PICTON HIGH SCHOOL

Creating Opportunities Achieving Success

YEAR 12 Standard Mathematics 2 2020
Networks Assignment

Date: 26th June, 2020	**Assessment Name: Investigation**
Marks: 40	**Weighting: 30%**

SYLLABUS OUTCOMES TO BE ASSESSED:

MS2 – 12 - 8 Solves problems uses networks to model decision making in practical problems

MS2 – 12 - 9 Chooses and uses appropriate technology effectively in a range of contexts, and applies critical thinking to recognise appropriate times and methods for such use

MS2 – 12 – 10 Uses mathematical argument and reasoning to evaluate conclusions, communicating a position clearly to others and justifying a response

DIRECTIVES TO BE ASSESSED:

Solves: Determine mathematically.
Chooses: To select items or answer from a collection of values.
Uses: make use of.
Applies: To use relevant information and skills for a given situation.
Communicating: To choose the correct way to give a mathematical answer.
Justifying: To provide evidence to support your solution.

TASK DESCRIPTION:

You will complete an assignment on the topic Network. You have two weeks to complete this investigation.
The investigation is divided into five parts: You are required to in:

Part 1: Draw a network for Picton Academy of Mathematical Sciences Campus.
Part 2: Design a cable network for the school using the roof of the walkways in the school for cabling.
Part 3: Design cable network for the school from building P to building N connecting only the buildings in the shortest path.
Part 4: Draw a directed network diagram for a project**.**
Part 5: Determine the critical from Building P to N.
Part 6: Outline which proposal the school board should accept.

Recommended equipment:
Board approved scientific calculator
Pens, ruler, pencils, rubber

This task will be completed at home.

ASSESSMENT CRITERIA

You will be assessed on the topics of:

- Networks

Note:

You can submit your work online or hand it in on the day(s) that you are at school.

Computer Cable Network

Map 1 is a plan of Picton Academy of Mathematical Sciences showing buildings and paths.

Part 1: (5 marks)

Using Map 1, draw a network diagram of all the buildings connected by covered walkways showing the actual distances, correct to the nearest 0.5 centimetre, on your diagram. Use the scale to make your conversions to metres.

Note:

(i) Each vertex represents a building and should be labelled with appropriate letter.

(ii) Each edge represents a covered walkway and should be labelled with the distance.

Part 2: (5 marks)

The School Board wants to link the outside of each building to computer network. Cable costs $60 per metre, and the existing covered walkways are to be used with cable attached to the roof of the walkways. (Measure the length of the walkways as shown on the map).

They ask Lee Industries Limited to submit a proposal. Design and cost the most economical cable network for Lee Industries Limited. Draw up Lee Industries' proposal detailing which method was used, explaining your reasoning and justify your working with calculations and network theory. Include a network diagram in your explanation.

Part 3: (5 marks)

In an effort to reduce the cost of cabling the school, the School Board decides that cable will be from Building P to Building N connecting only those buildings that are on the shortest path. They ask Olsen Cables Limited to submit a proposal for this. Find the shortest path from P to N and calculate the cost for this new cable network. Create and name the new network to represent this information. Justify your proposal using mathematical working and state which method was used to develop the proposal.

Part 4: (10 marks)

Use this activity table to draw a directed network diagram.

Activity	Duration(hours)	Predecessor
A	8	-
B	13	A
C	7	-
D	11	C
E	7	B
F	7	D
G	8	B
H	16	G
I	13	E
J	12	I
K	25	I
L	8	H, J
M	17	I
N	30	F, K
O	25	L
P	17	L
Q	20	P
R	42	M, N
S	10	O, Q
T	23	R
U	12	S
V	24	T

Part 5: (10 marks)

Using Map 2 and Part 4, determine the critical path from Building P to Building N whilst finding:

(a) The earliest starting times

(b) The latest starting times

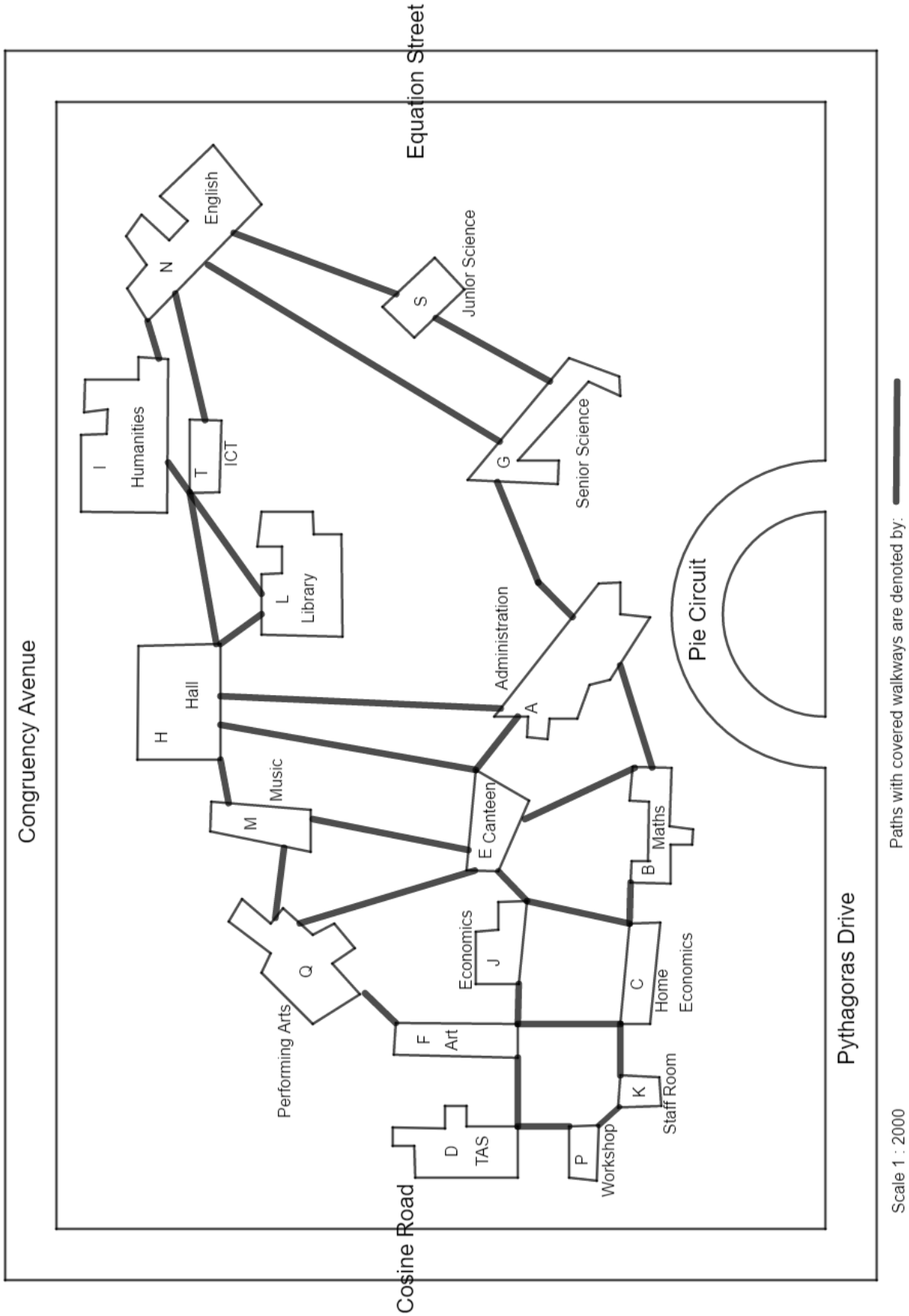
(c) The weight of the critical path

Part 6: (5 marks)

Using your findings from part 1 to 3, identify at least 2 strengths and limitations of these investigations. Furthermore, write a letter justifying your recommendation to the School Board for which proposal (Q2/Q3) the school board should adopt. Support your recommendation using evidence gathered from your calculations.

MAP 1

This diagram is the plan of Picton Academy of Mathematical Sciences building and paths.



MAP 2

Numbers represent the time in hours needed to complete each task.