiple of 3. Which of the followings ordered pairs belongs to R?
    $(9,3), (3, 9), (-1, 2), (1, 5), (-7, -2), (0, 4), (-4, -7)$. (note: a is an integral multiple of b if $a = kb$ where k is an integer)

30. Given that $x \in A, where\ A = \{-2, -1, 1,3,5\}$ draw a pictorial representation of the followings relations
    (a) $R = \{(x, y): y = -4x + 4\}$
    (b) $R = \{(x, y): y = -x^2 + 2\}$
    (c) $R: x \to 2x + 3$

31. The relation R is defined as $R = \{(x, y): y = -5x - 1\}$ where x is the set of integers between -5 and 3.
    (a) Show the relation using ordered pairs

(b) Show the relation using pictorial representation

32. **Is the graph shown below that of function?**



33. **Is the set of ordered pairs below represent a function?**
{(1,1), (2,3), (4,3),(5,4), (7,1),(6,2),(0, 5)}

34. **Is the set of ordered pairs below represent a function?**
{(1,-2), (2, 0), (4, 8),(5,7), (2,1),(9,-4),(10, 5)}

35. **Draw a pictorial representation of the following ordered pairs below.**
{(1,1), (2,3), (4,3),(5,4), (7,1),(6,2),(0, 5)}

36. **Is $y = \sqrt{x}$ represent an equation of function?**

37. The function $f(x)$ is defined as;

$$f(x) = \begin{cases} |x| \text{ for } -2 < x \leq 1 \\ x^2 + 1 \text{ for } x > 1 \\ x + 4 \text{ for } x \leq -2 \end{cases}$$

a) Sketch the graph of f(x)
b) Find f (3) , f (-1) and f(-4)
c) Is the graph one to one?
d) Determine the domain and range of $f(x)$

38. Find the value of a, b and c of $f(x) = ax^2 + bx + c$ if $f(0) = 16, f(1) = 11$ and $f(2) = 22$ then factorize $f(x)$ by splitting the middle term.

39. What must be added to the linear function $f(x)$ so that $f(1)$ *be equal to* 5, if $f(2) = 4$ and $f(0) = 2$

40. Given that $f(x) = x^2 + 5$, then find $f^{-1}(9)$

41. The function $f(x)$ is defined as;

$$f(x) = \begin{cases} x \text{ if } x \geq 2. \\ x+1 \text{ if } -1 \leq x < 2 \\ x-3 \text{ if } x < -1 \end{cases}$$

i. Sketch the graph of f(x)
ii. Find f (3) , f (-0.5) and f(1)
iii. State domain and range of f(x)

42. Sketch the graph of $f(x) = |x - 1|$ then determine the domain and range also state if it is one to one function

43. If $(x - 2)$ and $(x+3)$ are two factors of the quadratic equation$x^2 + px + q = 0$, find the values of p and q.

44. Find the inverse of $f(x)$ if $f(x) = x^2 + 1$

45. Write $f(x) = 2x^2 + 4x + 6$ in the form $f(x) = a(x + b)^2 + c$, then write down the value of constant a, b and c.

46. The function $f(x)$ is defined as;

$$f(x) = \begin{cases} -2 \text{ if } x < -2. \\ x+1 \text{ if } -2 \leq x < 1 \\ x^2 \text{ if } x \geq 1 \end{cases}$$

i. Sketch the graph of f(x)
ii. Use the graph to find $f(-3)$ and $f(2)$
iii. State domain and range of f(x)

47. Find the inverse of the function {(1, 2), (2, 3), (3, 4), (9, 10)}

48. If the function $f(x)$ is defined by the domain (1, 2, 5) and range (2, 3, 6). Find $f(-1)$.

Experiment with different values of c to answer the following questions

49. Find the value of v if the graph of $\boldsymbol{x^2 + cx + 3}$**has two x – intercepts**

50. Find the value of v if the graph of $\boldsymbol{4x^2 + 4x + c}$ **is a tangent to** $\boldsymbol{x - axis}$

51. Find the value of v if the graph of $\boldsymbol{x^2 + cx + 11}$ **has no x – intercept**

52. Find the value of v if the graph of $\boldsymbol{x^2 + cx + 11}$ **has two x – intercepts**

53. Find the value of v if the graph of $\boldsymbol{x^2 + 5x + c}$ **has two x – intercepts**

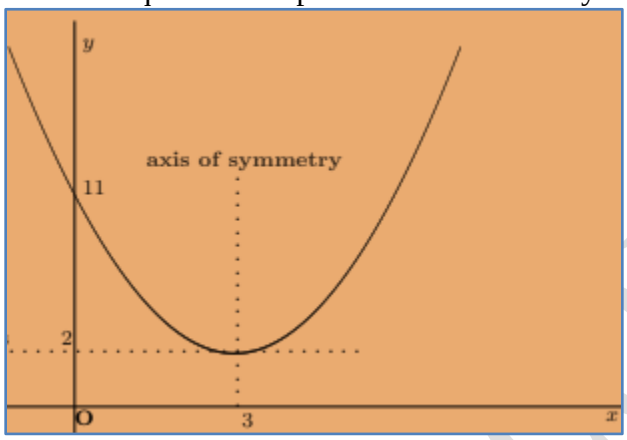
54. Find the value of v if the graph of $\boldsymbol{x^2 + 8x + c}$ **has one x – intercept**

55. Find the value of v if the graph of $\boldsymbol{x^2 + cx + 25}$ **has one x – intercept**

56. Find the value of v if the graph of $\boldsymbol{x^2 + cx + 7}$ **has two x – intercepts**

57. Find the value of v if the graph of $\boldsymbol{3x^2 - 6x + c}$ **has no x –intercept**

58. Write an equation of a parabola below. ANS y = $x^2 - 6x + 11$



59. Sketch the graph of function $f(x) = x^2 + 12x - 11$, then find the;
    a) **Turning point**
    b) **Line of symmetry**
    c) **Maximum or minimum value.**

60. **Sketch the graph of inverse of** $f(x) = x^2$, then find the turning point and the line of symmetry of the graph of inverse of $f(x)$.

61. **Which among { 2, 1, 4, -1} is the solution of** $f(x) = x^2 + 12x - 11$.

62. Solve $f(x) = x^2 - 12x + 11$ by completing the square method for $f(x) = 0$.

63. Write $f(x) = x^2 + 12x - 35$ as a product of factors.
64. Write $f(x) = x^2 + 3x + 2$ in the form $f(x) = (x + b)^2 + c$, then find the value of bc

65. **Find the domain and range of** $f(x) = (x + 4)^2 - 1$.

66. **Find the inverse of** $f(x) = (x + 6)^2 - 1$.

67. **Draw the graph of** $f(x) = x^2$ for $x \geq 0$ and state the range of the inverse of $f(x)$

68. **Draw the graph of the function** $\boldsymbol{f(x) = x + 2}$

69. **Draw the graph of** $f(x) = x^2$ and $f(x) = -x^2$ on the same xy plane or axis

70. **Draw the graph of** $f(x) = x^2$ and $f(x) = (x-3)^2 + 2$, t on the same xy plane or axis

71. Use graph to determine if $y = x^2$ is the inverse of $y = \sqrt{x}$

72. Use graph to determine if $y = 2x - 5$ and $y = 2x + 5$ are inverse to each other.

73. Let $g(x) = 7x - 4$. Find the equation of g^{-1}(x)

STASTISTICS #3

49. Calculate the arithmetic mean of the marks from the following table.

Marks	0 – 10	10 – 20	20 -30	30 -40	40 -50	50 – 60
No.of students	12	18	27	20	17	6

50. Find the arithmetic mean of the following frequency distribution :

X	1	2	3	4	5	6	7
F	5	9	12	17	14	10	6

51. Mwandu was recording data for the main purpose of analyzing them, the mode of the data was 67.44 and the total frequencies were 100. He had forgotten to record some frequencies in the interval of 71 – 75 and 61 – 65 as shown in the table below. If v and r are integers, find the value of v and r.

Class interval	51 – 55	56 – 60	61 -65	66 – 70	71 -75	76 -80	81 -85
Frequency	2	10	v	34	r	10	6

52. NECTA 2008 QN 12 a and b
    a. The age at which a child first walked (to nearest month) was recorded for eight (8) children. The results were 12, 10, 16, 19, 10, 12, 12 and 13. Calculate the mean, mode and median of the data.
    b. A survey was made on the number of people attending conferences on one particular week. A random sample of 100 conference centres was taken and the results were as follows

Number of people attending conference	150 – 154	155 -159	160 -164	165 – 169	170 -175
Number of conference centres	8	16	43	29	4

i. Draw the histogram and a cumulative frequency curve to represent these results.
ii. Estimate the median of this data from the cumulative frequency curve in 12.(b) (i) above.

53. NECTA 2017 QN 12

56	82	70	69	72	37	28	96	52	88	41	42
50	40	51	56	48	79	29	30	66	90	99	49
77	66	61	64	97	84	72	43	73	76	76	22
46	49	48	53	98	45	87	88	27	48	80	73
54	79										

a. Copy and complete this tally table for the data given above.

Height (cm)	21 -30	31 -40	41 – 50	51 – 60	61 – 70	71 - 80	81 -90	91 – 100
Tally								
Frequency								

Use this table to;
a) Draw the histogram for the heights of the plants.
b) Find the mean height of the plants (do not use assumed mean method).
c) Find the median of the heights of the plants.

54. OHONGSS(T) – WESTERN ZONE 2017 QN 12.The table below shows the altitude wind speeds recorded at a weather station in a period of 40 days.

Wind speed (knots)	74 -79	80 – 85	86 – 91	92 – 97	98 – 103	104 – 109
Frequency f (days)	3	9	11	4	8	5

a) Draw the cumulative frequency graph for the data.
b) Use the graph to estimate the median
c) State the modal class and hence compute the mode

55. NECTA 2016 QN 12. The following were the scores of 35 students in a mathematics mock examination: 07, 19, 78, 53, 43, 67, 12, 54, 27, 22, 33, 80, 25, 58, 50, 36, 65, 33, 16, 19, 34, 20, 55, 27, 37, 41, 04, 32, 48, 28, 70, 31, 61, 08, 35.
a) Prepare the frequency distribution table using the class intervals 0 -9, 10 -19, 20 -29, etc.
b) Which class interval has more students?
c) Represent the information in a histogram and frequency polygon and then find the mode.
d) Calculate the median mark.

56. OHONGSS (T) – WETERN- ZONE 2016 The marks below were obtained by 32 students in a civics test. 52 48 37 45 38 29 32 46 50
42 35 32 28 34 37 64 42 37 54 36
48 52 58 71 67 48 62 54 57 34 64
58
    a) Prepare a frequency distribution table by grouping the marks using the class intervals: 24 -29, 30 – 35 etc.
    b) Determine the mode from the histogram.
    c) Calculate: i. the mean mark ii. The median mark

57. Find the measures of central tendency of the following data value: $1-5, 6-10, 11-15, 16-20, 21-25, 26-30, 31-35, 36-40$ and $41-50$ with frequencies: $2, 10, 22, 34, 14, 9, 6, 1$ and 2 respectively.

58. The height of cabbage vegetables in (cm) recorded by a certain researcher are given below; copy and complete the table then find the mean and median.

Class interval	1 -10	11 -20	21 -30	31 -40	41 - 50	51 -60	61 – 70	71 – 80
Tally								
Class mark (x)								
Frequency (f)								
Fx	22	62	153	71	455	55.5	131	226.5

59. Find the mean, median and mode of the following data.
34, 35, 39, 44, 45, 49, 50, 57, 34, 42 and 30

60. The height of cabbage vegetables in (cm) recorded by a certain researcher are given below; copy and complete the table then find the mean by assumed mean method.

Class interval	1 -10	11 -20	21 -30	31 -40	41 - 50	51 -60	61 – 70	71 – 80
Tally								
Class mark (x)								
d = x – A								
Frequency (f)				11				
Fd	-30	-80	-60	0	100	40	60	160

61. a). The mean of v numbers is 30. If 90 is added in that v numbers, it change the mean. If the new mean is 40. Find the value of v.

b). Edriana noted the colours of the cars in her father's car pack. She drew the pie chart to show the results. The angles of the sectors are below.

Red cars	Brown cars	White cars	Blue cars	Yellow cars
120^0	48^0	72^0	42^0	78^0

i) There were 40 red cars. How many cars were there in total?
ii) How many yellow cars were there?

62. The table below shows the frequency distribution table of mathematics monthly test for 42 students of form three feb. 2019 at pearlicy secondary school, find the mean by assumed mean method, take A = 65, find mode and median of the marks.

Marks	1-9	10 -18	19 -27	28 -36	37 -45	46 -54	55 -63	64 -72	73 -81	82 -90
No.students	3	7	6	9	2	T	4	4	1	2

63. Find the mean, median and mode of the following data below.

Class interval	74 -79	79 – 84	84 – 89	89 – 94	94 – 99	99 – 104
Frequency f	3	9	11	4	8	5

64. Find the median from the table below

Wind speed	100	120	140	160	180	200
Frequency f	3	9	11	4	8	5

65. If the median of the following 9 data below is 34. Find the value of v.
44, 36, 32, 31, 54, 55, 30, v, 42.

66. Find the measures of central tendency from the following table below.

Class interval	26 – 30	21 – 25	16 – 20	11 – 15	6 – 10	1 – 5
Frequency	5	3	10	7	8	2

67. prepare the frequency distribution table and write down the modal class

Class mark	100	120	140	160	180	200
Frequency f	3	9	11	4	8	5

68. Draw the histogram and the cumulative frequency curve from the table below.

Class mark	10	12	14	16	18	20
Frequency f	3	9	11	4	8	5

69. Study the table below then answer the questions which follows

Region	Singida	Mwanza	Shinyanga	Simiyu	Geita	Mara
N. people	7.5%	22.5%	27.5%	10%	20%	12.5%

i) Draw the pie chart,
ii) There 40 people in total, how many people are in Singida?

70. Find the mean of the following data.
4,4,4,5,5,6,6,6,7,7,8,8,99,9,9,9,90,97,77,2,2,2,2,2,2,2,2,44,4,4,4,4,66,66,66,66,77,8,8,8,8,8,8,8,8,8,8,8,8,77,6,6,6,7,10,10

71. Draw the histogram and the cumulative frequency curve from the table below, given that the total frequencies is 40.

C. interval	9 -11	12 -14	15 – 17	18 - 20	21 – 23	24 - 26
Frequency	15%	45%	55%	10%	20%	25%

72. Display the results below in a histogram using 10 class interval size whereby the first class mark (x) be 5.5 and the last class mark (x) be 75.5
15 25 30 40 60 40 25 15 15 20 30 75 20 30 20 15 10 20 35 45 35 30 20 10 55 25 10 5 15 30 30 40 15 5 10 45 30 20 20 15 65 40 15 5 45 20 30 20 30 10

73. By grouping the data below using 10 class interval size with class mark of 5.5, 15.5, 25.5 … find the mean, median and mode using assumed mean method where applicable taking A = 45.5.
15 25 30 40 60 40 25 15 15 20 30 75 20 30 20 15 10 20 35 45 35 30 20 10 55 25 10 5 15 30 30 40 15 5 10 45 30 20 20 15 65 40 15 5 45 20 30 20 30 10

74. A dairy sold four flavours of ice – cream: banana chips, strawberry, chocolate and vanilla. Draw a pie chart for these flavours.

1.	Banana chips	8
2.	Strawberry	55
3.	Chocolate	23
4.	Vanilla	14

75. This table shows the frequency of different types of experiments carried out at Pearlicy secondary school in a science laboratory in the year 2019. Calculate the:

Type of experiment	Physics	Chemistry	Biology	Others
Number carried out	30	24	27	9

(a) Total number of experiment carried out.
(b) Fraction of physics experiments.
(c) Angles of pie chart for physics experiments.
(d) Fraction of biology experiments.

(e) Angles of pie chart for biology experiments
(f) Fraction of chemistry experiments.
(g) Angles of pie chart for chemistry experiments
(h) Fraction of others experiments.
(i) Angles of pie chart for others experiments
(j) Draw a pie chart to illustrate the data in the table.

76. Mr. MIDELO interviewed a number of students about their preferred holiday destination.

	Abroad	Tanzania
GIRLS	21	84
BOYS	34	66

(a) How many boys preferred a destination abroad?
(b) How many students preferred to holiday in Tanzania?
(c) How many students did MR. MIDELO interview?
(d) How many boys did MR. MIDELO interview?

77. Neilla tossed a red die and a white die together 15 times. The following table shows Neilla's results.

Red die results	1	5	6	4	1	1	2	3	3
White die results	2	3	4	5	6	5	6	1	5

(a) Which number came up on the red die when 4 came up on the white die?
(b) Which number came up on the white die when 4 came up on the red die?

78. MABULA gathered data from form two students class. The following table shows the leg length and the height of each student.

Leg length (mm)	10	20	21	25	33	41	42	43	50
Height (cm)	200	39	40	30	68	58	69	100	120

(a) How tall is the student whose leg length is 33 mm?
(b) What is the leg length of the tallest student in that class?

79. The marks below were obtained by 32 students in a civics test.

52 48 37 45 38 29 32 46 50 42 35 32
28 34 37 64 42 37 54 36 48 52 58 71
67 48 62 54 57 34 64 58

a) Prepare a frequency distribution table by grouping the marks using the class intervals: 24 -29, 30 – 35 etc.
b) Determine the mode from the histogram.
c) Calculate: i. the mean mark ii. The median mark
d) Prepare the pia chart from the frequency distribution table prepared in (a) above

80. Pediatricians check a child's age and weight in the table to track his or her rate of growth.

Distributions of weights for girls aged 2 years to 13 years												
Weight Kg)	11	14	15	17	19	21	24	28	32	48	41	46
Age (years)	2	3	4	5	6	7	8	9	10	11	12	13

i. How old is a girl whose weight is 24Kg?

ii. What is the weight of a girl who is 10 years old? iii. How old is the heaviest girl?

81. Consider the frequency distribution table below, find the measures of central tendency.

Class interval	5 – 10	11 – 16	17 – 22	23 -28	29 – 34	35 – 40	41 – 46
Frequency	18	26	20	12	11	10	3

82. Find the mean, mode and median of the following data from the table

Class interval	10 – 15	15 – 20	20 – 25	25 -30	30 - 35	35 – 40	40 – 45
Frequency	30	42	20	23	13	8	4

83. Compute the mean of the following data recorded after the form two joint terminal examinations at Sikonge district secondary schools, using assumed mean method.

Marks	10 -20	20 -30	30 -40	40 -50	50 -60	60 -70	70 -80	80 -90	90 -100
Number of students	4	5	4	5	3	4	16	13	11

84. Compute the mean, mode and median of the following data recorded after the form two joint terminal examinations at Sikonge district secondary schools, using common mean method.

Marks	10 -20	20 -30	30 -40	40 -50	50 -60	60 -70	70 -80	80 -90	90 -100
N.students	4	5	4	5	3	4	16	13	11

85. MrNdukeki timed all the phone calls his lovely wife made during august 2020. This list gives the times in minutes and seconds (e.g. 1.23 stands for 1 minute and 23 seconds).

6.24 5.12 3.04 6.26 5.01 3.52 4.14 7.19 6.34 2.05 5.40 4.48 5.17
2.58 3.48 2.00 1.46 0.48 6.06 0.50 2.45 6.00 3.03 4.24 3.34 1.20
7.48 2.44 2.03 3.45 3.53 1.34 0.45 3.54 5.40 4.47 7.41 6.50 6.43
5.23 4.49 2.34 3.49 2.00 4.09 3.48 5.23 2.47 5.23 1.40 6.05 5.10
7.09 5.45 5.07 6.45 7.53 6.09 4.06 5.45 5.32 0.56 4.57 3.48 4.25
4.40 7.10 0.54 6.10 0.36

a) Prepare a frequency distribution table by grouping the marks using the class intervals: 0 - 0.59, 1 – 1.59, 2 – 2.59 etc.

b) Draw the histogram for this data

86. find the median and mode

A.

$classinteval$	$1-10$	$14-23$	$27-36$	$40-49$
$frequency$	5	4	6	3

B.

$classinteval$	$0-10$	$10-20$	$20-30$	$30-40$
$frequency$	4	7	6	2

RATES AND VARIATION #4

87. If y is directly proportional to x, find the value of each of a, b and c in the table below.

x	8	12	b	32
y	2	a	6	c

88. Assuming that y is directly proportional to x, find a and b in the table below

x	8	12	24	32
y	2	a	6	b

89. Given that y varies direct proportional as $x + 1$ and that $y = 6$ when $x = 2$. Find the equation connecting x and y. Hence sketch its graph.

90. If y varies inversely as $\sqrt{x}$ and is multiplied by n, what is the ratio of the first y to the second y?

91. The numbers are directly proportional by the numbers 2, 3, 4. If $x^2 + 2y^2 - z^2$, then find x, y and z

92. Given that; y + 2 is inversely proportional to x and y = 3 when x = 2, find

a. the proportional constant

b. the value of y when x = 5

93. A matchbox in the shape of cuboid 6cm long, 3cm wide and 2cm high. Matchboxes are packed in similar box, 45cm wide. Calculate the length of the box?

94. Given that x is directly proportional to y and y = 7 when x = 8, find x when y = 21.

95. If z varies directly as x and inversely as y, if z = 35 when x = 7 and y = 6, calculate the value of z when x = 2 and y = 5

96. The value V of a diamond is proportional to the square of its weight W. It is known that a diamond weighing 10 grams is worth shs. 200,000/=.
(a) Write down an expression which relates V and W.
(b) Find the value of a diamond weighing 30 grams.
(c) Find the weight of a diamond worth shs. 5,000,000/=.

97. A variable a varies directly as b and inversely as the square root of c. if $a = 0.2$ when $b = 4$ and $c = 100$, find the value of a when $b = 16$ and $c = 64$.Three classes working 8 hours a day take 5 days to harvest maize from school shamba. How long will it take if there were only two classes, but working for 10 hours a day?

98. The value V of a diamond is proportional to the square of its weight W. It is known that a diamond weighing 10 grams is worth shs. 200,000/=.

i. Write down an expression which relates V and W.
ii. Find the value of a diamond weighing 30 grams.
iii. Find the weight of a diamond worth shs. 5,000,000/=.

99. Sixty people working 8 hours a day take 4 days to cultivate a village farm
How long will it take twenty people to cultivate the same farm if they work 15 hours a day?

100. Thirty people working 8 hours a day take 5 days to cultivate a village farm. How long will it take twenty people to cultivate the same farm if they are working for 10 hours a day?

101. If 20 men can dig a trench for laying 6km of water pipe in 10 days, how many kilometer of water pipe could be laid by 30 men in 15 days?

102. 24 men working 8 hours a day finish a job in 14 days. Find how long the job will take 24 men working 6 hours a day?

103. In a working of 10 hours a day, 21 men can do a certain piece of work in 6 days. For how many hours a day must 20 men work in order to do the same amount of work in 14 days?

104. If 12 people can finish a piece of work in 10 days. How long will it take for 20 people to finish the same piece of work

105. If 3 men working 8 hours a day can assemble 32 machines in 5 days. In how many days can 8 men working 9 hours in a day assemble 384 machines?

106. Sixty people working 8 hours a day take 4 days to cultivate a village farm. How long will it take twenty people to cultivate the same farm if they work 15 hours a day?

107. It has been observed that 12 students can finish a work in 10 days
i. How long will it take 20 students to finish the same piece of work?
ii. Draw the graph for the above information
iii. Use the graph to determine the number of students required to complete the work in 5 days.
iv. If the number of students is 30, how long will it take to finish the same work?

108. 18 men can dig a trench 54m long in 5 hours. How long would it take 15 men to dig a trench 90 m long?

109. If d varies directly with q and l, and inversely proportional with cubic of p. Given that $d = 5, q = 6, l = 8$ and $p = 2$, find d when $q = 12, l = 7$ and $p = 1$.

110. Write a statement of variation for $b = \frac{ka^2}{\sqrt{x}}$

111. The surface area of a sphere, $V\ mm^2$ varies directly as the square of its diameter $d\ mm$. If the surface area is to be doubled, what ratio must the diameter is altered?

112. If A varies jointly as b and h, and $A = 36$ when $b = 12$ and $h = 6$, find A when $b = 10$ and $h = 8$.

113. The distance of the horizon $d\ km$ varies as the square root of the height $h\ m$ of the observer above sea level. An observer at a height of $100m$ above sea level sees the horizon at a distance of $35.7\ km$. Find
(i) The distance of the horizon from an observer $70m$ above sea level

(ii) An equation connecting d and h.

114. If the exchange rate of American dollar is $\$\ 2.103 = Tsh.20$, find how much a person gets in exchange for $Tsh.12,000$.

115. Peter bought motor vehicle spare parts from Japan worth 5,900,000 Japanese Yen. When he arrived in Tanzania he was charged custom duty of 25% on the spare parts. If the exchange rates were as follows
$1\ US\ dollar = 118\ Japanese\ Yen$
$1\ US\ dollar = 76\ Tanzania\ Shillings$
Calculate the duty he paid in Tanzania shillings

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SQUENCE AND SERIES #5

116. Find the common difference for the arithmetic sequence $A_n = 3n + 1$

117. In the sequence 11, 14, 17, 20 … find the 10^{th} term of the sequence

118. Find the number of terms in the sequence 7, 10, 13, 16 …,49

119. The 8^{th} term of an arithmetic progression is 9 greater than the 5^{th} term of the same progression and the 10^{th} term is 10 times the 2^{nd} term. Find the common difference and the first term of the progression given.

120. Given 8,u, v,29 form the first four consecutive terms of an arithmetic progression. Find the value of u and v.

121. After knee surgery, your trainer tells you to return to your jogging program slowly. He suggested jogging for 12 minutes each day for the first week. Each week thereafter, he suggested that you increases that time by 6 minutes per day. How many weeks will be before you are up to jogging 36 minutes per day?

122. Find the general term of the following sequence; 3, 6, 9, …

123. How many terms are there in the following 2 + 6 + 10 + 14 + … + 50.

124. The 4^{th} term of an arithmetic progression is 11 and the sixth term of the same progression is 17. Find the nth term.

125. Find the sum of numbers which are divisible by 7 from zero to ninety nine

126. Which of the following series are arithmetic progression, finite, infinite, increasing or decreasing? Find the common difference of those that are.
   a) $2 + 2.7 + 3.4 + \ldots$
   b) $2 + 3 + 5 + 7 + 11 + 13$
   c) $\frac{1}{2} + 1 + \frac{3}{2} + 2 + \cdots$
   d) $64 + 60 + 56 + 52 + 48 + 44 + 40.$
   e) $64 + 49 + 36 + 25 + \cdots + 1$

98. The arithmetic mean of two numbers is 12. If one of the numbers given is 10. Find the second number.

99. Given arithmetic mean = 12 and 10 is the first number, then let v be the second number

100. Given 10, v and 18 are consecutive terms of an A.P. find the value of v

101. Find the arithmetic mean of the following. 3 and 9

102. Find three numbers between 3 and 15

103. The arithmetic mean between two numbers w and 90 is 80. Find the value of w.

104. The arithmetic mean between two numbers is 20. If the second number is thrice the first number. Find the value of large number.

105. The arithmetic mean between two numbers is 15. If the large number if 10 more than the small number. Find the numbers

106. How many arithmetic means are there between 10 and 30 with common difference 5?

107. There are five arithmetic means between 5 and 35. What is the common difference of this arithmetic progression?

108. Find two arithmetic means between 10 and 16.

109. The arithmetic mean between A and 15 is 10. Find the value of A

110. Determine the arithmetic mean between 7 and 21

111. Find the sum of first seven terms of an arithmetic progression whose third term and tenth term is 6 and 20 respectively.

112. Find the sum of the terms between 0 and 200 which are divisible by 3.

113. if 4, x + 1 and 8 are first three consecutive terms of an arithmetic terms. Find the value of x and the sum of the first five terms of this progression.

114. Find the sum of the first twenty terms of the series. $2 + 2.5 + 3 + 3.5 + \ldots$

115. The sum of the first five terms of an arithmetic progression is 25 and the sum of first ten terms of the same arithmetic progression is 100. Find the sum of first four terms of the progression.

116. Mr Midelo has two rods each 6.2 m long, which he cuts into pieces to illustrate to his class the ideas of an arithmetic progression and geometric progression.

117. The first rod is cut into five pieces whose lengths form a geometric progression in which the common ratio is 0.5. Calculate the length of the longest piece.

118. The first rod is cut into five pieces whose lengths form an arithmetic progression in which the common difference is 0.5. Calculate the length of the longest piece.

119. Calculate the difference between the lengths of the two pieces, one from each rod, which represent the middle term in the two progressions.

120. Each year, a tree produces 3 more coconuts that it did the previous year. If it produced 10 coconuts in 1985. a) How many coconuts will it produce in year 2000? b). Find the total number of coconuts produced from the year 1985 to year 2000.

121. MWENDAMKONO started a bank account and decided to deposit 1500/= during the first year, 2400/= during the second year and an extra 900/= for each additional year. Find the amount He will have to deposit during the 11^{th} year. ANS 11^{th} year will be 10500/=

122. a). In an arithmetic progression the sum of first ten terms is 400 and the sum of next ten terms is 1000. Find the common difference and the first term. ANS. d = 6 and $A_1 = 13$

b). Given a certain arithmetic progression (A.P), the sum of terms from the 10^{th} term to the 20^{th} term inclusive is 1617. If the first term of this A.P is 7, find the common difference. ANS. The common difference is 10

123. Show that $\log c + \log c^2 + \log c^4 + \cdots$ is in arithmetic progression

124. A concert hall has seating for 800 people. There are 21 seats in the first row. Each of the other row has two more seats than the row in front of it. a). How many rows are in the concert hall? b). how many seats are in the last row? ANS a) 20 rows b) 59 seats.

125. Assume that a person has two parents, four grandparents, and so on. How many people will be there in the fifth generation from the person? Is the sequence arithmetic, geometric or neither? ANS 16 people, it is geometric since each term is twice the preceding term.

126. Given a certain arithmetic progression (A.P), the sum of terms from the 7^{th} term to the 17^{th} term inclusive is 1419. If the first term of this A.P is 8, find the common difference. ANS. The common difference is 11

127. Find the number of terms in the following series. 7 + 7.5 + 8 + 8.5 + … + 15. ANS 17 terms.

126. The seats in the theatre are staggered to improve visibility. At the University of DODOMA, college of humanities the first row has 22 seats, the last row has 45 seats and each row after the first has one more seat than the row before it. How many seats are there in the theatre? ANS there are 804 seats in the theatre.

128. Find the sum of 35 terms of an arithmetic progression whose third term is 7 and 7^{th} term is two more than thrice of its third term. ANS the sum is 2345

129. If the 5^{th} term and 12^{th} term of an arithmetic progression are 30 and 65 respectively, find the sum of 26 terms. ANS the sum is 1885.

130a). Find four arithmetic means between 50 and 75. ANS The three arithmetic means are 55, 60, 65 and 70.

b). If the first term of an arithmetic progression is 30 and the common difference is 4, how many arithmetic means are there between 38 and 62? ANS there are five arithmetic means between 38 and 62.

131. If the first, second and fourth terms of A.P form tree consecutive terms of a G.P also the first, third and ninth terms of the same A.P form three consecutive terms of different G.P. find the sum of two common ratios of the two formed G.P also find the fifth terms of each G.P if the fifth term of the A.P is 10. ANS the sum is 5, the fifth terms are 32 and 108 respectively

132. Which term of the following A.P; 3, 15, 27, 39… will be 639? ANS the 54^{th} term of the sequence will be 639.

133. How many terms of the progression 2 + 4 + 6 + 8 + … are needed so that the sum be 210.

134. The third term of a G.P is 27 and the sixth term is 729.find the first term, common ratio and the sum of first three terms of the progression. ANS. The first term is 3, the common ratio is 3 and the sum of first three is 39.

135. The first three terms of an arithmetic progression are 2c, c + 4 and 2c – 7respectively.

i) Find the value of c, ANS. C = 7.5
ii) Verify that when c = 8 the terms form a G.P
iii) Find other possible value of c which gives a G.P

135. a). Two G.Ps has the same common ratios(r) and different first terms, the difference between the third terms is 4, show that the difference between the sixth terms is $4r^3$.

b). Two G.Ps has the same common ratios(r) and different first terms, the difference between the second terms is 2 and the difference between the seventh terms is 64. Find the common ratio(r). ANS the common ratio(r) is 2.

136. Two G.Ps has the same first terms and difference common ratios R and r, the difference between the third terms is 10 and the difference between the fifth terms is 130. Find $R^2 + r^2$.ANS $R^2 + r^2 = 13$.

137. a).Find the sixth term and the nth term of the sequence $\sqrt{3}$, 3, $\sqrt{27}$, 9, . . . ANS. The sixth term is 27 and the nth term is $\sqrt{3}^n$

b). Find the nth term of the sequence 1.1, 2.2, 3.3, 4.4, . . . ANS. The nth term is 1.1n

138. a). EBIA cycled a total of 85 km over a period of 5 days. Each day she cycled 5km more than the day before. How many kilometers did EBIA cycle on the first day? ANS. 7km

b). A spider was crawling up the wall. Every minute it crawled 4cm further than in the previous minute. It crawled 5cm in the first minute. How far did the spider crawl in the fifth minute? **ANS 21cm.**

139. Write down the first six terms of the sequence in which the first term is 2 and every term, after the first term, is 4 more than the previous term. ANS 2, 6, 10, 14, 18 and 22.

140. The second, fourth and eighth terms of an arithmetic progression form a geometric progression and the sum of the third and the fifth terms is 24. Find the first four terms of a progression. ANS. The first four terms of a progression are 3, 6, 9 and 12.

141. A rectangular plot of land has sides 9cm and 4cm. find the length of a side of a square having the same area as this plot. **ANS 6cm**.

142. In how many years would one double one's investment if sh 5,000 is invested at 8% compounded semiannually?

143. The 2^{nd} term, 4^{th} term and 8^{th} term of an arithmetic progression form a geometric progression and the sum of the 3^{rd} and 5^{th} terms is 24. Find the first term of A.P and G.P. ANS A_1 =3 and G_1 = 6

144. A rectangular plot of land has sides 9 m and 25 m find the length of a side of the square having the same area as this plot. ANS. 15 m

145. What is the difference between the sums of the first ten terms of the arithmetic progression and geometric progression whose terms are $-2 + 4 \pm \ldots$

146. The 3^{rd} term and 7^{th} term of G.P is 12 and 192 respectively. Find the sum of the first six terms of the progression given that G_1 is positive and common ration (r) is negative.

147. The sum of the first seven terms of an arithmetic progression is 56 and the first term is 2. Find the difference between the 4^{th} term and 7^{th} term of the progression

148. Find the common difference or the common ratio of the following;
   a) $X, X + 2, X + 4, \ldots$
   b) $X, 2X, 4X, \ldots$
   c) $X^2, X^3, X^4, \ldots$
   d) $0.45454545\ldots$

149. Write down the nth term of the sequence 1, -1, 1, -1 …

150. Find the nth term of the series $-1 + 1 - 1 + 1 - \ldots$

151. Find the sum of first 100 terms of the series. 3 + 3 + 3 + 3 + ...

152. Find the sum of the first four terms of an arithmetic progression whose sum of the first two terms is 25 and the sum of the 4^{th} term and the 3^{rd} term is 45.

153. The first three consecutive terms of A.P are $x - d, x$ and $x + d$ their sum is 24 and their product is 120. Find the possible values of d

154. The first term, the fifth term and the seventh term of an arithmetic progression are the second term, third term and fourth term of geometric progression. Find the common ratio of G.P.

155. The first term and second term of a geometric progression are 3 and 9 respectively..

a) Find the third term, fourth term and fifth term.

b) Verify that the sum of the first five terms is given by $S_n = \frac{G1\ (r^n - 1)}{(r - 1)}$ by using the results in part (a).

156. Given that 8, u, v, 64 form the first four consecutive terms of a geometric progression, find the value of u and v and that of the fifth term
.

157. The 7^{th} term of a geometric progression is 4 times the 5^{th} term. If the 2^{nd} term is 4. Find the sum of the first five terms of the progression.

158. The 9^{th} term of an A.P is twice as greater as the third term and the 15^{th} term is 27. Find the sum of first ten terms of this progression.

159. Given that the sum of the first two terms of G.P is 16 and the sum of the second term and third term of the same G.P is 48. Find the fifth term of this progression.

160. The sum of the first six terms of an A.P is 21 and the 7^{th} tem is thrice the sum of the 3d and 4^{th} terms. Find the second term of this progression.

THE EARTH AS THE SPHERE #6

161. A ship sails northwards to Tabora (5^0S,33^0E) at an average speed of 10 knots. If the ship starting points is Mbeya (9^0S, 33^0E) at 12:40 Pm on Monday, when will it reach Tabora. ***ANS. 12:40PM on Tuesday.***

162. Two Towns both on latitude 45^0S differ in longitude by 50^0. Calculate the distance between two towns measured along the parallel of latitude .***ANS. 3931.5km or 2122.84 n.m***

163. A plane flying at 595km/hour leaves Dar es Salaam (7^0S, 39^0E) at 0800 on Monday. When will it arrive at Addis Ababa at (9^0N, 39^0E). ***ANS. 1059 on Monday***

164. An aero plane flies from Tabora (5^0S, 33^0E) to Tanga (5ºS, 39ºE) at 332 km/hour along parallel of latitude. If it leaves at Tabora at 1500 Sunday. Find the arrival time at Tanga airport. ***ANS. 1700 Sunday***

165. A ship is steaming in eastern direction from town A to town B. if the position A is (32^0N, 136^0W) and B is (32^0N, 138^0W). What is the speed of sheep if it takes 3hours from town A to town B. ***ANS. 63 $^{km}/_{h}$ or 34knots***

166. A ship sails northwards to Tanga (5^0S,39^0E) at an average speed of 12 knots. If the ship starting points is Dar es Salaam (7^0S, 39^0E) at 12:30 A. noon, when will it reach Tanga? ***ANS. 10:30PM the next day***

167. A ship is teaming at 15knots in western direction from Q to R. if the position of P is 40ºS, 178º E and that of Q is 40º S, 172º E, how long will the journey take? ***ANS. 18 hours and 23 minutes***

168. A speed boat traveling from Zanzibar (6^0S, 45^0E) to Mwanza (9^0S, 45^0E) using 30knots left Zanzibar at 11:30am at what time did it reach at Mwanza? ***ANS. 5: 30 PM on the same day***

169. A ship sails from point A (10^0S, 30^0W) to B(12^0S, 30^0W) at 10 knots. If it leaves point A at 12:00 midnight on Monday when will it arrive at B?***ANS.Tuesday at 12:00 noon***

170. Find the time taken for a ship to sail from town P(80^0N, 60^0W) to town Q(60^0S, 60^0W) in 70knots. ***ANS 5days or 120 hours***

171. A ship sails from point A (10^0S, 30^0W) to B(10^0N, 30^0W) at 20 knots. If it leaves point A at 12:00 midnight on Monday when will it arrive at B? ***ANS. Thursday at 12:00 noon***

172. A ship sails from point A (10^0S, 30^0W) to B(16^0S, 30^0W) at 10 knots. If it leaves point A at 12:00 midnight on Monday when will it arrive at B?***ANS.Wednesday at 12:00 noon***

173. Two places A and B on latitude $54^0N$are 450 nautical miles apart. Find the difference in longitudes. ***ANS.*** $\mathbf{12^0 46'}$ ***or*** $\mathbf{13^0}$

174. A ray from the centre of the earth to a point P on the surface on the earth makes an angle of $75^0$with the ray from the centre of the earth to the South Pole. How long is the parallel of latitude through P? ***ANS. 1648.68 km or 890.22 n.m***

175. Find how long in kilometres the radius of the small circle parallel to equator along latitude 25^0. ***ANS 5773.18 km***

176. An airplane fly 12knots from town A$(60^0N, 45^0E)$ to town B$(60^0N, 55^0E)$. Find the time used to reach town B.

177. A ship sails from Bungulwa at $(7^0N, 32^0W)$ and sails east for 24^0. What is its new latitude and longitude? ***ANS.*** $\mathbf{(7^0\ N, 8^0 W)}$

178. A plane starts at $(51^0N, 31^0E)$ to A$(51^0N, 14^0W)$. Find the distance travelled***. ANS. 3149. 12 km or 1700.39 n.m***

179. A ship can sail at $24^{km}/_{h}$. It starts at $(30^0S, 60^0E)$, it sails due to north for 8 hours, then due to east for 12 hours. Find the latitude and longitude of its final position. ***ANS.*** $\mathbf{(28^0S, 63^0E)}$

180. A plan starts at $(23^0N, 15^0E)$, then flies east to $(23^0N, 33^0E)$,and then flies south to $(5^0S, 33^0E)$. The total time taken was 6 hours. Find the speed, given that it was constant. ***ANS. 446 Knots***

181. How long does it take a ship to travel due east from $(60^0N, 60^0E)$to $(60^0N, 63^0E)$, sailing at 9 knots? ***ANS. 10 hours***

182. A ship sails due west at 14 knots, starting at $(35^0N, 75^0E)$. Find where it will be after 25hours .***ANS. at*** $\mathbf{(35^0N, 68^0E)}$

183. Find the distance in nautical miles along a circle of latitude between $(23^0N, 15^0E)$and $(23^0N, 55^0E)$. ***ANS. 3866.12 n.m***

184. An aircraft took off from city A$(0^0, 65^0E)$ moving eastward along the equator for a distance of 1900km to city B. write the position of city B. ***ANS B*** $\mathbf{(0^0N, 82^0E)}$

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185. A speed boat travelling from Usega$(6^0S, 45^0E)$ to Ukanga $(4^0S, 45^0E)$ using 30 knots left Usega at 11: 30 A.M. on friday At what time did it reach Ukanga? ***ANS. 3: 30 P.M***.

186. Calculate the length of diameter in kilometres of the parallel of latitude 64^0N.***ANS 5585km***

187. A plane starts at $(50^oS, 40^oW)$ and flies north for 3 000 km. find the latitude and longitude of where it ends. ***ANS.*** $(\mathbf{23^oS, 40^oW})$

188. A plane starts at $(20^oS, 20^oW)$ and flies due east for 1 985.4 km. find the latitude and longitude of where it ends. ***ANS.*** $(\mathbf{20^oS, 1^oW})$

189. A plane starts at $(20^oS, 20^oW)$ and flies due south for 3 002.4 km. find the latitude and longitude of where it ends. ***ANS.*** $(\mathbf{47^oS, 20^oW})$

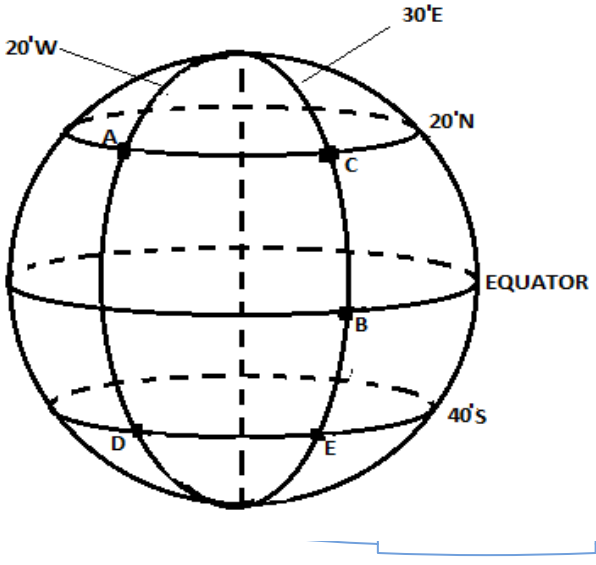
190. A plane starts at $(20^oS, 20^oW)$ and flies due north for 3 002.4 km. find the latitude and longitude of where it ends. ***ANS.*** $(\mathbf{7^oN, 20^oW})$

191. Find the shortest distance over the earth's surface between R(39°S,14°w) and S(39°S, 86°E) in kilometers.

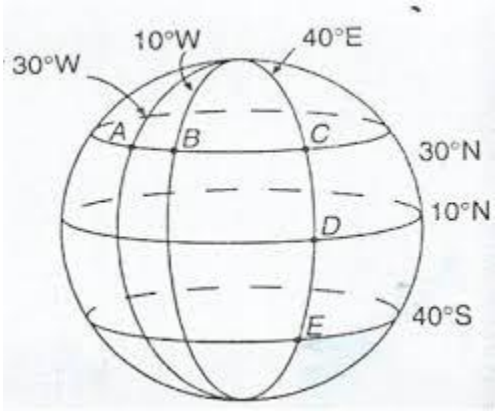
192. Point A is at $(20^oN, 40^oE)$and point B is at $(30^oN, 40^oE)$. find the distance between point A and B. (take the diametre of the earth be 12 800 km). ***ANS. 1117 km***

193. Find the distance in kilometres between Tanga$(5^oS, 39^oE)$ to Tabora $(5^oS, 33^oE)$. ***ANS. 664. 7 km***

194. a) Write down the latitudes and longitude of the places shown in figure
b) Find the distance in kilometers from A to C
c) Find the departure time at B and the arriving time at E, if the time used to travel from B to E is 100 hours for 24 knots



195. Find the distance in nautical miles from D to C



196. A cargo ship leaves point M$(41°S, 58°W)$ and sail due west for 30 hours to point N$(41°S, 70°W)$. Calculate its average speed in km per hr.

197. Two point A and B on latitude 48°N are 370 nautical miles apart. Find the difference in their longitude.

198. Match the correct parts to make a valid, statement:

Part one		Part two	Answers	
i.	Mean $(\bar{x})$	a. $G_1\left(\frac{r^n}{r}\right)$ b. Ten sides	i.	Is
ii.	Geometric mean of p and r	c. 9 sides d. Buying price – selling price	ii.	Is
iii.	Profit made	e. $L + \frac{c}{nw}\left(\frac{N}{2} - nb\right)$ f. $A_9 - A_7$	iii.	Is
iv.	General term of G.P	g. – buying price + selling price h. $\frac{G_3}{G_1}$	iv.	Is
v.	Median	i. $\sqrt{pr}$ j. $\log pq$	v.	Is
vi.	Sum of first n terms in A.P	k. $\frac{\sum fx}{\sum f}$ l. 8 sides	vi.	Is
vii.	Common ratio (r)	m. $G_1 r^{n+1}$ n. $\left(\frac{p+r}{2}\right)$	vii.	is
viii.	Decagon	o. $L + \left(\frac{\frac{N}{2} + nb}{nw}\right)c$ p. Liabilities – capital	viii.	Is
ix.	Common	q. $\frac{n}{2}(2A_1 + (n-1)d)$	ix.	Is

		difference (d)	r. $\left(\frac{p-r}{2}\right)$		
x.		Assets	s. $\frac{G_n}{G_{n-1}}$ t. $\log\left(\frac{p}{q}\right)$	x.	Is
xi.		Arithmetic mean of p and r	u. $P\left(1+\frac{RT}{100}\right)^n - P$	xi.	Is
xii.		loss made	v. $A_n - A_{n-1}$ w. $P\left(1-\frac{RT}{100}\right)^n - P$	xii.	Is
xiii.		Nonagon	x. $n(A_1 + A_n)$	xiii.	Is
xiv.		$\log p + \log q$	y. Liabilities + capital	xiv.	Is
xv.		$\sqrt[5]{159} = v$	z. $v^5 = 159$ aa. $v^{\left(\frac{1}{5}\right)} = 159$	xv.	is

CIRCLE #7

199. Find the arc length and area of the sector whose diameter and central angle is 28 m and 180° respectively. **ANS. 44 m and 308 m^2**

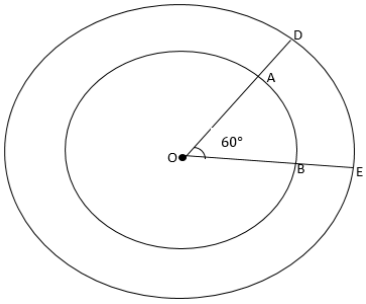
200. Find the diameter of the sector of the circle whose area and central angle is 693 m^2 and 180° respectively. **ANS 42m**

201. What is the central angle of the sector of the circle whose area and radius is 346.5 cm^2 and 21 cm respectively? **ANS 90°**

202. Find the arc length of the sector whose radius is 25m and central angle is 20°. **ANS 8.72 m**

203. Find the arc length of the sector of a circle whose radius is 14 m and its area is $462m^2$**. ANS arc length = 66 m**

204. Find the area of the sector of the circle whose arc length is 66 m and its central angle is 270°. **ANS Area = $462m^2$.**



205. If the radius of the small circle is 7 m and that of great circle is 14 m. find the area of the figure ABEDA, the length of arc AB and the length of arc DE. **ANS.**

ABEDA is 77 m^2, length of arc AB is 7. 3 m and length of DE is 14.7 m

206. Find the area of the sector whose radius and central angle is 25 dam and 20° respectively**. ANS. 109.03dam^2**

207. An arc of 10m subtends 0.4 rad at the Centre of a circle. Find the value of the radius of the circle

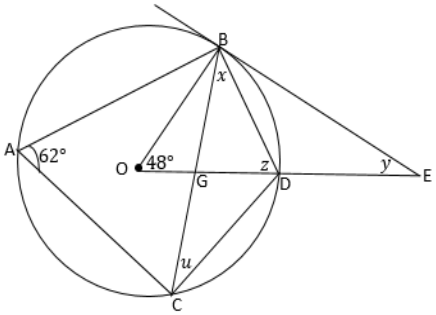
208. Edriana's racing bicycle has tires with a diameter of 14cm. Editha's mountain bicycle has tires with 21cm. if both bikes are wheeled forward 4π radians, how far will each bike travel? Explain why the two bikes travel different distances, even though the tires move the same number of radians.

209. Edriana runs for 80m along a circular running track of radius 50m. Through what angle has she turned? ***ANS. 91°43′ or 91.72***

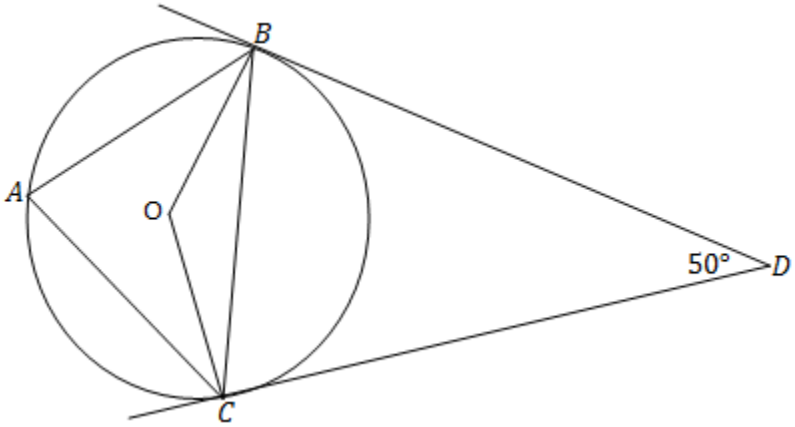
210. Find the arc length of the circle whose radius and area of the sector formed is 7 m and 77 m^2 respectively.

211. The radii of two concentric circles are 15 m and 13 m. a straight line ABCD cuts one circle at A and D, and the other circle at B and C. If $\overline{BC}$ is 10 m, calculate the length $\overline{AB}$

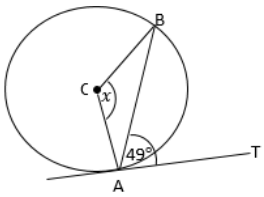
212. Find the value of all pronumerals, giving reasons for each step of your working. O is the centre of the circle, $\overline{BE}$ is a tangent. ANS. $u = 24°, y = 42°, z = 66°, x = 38°$



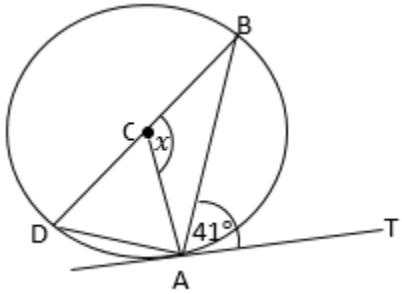
213. Find the size of angle$\angle CBO,\ \angle DBC\ and\ \angle BAC$



214. Find the value of an angle x, if C is the Centre of the circle and $\overline{AT}$ is a tangent to a circle. **ANS** $\boldsymbol{x = 98°}$

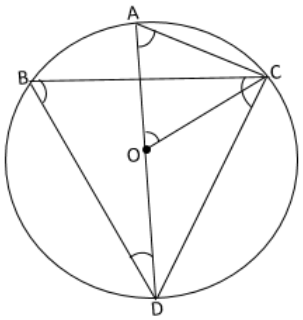


215. Find the value of ∠ADB, ∠ACB and ∠ABC. If C is the Centre of the circle.

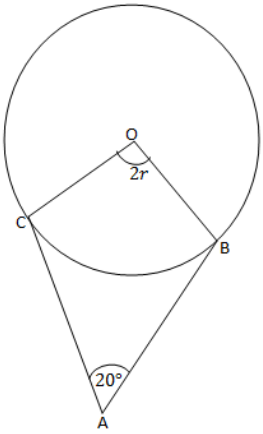


206. Find the value of the angles provided below if O is a Centre of a circle given that $\angle DCB = 70°$

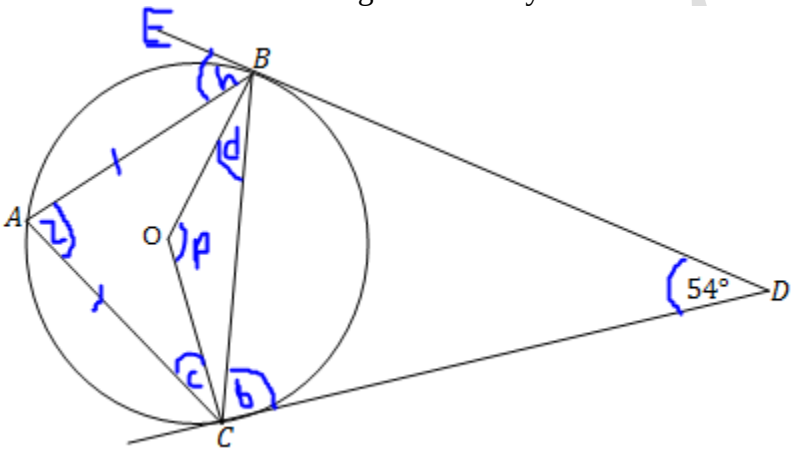
i. $\angle BD$
ii. $\angle OAC$
iii. $\angle OCB$



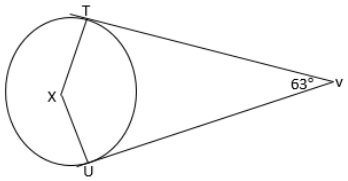
207. Find the value of r in the figure below.



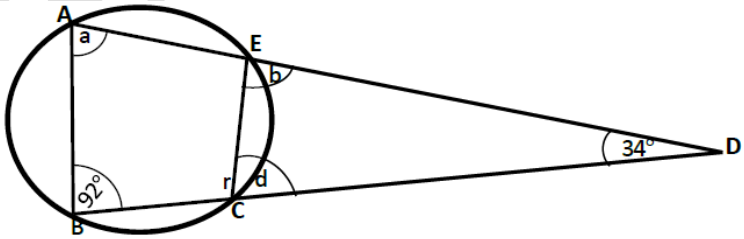
208. Find the value of the angle marked by small letters in the figure below



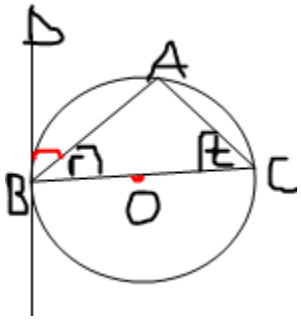
209. Find the size of $\angle TXU$



210. Find the size of the small lettered angles in the figure below

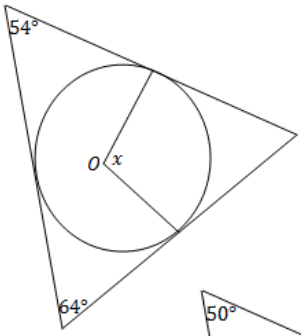


211. Find the value of angles marked by small letters if DB is a tangent to the circle and O is a centre of a circle.

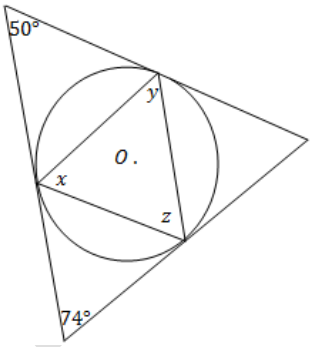


212. Find the value of the letter in the circle below, given that O is the centre of the circle and the line which appear to be tangent represent tangents

i.



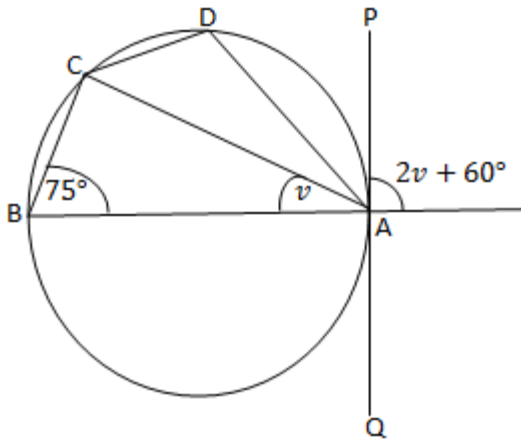
ii.



213. Prove that opposite angles of a cyclic quadrilateral are supplementary

214. Prove that exterior angle of a cyclic quadrilateral is equal to opposite interior angle

215. Find the value of v from the circle below, if PAQ is a tangent to the circle at A and BA is a diameter given that $\angle DAP = 40°$



Prepared by Tr. Ben from St. Francis De-sales
Mission Sec, School
Expert of Maths

ACCOUNTS #8

216. From 1st January to 29th January 2006 Mr. midelo decided to keep records of his business as follows :

Jan. 1 Mr.midelo started a business with capital in cash 500,000.00
5 Purchased goods …… ……...254,000.00
6 Sold goods ……290,000.00
9 purchased goods ……..204,000.00
29 expenses…… 24,000.00
29 sold goods…… 320,000.00

You are required to:

a. Prepare cash account and capital
b. Prepare trial balance. N:B. All payments and receipts were made in cash.

217. January 1, 2007 Evodia started business with capital in cash 1,200,00/=

January 2 Bought goods for cash 800,000/=
3 Purchased shelves for cash 250,000/=
5 Sold goods for cash 600,000/=
8 Paid rent for cash 240,000/=
10 Bought goods for cash 400,000/=
13 Paid wages for cash 60,000/=
18 Bought goods for cash 350,000/=
25 Sold goods for cash 300,000/=
27 Paid insurance for cash 100,000/=

a. Enter the given transactions in cash account,
b. Extract a trial balance.

218. From the given information below:

Opening stock	34,430/=
Closing stock	26,720/=
Net purchases	212,290/=
Gross profit makeup	50%
Water bill	45,880/=

Find: a). Cost of sales
b).Average stock
c).sales
d). net profit
e). net profit

219. a). use the balance sheet equation to fill the gaps in this table.

Assets	**Capital**	**Liabilities**

25,000	20,000	……..
100,000	……	80,000
……..	15,000	16,000
180,000	…….	120,000

b). prepare the balance sheet as at 31st December 2018 for the balances given in the table below.

Capital	45,000	Stock	4,000	Motor vehicle 7,000		Net profit	2,700
Drawings	8,000	Debtors	8,000	Cash in bank	4,000	Bank overdraft	6,000
Creditors	4,300	Premises	16,000	Cash in hand	9,000	Furniture	2,000

220. Madagaa started business on 1st January 2000 with capital of Tshs. 5,000,000.00 in cash.

January	2. Purchased goods and paid in cash Tshs	1,000,000.00
	3. Bought goods for cash	5,000,000.00
	5. Paid wages in cash	50,000.00
	7. Sold goods in cash	300,000.00
	8. Bought in cash	800,000.00
	9. Received loan from C.R.D.B	70,000.00
	12. Bought parking material in cash	20,000.00
	28. Paid transport charges	30,000.00
	28. Drew cash for charges	10,000.00

Enter the above transactions in the cash account and complete the Double entry.

221. June 1, 2000 Mr.Urasa stated a business with capital in cash 2,000,000/=
2 bought goods for cash 10% of sales
3 bought calculator for cash 300,000/=
4 sold goods for cash 800,000/=
8 Received salary in cash 250,000/=
12 paid wages for cash 200,000/=
15 paid rent for cash 300,000/=
20 ought goods for cash 600,000/=
20 paid carriage for cash 2% of rent
Enter the given transactions above in cash account and balance it.

222. EDRIANA commenced a business on 8th January 2019 with capital in cash 300, 000/=

June	9 bought goods for cash 150,000/=
	13 bought goods for cash 200,000/=
	16 sold goods for cash 450,000/=
	19 purchased goods for cash 50,000/=
	22 paid wages for cash 4000/=
	23 paid rent for cash 7000/=

25 bought computer for cash 50,000/=
28 paid water bills for cash 2000/=
Prepare the following:

i. Cash account,
ii. Trial balance
iii. Trading, profit and loss account and
iv. Balance sheet.

223. a). Prepare the balance sheet for the balances below

Loan from bank 20,000	Stock 5,000	Drawings 28,000
Computer 8,000	Debtors 8,000	Capital 45,000
Net profit 2,700	Bank payable 6,000	Creditors 4,300
Premises 16,000	Bank receivable 3,000	Cash 10,000

b). from the balance sheet constructed in (a) above, determine the following:

i. current ratio
ii. working capital

224. use the balance sheet equation to fill the gaps in this table.

Assets	**Capital**	**Liabilities**
18,000	20,000	……..
10,000	……	80,000
……..	15,000	111,000
18,000	…….	20,000

225. Trial balance as at 31st December, 2016

NO	Name of account	DR	CR
1	Capital		95,000
2	Purchases	60,000	
3	Sales		90,000
4	Stock as at 1st Jan, 2016	8,000	
5	Future	20,000	
6	Drawings	5,000	
7	Expenses	14,000	
8	Return on sales	2,500	

9	Return on purchases		3,000
10	Cash in hand	78,500	
TOTAL			

Closing stock as at 31st December, 2016 was 5,000. Prepare;

i. Trading, profit and loss account
ii. The balance sheet

226. The following information refers to Mr. Kahungya, a trader, as at 31st October 2012:

Sales……Shs.400,000.00
Gross Profit……25% of sales
Opening stock…20% of cost of sales
Expenses……10% of gross profit
Closing stock……Shs.120,000.00
Calculate:
(a) Opening stock
(b) Cost of sales
(c) Purchases
(d) Net profit
(e) Expenses

227. The following information relates to Mr. Kweka, a trade, as at 30th July 2013:
Sales .....shs. 340,000.00
Cost of sales .....75% of sales
Opening stock .....shs. 90,000.00
Net profit..... 20% of sales
Closing stock..... 20% of cost of goods sold,
Calculate:

i. Purchases
ii. Cost of sales
iii. Closing stock
iv. Net profit
v. Expenses

228. After ULAMAI completed form four in October 2017, she started chips business and she recorded the following transactions:

November 1 started with capital in cash 260,000/=
2 purchased potatoes for cash 70,000/=
3 sold chips for cash 90,000/=
7 purchased cooking oil for cash 30,500/=
13 bought aluminum foil for cash 5,000/=
19 paid transport charge for cash 3,000/=
20 bought more potatoes for cash 20,000/=
24 paid rent for Cash 6,000/=
29 sold chips for cash 60,000/=

a) Enter the transactions above in a cash account and balance it as at 1st December.
b) Prepare the trial balance as at 31st November 2017.

229. Mwajuma commenced business on 1st February with capital of cash 60,000.

Feb 2. Bought furniture for cash 5,000
3. Bought goods for cash.....35,000
4. Paid for transport.....450
5. Sold goods for cash 45,000
7. Paid rent 500
10. Bought goods for cash 50,000
15. Cash sales 40,000
18. Sold goods for cash 25,000
20. Paid wages 650
22. Lent Masawe 1,200
25. Paid for advertisement 680
28. Masawe repaid an account loan..... 1,000
29. Withdrew for personal use..... ..250
30. Paid for cleaning shop…150

Enter the above transaction in the cash book and balance it.