Mathematics/Computing Faculty

Wyndham College

2019 Year 12 Mathematics Standard 1

Networks and Paths – HSC Assessment Task 1

Due Date: Term 4, Week 8, Friday 6th December by 12:50 p.m.

Weighting: 20%

Outcomes

- **MS1-12-8** applies network techniques to solve network problems
- **MS1-12-10** uses mathematical argument and reasoning to evaluate conclusions, communicating a position clearly to others

Task

There are two parts in this assessment task; Part A and Part B.

In Part A you will solve exam style problems on networks.

In Part B you will read the information provided and answer questions and solve problems relating to networks and the Gooniyandi people.

For both parts, answers should be written on your own paper. Diagrams should be sketched neatly. This assessment task must be completed individually and needs to be your own work.
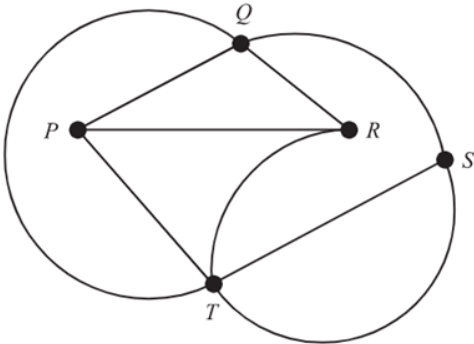
An electronic copy of the assignment can be downloaded from Moodle.

Part A

1. Define the following terms and give an example of each from the network diagram below.   **10**

   a. Walk

   b. Path

   c. Trail

   d. Cycle

   e. Circuit

   f. Tree

2. A regional airline operates flights in Queensland. Flight times between connected towns are shown in the table.

	Cairns	Kowanyama	Mt Isa	Pormpuraaw	Townsville
Cairns	–	1 h 50 min	2 h 5 min	–	55 min
Kowanyama	1 h 50 min	–	–	20 min	–
Mt Isa	2 h 5 min	–	–	–	1 h 40 min
Pormpuraaw	–	20 min	–	–	–
Townsville	55 min	–	1 h 40 min	–	–

   a. Draw a network diagram to show how the towns are connected, with weights on the edges showing flight times.   **2**
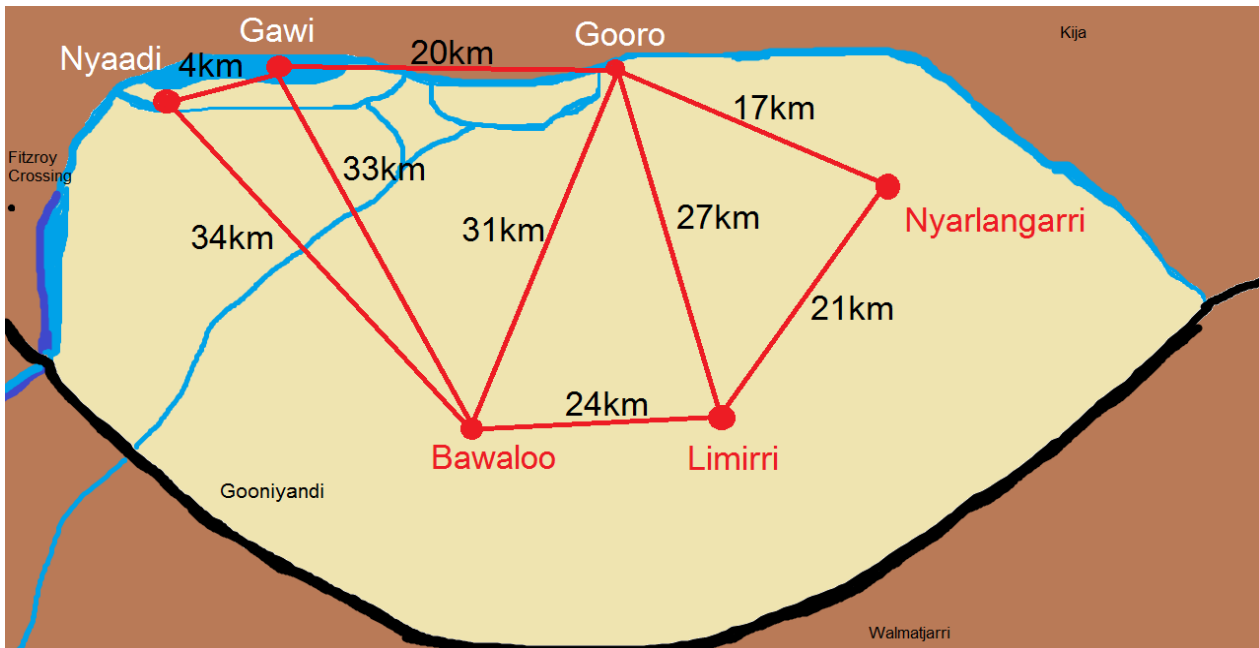
   b. What is the shortest travel time between Townsville and Pormpuraaw?   **1**

Part B Total Marks **13**

Part B

The Gooniyandi people are bound together by their lore and customs and have a deep and unbroken connection to their country. Gooniyandi country is located in the central Kimberley region of Western Australia.

Map – Copyright mEsh Project, Laura Andrikidis

The Gooniyandi people recognise four seasons:

- Barranga (very hot weather time)
- Yidirla (wet season time when the river runs)
- Ngamari (female cold weather time – cold days and cold nights)
- Girlinggoowa (male cold weather time – mild)

Gooniyandi people closely follow the weather. The seasons can tell them when the best time is for hunting and collecting different plants and animals. The following list represents a small sample of the resources used by the Gooniyandi people:

- **Bawaloo** is the bush carrot, it is collected in the wet season, Yidirla.
- **Nyaadi** is a bulb like a big onion. During flooding the Nyaadi can be crushed and thrown into the river which feeds the fish to ensure they are a good size to eat all year round.
- **Gawi** (fish) are said to shut their mouths when the weather is cooler and the wind starts blowing from the east. This is not a good time to catch the Gawi.
- **Gooro** is the freshwater mangrove. The red bark put in the water and is used as a poison to stun fish which are then speared.
- **Nyarlangarri** (King Brown Snake) are all fat and ready for hunting during Ngamari.
- **Limirri** is a wax that comes from spinifex. It is ground up with water and used to connect spear and axe heads, it is also used to soften the mouth of didgeridoos

For further information refer to the [Gooniyandi Seasons Calendar](https://www.csiro.au/en/Research/Environment/Land-management/Indigenous/Indigenous-calendars/Gooniyandi) https://www.csiro.au/en/Research/Environment/Land-management/Indigenous/Indigenous-calendars/Gooniyandi (CSIRO)

Questions

1. State the number of edges. **1**

2. List the degree of each node. **2**

3. Which node(s) has the highest degree? **2**

4. Construct a table showing the distance between each node. **2**

5. Starting at Nyaadi and finishing at Nyarlangarri, which path would you follow to visit each node once to minimise walking distance? **2**

6. What is the shortest distance you could travel to complete the hunting of the Gawi starting at the Limirri? List the path you would follow. **2**

7. Starting at Limirri, is it possible to walk along every walking track and return to Limiri? Explain. If it were possible list the path you could take. **2**

8. The best Gawi to catch are fat Gawi. Consider the information you have looked at about the Gooniyandi people and decide on a pathway you could take that would enable successful hunting of Gawi, starting at any point. Write a paragraph to explain your decisions and make reference to the information and map provided. **3**

9. During Yidirla, the Gawi to Gooro track would be flooded and cannot be used. The Bawaloo needs collecting as it is a food source and the Gawi needs to be fed with Nyaadi. Your starting point is Nyarlangarri and the end point is Gawi.

    a. Copy the given map of the Gooniyandi people. **1**

    b. Considering you can only walk up to 20km per day, trace out the shortest pathway you would take and include additional nodes as campsites after each 20km. Use the node names 'Camp 1', 'Camp 2', and so on. **2**

    c. How many days would your journey take? **1**

    d. How many kilometres would you travel in total? **1**

10. Refer to the <u>Gooniyandi Seasons Calendar</u> provided. (You can download a printable version from this site which is easier to read than the electronic version.)

    a. Copy the network diagram. Add in 3 more nodes to represent other resources that you have researched that could be used by the Gooniyandi people and where you think they could be found. Justify your choice of location. What season would these resources be gathered? **2**

    b. Draw a minimum spanning tree that includes all nine nodes. **3**

Total Marks **26**