Canadian and World Studies

Grade 9 – Geography

TEACHER'S RESOURCE GUIDE

Teachers' Resource Kit Overview

The Teachers' Resource Kit contains lesson plans and activities to be used by secondary level teachers and students as preparation and debrief to a trip to the CN Tower. The areas of study for this part of the Education Program focus on the Ontario Curriculum Grade 9 and 10 Canadian and World Studies, with a particular emphasis on Grade 9 Geography courses (CGC1D and CGC1P) and focused work on urban planning.

The written work includes some descriptions for images and/or graphics content that will enhance the resource materials. Links to currently available curriculum documents and learning expectations are noted where merited.

Some effort has been made to provide cross-curricular learning opportunities, including elements that help improve students' numeracy and literacy skills.

The resource kit is comprised of four sections:

1. Before Your Visit to the CN Tower

This resource sets the stage for a visit to the CN Tower. It outlines the recommended content that should be covered for optimum benefit from a visit to the Tower, the behaviours and tasks that the field study will entail, and includes ideas and content for pre-visit activities.

2. Arrival Instructions

This section will assist in your planning and preparation for your visit and will provide you with information on how to get to the CN Tower, what to do upon your arrival, what to bring, and the facilities that are available on-site.

3. Student Worksheets

Worksheets will be handed out to students at a specified time during their visit. These worksheets are linked to the visitor experience: the aerial view from the observation levels at the Tower, plus audio-visual and graphics content currently on display. The answers to questions and any editorial/graphics descriptions are in italics.

4. After Your Visit: Post-Visit Debrief Activities

These resources offer creative extensions, focused learning and culminating tasks for teachers and students to use after their visit to the Tower. They allow teachers to delve more deeply into course topics through projects and reflective work. Also, there are some suggestions for cross-curricular activities aimed at improving literacy and numeracy skills important to this age group.

Before Your Visit to the CN Tower

Overview

This package is designed for use by teachers of Grade 9 and 10 secondary level students before, during and after a field trip to the CN Tower. Many of the tasks that can be accomplished during the visit link to Canadian and World Studies courses. Grade 9 Geography (Academic and Applied) has received particular emphasis here. Any visit to the Tower will spark deeper investigation of many cross-curricular topics. Opportunities for reinforcing literacy and numeracy education have been noted within this package.

Learning Expectations

Students will:

- Identify and analyze patterns of spatial organization, including land use, population distribution, and ecozones;
- Demonstrate an understanding of the characteristics of human systems (e.g., transportation, population, communication, energy networks, industry);
- Demonstrate a knowledge of Canada's significant world contributions (e.g., engineering, telecommunications technology);
- Demonstrate an ability to collect, organize, and synthesize information from a variety of sources to identify the characteristics of Canada's geography.

Prior Learning

Position of Ontario and the city of Toronto in Canada and the World

Maps – reading and making maps, knowledge, and application of cartographic conventions (map features, scale, legend, longitude and latitude, etc.)

Urban Land Use

Some advance work on urban settlement and land use will be beneficial to students, including the terms used to refer to major land uses within a city.

- Residential
- Transportation
- Institutional and Public Buildings
- Recreational and Open Space
- Industrial
- Commercial

Glossary of Terms

Commercial lands
Communication systems
Demography
Ecological footprint
Economic systems
Ecozone
Energy networks
Human systems
Industrial lands
Institutional lands
Recreational lands
Renewable energy
Residential lands
Passive solar power
Population density
Primary industries
Secondary industries
Quaternary industries
Tertiary industries
Transportation lands
Transportation systems
Urban environment

Your Visit

What teachers can do	What students can do
Before • Pre-teach or review (activate prior knowledge on) relevant topics; • Local, regional, national and world geography – Toronto and its place in the world; • Model mapping techniques, review types of maps, the conventions of map reading and map making, vocabulary and/or concepts associated with mapping; • Sustainability – explore this term and what it may mean to students in relation to its real meaning; • Urban Land Use – vocabulary and connections to prior knowledge of the city of Toronto and communities local to student visitors.	• Participate in pre-excursion activities; • Be aware of some aspects of Toronto's urban geography and history; • Look at the visit as an opportunity to get an aerial view of an urban area without a trip to the airport; • Be prepared to look at Toronto as a "model" city – is it a model city and how could it be improved; • Sustainability – be aware of the meaning of this term and what it means for the future of any urban planning and development; • Think of their own communities and the planning that has gone into creating them – what works, what doesn't.
During • Urban Geography & Land Use – have students be ready to note the various zones that they travel through on their way to the CN Tower; • Hand out worksheets to students; • Monitor students as they explore the facility and its exhibits; • Have fun!	• Bring pen, pencil and surface to write on (binder, clip board); • Participate in activities during the field trip; • Take notes and do not lose the worksheet; • Explore thoroughly – take in the view, read the informational graphics well; • Take in all aspects of the experience; • Have fun!
After • Encourage students to complete worksheets as per instructions; • Work on projects suggested in teacher's resource kit	• Use the field trip as a departure point for deeper learning in many areas of study • Reflect, relate, investigate, delve, search, analyze, apply, communicate.

Arrival Instructions

Groups are to access the CN Tower via Bremner Blvd, one block south of Front St West, between York St and Spadina Ave. Bus drop-off and pick up is located on the north side, westbound lanes on Bremner Blvd. From the curb it is a short walk to the main entrance.

All guests must pass through our security screening, which includes the use of metal detectors and a bag check.

Upon arrival at the CN Tower, your group will be asked to wait outside while the teacher or group leader checks in at the Group Desk (open seasonally – please check in at Guest Services Desk if Group Desk is unavailable).

When you check in you will need to provide:

- Actual number of students and chaperones
- Final payment for your group (unless prepayment has been arranged in advance)

You will be given ONE ticket for each person in your group, which are to be distributed prior to elevation.

Your group will be directed to the elevators that will take them to the observation levels.

What to Bring

Please ensure that students bring a pen or pencil to write with and something to write on (ie: a clipboard or binder). There is an on-site gift shop for those who forget to bring a writing utensil with them.

On-Site Facilities

The CN Tower does not offer lockers or storage for students while on-site. Students are asked to bring only what is needed as they will have to keep their belongings with them at all times.

Dining - The CN Tower offers a variety of dining options including Le Café at the base of the CN Tower. Student group meal and snack packages can be ordered in advance, or students can order and pay on-site.

Completing the Assignments

Each student will have a set of worksheets that make up the Assignment to be completed while on-site at the CN Tower. Answers to the assignment questions can be found in written information about the CN Tower and other structures on the walls throughout the CN Tower (starting on the mezzanine level before the students board the elevators), and in the views of the city from the Observation Levels.

The entire visit, from arrival to departure, should take approximately 1.5 – 2 hours. Add another 45 minutes if you plan on having lunch at the CN Tower as well.

Student Worksheets – Grade 9-10

1. Why was the CN Tower built?

   The Tower was initially built as a telecommunications Tower.

2. What other purposes does the Tower serve?

   Tourist attraction, restaurants, observation platforms, entertainment, shopping, elevator, education, films, corporate events

On the Main Observation Level

To see: views of the city, information graphics, screens showing Toronto landmarks.

1. What modes of transportation can you see from the observation areas? What types of vehicles are used on these systems? What is being transported in each type of vehicle? (For example, automobile – people; tractor trailers – food, livestock, packaged goods, furniture, appliances, heavy equipment, etc.) Use the chart to compile this information and come up with as many items as possible.

Mode of Transport	Vehicle	Cargo
Road	*e.g. Automobile* *Trucks* *Tractor Trailers* *Motorcycles* *Bicycles*	*People* *Light goods* *Heavy goods*
Air	*Jet, plane, helicopter*	*People* *Light goods*
Water	*Ferry* *Cargo ship* *Sailboat* *Motorboat*	*People* *Heavy goods*
Rail	*Trains, rail cars*	*People* *Heavy goods*

2. Describe the weather you see outside using criteria such as wind speed, visibility, temperature, and precipitation.

   Answers will vary, of the day and the time of year.

3. The original settlement of Toronto (first named "York") began as early as 1793. Looking south and westward along the lakefront, what factors do you think led people to build a city here?

   Large protected harbor; strategic military position in relation to the United States (Fort York built in 1793); defend against an attack by water or from the west and south; access to fresh water, forests and farmland; travel by water to other areas, connecting via St. Lawrence River to the Atlantic Ocean.

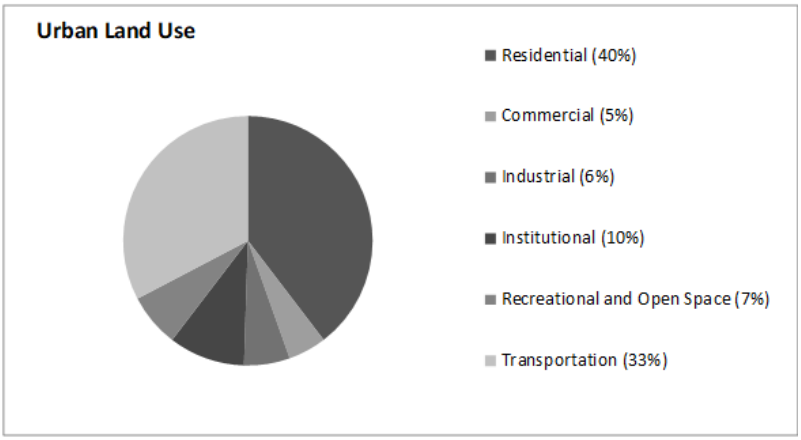
4. What patterns do you notice in the way that the city has developed? How has the lake influenced the way that transportation routes have developed? Note the way that roads have been oriented and the concentration of buildings in different areas.

   The streets are set up in a grid pattern. The expressway follows the shape of the lake, as does the railway. Many tall buildings are concentrated at the lake front and at certain road intersections; there is a concentration of tall buildings near the train station (Bay & King) and uptown (Bloor & Yonge); other collections of skyscrapers can be seen in the distance in the north and in the west (North York, Etobicoke). See if students can spot Yonge Street -- which is often called the longest street in the world.

5. Based on your observations of downtown Toronto, what types of urban development use the most space? Fill in the pie chart assigning a percentage to each of the land use categories and marking a wedge to indicate its relative size. Types of urban land use include:

   - Residential: condominium apartment buildings, single family homes, townhomes
   - Commercial: office buildings, retail stores, convention centres
   - Industrial: manufacturing and storage facilities, smokestacks, conveyors
   - Institutional and public buildings: government buildings, hospitals
   - Recreational and Open Space: indoor, and outdoor arenas and stadiums, parks, fields
   - Transportation: railway lands, highways, streets, multi-lane roads; gas, hydro and communications lines

Answers will vary. The actual estimate follows, based on statistical sources:



Statistical Source: Clark, Bruce. *Making Connections: Canada's Geography*. Pearson Education Canada: Toronto, 2006.

6. Which category does the CN Tower fit into, in terms of its land use?

   Commercial is the most accurate answer, although some may add industrial (because of the telecommunications function of the Tower) or recreational (because of the tourism and hospitality function of the Tower).

7. Mapping Toronto: Using your "bird's-eye view" and clues from the screens at the Main Observation Level, locate these notable Toronto landmarks on the map provided.

   1. The Roundhouse/Steamwhistle Brewery
   2. Harbourfront
   3. Toronto Harbour
   4. Toronto Islands
   5. Toronto Islands Airport
   6. Rogers Centre
   7. Gardiner Expressway
   8. Canadian National Exhibition Grounds
   9. TREC Windshare Turbine
   10. Ontario Place
   11. Railway Tracks
   12. CBC Building
   13. TIFF Lightbox
   14. Ontario College of Art and Design
   15. Art Gallery of Ontario
   16. Roy Thomson Hall
   17. Royal Alexandra Theatre
   18. Metro Hall
   19. Union Station
   20. Royal Ontario Musuem

   Description re: Graphic -- the map to be marked with highlighted letters and the activity could be done as a fill-in-the-blank.

8. What renewable energy sources do you see in operation from the Observation Level?

   Air – TREC windmill at the CNE grounds; Solar – panels on rooftops – Enwave water cooling (Post visit – Where does Toronto get its electric power?)

9. Beyond roof surfaces to keep out the elements, what do you see on the tops of buildings? What do you think property owners should be doing with this space? Design your own unique use for one of these spaces using the space below

   Boxes (air conditioning units), running tracks, gardens & trees, skylights, seating – restaurants, solar panels, satellite dishes (CBC Building), antennas, communications equipment.

   For the second part, answers will vary.

On the Lower Observation Level

To see: information graphics, Outdoor Terrace, the Glass Floor

1. Weather permitting, the Outdoor Terrace offers an opportunity to experience the climate conditions and sounds here in the sky. What sounds do you hear?

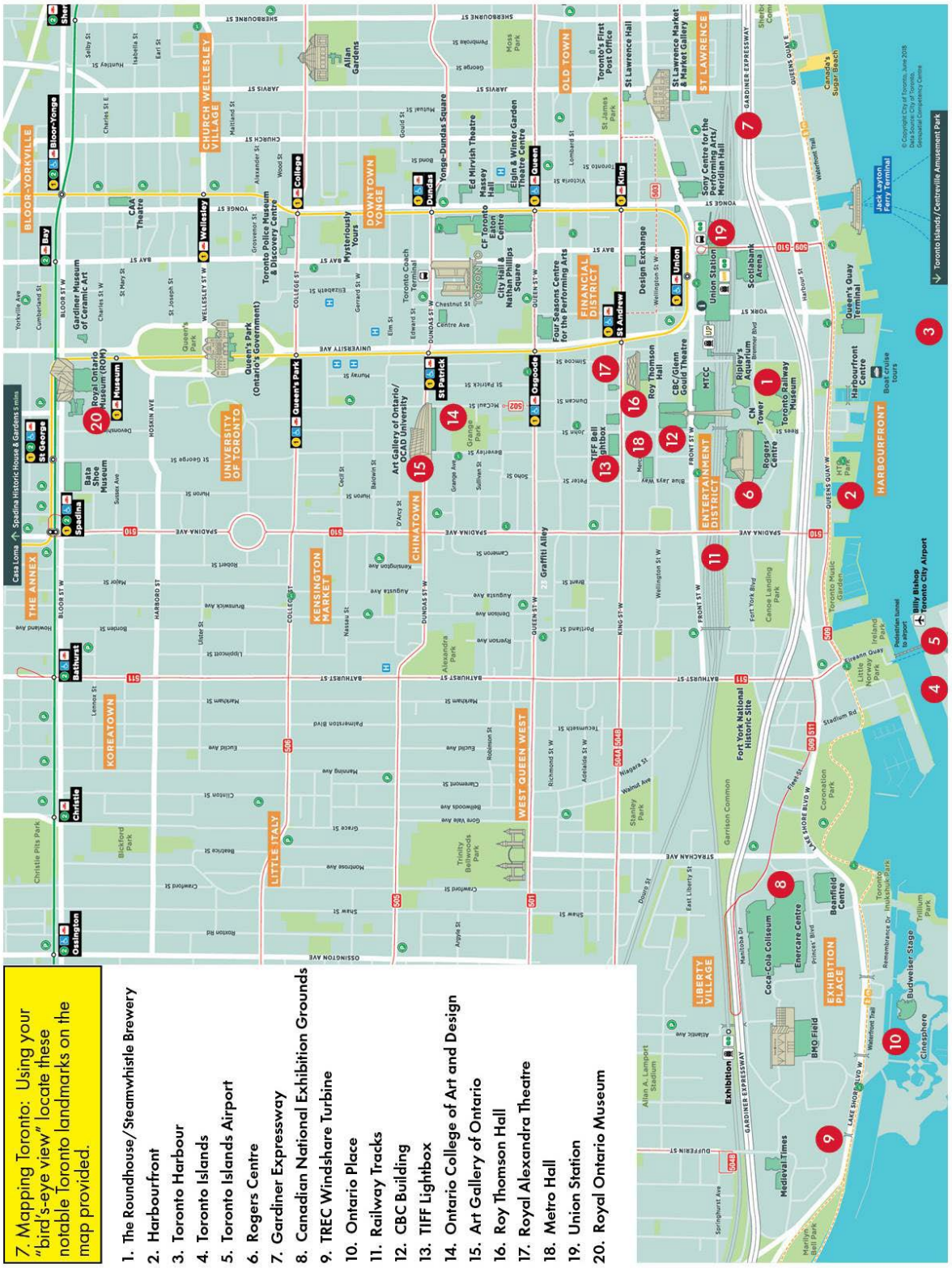
Answers will vary. Students will notice the sound of winds rushing past the tower in addition to the sounds of vehicles (horns, engines, wheels on pavement, airplanes) on the highway and streets below.

2. Consulting the information graphics, how much does the temperature differ in comparison to ground level?

   The temperature at this elevation can be as much as ten degrees cooler than at ground level.

3. Glass Floor Experience: Why do you think that the CN Tower had these floors installed? How did you react to walking (jumping?) on the floor?

   Answers will vary according to personal experiences on- site.



After Your Visit

These post-visit projects are designed to maximize the field research gained from a student trip to the CN Tower.

Our Local Community

Where do you live in relation to the CN Tower? What would your estimated travel time be by (a) car; (b) on foot; and (c), by helicopter?

Using Graphic Organizers -- Create a Sustainability Mind Map

Using the various categories of land use (residential, commercial, etc.), create a mind map that shows all of the various activities that can help create a sustainable city. For example: residential and transportation lands account for the largest amount of land use within a city. What types of residential property and transportation uses will you emphasise? (For example, live/work residences, urban farms, bike lanes, etc.)

News Report (OSSLT Preparation --Literacy Learning):

Using the information gathered during their visit, students will write a properly formatted news story. They can use the W5H (Who, What, When, Where, Why and How) and accepted news report format to create their story (headline, lead, important facts, short paragraphs, clear & logical development, specific details, quotes).

Here are a few ideas for stories:

- Report on the field trip to the Tower as an event.
- Focus on a new attraction or feature at the Tower (for example the glass floor panels in the elevators, EdgeWalk).
- Create a breaking news story, extrapolating from current events. For example: "LED Lights Reduce CN Tower's Ecological Footprint", "Windmill Farm on Toronto Island", "Toronto to get Underground Expressway", "Toronto CBD Roads to Become Toll Zone".

The story should be properly formatted and include photos with proper captions.

Build a Scale Model of the CN Tower and the South Financial core

The CN Tower borders the quickly expanding South Core. From the CN Tower in the west, the Scotiabank Arena in the east, Union station in the north and Lakeshore Blvd in the south, what was once expansive rail lands is an area of booming residential and business tower development. This is an excellent neighbourhood to study when considering urban land use, planning and development.

Materials may include recycled containers or be crafted from Bristol or foam board. Both the process (planning) and product (the finished model) will be evaluated.

Students are encouraged to incorporate their observations from the field trip in this project. They may also choose to analyze aerial and elevation views of the downtown area in order to create their model. Resources are numerous: www.cntower.ca is a good start, and Google Earth can provide easy access to aerial views. Many images of the downtown area exist in print and on the internet.

Human-Environment Interactions -- Revitalization and Future Development

You are in charge of future planning at the CN Tower. What additional attractions would you place within the Tower or in the surrounding lands around the base? Create schematic drawings that depict your plans. Explain and justify your choices in the form of a series of paragraphs.

Understanding and Managing Change -- Sustainability

Based on the charts in the on-line resources showing the population density of Metropolitan Toronto over the last two decades, estimate what the population density will be in 2070. Estimate the population growth in your own area over the same amount of time. Chart your results. What do you think will need to change within these areas in order to sustain this growth?

Understanding and Managing Change -- Planning the Ideal City

Create a planning map, including legend, symbols and scale depicting your **ideal city**. How would you ensure that the city and its inhabitants could thrive? How would you make it sustainable?

Write a report of several paragraphs supporting your choices.

Criteria – Key Words: sustainability, ecological footprint, lifestyle, aesthetics.

Draw a Cityscape

Like Toronto, many cities in the world have major architectural icons – London has Big Ben and the Shard, Paris has the Eiffel Tower, Chicago has the Sears (renamed Willis) and John Hancock Towers, New York has The Empire State Building and One World Trade Centre. What icon will you include in your city? Draw a cityscape that includes your urban icon and other buildings.

Geographic Foundations: Space and Systems -- Mapping Skills

During their fieldwork, students will collect information about the Tower and the surrounding area. Using this information, in addition to further in-class research, they will construct a series of thematic maps. Themes:

- Public Transportation in Metropolitan Toronto
- Green Space vs Commercial/Industrial Land Use in Toronto

Maps features should include: title, legend, border, scale, direction/orientation, labels, and a colour scheme.

Global Connections -- The Seven Wonders

What criteria were used by the American Society of Civil Engineers to choose the Seven Wonders? How are these “Wonders” similar and how do they differ? Investigate other exceptional structures that exist in the world, locate them, and justify what makes them exceptional. Come up with your own list of Seven Wonders of the World and justify your selections.

Global Connections -- Longitude and Latitude

What other cities sit close to the same mark of longitude or latitude as Toronto and the CN Tower? Use a globe or world map for this purpose. Use the internet or an atlas to compare the relative climate (temperature, precipitation) of these places. Chart your results in a graph. What conclusions can you reach from your data?

Understanding and Managing Change -- The Planning Debate

As part of an "Urban Development Forum", students debate an issue regarding city planning. In groups, students assemble arguments to support or argue against the central topic up for debate. Each group member participates in the debate, taking on a particular role – pro or con – in order to successfully support their point of view. Students may be given time in-class or on-line to research their topic.

Suggested Debate Topics

An underground tunnel to replace the Gardiner Expressway. Should the area above be developed, or turned into parkland?

Renewable energy is needed for Toronto. A windmill farm of 200 windmills is proposed for the Toronto Islands. Yes or No?

A developer wants to build a hotel/office tower in the Docklands area that surpasses the height of the CN Tower by 183 metres (600 feet). Should it be approved?

Sample Scenario -- A Tunnel for Toronto

Transportation in and around Toronto is a major concern. The Gardiner Expressway is now reaching the end of its projected operational life. Major remedial repairs need to be done in order to keep it running. Developers want to replace the expressway with an underground tunnel, charge tolls to commuters who use it, and develop the land above the tunnel for commercial and residential use. Concerned citizens want the Gardiner to be turned into an elevated greenspace. If a tunnel is constructed, they want the land above it to become parkland. What is the best solution?

Math Workout (a calculator will be needed for some of these questions)

1. The floor of the Tower Sphere is an average of 34.75 metres in diameter. What is the total square footage of the three publicly accessible floors in this part of the Tower? Hint: Area of a Circle = $\pi(d/2)^2$ where π equals 3.14 and d equals the diameter of the Tower Sphere.

   The diameter of the Tower Sphere is based on a circumference of 101.9 metres.
   If the area of one floor (inclusive of stairwells and elevator shafts) equals A, then:
   $A = 3.14 \times (34.75/2)^2$
   $A = 3.14 \times (17.375)^2$
   $A = 3.14 \times 17.375 \times 17.375$
   $A = 947.9$ square metres
   $3 \times A = 2843.7\ m^2$

2. What weighs the same as the Tower? The Tower weighs 100,000 metric tons. If that weight is the same as 23,214 elephants, how much would one elephant weigh? Based on your own weight, how many of you are needed to weigh the same as the Tower? What is your weight compared to an elephant?

   One elephant weighs 4.31 metric tons; if you weigh 60 kilograms (132 lbs) that equals 0.006 metric tons. Based on this information the Tower weighs 16,666,667 times as much as you do.

3. Daredevil Doug wants to slide on a wire from the tip of the CN Tower (555.33 metres) to a point 3km away, near the foot of Bathurst Street. What is the minimum amount of wire needed for him to do this stunt? Hint: Use the Pythagorean theorem: $a^2 + b^2 = c^2$. Include a graphic that depicts the Tower and the stunt as described.

Height of the Tower = a (553.33 metres)
Ground distance to destination = b (3km)
Length of wire = c

$a^2 + b^2 = c^2$
(height of Tower)^2 + (distance along the ground) ^{2} = (length of wire)^2
(553.33 metres)^2 + (3 kilometres) ^{2} = (length of wire)^2
(553.33 metres)^2 + (3000 metres) ^{2} = (length of wire)^2
(553.33 metres) (553.33 metres) + (3000 metres)(3000 metres)= (length of wire)^2
306,174.08 metres + 9,000,000 metres = (length of wire)^2
9, 306,174.08 metres = (length of wire)^2
Length of wire = the square root of 9, 306,174.08 metres
Length of wire = 3050.6 metres

Therefore, the minimum length of wire needed for the stunt would be 3050.6 metres.

4. The Tower is 553.33 metres (1815 feet 5 inches) tall. If the centre of gravity for the Tower is 200 feet (60.96 metres) above the ground, it means that half (50%) of the weight of the Tower sits above that point. What percent of the Tower in terms of height holds the largest amount of weight?

Calculate the ratio, R:
R = (Height of centre of gravity) ÷ (Height of the CN Tower)
R = 60.96 ÷ 553.33
R = 11.43 %
Therefore, the bottom 11.43 percent of the tower accounts for 50% of its weight.

5. It takes 58 seconds for the elevator to reach the Main Observation level. Capacity for the elevator is around 16 people. Assuming that it takes approximately 4 minutes for a round trip, including loading and unloading, what is the elevator's capacity per hour?

60 divided by 4 equals 15 trips, times 16 guests is equal to 240 guests per hour.

Resources - Textbooks:

Clark, Bruce. *Making Connections: Canada's Geography*. Pearson Education Canada: Toronto, 2006.

DesRivieres, Dennis. *Experience Canada: A Geography*. Oxford University Press: Toronto, 2003.

Kaplan, David. *Urban Geography (2nd Edition).* John Wiley & Sons: New Jersey, 2009.

On-Line Resources

CN Tower
www.cntower.ca

Modern Wonders
http://www.asce.org/People-and-Projects/Projects/Seven-Wonders/Seven-Wonders/

Maps of Toronto
www.toronto.ca/torontomaps/index.htm

Maps of Toronto Neighbourhoods
www.toronto.ca/demographics/profiles_map_and_index.htm

History of Toronto Neighbourhoods
www.toronto.ca/archives/edu_neighbourhood_gr9_10.htm

Toronto Population Growth
https://www.toronto.ca/city-government/data-research-maps/toronto-economy-labour-force-demographics/

Statistics Canada – Population Growth
https://www12.statcan.gc.ca/census-recensement/index-eng.cfm