

MATHEMATICS - ALGEBRA

1. $8+6x5a = 68$ Find a in the equation.

$8+6x5a = 68$ Tafuta thamani ya a katika mlinganyo.

- A) 1
- B) 2
- C) 3
- D) 4

3. Iddy has a total of 109 goats and hens(chickens) in his farm. All goats and hens have 354 legs. How many goats are there in his farm?

Iddy ana jumla ya mbuzi na kuku 109 katika shamba lake. Na wana jumla ya miguu 354. Je kuna mbuzi wangapi katika shamba?

- A) 68
- B) 72
- C) 76
- D) 80

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2. $\frac{71}{1420} - \frac{83}{3320} = ?$

- A) $\frac{1}{10}$
- B) $\frac{1}{20}$
- C) $\frac{1}{30}$
- D) $\frac{1}{40}$

4. In a bag of small balls $\frac{1}{12}$ are green, $\frac{1}{8}$ are blue, $\frac{1}{4}$ are yellow and the remaining 26 are white. How many balls are blue?

Ndani ya begi dogo lenye mipira, $\frac{1}{12}$ ni ya kijani, $\frac{1}{8}$ ni ya bluu, $\frac{1}{4}$ ni ya njano na na iliyobaki 26 ni ya rangi nyeupe. Je ni mipira mingapi ya bluu?

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

5. A car is traveling 75 kilometers per hour. How many meters does the car travel in three minutes?

Gari linatembea kilometa 75 kwa saa. Je ni mita ngapi hutembea kwa dakika tatu?

- A) 3000 m
- B) 3200 m
- C) 3600 m
- D) 3750 m

7.
$$\frac{8a^2b + 4ab^2}{2a+b}$$

What is the simplified form of the expression?

Rahisisha

- A) $2a+b$
- B) $a+2b$
- C) $2ab$
- D) $4ab$

6.

$2x-5$ cm

$x+5$ cm

$3x-3$ cm

What is the area of rectangle above?

Nini eneo la mstatili hapo juu?

- A) 84 cm^2
- B) 240 cm^2
- C) 405 cm^2
- D) 450 cm^2

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NUMBER THEORY

8. x, y are real numbers. If $(x+y-4)^2 = 0$ then what is the value of $x+y$?

x, y ni namba kamili. Iwapo $(x+y-4)^2 = 0$ ni ipi thamani ya $x+y$?

- A) 1
- B) 2
- C) 3
- D) 4

9. 1A56B is a five digit number. When 1A56B is divided by 36 the remainder is 23. How many possible values can A take?

1A56B ni namba yenye tarakimu tano. Wakati 1A56B ikigawanywa kwa 36 inabaki 23. Thamani ngapi za A zinaweza kupatikana?

- A) 1
- B) 2
- C) 3
- D) 4

10. If 7200 is factorized, what is the biggest prime factor's power?

Kama 7200 ikiandikwa katika vigawe, nini kipeo cha kigawe tasa kikubwa?

- A) 1
- B) 2
- C) 3
- D) 5

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11. If $\frac{2x-6}{24}$ is an integer. What is the lowest positive value of x ?

Iwapo $\frac{2x-6}{24}$ ni namba nzima. Ni ipi thamani ndogo chanya ya x ?

- A) 0
- B) 3
- C) 6
- D) 15

12. ISHK is a 4digit number and MED is a 3digit number. In ISHKMED each letter means different digits. If $ISHK+MED=2010$ then find $I+S+H+K+M+E+D$?

ISHK ni namba yenye tarakimu nne na MED ni namba yenye tarakimu tatu. Katika ISHKMED kila herufi ina tarakimu tofauti. Iwapo $ISHK+MED=2010$ tafuta $I+S+H+K+M+E+D$?

- A) 17
- B) 23
- C) 27
- D) 30

14. A kangaroo takes 6 seconds for every 4 jumps. How long does it take her to do 10 jumps ?

Kangaroo anatumia sekunde sita (6) kwa kuruka mara nne (4). Je itamchukua muda gani kuruka mara kumi (10)?

- A) 15
- B) 12
- C) 10
- D) 18

13. One 2-digit number was written on a board. A student wrote the same number on the same side of the last digit. One 4 –digit number was formed by these writing. How many times the 4-digit number is greater than the 2-digit number ?

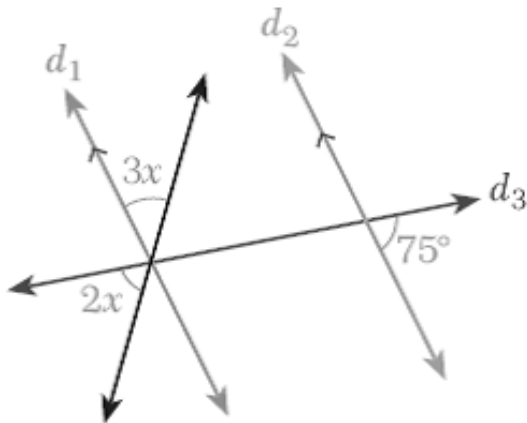
Namba yenye tarakimu mbili iliandikwa ubaoni. Mwanafunzi akaandika namba ile ile baada ya tarakimu ya mwisho. Namba yenye tarakimu nne iliundwa kwa kuandikwa hivyo. Namba yenye tarakimu nne ni mara ngapi zaidi ya namba yenye tarakimu mbili?

- A) 100
- B) 101
- C) 10
- D) 11

GEOMETRY

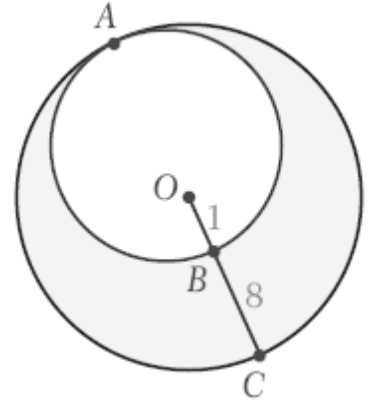
15. In the figure, d_1 & d_2 . What is the value of x ?

Katika mchoro ufuatao d_1 & d_2 ni mistari sambamba. Nini thamani x ?



- A) 18°
- B) 20°
- C) 21°
- D) 22°

16. The figure shows two circles which are internally tangent to each other at A . O is center of the bigger circle and $OB = 1$, $BC = 8$. Find the area of the shaded region.

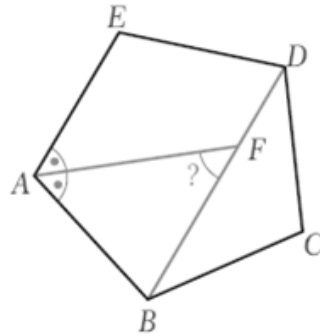


Mchoro ufuatao unaonyesha duara mbili ambazo zimegusana katia point A . O ni kitovu cha duara kubwa na $OB=1$, $BC=8$. Tafuta eneo lenye kivuli.

- A) 64π
- B) 56π
- C) 81π
- D) 49π

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17. In the figure, ABCDE is a regular pentagon, DB is a diagonal and AF is the bisector of $\angle A$. What is $m(\angle AFB)$?

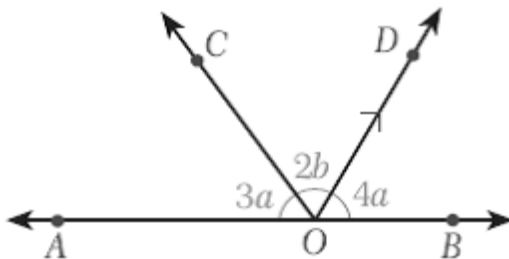


Katika mchoro ufuatao ABCDE ni pentagoni sawa, DB ni mshazari na AF inagawanya kati $\angle A$. ni ipi thamani ya $m(\angle AFB)$?

- A) 54°
- B) 56°
- C) 60°
- D) 72°

18. In the figure, $OD \parallel FE$, $m(\angle AOC) = 3a$, $m(\angle COD) = 2b$ and $m(\angle DOB) = 4a$. If $b = 20^\circ$. What is the value of a ?

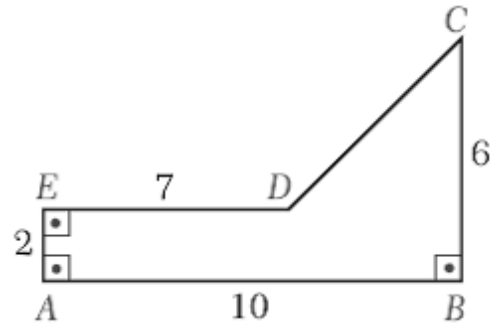
Katika mchoro, $OD \parallel FE$, $m(\angle AOC) = 3a$, $m(\angle COD) = 2b$ na $m(\angle DOB) = 4a$. Iwapo $b = 20^\circ$. Nini thamani a ?



- A) 10°
- B) 20°
- C) 30°
- D) 40°

19. In the polygon ABCDE at the right, $\angle A$, $\angle B$ and $\angle E$ are right angles. If $AE = 2$, $DE = 7$, $AB = 10$ and $BC = 6$, what is the perimeter of ABCDE?

Katika poligoni ABCDE, $\angle A$, $\angle B$ and $\angle E$ ni pembe mraba. Kama $AE = 2$, $DE = 7$, $AB = 10$ na $BC = 6$, Tafuta mzingo wa ABCDE?



- A) 24
- B) 28
- C) 30
- D) 32

20. The difference between the measures of two complementary angles is 44° . What is the measure of the larger angle?

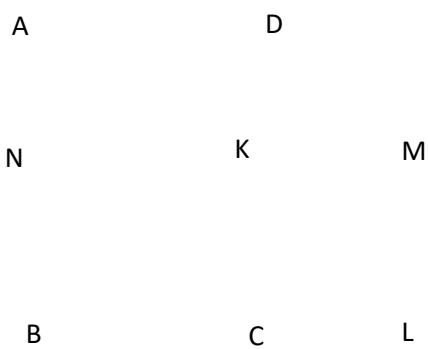
Tofauti kati ya pembe ambazo ukizijumlisha unapata pembe mraba ni 44° . Pembe kubwa kati ya hizo mbili ina thamani ya nyuzingapi?

- A) 72°
- B) 67°
- C) 65°
- D) 62°

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21. ABCD and KCLM are squares.
 $NB=CL$ If Area of (ABCD)= 144 cm^2
 and
 Area of (KCLM)= 25 cm^2
 What is the length of NC?

*ABCD na KCLM ni miraba
 $NB=CL$. Iwapo Eneo la (ABCD)= 144cm^2
 na Eneo la (KCLM) = 25cm^2
 Ni upi urefu wa NC?*



- A) 9
- B) 11
- C) 13
- D) 15

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COMBINATORICS

22. A boy has one more sister than brothers. How many more brothers than sisters does his sister have?

Kijana ana dada mmoja zaidi ya idadi ya kaka. Je dada yake anao kaka wangapi zaidi ya idadi ya dada?

- A) 1
- B) 2
- C) 3
- D) 4

23. Four villages A,B,C, and D are connected by trails as shown on the map. On path

A → B

there are

10 hills,

on the

path B → C

→ D there are 33 hills, on the path A →

B → D there are 22 hills, on the path

A → D → B there are 45 hills. A group

of tourists starts from A and wants

to reach D. They choose the path

with the minimal number of hills.

What is the best path for them?

Vijiji vine A,B,C, na D vimeunganishwa na barabara kama inavyoonyeshwa katika ramani. Katika njia ya

A → B kuna milima kumi, katika njia ya

B → C → D kuna milima 33,

katika njia ya A → B → D kuna

milima 22, katika njia ya A → D →

B kuna milima 45. Kikundi cha

watalii walianzia kijiji A na

kwenda kijiji D. Walichagua njia

yenye idadi ndogo ya milima. Ni

njia gani nzuri ya kutumia?

A) A → C → D

B) B → C → D

C) A → B → D

D) A → D

24. The digits on many electronic devices look like this:

0123456789

When numbers made of these digits are rotated 180° (), some of them become numbers and some don't. For example, when 8 is rotated it remains the same, 25 becomes 52, and 14 does not become a number.

If you rotate 521 through 180° ,

what number can you get?

Tarakimu katika vifaa vingi vya kielektroniki huonekana kama hivi

Ikiwa namba zinazotengenezwa na vifaa hivi zitazungushwa kwa 180° (), baadhi yake zitaendelea kuwa namba na nyengine hazitokuwa namba. Kwamfano 8 inapogeuzwa itabaki vilevile, 25 itakuwa 52, na 14 haitokuwa namba. Kama utageuza 521 utapata namba nini?

- A) 251
- B) 215
- C) 512
- D) 125

25. Edgar can walk only in the directions to pass through numbers on the road. What is the possible maximum sum for the numbers he passed through?

2	3	6
1	4	5

Edgar anaweza kutembea katika uelekeo kupitia namba zilizoandikwa katika barabara ni kisai gani ki kubwa zaidi cha jumla ya namba ana weza kupitia?

- A) 10
- B) 12
- C) 14
- D) 21

26. A family: Father, Mother, Grandfather and Daughter want to cross the Dark bridge. They have only 2 flashlights, so at most two people can cross at the same time.

- The father can cross in 1 minute.
- The mother can cross in 2 minutes.
- The daughter can cross in 5 minutes.
- The grandfather can cross in 10 minutes.

If two people are crossing, they go with the speed of the slowest of the two. What is the minimum number of minutes that entire family cross the bridge?

Familia ya Baba, mama, babu na mtoto wanataka kuvuka daraja. Wakiwa wamebeba tochi mbili tu, ambapo watu wawili tu wanaweza kuvuka kwa wakati mmoja.

- baba anatumia dakika moja kuvuka.
- mama anatumia dakika mbili kuvuka.
- mtoto anatumia dakika tano kuvuka.
- babu anatumia dakika kumi kuvuka.

Endapo watu wawili watawuka kwa pamoja, watumia kwa mwendo wa mwenye spidi ndogo. Je watumia muda gani mdogo zaidi ili familia yote iweze kuvuka katika daraja?

- A) 10
- B) 12
- C) 14
- D) 16

27. In a primary school, 10 male and female students formed a circle. It appeared that there is no child such that both its neighbors are female. What is the least possible number of male students?

Katika shule ya msingi, jumla ya wanafunzi kumi wa kike na kiume walitengeneza duara. Ikatokea kwamba hakuna mwanafunzi ambaye jirani zake wote wawili walikuwa wa kike. Je uwezekano wa idadi ndogo ya wanafunzi wakiume ni ngapi?

- A) 6
- B) 5
- C) 4
- D) 3

28. A 3×3 square is filled with numbers 1, 2, or 3, one number in each of the 9 unit squares (numbers can repeat). Every number must be used at least once. What is the maximal sum of all numbers in 9 unit squares?

Mraba wa 3×3 umewekwa namba 1, 2 au 3 katika kila chumba katika vyumba 9 vilivopo kwenye mraba (namba zinaweza kujirudia). Kila namba inatakiwa itumike angalau maramoja. Ni ipi jumla kubwa ya namba inayoweza kupatikana katika vimraba hivyo 9?

- A) 16
- B) 20
- C) 24
- D) 28

SCIENCE

29. Which organ is largest in human body?

Ogani ipi ni kubwa katika mwili wa binadamu?

- A) Heart (Moyo)
- B) Liver (Ini)
- C) Skin (Ngozi)
- D) Lung (Mapafu)

31. Light energy is converted to chemical energy through the process of

Nishati ya jua hubadilishwa kuwa nishati ya kikemikali kwa kupitia kitendo cha

- A) Solar panel. (Paneli za sola)
- B) Respiration. (Kupumua)
- C) Photosynthesis. (fotosinthesisi)
- D) Fermentation. (chachisha)

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30. Which organelle contains digestive enzymes?

Oganeli ipi ina vimeng'enya?

- A) Endoplasmic reticulum (endoplazimiki retikulamu)
- B) Lysosomes (lizo-zomu)
- C) Ribosome (ribo-zomu)
- D) Golgi Apparatus (golgi bodi)

32. Which one of the following has the same kind of relation as it is given below

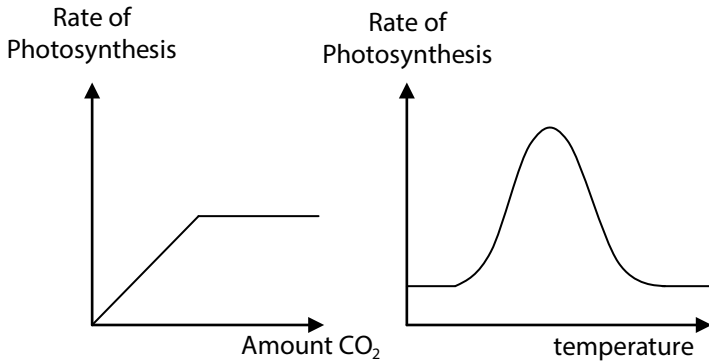
Ipi kati ya zifuatazo ina uhusiano kama wa

PHOTOSYNTHESIS : OXYGEN
(FOTOSINTHESIS : OKSIJENI)

- A) Transpiration : water vapor
transpiresheni-mvuke wa maji
- B) Germination : oxygen
kuota- oksijeni
- C) Respiration : carbon dioxide
kupumua – kaboni dayoksaidi
- D) Digestion : enzymes
Mmeng'enyo - vimeng'enya

33. According to graphs given below, which one of the following statement is correct

Kwa kuzingatia mchoro hapo chini, ipi ni kauli sahihi



- A) Photosynthesis is independent of environmental factors.
fotosinthesisi inategemea hali ya mazingira
- B) Increases in amount of CO₂ cause increases in temperature.
kuongezeka kwa kiwango cha CO₂ inasababisha kuongezeka kwa joto
- C) As the rate of photosynthesis increases, the temperature of a plant eventually decreases.
kila fotosinthesis inapoongezeka, joto la mmea hupungua
- D) The rate of photosynthesis is affected by changes in the environment.
kiwango cha fotosinthesi kinaathiriwa na mabadiliko ya mazingira

34. Which of the following is the largest group of living organism?

Kundi lipi kati ya yafuatayo lina idadi kubwa ya viumbe hai?

- A) Mammal (wanyama)
- B) Reptile (reptilia)
- C) Amphibian (amfibia)
- D) Insect (wadudu)

35. An empty beaker of 150 g weighs 200 g when full of water. What would it weigh when full of mercury?

$(d_{\text{mercury}} = 13.6 \text{ g/cm}^3, d_{\text{water}} = 1 \text{ g/cm}^3)$

Bika tupu yenye uzito wa 150 g ina 200 g ikiwa imejazwa maji mpaka juu. Je itakuwa na uzito gani itakapojazwa mekyuri?

$(d_{\text{mekyuri}} = 13.6 \text{ g/cm}^3, d_{\text{maji}} = 1 \text{ g/cm}^3)$

- A) 830g
- B) 680g
- C) 4760g
- D) 4910g

36. The SI unit of time is

Kizio cha muda ni

- A) Second (sekunde)
- B) Minute (dakika)
- C) Hour (saa)
- D) Light year (mwaka mfupi)

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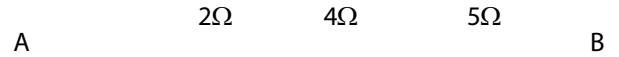
37. Gold element is represented by symbol of _____.

Elementi ya dhahabu inawakilishwa kwa alama ya _____.

- A) Hg
- B) Go
- C) Au
- D) Ag

39. Calculate the total resistance between A and B points

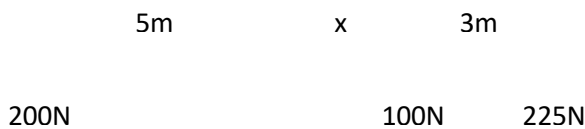
Tafuta kiasi cha ukinzani kati ya pointi A na B



- A) 14Ω
- B) 7 Ω
- C) 60/67Ω
- D) 5 Ω

38. In the diagram given below, calculate the value of X?

Katika mchoro ufuatao, tafuta thamani ya X?



- A) 3.25m
- B) 1m
- C) 3.11m
- D) 2m

40. When a school nurse measured the temperature of Ally using a Fahrenheit scale she got 140°F. If the nurse had used the centigrade scale, she would obtain

Nesi wa shule alipompima Ally joto lake kwa kipimo cha farenheit alipata 140°F. Kama nesi angetumia kipimo cha sentigredi angepataje?

- A) 60°C
- B) 284°C
- C) 309.6°C
- D) 140°C

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41. Henry was pushing a box through 4m by using 50N as shown in the picture. What will be the work that has been done by Henry

Henry alisukuma box kwa 4m kwa kutumia 50N kama inavyo onyeshwa katika mchoro. Tafuta kiasi cha kazi iliyofanywa na Henry



- A) 0J
 B) Less than 200J (chini ya 200J)
 C) 200J
 D) More than 200J (zaidi ya 200J)

43. The main reason why no machine is 100% efficient is due to _____

Sababu ya kutokuwepo kwa machine yenye uwezo wa ufanisi kwa 100% ni

- A) Gravity (Uvutano)
 B) Friction force (msugvano)
 C) Efficiency (ufanisi)
 D) Mechanical advantage (faida ya kimekanika)

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42. A machine lifted a load of 60kg using an effort of 20N. Calculate the Mechanical Advantage (MA).

Mashine ilipandisha mzigo wa 60kg kwa jitihada ya 20N. Tafuta faida ya kimekanika.

- A) 1/3
 B) 40
 C) 3
 D) 30

44. Joan mixes two liquids having same volume. First liquid has pH8 and second one has pH2. What will be the colour of litmus paper if she drops it in the mixture?

Joan alichanganya vimiminika viwili vyenye ujazo sawa. Kimiminika cha kwanza kilikuwa na pH8 na cha pili kilikuwa na pH2. Je karatasi ya litmas itakuwa na rangi gani itakapodondoshewa mchanganyiko huo?

- A) Yellow (njano)
 B) Red (nyekundu)
 C) Blue (buluu)
 D) White (nyeupe)

45. is the outer membrane enclosing the embryo in birds, reptiles and mammals

.....Ni membreni ya nje inayofunika kijusi cha ndege, reptilia, na mamalia;

- A) Chorion (korioni)
- B) Amnion (amnioni)
- C) Placenta (plasenta)
- D) Umbilical (umbiliko)

47. What is the female gamete?

Gametiuke ni nini?

- A) Ovum (ovam)
- B) Ovary (ovari)
- C) Ovulation (uchavushaji)
- D) Oviducts (mirija ya uzazi)

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46. Which method can we use to separate the mixture of oil, water, and soil?

Ni njia gani hutumika kutenganisha mchanganyiko wa mafuta, maji na mchanga?

- A) Filtration, boiling
(kuchuja, kuchemsha)
- B) Decantation, separating funnel
(kupembua, kutumia faneli)
- C) Evaporation, filtration
(kuvukisha, kuchuja)
- D) Winnowing, distillation
(winowingi, distilasheni)

48. One of the effects of force is:

Moja ya madhara ya kani ni;

- A) To change colour
(kubadili rangi)
- B) To increase brightness
(kuongeza mwangaza)
- C) To change direction
(kubadilisha uelekeo)
- D) To change state of matter
(kubadilisha hali ya maada)

49. Which one of the following is the one responsible for reflex action

Ipi kati ya yafuatayo huratibu tendo lisilo la hiari

- A) Cerebrum
(serebram)
- B) Cerebellum
(serebellam)
- C) Medulla oblongata
(medulla oblongata)
- D) Spinal cord
(uti wa mgongo)