

MATHEMATICS - ALGEBRA

1. What is y if $\frac{x-y}{4} - \frac{17-2x}{8} = \frac{3}{4}$

Tafuta thamani ya ikiwa: $\frac{x-y}{4} - \frac{17-2x}{8} = \frac{3}{4}$

- A) 5.5
- B) 6
- C) 6.5
- D) 7
- E) Not possible (haiwezekani)

2. What is b if $\frac{a^2+2ab}{ab-a} = 2$, $a = -2$?

Tafuta thamani ya b ikiwa $\frac{a^2+2ab}{ab-a} = 2$, $a = -2$?

- A) 2
- B) 3
- C) -2
- D) -3
- E) 1

3. For natural numbers x and y, $x:y = 7.5 : 13.5$. What is the minimum sum for x and y?

Kwa namba asili x na y, $x:y = 7.5 : 13.5$. Tafuta thamani ndogo kabisa ya jumla ya x na y?

- A) 10
- B) 11
- C) 12
- D) 13
- E) 14

4. a, b, c and d are four distinct two digit natural numbers, where d is the biggest number. If $a + b + c + d = 128$, find the biggest possible value of d.

a, b, c na d ni namba 4 tofauti zenye tarakimu 4 ambapo d ni namba kubwa kuliko zote. ikiwa $a + b + c + d = 128$, tafuta thamani kubwa zaidi ya d.

- A) 92
- B) 93
- C) 95
- D) 96
- E) 97

5. Acacia is three times as old as her brother. In four years the sum of their ages will be half of their father's age. If their father is now 52 years old, how old is Acacia's brother.

Acacia ana umri mara tatu ya umri wa kaka yake. baada ya miaka 4 Jumala ya umri wao utakuwa ni nusu ya umri wa baba yao. Ikiwa baba yao ana umri wa miaka 52 kwa sasa, kaka yake Acacia ana umri gani?

- A) 12
- B) 16
- C) 20
- D) 36
- E) 40

6. $\left(\frac{1}{1} - \frac{1}{2}\right) + \left(\frac{1}{2} - \frac{1}{3}\right) + \left(\frac{1}{3} - \frac{1}{4}\right) + \dots + \left(\frac{1}{99} - \frac{1}{100}\right) = ?$

- A) 0.96
- B) 0.97
- C) 0.98
- D) 0.99
- E) 1

7. A clothing company has 4 different kinds of shirts. Each year, the company makes 60,000 of each kind of sweatshirt. How many shirts does the company make each year?

Kampuni fulani ya nguo inatengeneza aina 4 za mashati. Kila mwaka inatengeneza mashati 60,000 kwa kila aina. Je, kampuni hiyo inatengeneza mashati mangapi kwa mwaka?

GEOMETRY

8. One of two supplementary angles is three times 12 less than the other. What is the largest one?

Moja kati ya pembe mbili nyongeza ni mara tatu ya namba 12 pungufu ya nyingine. Tafuta thamani ya pembe kubwa kati ya hizo?

- A) 60°
- B) 80°
- C) 100°
- D) 120°
- E) 132°

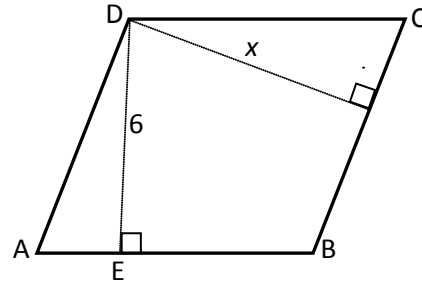
9. In a quadrilateral ABCD, points E and F lie on AB and BC respectively. $|EF| = |BF|$, $\angle A = \angle C = 90^\circ$, and $\angle D = 110^\circ$.

Katika umbo la pembe nne ABCD, pointi E na F zipo juu ya AB na BC kwa mfuatano huo. $|EF| = |BF|$, $\angle A = \angle C = 90^\circ$, na $\angle D = 110^\circ$.

- A) 60°
- B) 70°
- C) 80°
- D) 90°
- E) 100°

10. In a parallelogram ABCD, $AB = 21\text{cm}$, $AD = 14\text{cm}$ and $DE = 6\text{cm}$. What is x ?

Katika msambamba ABCD, $AB = 21\text{cm}$, $AD = 14\text{cm}$ and $DE = 6\text{cm}$. What is x ?



- A) 12
- B) 14
- C) 16
- D) 8
- E) 9

11. If sides of a square increase by 1 m, then its area increases by 101 m^2 . What is the length of the original square's sides?

Iwapo pande za mraba zikaongezwa kwa mita 1, eneo la mraba huo litaongezeka kwa mita za mraba 101. Tafuta urefu wa upande wa mraba huo kabla ya lile ongezeko?

- A) 20
- B) 30
- C) 50
- D) 75
- E) 100

12. If the sum of the interior angles of a regular polygon measures 1440° , how many sides does the polygon have?

Iwapo jumla ya pembe za ndani za umbo lenye pande sawa ni 1440° , je umbo hilo lina pande ngapi?

- A) 10
- B) 8
- C) 12
- D) 9
- E) none of these (hakuna jibu)

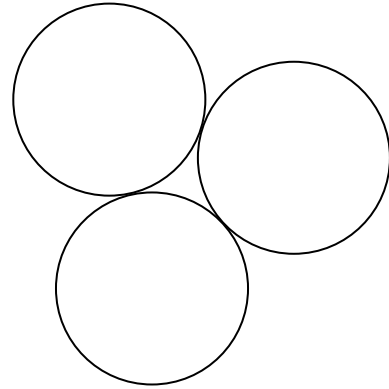
13. If the largest angle in a triangle is 70° , what is least possible value of the smallest angle of the triangle?

Iwapo pembe kubwa kuliko zote katika umbo la pembe tatu ni 70° , ni nini thamani ndogo kabisa ya pembe ndogo kuliko zote katika umbo hilo la pembe tatu?

- A) 69°
- B) 1°
- C) 40°
- D) 39°
- E) 41°

14. Three identical circles with diameter 8cm tangent to each other as shown below. Find the area enclosed by the circles?

Duara tatu zinazolingana zenye kipenyo cha sm 8 zimegusana kama ifuatavyo. Tafuta eneo lililofungwa na duara hizo.



Genius Cup 14 September 2019

COMBINATORICS

15. One hundred and one people chatted in WhatsApp. What can the maximum number of chats be for a person?

Watu 101 walikuwa wanazungumza kupitia WhatsApp. Ni namba gani kubwa zaidi ya maongezi itakuwa kwa mtu mmoja?

- A) 101
- B) 100
- C) 99
- D) 5050
- E) 500

16. Hassan produced words using letters E, I, L and P (A word has meaning or not e.g EILP). Then he arranged these words in an alphabetical order. What is the position of the word PILE?

Hassan aliunda maneno kwa kutumia E, I, L and P (haijalishi kama lina maana au la. mfano: EILP). Halafu alipanga maneno hayo kialfabeti. Je, neno PILE litakuwa lipo nafasi ya ngapi?

- A) 18
- B) 19
- C) 20
- D) 22
- E) 24

17. Twenty nine people chatted in WhatsApp. Each person chatted to exactly 10 people. What was the total number of chats?

Watu 29 walikuwa wanazungumza kupitia WhatsApp. Ikiwa kila mtu alizungumza na watu 10, nini jumla ya mazungumzo yaliyojitokeza?

- A) 290
- B) 280
- C) 145
- D) 135
- E) 130

18. A family consists of a mother, father, 2 girls, and 3 boys. How many different ways can the family choose one girl to wash the dishes and one boy to dry the dishes?

Familia fulani inajumuisha mama, baba, watoto 2 wa kike na 3 wa kiume. Ni katika njia ngapi familia hiyo inaweza kuchagua msichana mmoja kuosha vyombo na mvulana mmoja kukausha vyombo?

- A) 6
- B) 7
- C) 8
- D) 9
- E) 10

19. The Labanese restaurant offers the following side order choices: tater tots, french fries, and onion rings. They come in two sizes: small and large. How many possible combinations are there?

Mgahawa wa kilebanon unaofa vifuatavyo kama chakula cha ziada: tater tots, chipsi na vitunguu. Vinaletwa kwa ukubwa wa aina mbili: ndogo na kubwa. ni michanganyiko mingapi inawezekana?

- A) 5
- B) 6
- C) 7
- D) 8
- E) 9

20. Judy wakes up in the morning and finds that she has three pairs of shorts and four shirts. How many ways can she dress for school?

Judy anaamka asubuhi na kukuta ana jozi tatu za kaptula na 4 za mashati. Ni katika njia ngapi anaweza kuvaa kuelekea shuleni?

- A) 5
- B) 6
- C) 9
- D) 12
- E) 14

21. Margeret fills in 2×2 table using numbers 1,2,3 and 4 each once. One number is placed in an unit square exactly once. She places 4 as shown in the figure. In how many ways can she place the remaining numbers?


	4

Margeret anajaza meza yenye 2×2 namba 1,2,3 na 4 kila moja mara moja. Namba moja imewekwa katika mraba mmoja mara moja tu. Ameweka miraba minne kama inavyoonekana katika mchoro hapo juu. Ni katika njia ngapi anaweza kuweka namba zilizobakia?

	4


NUMBER THEORY

22. A number that can make equilateral dot patterns is called a triangular number.



 i.e. $T_1 = \bullet = 1$, $T_2 = \bullet \bullet = 3$, $T_3 = \bullet \bullet \bullet = 6$.
 What is the value of $T_7 + T_3 - T_5$

Namba inayoweza kutengeneza umbo nukta la pembetatu sawa inaitwa namba pembetatu.



 Mfano: $T_1 = \bullet = 1$, $T_2 = \bullet \bullet = 3$, $T_3 = \bullet \bullet \bullet = 6$. Tafuta thamani ya $T_7 + T_3 - T_5$

- A) 19
- B) 20
- C) 45
- D) 35
- E) 30

23. How many multiples of 5 are there between 73 and 212?

Kuna vigawe vingapi vya 5 vilivyopo baina ya 73 na 212?

- A) 27
- B) 28
- C) 29
- D) 35
- E) 100

24. A 4-digit number $x53y$, where x and y are digits, is a multiple of 5 and 3. What is the smallest possible value of that number?

$x53y$ ni namba yenye tarakimu 4 huku x na y ni tarakimu katika namba hiyo. Vilevile namba hiyo ni kigawe cha 5 na 3. Ni ipi thamani ndogo zaidi ya namba hiyo?

- A) 1350
- B) 1355
- C) 1531
- D) 1530
- E) 1535

25. Jamal's father promised him to give a pocket money not exceeding 100 USD under the condition of sharing it with his friends who are either 2, 3 or 5 people. What is the maximum amount of money Jamal can get from his father under these conditions?

Baba yake Jamal aliahidi kumpa Jamal pesa ya matumizi isiyozidi 100 USD kwa masharti kuwa atagawana na rafiki zake aidha 2, 3 au 5. Ni kiasi gani kikubwa ambacho Jamal anaweza kupewa na baba yake kwa kuzingatia masharti hayo?

- A) 30
- B) 60
- C) 90
- D) 99
- E) 100

26. A man wants to plant trees around a rectangular field whose sides are 76m and 132 m long. The trees are put in such a way that the distance between them is the same for each tree. What is the least number of trees that man need and the distance between them?

Mtu fulani anataka kupanda miti izunguke kiwanja chenye umbo la mstatili wenye upana wa mita 76 na urefu wa mita 132. Miti inatakiwa kupandwa kwa umbali sawa baina ya mti na mti. Ni miti mingapi kwa uchache zaidi atahitaji na kutakuwa na umbali gani baina ya mti na mti?

- A) 27
- B) 28
- C) 29
- D) 35
- E) 100

27. C is a natural number. If C is divided by 2, 3, and 7, and the remainders are 1. What is the smallest possible value of C.

C ni namba ya asili. Ikiwa C ikigawanywa kwa 2, 3 na 7 itabaki 1. Nini thamani ndogo kabisa ya C?

- A) 42
- B) 43
- C) 44
- D) 45
- E) 50

28. A grasshopper can jump 58 times half its length at a go. If it jumps twice and covers the distance of 232 cm, how long is the grasshopper?

Panzi anaweza kuruka mara 58 ya nusu ya urefu wake kwa mara moja. Kama aliruka mara mbili na akaweza kwenda umbali wa 232 cm, je panzi ana urefu gani?

SCIENCE

29. A person who is dehydrated is one who has lost,

- A) A lot of blood
- B) A lot of vitamins from the body
- C) A large quantity of iron
- D) A lot of water from the body

Mtu aliye na ukosefu wa maji mwilini ni mtu ambaye amepoteza,

- A) Damu nyingi
- B) Vitamini nyingi kutoka kwenye mwili
- C) Kiasi kikubwa cha madini ya chuma
- D) Maji mengi kutoka mwilini

30. Mushroom, yeast and penicillium are examples of

- A) Non-green plant
- B) Non-sporting plants
- C) Pale green plants
- D) Plants with weak roots

Uyoga , amira and penisiliamu ni mifano ya,

- A) Mimea isiyo ya kijani
- B) Mimea isiyo ya michezo
- C) mimea yenye kijani kibichi
- D) Mimea iliyo na mizizi dhaifu

31. Which of the following sets represent soil erosion?

- A) Wind, water, plant & animals
- B) Plant, water, animals & sea waves
- C) Water, tillage, winds & ice
- D) Animals, wind, rain & heat

Ni ipi kati ya seti zifuatazo zinaonyesha mmomonyoko wa ardhi?

- A) Upepo, Maji, Mimea & wanyama
- B) Mimea, Maji, Wanyama & Mawimbi ya bahari
- C) Maji , tillage, upepo & Barafu
- D) Wanyama, Upepo, Mvua & Joto

32. Which one of the following is the correct sequence of the water cycle?

- A) Sea/river/lakes/clouds →Plants →Animals
- B) Sea/river/lakes → Soil → Animals →Plants
- C) Sea/river/lake → Clouds →Rain →Soil
- D) Sea/river/lakes → Soil → Clouds → Rain

Ni ipi kati ya yafuatayo ni mlolongo sahihi wa mzunguko wa maji?

- A) Bahari/Mto/Maziwa/Mawingu →Mimea → Wanyama
- B) Bahari/Mto/Maziwa →Ardhi → WanyamaMimea
- C) Bahari/Mto/Ziwa → Mawingu → Mvua → Ardhi
- D) Bahari/Mto/Maziwa → Udongo → Mawingu → Mvua

33. Double walled membrane surrounding the heart is called,
- A) Periosteum
 - B) Pericardium
 - C) Peritoneum
 - D) Perilymph

Utando wa pande mbili unaouzunguka moyo unaitwa,

- A) Periosteum
- B) Pericardium
- C) Peritoneum
- D) Perilymph

34. Measles, Flu and TB are diseases which are transmitted by
- A) Stagnant water
 - B) Air
 - C) Dirty food
 - D) Blood transfusion

Vipimo, homa na kifua kikuu ni magonjwa ambayo hupitishwa na

- A) Maji yaliyoTuama
- B) hewa
- C) Chakula kichafu
- D) uchangiaji damu

35. The root nodules of leguminous plant fix to the soil

- A) Carbon
- B) Nitrogen
- C) Hydrogen
- D) Oxygen

Vifunduo vya mizizi ya mimea jamii ya kunde huongeza kwenye udongo

- A) kaboni
- B) Naitrojeni
- C) Haidrojeni
- D) Oksijeni

36. The following data were obtained after measuring the heights of 5 plants in centimeters: 10, 12, 15, 28 and 40. The average height of plant in centimeters is...

- A) 22
- B) 25
- C) 27
- D) 30

Takwimu zifuatazo zilipatikana baada ya kupima urefu wa mimea 5 kwa sentimita: 10, 12, 15, 28 na 40. Urefu wa wastani wa mmea katika sentimita ni ...

- A) 22
- B) 25
- C) 27
- D) 30

37. Which acid is used in car batteries?

- A) Nitric acid
- B) Sulphuric acid
- C) Hydrochloric acid
- D) Lactic acid

Asidi ipi hutumiwa katika betri za gari?

- A) Naitric asidi
- B) Salfuric asidi
- C) Haidrochroric asidi
- D) Laktik asidi

38. Which of the following can most likely be a symptom of schistosomiasis?

- A) Blood in urine
- B) Cataract
- C) Chest pain
- D) Constipation

Ni ipi kati ya dalili zifuatayo ni ya ugonjwa wa kichocho?

- A) Damu kwenye mkojo
- B) ukungu machoni
- C) Maumivu katika kifua
- D) kushindwa kujisaidia

39. If a person with blood group O loses a lot of blood, this blood must be replaced by a person with blood

- A) Group O
- B) Group AB
- C) Group A
- D) Group B

Ikiwa mtu mwenye kundi la damu O kapoteza damu nyingi, atachangiwa damu na mtu mwenye damu

- A) kundi O
- B) kundi AB
- C) kundi A
- D) kundi B

40. A single Celled Animal such as amoeba reproduces by dividing into two. This type of reproduction is known as

- A) Sexual reproduction
- B) Asexual reproduction
- C) Vegetative Reproduction
- D) Long division

Mnyama mwenye seli moja kama vile amoeba huzaa kwa kugawanyika vipande viwili. Aina hii ya uzazi inajulikana kama

- A) uzazi wa jinsia mbili tofauti
- B) uzazi wa jinsia moja
- C) uzazi wa mimea
- D) Mgawanyiko mrefu

41. The average temperature in Dar Es Salaam for this month is 122°F. What is this temperature in degrees Celsius?

- A) 40
- B) 45
- C) 50
- D) 55

Joto la wastani Dar es Salaam kwa mwezi huu ni 122°F. Joto hili kwenye nyuzi Celsius ni ngapi?

- A) 40
- B) 45
- C) 50
- D) 55

42. A blood serum taken from a Malaria patient was investigated by an instrument called microscope, finally the germs observed were....

- A) Paramecium
- B) Fungus
- C) Protozoa
- D) Plasmodium

Sehemu ya damu iliyochukuliwa kutoka kwa mgonjwa wa Malaria ilichunguzwa na chombo kinachoitwa darubini, hatimaye vijidudu vilivyoonekana vilikuwa....

- A) Paramesiamu
- B) Fangasi
- C) Protozoa
- D) Plasmodium

43. The part of the brain that controls involuntary actions such as heartbeats, respiration, sneezing etc. is called

- A) Cerebrum
- B) Cerebellum
- C) Medulla oblongata
- D) Mid-brain

Sehemu ya ubongo inayodhibiti vitendo vya hiari kama vile mapigo ya moyo, kupumua, kupiga chafya nk inaitwa

- A) Cerebrum
- B) Cerebellum
- C) Medulla oblongata
- D) Ubongo wa kati

44. Study the part section of this female reproductive system showing one of the methods of family planning used:



name the method of family planning illustrated above:

- A) Vasectomy
- B) Stick method
- C) Tubaligation
- D) Pills

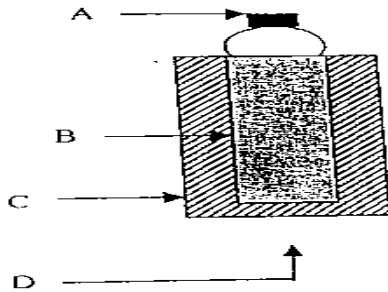
Soma sehemu ya mfumo huu wa uzazi wa kike unaonyesha moja ya njia za kupanga Uzazi



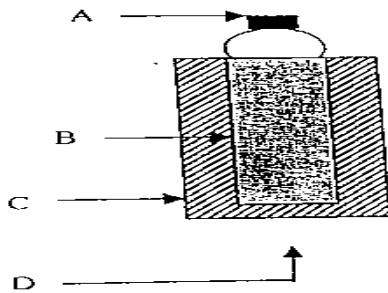
taja njia ya upangaji uzazi iliyoonyeshwa hapo juu:

- A) Vasectomy
- B) Njia ya fimbo
- C) Tubaligation
- D) Vidonge

45. Study carefully the diagram of the dry cell shown below. The part which is made up of carbon is represented by a letter of



Chunguza kwa umakini mchoro wa seli kavu ilichoonyeshwa hapa chini. Sehemu ambayo imetengenezwa na kaboni inawakilishwa na herufi gani



46. Very thick mist is called

- A) Fog
- B) Dew
- C) Heavy rain
- D) Water

Ukungu mzito sana huitwa

- A) Ukungu
- B) Umande
- C) mvua nzito
- D) Maji

47. Which of the following is NOT the function of the respiratory system?

- A) Regulate blood Ph
- B) Helps in gaseous exchange
- C) Contains receptors for the sense of smell
- D) Protection against blood loss

Ni ipi kati ya ifuatayo sio kazi ya mfumo wa kupumua?

- A) Kufekabisha pH ya Damu
- B) Husaidia katika kubadilishana gesi
- C) Inayo vinasa harufu
- D) Ulinzi dhidi ya upotevu wa damu

48. Mass of oil is 11040 kg and volume is 12 m³, its density would be

- A) 920 kg m⁻³
- B) 92 kg m⁻³
- C) 9.2 kg m⁻³
- D) 1.08 × 10⁻³

Uzito ya mafuta ni kilo 11040 na kiasi ni 12 m³, wiani wake ungekuwa

- A) 920 kg m⁻³
- B) kilo m⁻³
- C) 9.2 kg m⁻³
- D) 1.08 × 10⁻³

49. John, Peter and Jane weigh 80N, 60N and 50N respectively. John sits 3 meters, Peter sits 5 meters and Jane sits 6 meters. from the fulcrum on the same side. How far must their 200N father sit from the fulcrum in order to balance them?

John, Peter na Jane wana uzito wa 80N, 60N na 50N . John ameketi mita 3, Peter huketi mita 5 na Jane anakaa mita 6. kutoka kwa Egemeo upande huo huo. Je! Baba yao 200N anapaswa kukaa mbali kiasi gani na Egemeo ili kusawazisha?

50. Find the current passing through the circuit below.

Tafuta mkondo katika mzunguko uliyopo chini

