# The World's Shared Battle

# COVID-19: The world's ongoing battle against SARS-CoV-2



Symptoms include fever, shortness of breath and loss of taste and smell; infected individuals may also be asymptomatic



First case detected end of 2019



Bat origin



May be transmitted to humans via an intermediate host, which is yet to be identified



Transmission via close contact with infected individuals and respiratory droplets from coughs or sneezes, and contact with contaminated surfaces



# **Pocket Fact:**

SARS-CoV-2, the virus that causes COVID-19, is short for severe acute respiratory syndrome coronavirus 2

Preventive measures are key to slowing and stopping the spread of COVID-19.



# Virus Hunter Icon:

Noor Hisham Abdullah, the Director-General of Health in Malaysia is recognized for managing the team handling COVID-19 pandemic in Malaysia.



# **Frequent Hand Washing**

Hands should be washed with soap for at least 20 seconds. Hand sanitizer can also be used if soap and water is not conveniently available.



Soap particles disrupt the envelope of viruses, destroying them!



# Mask Wearing

Masks are worn to protect other individuals in case the wearer is infected. This is particularly important as many COVID-19 cases are asymptomatic.



# **Daily Health Monitoring**

Each person must be assessed to ensure absence of COVID-19 symptoms, especially before going into public or shared spaces for work, studies, or errands.

# Pocket Fact:

Infrared thermometers are used in public places as they do not require physical contact with those being tested!



## Clean & Disinfect

Surfaces touched frequently should be cleaned and disinfected regularly as COVID-19 can be transmitted indirectly via contact with contaminated surface.



# **Social Distancing**

As measures like hand washing, mask wearing as well as cleaning and disinfecting are not fool proof and does not eliminate the risk of encountering the virus completely, social distancing must be practiced whenever possible. Better yet, stay at home to stay safe!



# **Pocket Fact:**

A sneeze can send droplets of mucus and saliva more than 5 metres away!



# Try this:

What are social distancing new norms practiced in your school?



# **Contact Tracing**

Identifying individuals who were in close contact with infected people allows targeted testing and preventing further spread of the virus.



# **Pocket Fact:**

Samples are usually obtained through nasal swab, which is then analysed using RT-PCR to identify infected individuals.



# **Get Educated**

Public understanding why each step measure is taken, and how it would help curb this global outbreak is important to ensure continuous practice and compliance.



# What's Next?

Even with all our ongoing efforts and the health measures currently in place to battle COVID-19, a vaccine effective against the disease is still our best hope to end the pandemic in the long run.

Let's continue virus hunting!



# Performing COVID-19 Test Part 1 Nasopharyngeal (NP) Sample Collection

- Hold the swab by its handle. Do not touch the tip!
- Insert the swab into the left nostril and continue until you feel a resistance.



### **Check:**

The LED will light up and you will hear a "beep" when you reach the right position!



### **Pocket Fact:**

In an actual COVID-19 test, the swab has to be inserted about 8 to 12 cm into the nasal cavity!

- Roll and rotate the swab twice in the nasal cavity to collect the sample
- With the same swab, repeat steps 1 to 4 by inserting the swab in the right nostril.



### **Pocket Fact:**

The virus, when present, is usually found in nasal tissues—in the nose!

- 5 Place the swab into the blue tube.
- You have collected the NP samples!



### What's Next:

Let's continue to Part 2: RNA Extraction and Part 3: RT-PCR in the laminar flow hood!



This is only a simulation of COVID-19 testing. Please do not try this at home!

# Performing COVID-19 Test Part 2 **RNA Extraction**

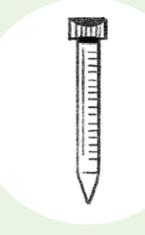
The following are the apparatus and materials required for this section.



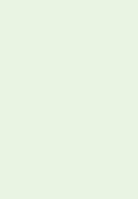
### Try this:

Can you spot all of them in the laminar flow hood?











Sample Tube

Centrifuge Tubes





Micropipette

Centrifuge Tube Holder

Before you start this activity, please watch the video on how to use a micropipette! Once you've watched the video, let's begin!

- Insert both your hands into the gloves.
- Take the sample tube (labelled "Sample") and open the lid. Note: The sample tube contains the NP sample that you collected in Part 1: Nasopharyngeal (NP) Sample Collection.
- Using a micropipette, pipette out 100µL of the NP sample.



### Check:

Make sure that the counter on the side of micropipette shows 100µL!

- Place 100µL of the NP sample in the centrifuge tube (labelled "Lysis Buffer").
- Close the centrifuge tube (labelled "Lysis Buffer") and place it in the centrifuge tube holder.
- Now, RNA is extracted in your centrifuge tube.



### What's Next:

Let's continue to Part 3: RT-PCR!



### **Pocket Fact:**

A purification step is usually carried out at this point to remove unwanted molecules (cell debris, protein and DNA) from the RNA.

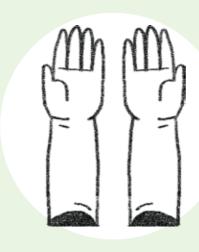
# Performing COVID-19 Test Part 3 RT-PCR

The following are the apparatus and materials required for this section.



### Try this:

Can you spot all of them in the laminar flow hood?



Gloves



Centrifuge Tubes





### Check:

miniPCR

Check:

: Something is wrong! Please close the lid properly.

Place 20µL of the RNA in the PCR tube (labelled "PCR Mix").

the slots on the miniPCR, then gently close the lid of the

Close the PCR tube (labelled "PCR Mix") and place it in one of

Yellow: PCR has started. Please wait.

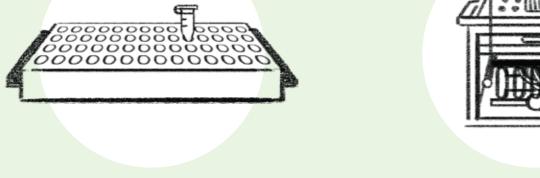
At this stage, you will see the miniPCR light up!

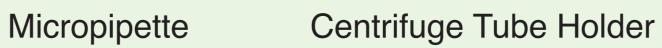
Using a micropipette, pipette out 20µL of the RNA.

Make sure that the counter on the

side of micropipette shows 20µL!

Green: PCR is complete!





Mini PCR

- Insert both your hands into the gloves.
- Take the centrifuge tube (labelled "Extracted RNA") and open the lid. Note: The centrifuge tube contains the RNA you extracted in Part 2: RNA Extraction.



### What's Next:

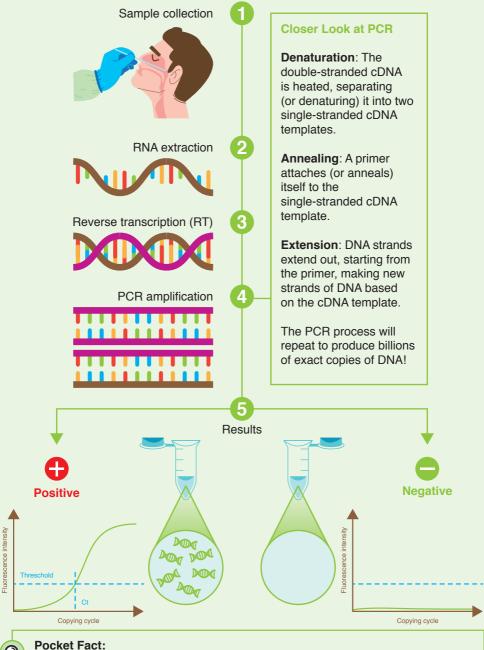
The lab staff will use the PCR product to determine the presence of target DNA, and whether the patient is COVID-19 positive or negative!



### **Pocket Fact:**

If DNA of SARS-CoV-2 is present, that means the person is COVID-19 positive.

### **COVID-19 Testing Using RT-PCR**



### Pocket Fac

cDNA (complementary DNA) is produced by the enzyme reverse transcriptase (RT) using RNA template!