

ALGEBRA

1. What is the minimum sum of three different 3–digit positive integers using all digits once?

Tafuta jumla cha kiwango cha chini cha namba ndogo tatu zenye tarakimu 3 zenye utafaut?

- A) 1240
- B) 738
- C) 1368
- D) 711

2. A man can do a job in 6 h 35 min. If he starts to do the job at 9.30 a.m, what time does he complete the job?

Mtu anauwezo wa kufanya kazi kwa masaa 6 na dk 35. Atamaliza muda gani kama atanza saa 9.30 asubuhi ?

- A) 15:05
- B) 16:05
- C) 4:15 pm
- D) 3: 25 pm

3. The sum of the quarter and one third of a number is 5 less than the number. What is the number?

Jumla ya robo na theluthi ya namba ni 5 chini ya namba. Tafuta namba?

- A) 7
- B) 12
- C) 14
- D) 15

4. When we add twice the value of denominator to the numerator of a fraction and twice the value of numerator to the denominator of the fraction, it becomes $\frac{5}{4}$. Find the value of the fraction.

Kama sehemu ya juu ya sehemu itaongezwa mara mbili ya sehemu ya chini na mara mbili ya sehemu ya juu itaongezwa kwenye sehemu ya chini ya sehemu, jumla ni $\frac{5}{4}$. Tafuta hiyo sehemu

- A) $\frac{3}{7}$
- B) $\frac{4}{9}$
- C) $\frac{2}{3}$
- D) $\frac{1}{2}$

5. A bottle is a kg when it is full of water, this bottle is b kg when it is empty. How many kg will it be when one third of the bottle is filled by water?

Kama chupa nikiwa imejaa maji na kg b ikiwa tupu, kg ngapi zitakuwa kama itajazwa kwa theluthi ya chupa ?

- A) $2a+b$
- B) $(a-b)/3$
- C) $(a+2b)/3$
- D) $(a-2b)/3$

6. If $\frac{a-2}{7}$ is a simple positive fraction, then what is the biggest value of a?

Tafuata namba kubwa ya a , kama $\frac{a-2}{7}$ ni sehemu rahisi chanya.

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

7. If $x=2y=3z$, then $\frac{3x-2y+z}{3x+5y-2z}$ equals:

Kama $x=2y=3z$, tafuta $\frac{3x-2y+z}{3x+5y-2z}$

- A) $\frac{29}{14}$
- B) $\frac{29}{13}$
- C) $\frac{23}{11}$
- D) $\frac{11}{29}$

8. A car-washer can wash 18 cars and 8 trucks or 9 cars and 14 trucks per day. If he washes only cars, how many cars can be washed per day?

Muaoshaji anaweza kuosha magari 18 na malori 8 au magari 9 na malori 14 kwa siku. Kama ataosha magari tu, magari mangapi atakua ameosha kwa siku?

9. In a village the price of a cow is the price of 10 goats. the price of 5 goats is the price of 50 hens and the price of 10 hens is 20 ducks. How many cows can be bought with the Money 1000 ducks can be bought?

Kwenye kijiji kimoja bei ng'ombe ni sawa na bei ya mbuzi 10 na bei ya mbuzi 5 ni sawa na bei ya kuku 50 na bei ya kuku 10 ni sawa na bei ya mabata 20.

GEOMETRY

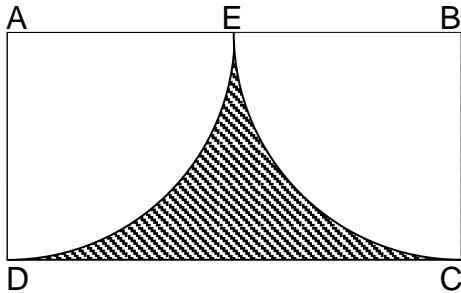
10. If one side of a square reduces by 4 cm, the area of the square reduces by 80 cm^2 . Find the perimeter of the square.

Kama upande mmoja wa mraba umepunguzwa kwa sm 4 na eneo la mraba limepungua kwa $\text{sm}^2 80$. Tafuta mzunguko wa mraba.

- A) 8
- B) 40
- C) 12
- D) 48

11. Point E is midpoint of aside AB in the following figure. Theradius of theeach quartercircle is 5 cm. Findtheshadedarea? ($\pi = 3$)

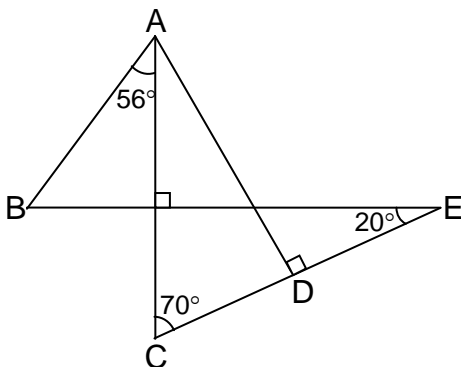
Kwenye umbo lifutalo E ni sehemu ya katikati ya AB. Kama nusu kipenyo cha kila robo mduara ni sm 5. Tafuta eneo lenye kivuli. ($\pi = 3$)



- A) 37.5
- B) 25
- C) 20.5
- D) 12.5

12. Theside AB equalstothesideAD. CD equalsto DE in thefigure. Findtheangle B.

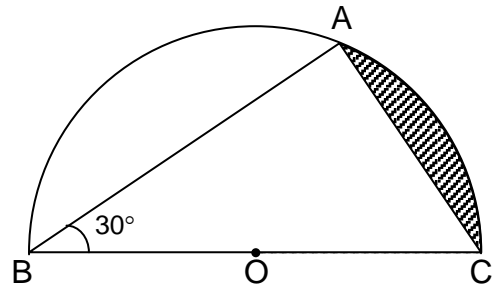
Tafuta pembe B kama pembe urefu AB=urefu AD



- A) 32
- B) 20
- C) 18
- D) 34

13. In the figure, right-angled triangle BAC is inscribed in a semi-circle with diameter BC. If BC = 8 cm, then the area of the shaded region is: ($\pi = 3$)

Tafuata sehemu yenye kivuli kama BAC ni pembe tatu iliyozungukwa na nusu duara lenye kipenyo BC. BC = sm 8, $\pi = 3$

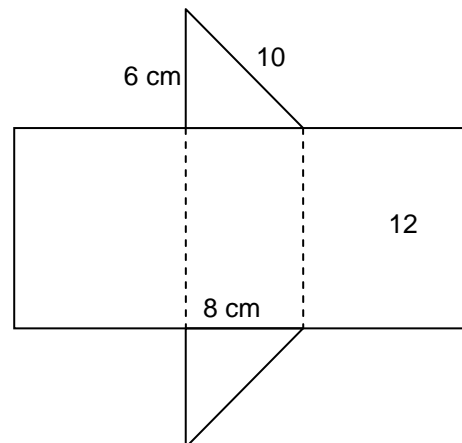


- A) $8\sqrt{3}$
- B) 16
- C) $8-4\sqrt{3}$
- D) $4\sqrt{3}$

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14. The figure shows the surfaces of a triangular prism. Find the surface areaof the triangular prism.

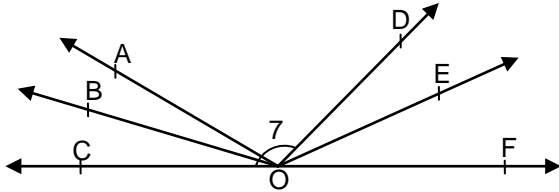
Umbo lifuatalo ni nyuso za pembe tatu. Tafuata enelo la umbo za mche wa mstatili.



- A) 336 cm^2
- B) 120 cm^2
- C) 288 cm^2
- D) 144 cm^2

15. If $\angle AOB = \angle BOC$, $\angle DOE = \angle EOF$ and $\angle COD = 76^\circ$, then find the $\angle COE$.

Kama $\angle AOB = \angle BOC$, $\angle DOE = \angle EOF$ na $\angle COD = 76^\circ$, Tafuta $\angle COE$.



- A) 104
- B) 128
- C) 95
- D) 104

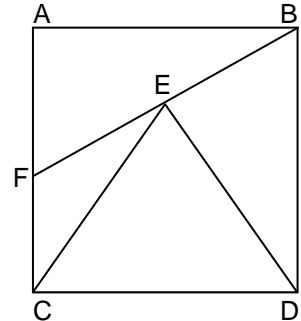
16. The surface area of a cube is equal to the area of the semi circle. If the radius of the circle is 8 cm. Find the volume of the cube. ($\pi = 3$)

Eneo la mchemraba (cube) ni sawa na eneo la nusu duara. Kama nusu kipenyo cha duara ni sm 8. Tafuta ujazo wa mchemraba (cube)

- A) 64
- B) 96
- C) 80
- D) 192

17. In the figure ABCD is a square and DEC is an equilateral triangle. Find $\angle FED$.

ABCD ni mraba na DEC ni pembe tatu. Tafuta $\angle FED$.



COMBINATORICS

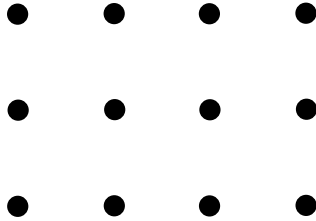
18. Determine the minimum among all numbers obtained by deleting any ten digits from the number 1357911131517

Tafuta namba iliyo ndogo kwenye 1357911131517 itakayopatikana kwa kufuta tarakimu 10 zozote.

- A) 131
- B) 111
- C) 112
- D) 311

19. In the grid, the distances between two neighbor points vertically or horizontally is one unit. How many squares can we form using the dots as vertices?

Miraba mingapi inaweza kutengenezwa kutoka kwenye nukta zifuatazo?



- A) 6
- B) 8
- C) 10
- D) 12

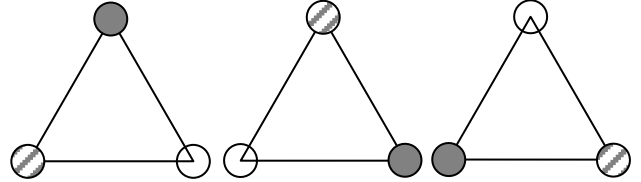
20. Numbers from 1 to 90 written in the line to form the following number 12345678910... 90. What is the middle digit in the number?

Nambari zimeandikwa kutoka 1 hadi 90 Katika mstari kama zifuatazo. 12345678910...90. Andika tarakimu yakati?

- A) 3
- B) 4
- C) 7
- D) 8

21. How many degrees should we rotate first figure to get the last figure?

Umbo la kwanza lizungushwe nyuzi ngapi kupata umbo la mwisho?



- A) 120
- B) 90
- C) 60
- D) 30

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22. How many squares contain 3 R's ?

Miraba mingapi in 3R kwa pamoja?

R			
		R	
	R		
			R

- A) 2
- B) 3
- C) 4
- D) 5

23. Some students standing around a circular line with equal distances from each other. If the third and the ninth ones are face to face (opposite) how many students are there?
- Baadhi ya wanafunzi wamesimamakwa mstari mviringo umbali sawa kutoka kwa kila mmoja. Kama mwanafunzi wa tatu na tisa wanaangaliana, kuna wanafunzi wangapi?*
- A) 10
B) 11
C) 12
D) 14

24. In a chess tournament each competitor plays at least once and gets following possible points :
- win :1
draw :0.5
lose : 0
- What is the sum of all points the competitors have if they play totally 10 games?
- Kwenye mashindano ya draft kila mshiriki hucheza angalau mara moja na kupata alama zifuatazo
kushinda :1
suluhu :0.5
kushindwa : 0
Kama watacheza michezo 10 Tafuta jumla ya alama zote?*
- A) 4
B) 5
C) 8
D) 10

25. Counting numbers from 1 to 55 are divided into groups as in the following way

Namba za kuhesabia kutoka 1 hadi 55 zimegawiwa katika makundi ya fuatayo.

$\underbrace{1}_{1st\ group}$ $\underbrace{2,3}_{2nd\ group}$ $\underbrace{4,5,6}_{3rd\ group}$ $\underbrace{7,8,9,10}_{4th\ group}$...

$\underbrace{46,47,48,49,50,51,52,53,54,55}_{the\ last\ group}$

Find the number of groups.
Tafuta idadi ya makundi

NUMBER THEORY

26. What is the least common multiple of 12 and 21 which is divisible by 5?

Tafuta KDS ya 12 na 21 ambayo inagawika kwa 5

- A) 420
- B) 42
- C) 84
- D) 105

27. How many prime numbers which are divisible by 2 are there?

Kuna namba tasa ngapi zinazogawika kwa 2?

- A) one
- B) two
- C) 4
- D) infinite

28. What is the last digit of 7^{10} .

Nini tarakimu ya mwisho ya 7^{10} .

- A) 9
- B) 7
- C) 3
- D) 1

29. How many 3-digit natural square numbers are there such that their first and last digits are same?

Kuna tarakimu tatu ngapi za namba halisi za kipeo cha pili kwa namna ambayo tarakimu ya kwanza na ya mwisho zina fanana.

- A) 0
- B) 1
- C) 2
- D) 3

30. If x is an even integer and y is an odd integer, then which of the following is an even integer?

Kama x ni namba shufwa na y ni witiri, ipi kati ya zifuatazo ni shufwa?

- A) $x^2 + y$
- B) $x^2 - y$
- C) $(x^2)(y)$
- D) $x + y$

31. A businessman goes to Chicago every 18 days for one day and another businessman every 24 days, also for only one day. Today, both men are in Chicago.

Within how many days will the two business men be in Chicago again at the same time?

Mfanyabiashara mmoja huenda Chikago kila siku 18 kwa siku moja na mwingine kila baada ya siku 24 kwa siku : kama kwa sasa wapo Chikago Chikago? Baada ya muda gani watakutana tena

- A) 72
- B) 74
- C) 70
- D) 80

32. **Evaluate. Tafuta thamani**
 $(3 - 33 + 333 - 3333 + 33333 - 333333$
 $+ 707070) \div 40 - 101$
 A) 10101
 B) 10,000
 C) 11,000
 D) 1010

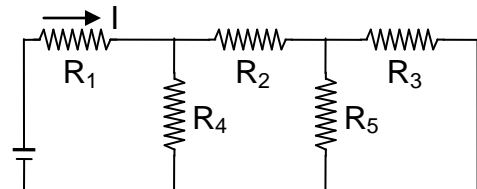
33. **Write all possible prime number pairs to express 16 as sum of two prime numbers.**

Andika namba mbili za tasa ambazo jumla yake ni 16.

SCIENCE

34. **What is total resistance?**
 $R_1 = 6\Omega$
 $R_2 = 3\Omega$
 $R_3 = 12\Omega$
 $R_4 = 6\Omega$
 $R_5 = 12\Omega$

Nini jumla ya ukinzani katika sakiti hii?



35. **Draw an atom model which has 8 electrons, 8 protons and 9 neutrons**
Chora muundo wa atomi wenye elektroni 8, protoni 8 na nyutroni 9

36. How many chromosomes does a Down's syndrome person have?

Mtu mwenye ugonjwa wa Dawnsindrom huwa na kromosom ngapi?

37. Ally: 'I wonder how I can dissolve a cube sugar much faster?'
Which one of the following cannot be the answer of Ally's question?

*Ally: 'Nashangaa vipi naweza kuyeyusha donge la sukari kwa haraka zaidi?'
Ni ipi kati ya zifuatazo si jibu sahihi la swali la Ally?*

- A) Mixing with a spoon
Kukoroga kwa kijiko
- B) Decreasing the amount of water
Kupunguza kiasi cha maji
- C) Using hot water
Kutumia maji ya moto
- D) Grinding the cube sugar
Kusaga donge la sukari

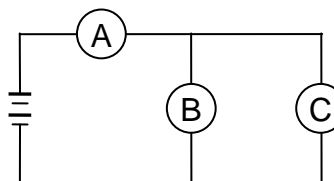
38. I. NO
II. Pb
III. S₈
IV. Mg₃(PO₄)
Which one(s) of the following are compound?

Ipi kati ya zifuatazo ni kampaundi?

- A) I and IV
- B) II and IV
- C) I and II
- D) III and IV

39. Which of the following identical bulbs will glow the brightest?

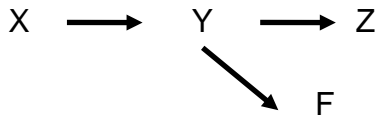
Ipi kati ya balbu hizi zifuatazo itawaka zaidi?



- A) Bulb A only
Balbu A tu
- B) Bulb B only
Balbu B tu
- C) Bulb C only
Balbu C tu
- D) Bulb B and C
Balbu B na C

40. The following diagram shows some of the feeding patterns in a grassland habitat.

Mchoro ufuatao unaongesha baadhi ya mifumo ya ulaji katika makaazi ya nyasi.



Which of the following statements is not true?

Yapi kati ya maelezo yafuatayo si sahihi?

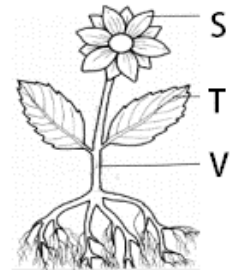
- A) Z hunt for their food
Z huwinda ili kujipatia chakula
- B) Y eat X
Y hula X
- C) F are herbivores
F ni hebivorasi
- D) Z are carnivorous
Z ni kanivorasi
41. Which one of following statements tells us that whale is mammal?
- Yapi kati ya maelezo yafuatayo yanatueleza kuwa nyangumi ni mamalia?*
- A) Whales live in water
Nyangumi wanaishi majini
- B) Whales eat fish
Nyangumi wanakula samaki
- C) Whales body shape helps them to move easily in the water
Umbo la nyangumi lilivo linawasaidia kuweza kujongea ndani ya maji kwa urahisi.
- D) Whale feeds her young with milk from her body
Nyangumi huwanyonyesha watoto wao maziwa yatokayo katika miili yao.

42. What are the energy transformations that occur from the DAM upto heater which we are using at home?

Ni mabadiliko gani ya nishati yatakatoka kutoka bwawani hadi katika hita ya nyumbani?

- A) Potential → kinetic → electrical → heat
Nishati tuli → nishati mwendo → nishati umeme → joto
- B) Potential → heat → electrical → kinetic
Nishati tuli → joto → umeme → nishati mwendo
- C) Kinetic → potential → electrical → heat
Nishati mwendo → nishati tuli → umeme → joto
- D) Kinetic → electrical → heat
Nishati mwendo → umeme → joto

43. Which one of the following sequences correctly shows each of the functions of the plant respectively?



Upi kati ya mtiririko ufuatao unaonesha kazi ya kila sehemu ya mmea kwa usahihi kama ilivopangiliwa?

- Holds the plant in the ground
Inashikilia mmea katika ardhi
 - Attracts insects
Inawavutia wadudu
 - Makes food for the plant
Inatengeneza chakula kwa ajili ya mmea.
- A) T, V, S
B) T, S, V
C) V, S, T
D) V, T, S

44. What will happen when 10cm³ ice melts in 50 cm³ water?

Nini kitatokea ikiwa Sm³10 za barafu zitayeyuka katika maji ya Sm³50.

- A) Total volume will be 60 cm³
Jumla ya ujazo utakua ni sm³60
- B) Total volumewill be below 60 cm³
Jumla ya ujazo utakua chini ya sm³60
- C) Total volumewill be morethan 60 cm³
Jumla ya ujazo utakuwa zaidi ya sm³60
- D) Mass will remain same
Uzito hautobadilika

45. When liquid water boils and turn into steam, the water molecules:

Wakati maji yanapochemka na kugeuka kuwa mvuke,molekyuli za maji huwa:

- A) Get lighter
Zinakuwa nyepesi
- B) Split up into atoms of hydrogen and oxygen
Zinavunjika kutoa atomu za haidrojeni na oksijeni
- C) Move further apart
Zinazunguuka hapa na pale
- D) Split up into molecules of hydrogen and oxygen
Zinavunjika kutoa molekyuli za haidrojeni na oksijeni

46. External fertilization takes place when the sperm and the egg meet outside the body. Which of the following animals undergo external fertilization?

Urutubishaji wa nje hutokea wakati mbegu za kiume na yai zinapokutana nje ya mwili. Yupi kati ya wanyama wafuatao hufanyaurutubishaji wa nje?

- I. Duck -Bata
- II. Frog - Chura
- III.Horse-farasi
- IV.Fly-nzi
- V. Fish-samaki

- A) I, II, III
- B) I, III, IV
- C) II and V
- D) I and II

47. Two groups of animals, A and B have similar and different characteristics:

Makundi mawili ya wanyama, A na B yana tabia zinazofanana na kutofautiana

Group A: Fly, Locust, Ant

Kundi A: Nzi, Panzi na Sisimizi

Group B: Penguin, Dove, Swallow

Kundi B: Pengwin, njiwa, mbayuwayu

Which description strictly applies to group A?

Maelezo yapi yanawiana na kundi A

- A) Sixlegsand body dividedinto 3 parts
Miguu sita, mwili umegawanyika sehemu 3
- B) Fourlegsandwingstofly
Miguu mine na mbawa za kuruka
- C) Beakandfeatheredwings
Mdomo mchongoko na mbawa zenye manyoya
- D) Legsandwings
Miguu na mbawa

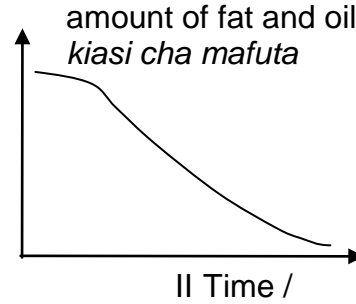
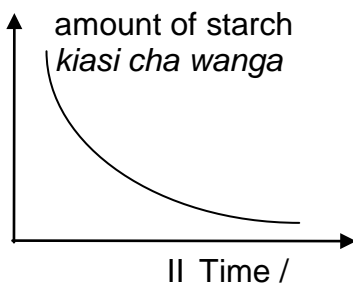
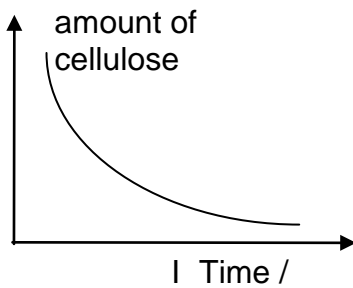
48. A patient whose gallbladder is surgically removed is most likely to have problems with...

Mgonjwa aliyefanyiwa upasuaji wa kuondolewa kibofu cha nyongo anauwezekano mkubwa wa kupata matatizo ya...

- A) Acid productions
Uzalishaji wa asidi(tindikali)
- B) Urea excretion
Utoaji wa yurea
- C) Absorption of mineral salts
Ufyonzaji wa madini ya chumvi
- D) Fat breakdown
Mmeng'enywa wa wa Fati(mafuta mgando)

49. Which one of the following diagram is correct during digestion in the human alimentary canal?

Upi kati ya michoro ifuatayo ni sahihi wakati wa mmeng'enywa wa chakula katika mfumo wa mmeng'enywa wa chakula?



- A) I and II
I na II
- B) Only I
I tu
- C) I, II, III
I, II na III
- D) II and III
II na III

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50. Which of the following circulates through blood in the body?

Kipi kati ya vinavofuatavyo huzunguuka mwilini kupitia katika damu?

- I. Food-*chakula*
- II. Oxygen-*oksijeni*
- III. Pulse-*mapigo ya moyo*
- IV. Carbon dioxide-*kabondayoksaidi*

- A) II and IV
II na IV
- B) I and II
I na II
- C) I, II and IV
I, II na IV
- D) II, III and IV
II, III na IV

51. When Michelin steps on a needle, she suddenly gets back her foot. What are the corrects equences of the organs that play role in that case?

Wakati Michelin alipokanyaga ncha ya sindano, ghafla aliundoa mguu wake kwa haraka sana. Mtiririko upi ni sahihi unaoonesha viungo au ogani zilizofanya kazi hiyo?

- A) Muscles, bones, nerves, sensory cells
Misuli, mifupa, neva na seli za fahamu
- B) Sensory cells, nerves, muscles, bones
Seli za fahamu, neva, misuli, mifupa
- C) Bones, muscles, nerves and sensory cells
Mifupa, misuli, neva na seli za fahamu
- D) Sensory cells, bones, muscles, nerves
Seli za fahamu, mifupa, misuli, neva

52. While adrenaline hormone is increasing in the blood, which one of the following does not happen?

Wakati homoni ya adrenalini inapoongezeka katika damu, kipi kati ya vifuatavyo hakitokei?

- A) The amount of urine increase
Kuongezeka kwa kiasi cha mkojo
- B) Heart beats increase
Kuongezeka kwa mapigo ya moyo
- C) The amount of stored food increase
Kuongezeka kwa kiasi cha chakula kinachohifadhiwa
- D) Breathing increase
Kuongezeka kwa upumuaji

53. Some students get information problems about ozone layer deletion, acidic rains and gren house effect from news papers and internet. Mentioned problems are related with:

Baadhi ya wanafunzi hupata taarifa zinazohusiana na matatizo ya kutoboka kwa tabaka la ozone, mvua za asidi na athari za grinihausi (chafu) kutoka katika magazeti na mitandao. Matatizo hayo yaliyotajwa yanahusiana na

- A) Soil pollution
Uchafuzi wa udongo/ardhi
- B) Water pollution
Uchafuzi wa maji
- C) Air pollution
Uchafuzi wa hewa
- D) Nuclear pollution
Uchafuzi wa nuklia

54. What is going to happen if the amount of vitamin C in the blood is more than supposed to be?

Nini kitatokea ikiwa kiasi cha vitamin C kitazidi kiwango kinachohitajika mwilini?

- A) Converted into energy
Kubadilishwa kuwa nishati
- B) Stored in intestines
Kitahifadhiwa katika utumbo
- C) Excreted out with urine
Kitatolewa nje kwa njia ya mkojo
- D) Stored in kidneys
Kitahifadhiwa katika figo

55. Which part of the plant transports water within the organism?

Sehemu gani ya mmea husafirisha maji ndani ya mwili wake?

- A) Xylem -ekzailemu
- B) Osmosis
- C) Diffusion-difyusheni
- D) Flower-ua

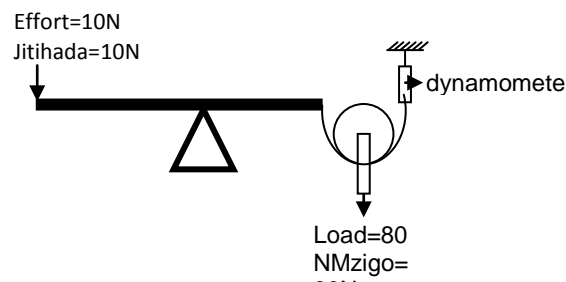
57. As genius pupil was walking from school towards the home at 5:00pm he noticed his shadow was his rightside. In which direction was the school from his home?

Mwanafunzi mmoja mwerevu alikua akitembea kutoka shuleni kwenda nyumbani saa 11.00 za jioni, akagundua kuwa kivuli chake kilikua upande wake wa kulia. Je ni upande gani shule ilikuwa kwa kutokea nyumbani kwake?

- A) East -mashariki
- B) West-magharibi
- C) South-kusini
- D) North-mashariki

58. In the given diagram, the system in the balance.

Mchoro uliopewa upo katika uwiano sawa,



Calculate $\frac{\text{distance moved by effort}}{\text{distance moved by load}}$
Kokotoa $\frac{\text{umbali wa jiti hada}}{\text{umbali wa mzigo}}$

- A) 4
- B) 8
- C) 1
- D) 0.25

56. Convert 50 °F to Celsius

Badili 50°F kuwa Selishas

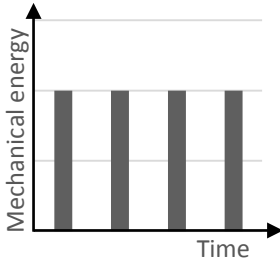
- A) 122
- B) 10
- C) 58
- D) 45

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59. Which of the following graphs certainly belongs to an object that moves on fractional surface?

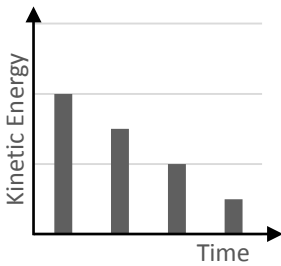
Jedwali lipi linaonyesha kitu kinachopiata katika sehemu yenye msugvano?

A)



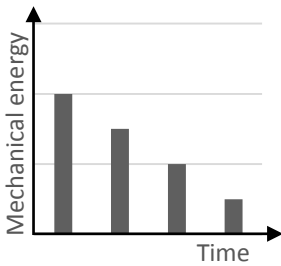
Mechanical energy = *nishati ya mekanika*,
time = *muda*

B)



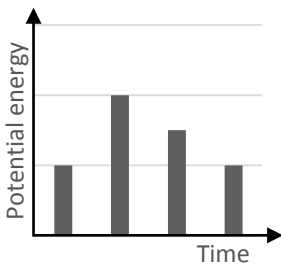
kinetic energy = *nishati ya mwendo*

C)



Mechanical energy = *nishati ya mekanika*,
time = *muda*

D)



potential energy = *nishati tuli*

60. For wheel K and wheel L,

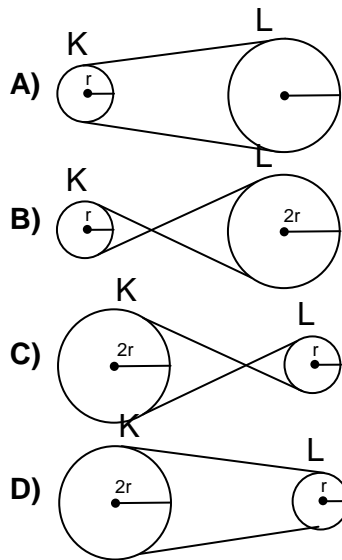
- They are rotating in opposite direction
- When wheel K rotates once, wheel L is supposed to rotate twice

According to the given information, how will be connection and sizes of wheel K and L?

Magurudumu K na L,

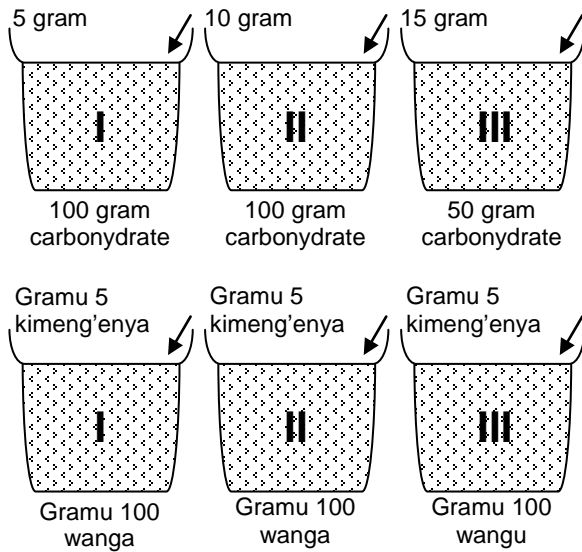
- *yanazunguuka katika uelekeo tofauti*
- *gurudumu K linazunguuka mara moja, gurudumu L linazunguuka maara mbili.*

Kutokana na maelezo hayo, vipi muunganiko wake utakuwa pamoja na ukubwa wa kila gurudumu?



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61. In order to investigate food digestion, three set-up are prepared as below:



Which are of the following question can be answered by this experiment?

Swali lipi kati ya yafuatayo linajibiwa na jaribio hili?

- A) Does the type of enzyme affect the speed of digestion
Je aina ya kimeng'anya inaathiri muda wa umeng'enyaji?
- B) Does the amount of food affect the speed of digestion
Je kiasi cha chakula kinaathiri muda wa umeng'enyaji?
- C) Does the size of container affect the speed of digestion
Je ukubwa wa chombo unaathiri muda wa umeng'enyaji?
- D) Does the amount of enzyme affect the speed of digestion
Je kiasi cha kimeng'anya kinaathiri muda wa umeng'enyaji?

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