About the Investigation

Students are bound to enjoy imagining the cities and sites they would visit if they won flights to four of the world's major cities. Staying within a 50 000 km flight limit will require careful planning and calculation. Budgeting for accommodation and spending money will require research and realistic calculations. Justifying budgeting and planning decisions for the trip encourages students to think about the decisions they make, and helps develop financial literacy.

Planning the Investigation

Expected duration of Investigation:
3 to 4 weeks

Recommended group size:
3 to 4 students

Students will need:
☆ **BLM 7.1** – *World map outline*
☆ calculator
☆ internet access
☆ travel brochures
☆ atlas or map

Topics for this Investigation

Before starting the Investigation, teach the following Topics...

NA15 Decimal addition and subtraction

NA21 Discount

NA22 Operations with money

MG6 Read and interpret timetables

MG7 Add and subtract time

MG9 International time zones

MG14 Latitude and longitude

Curriculum match for Investigation 7

The table below shows how the Topics in Investigation 7 match the content requirements of the Australian Curriculum.

Content descriptions	iMaths 6 Topics
Number and Algebra **Fractions and decimals** • Add and subtract decimals, with and without digital technologies, and use estimation and rounding to check the reasonableness of answers. **Money and financial mathematics** • Investigate and calculate percentage discounts of 10%, 25% and 50% on sale items, with and without digital technologies.	**NA15** Decimal addition and subtraction **NA21** Discount **NA22** Operations with money
Measurement and Geometry **Using units of measurement** • Interpret and use timetables. **Geometric reasoning** • Investigate, with and without digital technologies, angles on a straight line, angles at a point and vertically opposite angles. Use results to find unknown angles.	**MG6** Read and interpret timetables **MG7** Add and subtract time **MG9** International time zones **MG14** Latitude and longitude

The table below shows how students will apply the proficiency strands during each task in this Investigation.

Proficiency strands	Investigation 7 criteria
Understanding, Fluency and Problem Solving	**Step 2:** Find and record the distance between each destination. Calculate the total distance travelled. **Step 3:** Find the latitude and longitude for the 4 destinations and mark them on a map. **Step 4:** Find and record the departure and arrival times and flight durations. Calculate the total flying time. **Step 5:** Write a list of all expenses and calculate the total cost of the trip.
Reasoning	**Step 6:** Present your itinerary and budget. Discuss the factors that influenced your planning and budget. Justify your choices

Essential word list

Students will need to understand the following terms:

- ☆ itinerary
- ☆ accommodation
- ☆ map references
- ☆ major city
- ☆ destination
- ☆ budgeting
- ☆ 'a catch'
- ☆ route
- ☆ allotted
- ☆ influenced
- ☆ allocated
- ☆ continent
- ☆ country

The rubric

Read and discuss the rubric. Discuss the criteria and have students identify which step of the Investigation each one is describing. The rubric should be revisited after the *Understanding the Investigation* stage, both during and after the *Using maths* stage and during the *Reasoning and reporting* stage.

Investigation 7
Fantasy flight

You have won a dream trip around the world, providing you with 50 000 km of free air travel to four major cities. Unfortunately, there is a catch! You have to pay for your own accommodation and provide all your own spending money.

Produce a travel itinerary and a record of expenses to show how much this dream trip will actually cost you.

Look out for discounts and special offers.

✔ **Topics**

Before you start the Investigation you need to know...

NA15 Decimal addition and subtraction............p60	**MG7** Add and subtract time p92
NA21 Discount p72	**MG9** International time zones p96
NA22 Operations with money............................p74	**MG14** Latitude and longitude p106
MG6 Read and interpret timetables...................p90	

Understanding the Investigation

1 **Read and plan.**

Make sure you understand the meanings of: *itinerary, accommodation, map references, major city, destination, budgeting, 'a catch', route, allotted, influenced* and *allocated*.

Read and discuss the rubric.

Download your Investigation plan. This will help you with the organisation and understanding of the Investigation.

Teacher note
- Comprehensive lesson notes, suggestions and resources are available in *iMaths 6 Teacher Book*.
- The Investigation plan and BLM for this Investigation can be downloaded from **www.imathsteachers.com.au**.

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1 Read and plan.

Read the introductory text and discuss the premise of the Investigation.

Teach the Topics (concepts) that provide the knowledge required to complete the Investigation.

Re-read the introductory text and each step of the Investigation. Discuss any procedures to be used, how data will be organised and how solutions will be communicated.

Discuss new terms in the context of the Investigation.

Read and discuss the rubric. Clarify the criteria to be assessed. This rubric should be revisited throughout the investigative process.

Go to imathsteachers.com.au and print a copy of the Investigation plan for each student. Work through the plan as a class, in small groups or individually.

Focus questions

- What is this Investigation asking you to do?
- Which Topics are really important to this Investigation?
- What do you think you will be good at?
- What do you think you will need help with?
- Do you understand the meanings of the words on page 20?

Materials

Internet access BLM 7.1 Calculator Atlas Travel brochures World map

Using maths

2 Choose your destinations.

Choose your four destinations. Visit the websites listed at imathskids.com.au to find and calculate the total distance you will fly. Ensure that you stay within the allotted 50 000 km. Your journey should begin and end at your nearest capital city.

Design a table and record the distances.

3 Mark your journey.

Find the map references (latitude and longitude) of each city. Record these in a separate table.

Use the world map outline on **BLM 7.1**. Mark the cities and map references on the map. Decide the direction of your route and mark it on the map.

4 Calculate your flying time.

Find suitable flights. Record the departure and arrival times and flying times in a table.

Calculate the total time you will spend flying.

5 Find accommodation and calculate your expenses.

Find accommodation in each city. How long will you stay in each city? How much will your accommodation cost? See how much money you can save with special deals and discounts.

How much spending money will you require daily? Remember you need to eat and visit tourist attractions.

Write a list of all your expenses and calculate the total cost of your trip.

Reasoning and reporting

6 Report on your fantasy flight.

Present your world map, completed tables and list of expenses. Did you find any discounted accommodation? How much did you save?

Discuss some of the factors that influenced the decisions you made when planning and budgeting your trip.

imathskids.com.au

Go to **imathskids.com.au** – the Investigation 7 area contains the Investigation plan, websites and BLM that you need to complete this Investigation.

Inquiry

I visited these places on my dream trip. Where did I go?
(27°10′ N, 78°02′ E)
(38°00′ N, 23°44′ E)
(40°41′ N, 74°02′ W)
(21°25′ N, 39°49′ E)
(48°51′ N, 2°17′ E)
What famous landmark could I see at each place?

ISBN 978 1 74135 181 1   iMaths 6 Student Book **21**

2 Choose your destinations.

Before students decide which world cities to visit during the Investigation, it is a good idea to ensure they understand the terms *continent*, *country* and *city*.

The term *continent* refers to the world's main land masses: Asia, Africa, North America, South America, Antarctica, Europe and Australia. The term *country* generally refers to a self-governed sovereign nation, usually divided along political and/or geographical lines. A *city* is characterised as an urban area with a large and dense population.

Have the class brainstorm countries and major cities that students have heard of, and locate them on a world map. Ask students to select four cities to visit during the Investigation. Encourage students to select major cities from all around the world, rather than just from one region. Remind them that their journey must begin and end at their nearest capital city and must not exceed 50 000 km. Students are to design a table and record their distances. Remind them that a table should have a title and labelled columns and rows.

Problem solving

Using the problem solving strategy *guess and check* will help students adhere to the 50 000 km flight limit when choosing their cities.

If the total flight distance is too large or falls far short, the distances should be adjusted accordingly and then rechecked. The process is then repeated until suitable cities are chosen. Keeping within the allocated flying kilometres requires careful guessing, checking and adjusting, to potentially improve the itinerary.

Investigation 7 Fantasy flight

3 Mark your journey.

Students will need to find the latitudes and longitudes of their chosen cities (see Fig 7.1). They can find this information by visiting www.imathskids.com.au and following the links to the websites listed in the Investigation 7 area. Alternatively, an atlas could be used since the required information is usually listed on the last pages.

Print a copy of the *World map outline* on **BLM 7.1** for each student. Instruct students to mark their chosen cities and the corresponding map references on the map outline (see Fig 7.2). Inform students they will also need to mark the starting point for their trip and its map reference on the *World map outline*.

Students should then decide the direction of their route and mark it on the map. Most round-the-world trips travel in one direction only, without backtracking. Remind students that their journey must end in the same city it started.

Fig 7.1 – Example latitudes and longitudes for major cities

City	Country	Latitude	Longitude
Brisbane	Australia	27° 29' S	153° 8' E
Kuala Lumpur	Malaysia	3° 8' N	101° 42' E
Madrid	Spain	40° 26' N	3° 42' W
Toronto	Canada	43° 40' N	79° 24' W
Rio de Janeiro	Brazil	22° 57' S	43° 12' W

Fig 7.2 – Example World map outline
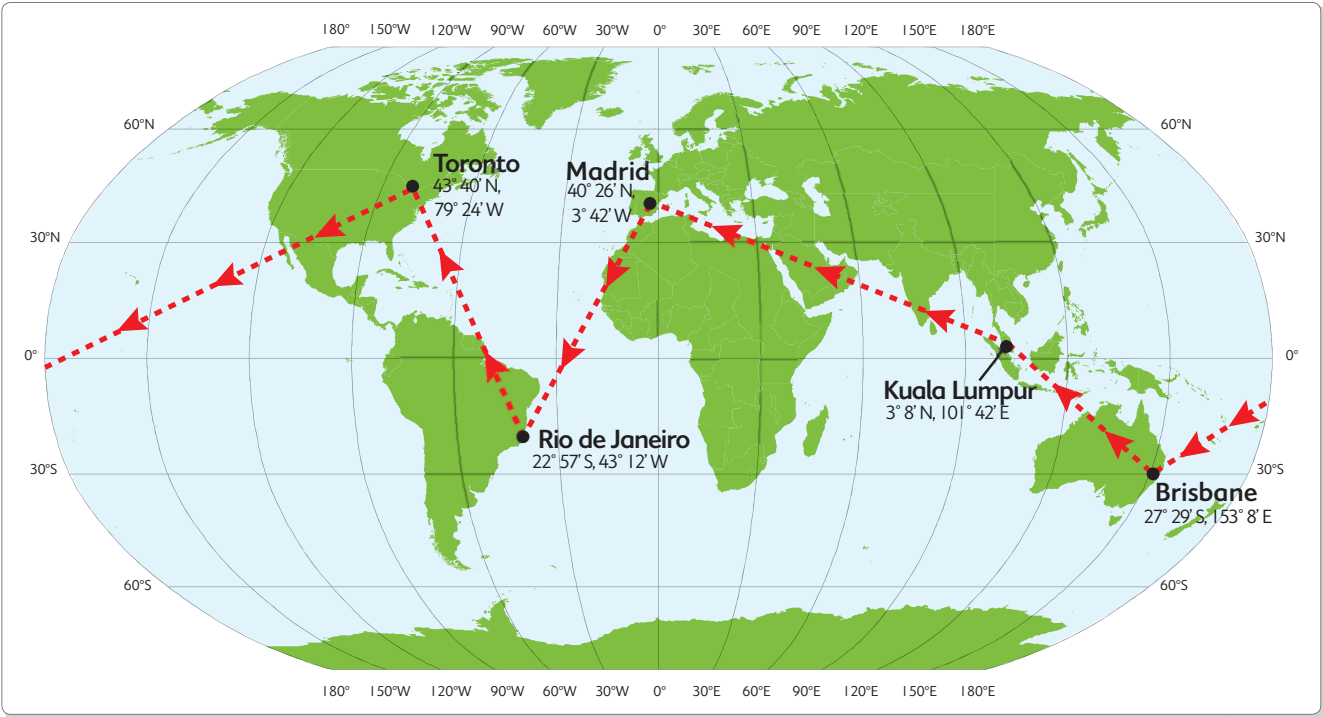
4 Calculate your flying time.

Students need to find suitable flights for their trip and calculate the total time they will spend flying. They can find flights by using the websites listed for this Investigation at www.imathskids.com.au.

Have the class brainstorm airlines that could offer suitable flights. Many countries have their own national airlines, called flag carriers, so a good place for students to start is to identify the countries they will visit and find the flag carriers of those countries. For example, referring to Fig 7.1, the flag carriers for the countries listed are: QANTAS (Australia), Malaysian Airlines (Malaysia), Iberia Airlines (Spain), Air Canada (Canada) and VARIG and TAM Airlines (Brazil).

Focus questions
- What is a flag carrier?
- What are the flag carriers for the countries you have chosen to visit?
- Where is the starting point of your trip?

4 Calculate your flying time. *(continued)*

It is likely that students will require different airlines for different stages of the journey. Students will also notice that not all flights are direct between cities. Some flights will have brief stopovers in other cities along the route. Remind students that their flights will be free, so the cost of flights is not an issue.

At this stage, students will need to decide how long they are going to stay at each destination. Engage the class in a discussion about how long they might like to stay in each place. They might decide to stay a number of days in each city, to give adequate time for sightseeing, shopping and/or relaxing.

After deciding how long they want to stay in each city, students should record all of their flight data in a table. The table should include information such as destination and departure cities, flight departure and arrival times, flight information (date/time), flying time and distance travelled (see Fig 7.3). This table will form part of their itinerary.

Students will also have to calculate the total amount of flying time. Remind students that they will need to convert times in excess of 24 hours to days, hours and minutes (see Fig 7.3). Have them record this information in their table.

Fig 7.3 – Example flight information table

My Journey					
From	To	Departure Date/Time	Arrival Date/Time	Flying Time	Distance (km)
Brisbane	Kuala Lumpur	30 Nov 23:25	1 Dec 05:25	8 h	6469
Kuala Lumpur	Madrid	4 Dec 21:30	5 Dec 10:05	19 h 35 m	11 083
Madrid	Rio de Janeiro	10 Dec 20:50	11 Dec 08:30	14 h 40 m	8153
Rio de Janeiro	Toronto	16 Dec 23:15	17 Dec 09:37	13 h 12 m	8279
Toronto	Brisbane	22 Dec 18:50	24 Dec 12:35	26 h 45 m	15 054
			TOTAL	82 h 12 m	49 038
				3 d 10 h 12 m	

5 Find accommodation and calculate your expenses.

After finding their flights, students must find accommodation in each city and work out how much money they will need. Once again, students should use the websites provided at www.imathskids.com.au for online resources to find accommodation.

A spreadsheet or table is very helpful for recording all gathered information (see Fig 7.4).

Remind students that all flights between major cities are free. They only have to budget for accommodation costs, food and sightseeing trips. Students may find that breakfast is included with some accommodation. Encourage students to design any budget they want for this dream trip. Students may enjoy finding a 6-star hotel or tracking down a massive bargain.

Fig 7.4 – Example accommodation table

City	Length of stay	Hotel	Cost per night (AU$)	Total cost (AU$)
Kuala Lumpur	3 nights	Ascott Kuala Lumpur	$188	$ 564
Madrid	5 nights	Gran Meliá Fénix	$337	$1685
Rio de Janeiro	5 nights	Marina All Suites	$544	$2720
Toronto	5 nights	Comfort Hotel Downtown	$135	$ 675
			Total:	$5644

5 Find accommodation and calculate your expenses. *(continued)*

Most accommodation websites list their rates in their local currency, and provide a currency converter to show prices in Australian dollars. Remind students to ensure they are working in Australian dollars by using a currency converter, if necessary.

When looking at accommodation costs, students are likely to find that the cost of a hotel room varies according to the day of the week, with the highest prices generally falling on weekends. Students should take note of the dates they will be travelling and find the accommodation costs for those specific days. Encourage students to look for special deals or discounts that might save them money.

Students will be confronted by a plethora of travel information online. It is essential that only the information required for this Investigation be considered. By keeping in mind the problem solving strategy *check for relevant and irrelevant information,* students should be better able to sift through the excess information provided by online sales sites. This is a strategy for life-long learners, as we are all overwhelmed and often distracted by the volume of information online. Avoiding advertising hype and learning to focus on vital information are essential life skills. As well as accommodation costs, expenses will also need to include money for food and sightseeing. Calculating a budget for these expenses is challenging, as there is no right or wrong answer. Students may choose to budget as much or as little as they like, depending on the type of food they will eat and the tourist attractions they will visit.

You may need to guide students on appropriate budgets for different styles of holidays. An approximate budget guide can be found below. Remind students that this is a guide only, and they will need to devise a specific list of expenses for their trip.

Approximate spending money guide
Budget holiday: $25 – $50 per day
Mid-range holiday: $50 – $100 per day
Luxury holiday: >$100 per day

After working out their daily budget for food and activities, students will need to calculate their total expenses. Total expenses will be the cost of accommodation, plus the daily budget multiplied by the number of days in each city. Encourage students to record their expenses information on a spreadsheet or table, in a format that is easy to read (see Fig 7.5). This table, along with the tables students created in Steps 4 and 5, will form the travel itinerary for their fantasy flight.

Discussion starter

This is a good opportunity to discuss different types of holidays with the class. When determining their budget, students will need to decide what type of holiday they are having.

A budget holiday would involve spending as little money as possible by staying in backpacker hostels or low star-rating hotels, eating at inexpensive restaurants and seeking out free sightseeing activities. This type of holiday requires a relatively small budget.

A mid-range holiday would involve spending more money than a budget holiday, but still requires strict spending limits. This type of holiday might involve staying in 3-star accommodations, eating at mid-range restaurants and mixing free sightseeing with selected activities that may incur costs.

A luxury holiday is one where saving on money is not a factor. The luxury traveller enjoys lavish, 6-star hotels, expensive restaurants and costly sightseeing activities.

Fig 7.5 – Example expenses table

City	Accommodation expenses per day	Spending money per day	Total daily expenses	Number of days	Total expenses
Kuala Lumpur	$188	$100	$288	3	$ 864
Madrid	$337	$100	$437	5	$2185
Rio de Janeiro	$544	$100	$644	5	$3220
Toronto	$135	$100	$235	5	$1175
				Total:	$7444

6 Report on your fantasy flight.

Students should present a report on their fantasy flight using their world map and travel itinerary, which consists of flight, accommodation and expenses tables. In addition, they may be able to give an account of how much they were able to save using discounted accommodation.

Students will discuss some of the factors that influenced their planning and budgeting for the trip, such as:

- "I decided to visit Madrid because that is where my father was born."
- "I planned my trip for December so I could see the winter snow in Canada. It would also be a big change from the heat of Rio de Janeiro."
- "I flew in and out of Brisbane because it is the nearest international airport to my home in Grafton."

Students should submit:

☐ **BLM 7.1** – *World map outline*, with the route between four major cities and the starting point clearly marked, with coordinates

☐ flight information table showing the details of flights between cities, departure and arrival times, flight durations and distances travelled

☐ a table showing accommodation details, including number of nights and cost

☐ a table showing the total expenses (budget) for the trip.

Communicating and reflecting

The following questions are designed to help you assess students' proficiency in reasoning.

- What do the coordinates of one of your chosen cities represent?
- How did you find the coordinates of your chosen cities?
- How did you decide which route to take around the world?
- What factors influenced which airline you chose for each leg of the journey?
- How could you have improved your itinerary?
- What type of holiday did you decide to have – budget, mid-range or luxury? Why? What effect did it have on your record of expenses?
- How did you find accommodation appropriate to your budget level?
- What factors influenced how much you budgeted for expenses?
- What information did you consider when making your record of expenses?
- What would be the effect on your record of expenses if your second flight was delayed a day?

Inquiry

Students who need an extra challenge could be engaged in the following activity, which extends the application of the Topics used in this Investigation.

I visited these places on my dream trip. Where did I go?

(27° 10' N, 78° 02' E)

(38° 00' N, 23° 44' E)

(40° 41' N, 74° 02' W)

(21° 25' N, 39° 49' E)

(48° 51' N, 2° 17' E)

**What famous landmark could I see at each place?**

The five places listed in the Inquiry on can be located using a globe and an atlas, or by using Google Maps online.

If you want students to develop logical thought processes when locating places, the globe/atlas method is quite a sophisticated task. In this process, students will need to roughly locate the position using the globe, and then use an atlas to zoom in on the location. The indexes in some atlases also give the latitude and longitudes of locations. Students can then confirm the location by using the internet to find the latitude and longitude.

For example, in the first location, students will use the latitude and longitude to locate Agra in Northern India. They can search for the latitude and longitude of Agra using their internet browser.

27° 10' N, 78° 02' E = Taj Mahal (Agra, Northern India)
38° 00' N, 23° 44' E = Parthenon (Athens, Greece)
40° 41' N, 74° 02' W = Statue of Liberty (New York, USA)
21° 25' N, 39° 49' E = Mecca (Saudi Arabia)
48° 51' N, 2° 17' E = Eiffel Tower (Paris, France)

Alternatively, students can enter the latitude and longitude in Google Maps to find the location. The satellite view will amaze the students.
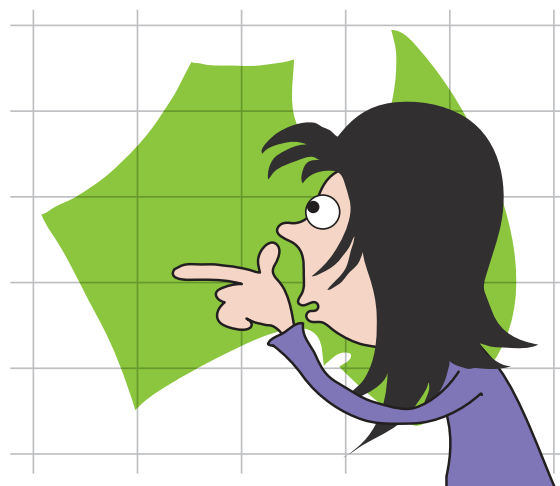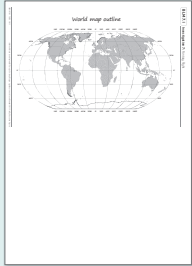
Investigation 7 Fantasy flight

Tear-outs, Data pages and Black Line Masters

There are no Tear-outs, Data pages or Black Line Masters for this Investigation.

BLM 7.1

Notes and strategies

Rubric

Investigation 7 Fantasy flight

Name: _____   Due date: _____

Step	Ability to...	A	B	C	D	E
	Find and record the distance between each destination. Calculate the total distance travelled.	All distances were recorded correctly. All information was well organised and clearly presented in a table. Columns and rows were appropriately labelled. Used an efficient strategy to accurately calculate the total distance travelled.	Needed prompting to organise the information into a table and to use suitable labels for the columns and rows. Made very few errors when recording distances. Corrected any errors when calculating the total distance travelled.	Used simple lists to record the information. Needed some help to label these to make the information clear to the reader. Made some errors when recording the distances and calculating the total distance travelled.	Recorded the information in a haphazard way and made several errors when entering the distances in the table. Had difficulty calculating the total distance travelled.	Did not record any information in a way that could be read and easily understood. Was unable to calculate the total distance travelled.
	Find the latitude and longitude for the 4 destinations and mark them on a map.	Independently used the correct coordinates to mark the four destinations accurately on the map.	Used the coordinates to mark the destinations on the map in the approximate location.	Needed some help to use the coordinates to mark the four destinations on the map.	Selected 4 cities. Was unable to mark the destinations on the map using the coordinates.	Did not understand the concept of latitude and longitude and was unable to mark the destinations on the map.
	Find and record the departure and arrival times and flight durations. Calculate the total flying time.	All flight times were written correctly. All information was well organised and clearly presented in a table. Columns and rows were appropriately labelled. Used an efficient strategy to accurately calculate the total flying time.	Needed prompting to organise the information into a table and to use suitable labels for the columns and rows. Made very few errors when recording flight time. Corrected any errors when calculating the total flying time.	Used simple lists to record the information. Needed some help to label these to make the information clear to the reader. Made some errors when recording the flight times and calculating the total flying time.	Recorded the information in a haphazard way and made several errors when entering the flight times in the table. Had difficulty calculating the total flying time.	Did not record any information in a way that could be read and easily understood. Was unable to calculate the total flying time.
	Write a list of all expenses and calculate the total cost of the trip.	List of expenses was clearly presented. The budget showed a detailed list of accommodation and other costs and how these were calculated. Independently found an efficient strategy to accurately calculate the total cost of the trip.	Listed the accommodation costs and other expenses in a table. Needed prompting to label the columns and rows appropriately. Corrected any errors when calculating the total cost of the trip.	Used simple lists to record the accommodation and other expenses. Needed some help to write these as a budget and to label the items to make the information clear to the reader. Made some errors when calculating the total cost.	Recorded the information on the accommodation costs and other expenses in a haphazard way. Needed help to write a budget that made sense to the reader. Had difficulty calculating the total cost of the trip.	Did not record the accommodation costs and other expenses in a way that could be read and easily understood. Did not understand the concept of a budget. Was unable to or did not calculate the total cost of the trip.
	Present your itinerary and budget. Discuss the factors that influenced your planning and budget. Justify your choices.	Clearly explained the itinerary. Identified and discussed any factors that affected the decisions and budgeting decisions. Discussed how the itinerary could have been improved. Used the information in the tables and budget to justify the choices they made.	Listed a number of factors that could have affected the decisions that were made when planning the itinerary and budget. Made some reference to the results on the data table and graphs when giving reasons for their choices.	Gave a very brief list of some factors that could have affected the itinerary and budget. Gave a brief explanation and some simple reasons for their choices.	Listed some factors that could have affected the itinerary and budget, but these were sometimes improbable. Reasons for their choices were sometimes confused and did not refer back to the data.	Was unable to identify or to express any factors that could have affected the itinerary or budget. Did not give any reasons for their choices.

Proficiency strands — Understanding, Fluency and Problem Solving / Reasoning

Teacher comments

_____

_____

Overall rating