

# Ucwawgciso Sifundo Yokuqala Iziqhelaniso

## IZIPHUMO EZIMANDUNDU

**CO#2:** ukusebenzisana ngendlela nabanye njengamalungu eqela, ombutho, okanye entlalo.

**CO#3:** ukuzilungisa nokuzilawula nezenzo zakho ngokuthembekileyo nangendlela.

**CO#4:** qokelela, hlela, ulungise, ukwaxabisa ngokumandundu ulwazi.

**CO#5:** Nxebelelana ngendlela ngokusebenzisa ubuchule bezezibalo, obokubonakalisa noboku / okanye obelwimi ngohlobo lwentetho okanye lokubhaliweyo.

## IZIPHUMO ZEMFUNDO

**LO#1:** Umfundi uza kukwazi ukuphakamela (act on) ngokuzithemba nangokuzingca ngezimanga zendalo, nokuphonononga ubudlelwane nezona ngxaki kwimeko zenzululwazi, ezobuchwepheshe nezemimandla.

**Ubuchule benkqubo:**

Uqwalaselo, ulinganiselo, ubhalo phantsi lolwazi, uqondo lwazi.

Uqikelelo ncingo (hypothesizing), uphakanyiso mibuzo ngemeko.

Ucebo lweziphengululo zenzululwazi.

Ulwaziwo lweziphengululo.

Unxebelelwano ngolwazi lwenzululwazi.

## AMABANGA OXABISO

Uceba iimpengululo; uncedisa kucaciso mibuzo yoqwalaselo kuphengululo achaze nohlobo lolwazi olunokudingeka kuphendulo mibuzo.

Wenza uphengululo aqokelele ulwazi; wenza uvavanyo olululo abhale phantsi akubonileyo okanye okuye kwaqhubeka.

Wenze uxabiso lwazi wenza nonxebelelwano lokufunyanisiweyo; wenza udlelwaniso lokuboniweyo nokwenzekileyo kumbuzo woqwalaselo.

## UKUFUNDISA KWESIFUNDO

Ngokusebenzisa lwazi olukwicandelo leziqhelaniso lesigaba sesine elifumaneka kuphepha 13, khumbuza abafundi isigama seziqhelaniso, kulandelwe yimpinda lwaziso lweziqhelaniso zeengwenkala olufutshane ngesenzo soLwakhelo Mendu.



### ISENZO 1 - uLwakhelo Mendu

Ngokusebenzisa itshathi ekhutshiweyo, mema abafundi bagcwalise izikhewu bebonakalisa ubudlelwane phakathi kwelungu, isiqhelaniso nomsebenzi walo.



## Isikhokhelo seempendulo zoLwakhelo Mendu:

ILUNGU	ISIQHELANISO	UMSEBENZI
Umsila	Mde ucuthekile.	Uxhathiso nokujika.
Umzimba	Ubhityile, unemilenze emide, ulula	Ucutheko lwempikiswano moya nenyathelo elide kwande nesantya.
Amathupha	Iinzipho ezingabuyi ngokugqibeleleyo, imikrwello enzulu phantsi kwamathupha.	Ubambelelo olungcono ukuphucula unyuso mendu nokukhuthaza iintshukumo ezikhawulezileyo.
Umqolo	Uthambile.	Unyusa inyathelo ngokuthi uvumele umzimba ubenakho ukutwezeka nangakumbi.
Intliziyo	Yandisiwe	Ulwabelo mongo moya oya ezihlunwini lwandisiwe.





## ICWECWE LOMSEBENZI LOLWAKHELO MENDU

**Igama:** \_\_\_\_\_ **Umhla:** \_\_\_\_\_

Ngokusebenzisa itshathi ekhutshiweyo, mema abafundi bagcwalise izikhewu bebonakalisa ubudlelwane phakathi kwelungu, isiqhelaniso nomsebenzi walo.

ILUNGU	ISIQHELANISO	UMSEBENZI
Umsila		
Umzimba		
Amathupha		
Umqolo		
Intliziyo		

### Iziqhelaniso zamendu zengwenkala:

Ingwenkala sesona silo sibaleka ngamandla ehlabathini, inesona santya siphezulu singama 110-120 eekhilomitha ngeyure. Ukubaleka yeyona ndlela yokuzikhusela yangwenkala, amendu ayo ayivumela ukuba ibenakho ukuzingela nokubaleka iingozi. Ingwenkala ineziqhelaniso ezininzi, eziyanceda ukuba ibenokubaleka ngokukhawuleza okungaka. Ingwenkala inobugoxo obulula ngeyona ndlela, ingenazihlunu zihlunu zininzi, okuyivumela ukuba ibenokubaleka ngamandla kuba ngokubanzima kwakho kukuchotha kwakho. Umzimba wengwenkala ubhityile, unempikiswano-moya (air resistance) engephi. Amathambo emilenze yayo made kuneyezinye iikati, zikwabaleka phezu kobungcipheko beenzwane zazo iingwenkala, okuthi ke kuyinike inyathelo elikhulu. Nomqolo wayo ingwenkala uthambe ngeyona ndlela xa kuthekiswa neyezinye iikati, oku ke kuthi kuyincede kunyuso lwamanyathelo ayo ngokuthi ibenakho ukutwezisa umzimba wayo nangakumbi. Amthambo azo anakho ukujika-jika apho aqhagamshelene khona nentsalela yobugoxo bazo, oku kuyivumela ukuba ibenakho ukutwezisa imilenze yazo yangemva nangakumbi. Zonke eziqhelaniso ziyinika ugxanyo/innyathelo elingangeemitha ezisibhozo ingwenkala xa ibaleka ngesona santya siphezulu. Umsila wengwenakala omde, omxinwa uyinceda ekuxhathiseni nasekujikeni. Amathupha ayo ayinika ubambelelo olungcono emhlabeni ukuyinqanda ekuweni ngelixa ibaleka ingwenkala. Olu bambelelo lunikwa yimikrwelo kwimiqamelelo yamathupha kwakunye namazipho angakwazi kutsalekela kumathupha ngokugqibeleleyo. Kuthatha amandla (energy) amaninzi ukuze ingwenkala ibenoku baleka kangaka. Ngumongo moya osegazini lethu osinika amandla. Ingwenkala inintliziyo namaphaphu amakhulu, xa kuthelekiswa nezinye izilo, ukuqinisekisa ukuba zifumana umongo moya owaneleyo oya ezihlunwini ngelixa ibaleka ukugcina amandla azo ekumgangatho owuwo.





## **ISENZO 2 - Iziqhelaniso zeBala Lasemva (kuthatyathwe ku- "Gritter Lab" ngokuyilwe nguBlake Sills noMelissa Gibbons)**

### **Inkqubo:**

Kwesi senzo, abafundi bazakuphonononga iziqhelaniso ngokusebenzisa umzekelo ofunyenwe kwibala langasemva kwesikolo, basebenzise ulwazi abathe balufumana ngaphambili ngeziqhelaniso zengwenkala ukunika imbono zabo, ezinentsingiselo, ngemisebenzi yeziziqhelaniso. Abafundi baza kulolonga ubuchule babo bozobo benzululwazi.

Khetha isinambuzane sakho okanye nasiphi na esinye isilwanyana esingamqolo phambi kesi sifundo uphenguphengulule izimo zayo zangaphambili (traits) nohlobo layolokuziphatha. Oku kuzakuba sisikhokhelo seempendulo zocwecwe lomsebenzi lwabafundi.

### **Izixhobo:**

Izinambuzane (okanye ezinye izilo ezinganamqolo) ezaneleyo, ukuze abafundi babenakho ukuziphengulula, isilwanyana esinye ngamfundi ngamnye okanye kumaqela angambini okanye nangantathu. Zingaqokelelwa emakhaya okanye kwibala elingasemva lesikolo.

Isikhongozelo (container) ukugcina isinambuzane sibe nokubonwa kakuhle (ingxowa encinci ekubonakalayo phakathi kuyo, isikhongozelo sophondo (plastic) esinesiciko ekubonakalayo kuso okanye I-petri dish yophondo)  
Icwecwe elinye lephepha elimhlophe.  
Icephe, I-paint brush okanye uswazi.  
Irula yobalo ngamashumi (metric).  
I-lens yesandla xa inokufumaneka

Isifundo singajikwa lula ukwenzela kubenakho ukusebenzisa ezinye izixhobo xa zingena kubakho ezingentla okanye ungasuke ungasiqinisekisa ukuba abafundi baqokelela izinambuzane ezinokuba lula ukubonwa ngeliso lenyama. Xa ixesha likuvumela kukhuthazwa ukuba abafundi basebenzise iintsuku ezininzi kulomsebenzi, okuzakwenza babumbe umfuniselo (experiment) omhle onentsingiselo.





## IZIQHELANISO ZEBALA LANGASEMVA

**Igama:** \_\_\_\_\_ **Umhla:** \_\_\_\_\_

### Isenzo solwaziso:

Kwesisenzo nizakufunda izinto ezibalulekileyo nge \_\_\_\_\_, lwazi ngamalungu omzimba nohlobo eziziphatha ngayo. Uzakufunda nakhona nokuqhelisa \_\_\_\_\_ nokuba azisokuze zikulhasele.

Ulwazi nobuchule ozakubufumana kwesisenzo luzakukunceda kuyilo nasekuqhubeni kwakho uphengululo lwe \_\_\_\_\_ kwisigaba sesibini sesisenzo.

### Nkqubo:

Ngokusebenzisa icephe nebrashi, faka ii \_\_\_\_\_ zibembini okanye zibentathu kwisikhongozelo. Sebenzisa ezi \_\_\_\_\_ ekuphenduleni lemibuzo ilandelayo.

1. Bungakanani ubude besona \_\_\_\_\_ sifutshane?, \_\_\_\_\_ mm.  
Sibungakanani ngobude esona \_\_\_\_\_ side?, \_\_\_\_\_ mm.
2. Sinemilenze emingaphi \_\_\_\_\_? Sinemilenze emi \_\_\_\_\_. Ingaba zonke \_\_\_\_\_ zinemilenze elinganayo ngobuninzi? \_\_\_\_\_
3. Isi \_\_\_\_\_ sineempondo ezingaphi? \_\_\_\_\_.  
Ucinga ukuba zinamsebenzi mni ezimpondo? \_\_\_\_\_.
4. Sinamehlo amangaphi isi \_\_\_\_\_? \_\_\_\_\_ Ingaba lamehlo akohlukaniswanga (ane-lens enye ngaphandle) okanye ohlukene (mehlo ngalinye lineeyanlukwano-ngeeyantlukwakwano kwii-lens zayo)? \_\_\_\_\_
5. Ingaba isi \_\_\_\_\_ sinamaphiko? \_\_\_\_\_  
ukuba kunjalo mangphi? \_\_\_\_\_



6. Zoba isazobe se \_\_\_\_\_ ngezantsi. Lebelisha onke amamlungu akhombeka lula.

7. Yiva umqolo we \_\_\_\_\_ ukqonda ukuba inobugoxo bangaphakathi okanye obungaphandle? Ukuba uvakala uqinile, sinobugoxo bangaphandle; xa sinokuthi sivakale sithambile sinenyama, lonto ithetha ukuba sinobugoxo bangaphakathi. Sinoluphi ulhlobo lobugoxo isi \_\_\_\_\_ ?
8. Beka isi \_\_\_\_\_ ngomqolo phezu kwephepha. Chaza ukuba siguquka njani nokuba silandelisa ngokukwenza ntoni. \_\_\_\_\_ . Chaza nokuba senza ntoni isi \_\_\_\_\_ xa sifika ebungcibekhweni apho sinokuwa khona? \_\_\_\_\_
9. \_\_\_\_\_ siyakwazi imigangatho eliqhina egudileyo ngjengamacala e-petri dish okanye esikhongozelo? \_\_\_\_\_ . \_\_\_\_\_ siyakwazi ukunyuka ngengalo yakho okanye ngomnye umgangatho orhabaxa? \_\_\_\_\_ .
10. Singakanani isantya esihamba/sibaleka ngaso \_\_\_\_\_?(ukulinganisela isantya ehamba ngaso yenza oku kulandelayo:)
- A) Bhala u-X omncinci esiphakathini sephepha.
  - B) Beka I \_\_\_\_\_ ku-X.
  - C) Emveni kokusiyeka, bhala phantsi ixesha elisithathileyo ukusuka phezu kwephepha.
  - D) Bhala omnye u-X apho sisuke khona phezu kwephepha.
  - E) Yenza umlinganiselo womgama ophakathi koo-X bobabini .
  - F) Bala isantya se \_\_\_\_\_ ngeesentimitha ngamzuzwana(cm/sec) ngokwahlula umgama othathiweyo ngexesha okuthe oku kwenziwa ngalo yi \_\_\_\_\_ .
  - G) Isi \_\_\_\_\_ sithathe \_\_\_\_\_ (cm/sec)





## UMFUNISELO

Ngelixa sele uziqhelanise nolwakhiwo mzimba lwe \_\_\_\_\_, ukulungele ukuyila wenze uphenguphengulula lwenzululwazi ngokuziphatha komzekelo(specimen) wakho. Uzakubhala phantsi wenze ingxelo yazo naziphi iingqwaselo othe wazibona ngokuziphatha kwazo.

1. Yenzani ubhalo zingcinga(brainstorming) nabalingane bakho ngemibuzo eninokuba nayo ngokuziphatha kwe \_\_\_\_\_ eninoku thanda ukuzi phengulula. Yenza uluhlu lwalemibuzo, ibemithathu ubuncinane.  
\_\_\_\_\_  
\_\_\_\_\_
2. Chonga ubemnye umbuzo eniza kuwuphengulula niwubhale ngezantsi. Qinisekisa ukuba ngumbuzo. \_\_\_\_\_  
\_\_\_\_\_
3. Bhala ingcinga(hypothesis) engqamelana nombuzo owuchongileyo. Bhala ingcinga leyo yakho ngoluhlobo lwengxelo eniy"ukuba kuthe, kuza kuthi": Umzekelo; Ukuba ii-pill bugs zibenokufakwa ebhokisini apho zinokukhetha phakathi kwendawo emnyama nekhanayo. Zizakukhetha le imnyama indawo.  
\_\_\_\_\_  
\_\_\_\_\_
4. Nika umsebenzi wakho isihloko esiyinkcaza usibhale phantsi ngezantsi.  
\_\_\_\_\_
5. Yenza uluhlu lakho konke okunokuphembelela iziphumo zophengululo lwakho.  
\_\_\_\_\_  
\_\_\_\_\_
6. Chonga utshintsho onokulusebenzisa ngobuchule (olu lutshintsho olungaxhomekekanga ntweni) ulubhale ngezantsi. [ukhumbule ukuba kufuneka usebenzise ngobuchule utshinsho lube lunye ngaxesha]. Ukwachonga notshintsho(variable) olunokulinganiselwa(utshintsho oluxhomekekileyo), nezo zingazuku tshintsha-tshintsha kuphengululo(iintshintsho ezilawulekayo)  
Iintshintsho ezingaxhomekekanga \_\_\_\_\_  
Iintshintsho ezixhomekekileyo \_\_\_\_\_  
Iintshintsho ezilawulekayo \_\_\_\_\_

**Qaphela:** ulwazi olungaphezulu lunokukunceda ekugcwaliseni ubhalo phengulula. Lungiselela olu lwazi ngokwemiyalelo katitshala/kazi wakho.



7. Qala uthotho lwemiyalelo yonyathelo-ngonyathelo onokuyilandela kuvavanyo umbuzo walendindi yakho. Lemiyalelo izakuba luyilo lomfuniselo wakho. [Qinisekisa ukuba uyilo lomfuniselo luzakukwenza okufanele lukwenze]. Uyilo kufuneka luquke uhlobo lokuphendula umbuzo wendindi yakho.
8. Yenza isazobe esiza kubonakalisa uyilo lomfuniselo wakho.
9. Bhexesha umfuniselo owuyilileyo.
10. Ngokusebenzisa uluhlu lolwazi, bhala phantsi iziphumo ngokushwankathelweyo. Ngokusebenzisa uhlobo oluchanekilyo lwegrafu(eyomgca okanye eye-bar) nika igrafu yeziphumo zakho. Igrafu kufuneka ibenesihloko esiyinkcaza ilebhelwe nee-asi nganye.
11. Bhala umhlathi oxela iziphetho(conclusions) zakho. Kufuneka uquke nempendulo yombuzo wengxaki uxele ukubangaba uyiqinisekisile ingcinga yakho, ucacise njani. Ukwaxoxa ukuba zingangqamelana njani iziphumo zomfuniselo nobuchule be \_\_\_\_\_ ukuze iphile kummandla wao wendalo.

### **Izinto ekufuneka zithathelwe ingqalelo.**

Xa uyila umfuniselo wakho, qinisekisa ukuba unakho ukuphendula lemibuzo ilandelayo. [xa kunokuthi ubenombuzo ongawuqondiyo kule, qinisekisa ukuba ucela isikhokhelo/uncedo kutitshala(kazi)]

Ndikwazile ukuzikhomba zonke izinto ezinokutshintsha?  
 Izinto ezinokutshintsha zingalawulwa njani?  
 Zizakulinganiselwa njani izinto ezinokutshintsha?  
 Zingatshintshwa njani ngobuchule izinto ezinokutshintsha?  
 Zixhobo zini ezi ndizakuzidinga?  
 Ingaba uyilo lomfuniselo wam lwenza kanye oku kufunekayo?  
 Ingaba umfuniselo wam uyawuphendula umbuzo wam?  
 Zingaphi izinto eziphilayo endizidingela uphengululo?  
 Ndizakuluphinda-phinda kangaphi uphengululo  
 lwaukuqinisekisa ukuba ndifumana iziphumo ezizizo?





## UXABISO

### Uluhlu lokhangelisiso:

Ingxelo yoxabiso.	Ewe	Hayi
Umfundi uyilandele imiyalelo.		
Umfundi ukwazile ukwenza umahluko phakathi kombuzo nengcinga.		
Umfundi uzibhale phantsi iintshintsho ezithe zaphembelela umfuniselo.		
Umfuniselo othe wayilwa ngumfundi uyewaba ngochanekileyo ekuphenduleni umbuzo.		
Umfundi uwuqhuba ngendlela eyiyo umfuniselo.		
Umfundi uqokelele ulwazi olungqamelene nengcinga(hypothesis).		
Umfundi ubhale phantsi ulwazi ngendlela efanelekileyo.		
Umfundi ubenakho ukubona iintsingiselo(trends) kolu lwazi.		
Umfundi wenze iziphetho ezizizo ngokusebenzisa ulwazi olukhoyo.		
Umfundi ubenakho ukusebenzisa, ngengqiqo eyiyo, iziphetho ukungqinisisa/ephikisa ingcinga.		
Umfundi ukuchaze akufumeneyo kakuhle nangendlela.		

### Ummiselo:

1	2	3	4
Umfundi akakwazanga ukubanakho ukuyila ingcinga(hypothesis) okanye umfuniselo.	Uyilo lomfuniselo lomfundi lube nongqamelano olungephi nengcinga ephuhliweyo. Umfundi ukwazile ukuqokelela ulwazi kodwa ke lwazi olo luye alwahambelana nemibuzo alwakwazi nokusetyenziswa kuvunyelo/kukhatyo nginga.	Umfundi ukwazile ukuyila ingcinga momfuniselo. Umfundi ukwazile ukuqhuba umfuniselo, eqokelela ulwazi olungqamelene nengcinga. Umfundi ukwazile ukuxabisa ulwazi ukuze abenokukhaba/avumelane nengcinga. Umfundi ubenakho ukunika ingxelo yomfuniselo nokufunyanisiweyo (conclusions) eklasini.	Umfundi wenze ngaphaya koko bekulindelikile, ebonkalisa uqondo olunzulu loyilo noqhutyo mfuniselo. Umfundi ukuqondile okwenziwa ziimeko ezitshintshayo(variables) wacebisa amanyathelo anokusa phambili umfuniselo.

### Okuqhagamshelene nolwimi:

IZIPHUMO ZEMFUNDO(LO):	AMABANGA OXABISO
LO#2: Ukuthetha	Unxebelelana ngokokwezekileyo, iingcinga ezinobunzulu nolwazi olukwiimeko ezitshatshelyo. Usebenzisa ubuchule bosetyenziswano kwiimeko zoqelaniso.
LO#4: Ukubhala	Ubhala izihloko ezinolwazi olululo egqithisa iingcinga ngokucacileyo nangengqiqo. Uphuhla alungiselele iingcinga ngenkqubo yokubhala.
LO#5: Ukucinga nolwenziwo zizathu	Uyalujongisisa ulwazi. Usebenzisa ulwimi ekucingeni ngokwakhayo.

