# UNIT II

World Time Zones and Elapsed Travel Times

In this unit, you will learn about the 24-hour clock and its importance in planning travel itineraries. You will learn to understand the importance of world time zones when planning itineraries and how to calculate time differences around the world. You will read several examples that illustrate how to calculate time differences and elapsed travel times between countries. Finally, you will learn about the International Date Line and how it affects time differences.

Examining the 24-Hour Time Clock

The conventional time clock expresses time as a function of 12-hour intervals with corresponding a.m. and p.m. designations. Although this method of telling time is used commonly throughout the world, it has significant shortcomings, particularly when applied to travel itineraries.

As a result, the travel industry uses a 24-hour time clock to eliminate confusion over a.m. and p.m. distinctions and to facilitate easier calculation of elapsed travel times, which we will explore in the following Units.
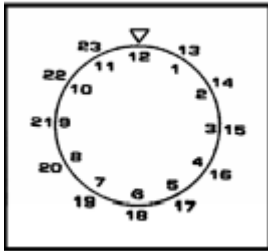

24-Hour Clock System vs. the 12-Hour System

World Time Zones

In 1884, the world's major nations agreed to create a series of standardised time zones. The world is now divided into 24 time zones, beginning with the prime meridian in Greenwich, England. The prime meridian is an imaginary line running through Greenwich that connects the north and south poles.

The time at Greenwich and all other countries in this zone is called Greenwich Mean Time (GMT) and is also referred to as Universal Time Coordinated (UTC)
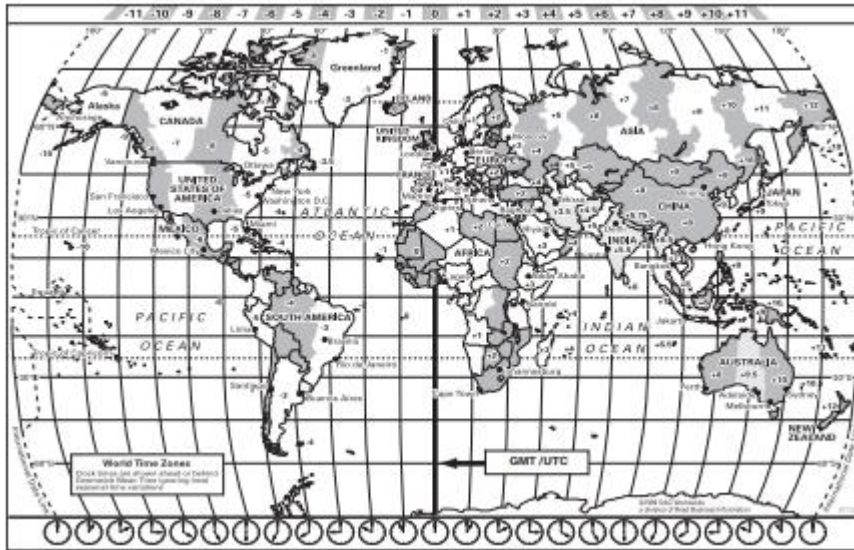
Time Zones of the World

The time in all other zones can be expressed by referring to Greenwich Mean Time or Universal Time Coordinated. The sign + (for plus) and - (for minus) are used in this context having the following application:

• GMT + 1 (or UTC + 1) = 1 hour ahead of GMT/UTC

 • GMT - 1 (or UTC - 1) = 1 hour behind of GMT/UTC Up to GMT/UTC + 12 and GMT/UTC - 12.

This diagram illustrates a scale of hours relative to GMT/UTC.
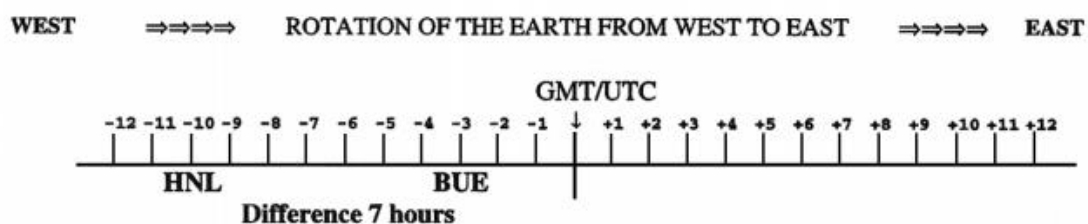
Scale of Hours

Each of the blocks represents one hour. When trying to work out the difference between two points on the scale, count the number of hours between them. This theoretical system has had to be adapted, in certain cases, in order to maintain the same local time with national boundaries or groups of islands.

Such local time, fixed by law, is called Standard Clock Time or Standard Time. Certain countries modify their standard time during the summer by advancing one hour (or a fraction of an hour in some areas). This temporary change is called Daylight Saving Time (DST).

Time charts are published in all major Airline Guides. Reproduced on the next two pages is the complete OAG International Time Calculator. It lists all countries, with an indication against each country of its standard time in relation to GMT/UTC.

In countries where Daylight Saving Time applies during certain periods of the year, such time is specified together with the periods during which it applies.

Standard Clock Time is expressed in hours fast (+) or slow (-) of GMT/UTC. All examples and exercises in this Unit are based on these extracts.

The following examples illustrate this time system:

Example 1

What is the local time in Addis Ababa (ADD), Ethiopia when it is 12:00 hours GMT?

In Ethiopia the standard time is GMT + 3 all year round. This means that the local time is 3 hours ahead of GMT. The local time in Addis Ababa is 15:00 hours when it is 12:00 hours GMT
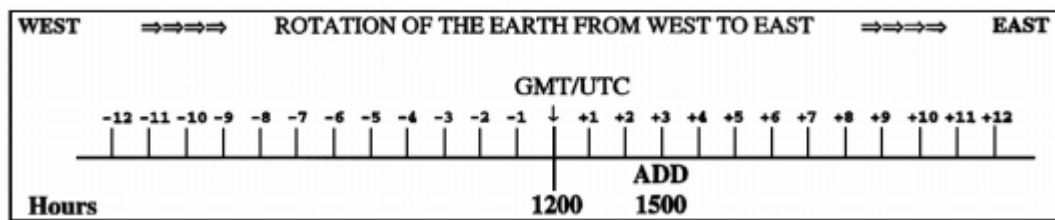
Example 2

What is the local time in Caracas (CCS), Venezuela on 1st August when it is 12:00 hours GMT?

The chart indicates that in Venezuela the standard time of GMT - 4:30 applies all year. Local time on 1st August is 4 hours behind GMT and it is therefore, 07:30 hours in Caracas when it is 12:00 hours GMT.
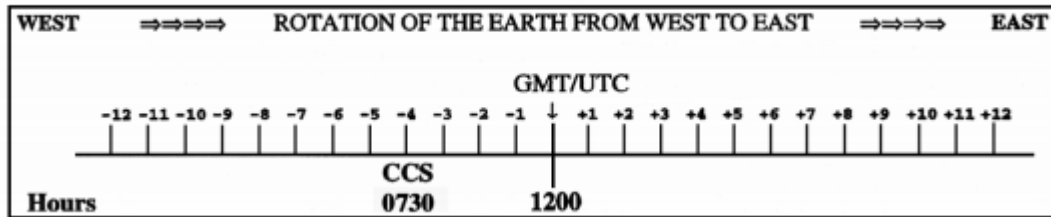
International time calculator

A	Hours ±GMT	DST ±GMT	Daylight saving time DST (period)	
Afghanistan	+4.30			
Albania	+1	+2	27 Mar -	30 Oct
Algeria	+1			
American Samoa	-11			
Andorra	+1	+2	27 Mar	30 Oct
Angola	+1			
Anguilla, Leeward Islands	-4			
Antarctica	-4			
Antigua and Barbuda, Leeward Islands	-4			
Argentina	-3			
Armenia	+4	+5	27 Mar	30 Oct
Aruba	-4			
Australia**				
Lord Howe Island	+10.30	+11	02 Oct	01 Apr
Capital Territory, NSW (excluding Lord Howe Island and Broken Hill), Victoria	+10	+11	02 Oct	01 Apr
Northern Territory	+9.30			
Queensland	+10			
South Australia, Broken Hill	+9.30	+10.30	02 Oct	-01 Apr
Western Australia	+8			
Tasmania	+10	+11	02 Oct	01 Apr
Austria	+1	+2	27 Mar	30 Oct
Azerbaijan	+4	+5	27 Mar	30 Oct

B	Hours ±GMT	DST ±GMT	Daylight saving time DST (period)	
Bahamas	-5	-4	13 Mar	-06 Nov
Bahrain	+3			
Bangladesh	+6			
Barbados	-4			
Belarus	+2	+3	27 Mar	30 Oct
Belgium	+1	+2	27 Mar	30 Oct
Belize	-6			
Benin	+1			
Bermuda	-4	-3	13 Mar	-06 Nov
Bhutan	+6			
Bolivia	-4			
Bonaire, Saint Eustatius and Saba	-4			
Bosnia and Herzegovina	+1	+2	27 Mar	30 Oct
Botswana	+2			
Brazil**				
Alagoas, Amapa, Bahia, Ceara, Maranhao, Para, Paraiba, Pernambuco, Piaui, Rio Grande do Norte, Sergipe, Tocantins	-3			
Amazonas, Rondonia, Roraima, Acre	-4			
Fernando de Noronha	-2			
Espirito Santo, Distrito Federal, Goias, Minas Gerais, Parana, Rio De Janeiro, Rio Grande do Sul, Santa Catarina, Sao Paulo	-3	-2	16 Oct	25 Feb
Mato Grosso, Mato Grosso do Sul	-4	-3	16 Oct	25 Feb

Brunei Darussalam	+8			
Bulgaria	+2	+3	27 Mar	30 Oct
Burkina Faso	GMT			
Burundi	+2			

C	Hours ±GMT	DST ±GMT	Daylight saving time DST (period)	
Cambodia	+7			
Cameroon	+1			
Canada**				
Newfoundland Island (excluding Labrador)	-3.30	-2.30	13 Mar	06 Nov
Atlantic Area including Labrador	-4	-3	13 Mar	06 Nov
Eastern Time	-5	-4	13 Mar	06 Nov
Central Time except Saskatchewan	-6	-5	13 Mar	06 Nov
Mountain Time Zone	-7	-6	13 Mar	06 Nov
Pacific Time	-8	-7	13 Mar	06 Nov
Atlantic Areas not observing DST	-4			
Eastern Areas not observing DST	-5			
Saskatchewan	-6			
Mountain Areas not observing DST	-7			
Cape Verde	-1			
Cayman Islands	-5			
Central African Republic	+1			
Chad	+1			
Chile**				
Mainland	-4	-3	09 Oct	-10 Mar
Easter Island	-6	-5	08 Oct	-10 Mar
China	+8			
Chinese Taipei	+8			
Christmas Island, Indian Ocean	+7			
Cocos (Keeling) Islands	+6.30			
Colombia	-5			
Comoros	+3			
Congo	+1			
Congo Democratic Republic of**				
Kinshasa, Bandundu, Bas-Congo, Equateur	+1			
Kasai, Kivu, Maniema, Katanga, Oriental	+2			
Cook Islands	-10			
Costa Rica	-6			
Cote d'Ivoire	GMT			
Croatia	+1	+2	27 Mar	30 Oct
Cuba	-5	-4	20 Mar	30 Oct
Curacao	-4			
Cyprus	+2	+3	27 Mar	30 Oct
Czech Republic	+1	+2	27 Mar	30 Oct

D	Hours ±GMT	DST ±GMT	Daylight saving time DST (period)	
Denmark	+1	+2	27 Mar	30 Oct
Djibouti	+3			
Dominica	-4			

	Hours ±GMT	DST +GMT	Daylight saving time DST (period)
Dominican Republic	-4		

E

	Hours ±GMT	DST +GMT	Daylight saving time DST (period)
Ecuador**			
Mainland	-5		
Galapagos Islands	-6		
Egypt	+2		
El Salvador	-6		
Equatorial Guinea	+1		
Eritrea	+3		
Estonia	+2	+3	27 Mar - 30 Oct
Ethiopia	+3		

F

	Hours ±GMT	DST +GMT	Daylight saving time DST (period)
Falkland Islands	-3		
Faroe Islands	GMT	+1	27 Mar - 30 Oct
Fiji	+12		
Finland	+2	+3	27 Mar - 30 Oct
France	+1	+2	27 Mar - 30 Oct
French Guiana	-3		
French Polynesia**			
Marquesas Islands	-9.30		
French Polynesia except Marquesas Island and Gambier Island	-10		
Gambier Island	-9		

G

	Hours ±GMT	DST +GMT	Daylight saving time DST (period)
Gabon	+1		
Gambia	GMT		
Georgia	+4		
Germany	+1	+2	27 Mar - 30 Oct
Ghana	GMT		
Gibraltar	+1	+2	27 Mar - 30 Oct
Greece	+2	+3	27 Mar - 30 Oct
Greenland**			
Greenland except Pituffik, Ittoqqortoormiit, Nerlerit Inaat	-3	-2	26 Mar - 29 Oct
Pituffik	-4	-3	13 Mar - 06 Nov
Ittoqqortoormiit, Nerlerit Inaat	-1	GMT	27 Mar - 30 Oct
Grenada, Windward Islands	-4		
Guadeloupe	-4		
Guam	+10		
Guatemala	-6		
Guinea	GMT		
Guinea-Bissau	GMT		
Guyana	-4		

H

	Hours ±GMT	DST +GMT	Daylight saving time DST (period)
Haiti	-5		
Honduras	-6		
Hong Kong (SAR) China	+8		
Hungary	+1	+2	27 Mar - 30 Oct

I

	Hours ±GMT	DST +GMT	Daylight saving time DST (period)
Iceland	GMT		
India	+5.30		

	Hours ±GMT	DST +GMT	Daylight saving time DST (period)
Indonesia**			
Western including Sumatera, Jawa, Kalimantan Barat and Kalimantan Tengah	+7		
Central including Sulawesi, Kalimantan Selatan, Kalimantan Timur and Nusa Tenggara	+8		
Eastern including Maluku and Papua	+9		
Iran Islamic Republic of	+3.30	+4.30	22 Mar - 21 Sep
Iraq	+3		
Ireland Republic of	GMT	+1	27 Mar - 30 Oct
Israel	+2	+3	01 Apr - 02 Oct
Italy	+1	+2	27 Mar - 30 Oct

J

	Hours ±GMT	DST +GMT	Daylight saving time DST (period)
Jamaica	-5		
Japan	+9		
Jordan	+2	+3	01 Apr - 27 Oct

K

	Hours ±GMT	DST +GMT	Daylight saving time DST (period)
Kazakhstan**			
Aktau, Atyrau, Aktyubinsk, Uralsk	+5		
Almaty, Astana, Karaganda, Kokshetau, Kostanay, Kyzl-Orda, Petropavlovsk, Semipalatinsk, Shimkent, Ust-Kamenogorsk	+6		
Kenya	+3		
Kiribati**			
Gilbert Islands	+12		
Line Islands	+14		
Phoenix Islands	+13		
Korea Democratic People's Republic of	+9		
Korea Republic of	+9		
Kuwait	+3		
Kyrgyzstan	+6		

L

	Hours ±GMT	DST +GMT	Daylight saving time DST (period)
Lao People's Democratic Republic	+7		
Latvia	+2	+3	27 Mar - 30 Oct
Lebanon	+2	+3	27 Mar - 29 Oct
Lesotho	+2		
Liberia	GMT		
Libyan Arab Jamahiriya	+2		
Liechtenstein	+1	+2	27 Mar - 30 Oct
Lithuania	+2	+3	27 Mar - 30 Oct
Luxembourg	+1	+2	27 Mar - 30 Oct

M

	Hours ±GMT	DST +GMT	Daylight saving time DST (period)
Macao (SAR) China	+8		
Macedonia Former Yugoslav Republic of	+1	+2	27 Mar - 30 Oct
Madagascar	+3		
Malawi	+2		
Malaysia	+8		

	Hours +GMT	DST +GMT	Daylight saving time DST (period)
Maldives	+5		
Mali	GMT		
Malta	+1	+2	27 Mar - 30 Oct
Marshall Islands	+12		
Martinique	-4		
Mauritania	GMT		
Mauritius	+4		
Mayotte	+3		
Mexico**			
Mexico, Rest	-6	-5	03 Apr - 30 Oct
Baja California Sur, Chihuahua, Nayarit, Sinaloa	-7	-6	03 Apr - 30 Oct
Baja California Norte	-8	-7	03 Apr - 30 Oct
Sonora	-7		
Piedras Negras, Nuevo Laredo, Reynosa, Matamoros, Ciudad Acuna	-6	-5	13 Mar - 06 Nov
Ciudad Juarez	-7	-6	13 Mar - 06 Nov
Tijuana, Mexicali	-8	-7	13 Mar - 06 Nov
Micronesia Federated States of**			
Except Kosrae, Pohnpei	+10		
Kosrae, Pohnpei	+11		
Moldova Republic of	+2	+3	27 Mar - 30 Oct
Monaco	+1	+2	27 Mar - 30 Oct
Mongolia	+8		
Montenegro	+1	+2	27 Mar - 30 Oct
Montserrat, Leeward Islands	-4		
Morocco	GMT	+1	03 Apr - 31 Jul
Mozambique	+2		
Myanmar	+6.30		

N	Hours +GMT	DST +GMT	Daylight saving time DST (period)
Namibia	+1	+2	04 Sep - 01 Apr
Nauru	+12		
Nepal	+5.45		
Netherlands	+1	+2	27 Mar - 30 Oct
New Caledonia	+11		
New Zealand**			
Mainland except Chatham Island	+12	+13	25 Sep - 01 Apr
Chatham Islands	+12.45	+13.45	25 Sep - 01 Apr
Nicaragua	-6		
Niger	+1		
Nigeria	+1		
Niue	-11		
Norfolk Island	+11.30		
Northern Mariana Islands (except Guam)	+10		
Norway	+1	+2	27 Mar - 30 Oct

O	Hours +GMT	DST +GMT	Daylight saving time DST (period)
Oman	+4		

P	Hours +GMT	DST +GMT	Daylight saving time DST (period)
Pakistan	+5		
Palau	+9		
Panama	-5		
Papua New Guinea	+10		
Paraguay	-4	-3	02 Oct - 07 Apr

	Hours +GMT	DST +GMT	Daylight saving time DST (period)
Peru	-5		
Philippines	+8		
Pitcairn Islands	-8		
Poland	+1	+2	27 Mar - 30 Oct
Portugal**			
Mainland and Madeira	GMT	+1	27 Mar - 30 Oct
Azores	-1	GMT	27 Mar - 30 Oct
Puerto Rico	-4		

Q	Hours +GMT	DST +GMT	Daylight saving time DST (period)
Qatar	+3		

R	Hours +GMT	DST +GMT	Daylight saving time DST (period)
Reunion	+4		
Romania	+2	+3	27 Mar - 30 Oct
Russian Federation**			
Kaliningrad	+2	+3	27 Mar - 30 Oct
Moscow, St Petersburg, Astrakhan, Naryan Mar, Izhevsk, Samara	+3	+4	27 Mar - 30 Oct
Perm, Nizhnevartovsk, Ekaterinburg	+5	+6	27 Mar - 30 Oct
Omsk, Novosibirsk, Kemerovo	+6	+7	27 Mar - 30 Oct
Norilsk, Kyzyl	+7	+8	27 Mar - 30 Oct
Bratsk, Ulan-Ude	+8	+9	27 Mar - 30 Oct
Chita, Yakutsk	+9	+10	27 Mar - 30 Oct
Khabarovsk, Vladivostok, Yuzhno-Sakhalinsk	+10	+11	27 Mar - 30 Oct
Magadan, Chukotka, Kamchatka	+11	+12	27 Mar - 30 Oct
Rwanda	+2		

S	Hours +GMT	DST +GMT	Daylight saving time DST (period)
Saint Barthelemy	-4		
Saint Helena	GMT		
Saint Kitts and Nevis, Leeward Islands	-4		
Saint Lucia	-4		
St Maarten (Dutch Part)	-4		
Saint Martin	-4		
Saint Pierre and Miquelon	-3	-2	13 Mar - 06 Nov
St Vincent and the Grenadines	-4		
Samoa	-11		
San Marino	+1	+2	27 Mar - 30 Oct
Sao Tome and Principe	GMT		
Saudi Arabia	+3		
Senegal	GMT		
Serbia	+1	+2	27 Mar - 30 Oct
Seychelles	+4		
Sierra Leone	GMT		
Singapore	+8		
Slovakia	+1	+2	27 Mar - 30 Oct
Slovenia	+1	+2	27 Mar - 30 Oct
Solomon Islands	+11		
Somalia	+3		
South Africa	+2		
Spain**			
Mainland, Balearics, Melilla, Ceuta	+1	+2	27 Mar - 30 Oct
Canary Islands	GMT	+1	27 Mar - 30 Oct

International time calculator

Sri Lanka	+5.30		
Sudan	+3		
Suriname	-3		
Swaziland	+2		
Sweden	+1	+2	27 Mar - 30 Oct
Switzerland	+1	+2	27 Mar - 30 Oct
Syrian Arab Republic	+2	+3	01 Apr - 27 Oct

T	Hours ±GMT	DST ±GMT	Daylight saving time DST (period)
Tajikistan	+5		
Tanzania United Republic of	+3		
Thailand	+7		
Timor-Leste	+9		
Togo	GMT		
Tonga	+13		
Trinidad and Tobago	-4		
Tunisia	+1		
Turkey	+2	+3	28 Mar - 30 Oct
Turkmenistan	+5		
Turks and Caicos Islands	-5	-4	13 Mar - 06 Nov
Tuvalu	+12		

U	Hours ±GMT	DST ±GMT	Daylight saving time DST (period)
Uganda	+3		
Ukraine	+2	+3	27 Mar - 30 Oct
United Arab Emirates	+4		
United Kingdom	GMT	+1	27 Mar - 30 Oct
United States Minor Outlying Islands**			
Johnston Atoll	-10		
Midway Island	-11		
Wake Island	+12		
USA**			
Eastern Time except Indiana	-5	-4	13 Mar - 06 Nov
Central Time	-6	-5	13 Mar - 06 Nov
Mountain Time except Arizona	-7	-6	13 Mar - 06 Nov
Mountain Time Zone - Arizona	-7		
Pacific Time	-8	-7	13 Mar - 06 Nov
Alaska	-9	-8	13 Mar - 06 Nov
Aleutian Islands	-10	-9	13 Mar - 06 Nov
Hawaiian Islands	-10		
Uruguay	-3	-2	02 Oct - 11 Mar
Uzbekistan	+5		

V	Hours ±GMT	DST ±GMT	Daylight saving time DST (period)
Vanuatu	+11		
Venezuela	-4.30		
Viet Nam	+7		
Virgin Islands, British	-4		
Virgin Islands, US	-4		

W	Hours ±GMT	DST ±GMT	Daylight saving time DST (period)
Wallis and Futuna Islands	+12		

Y	Hours ±GMT	DST ±GMT	Daylight saving time DST (period)
Yemen	+3		

| Zimbabwe | +2 | | |

Example 3

What is the local time in Damascus (DAM), Syria on 10th July when it is 12:00 hours GMT?
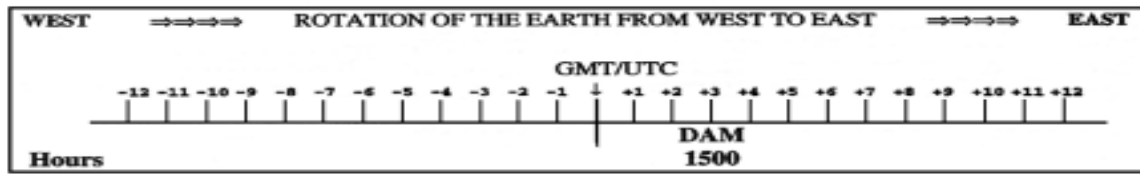
Here, it is indicated that in Syria the daylight saving time of GMT + 3 applies during the period from 1st April to 30th September. Therefore, the local time is 3 hours ahead of GMT, meaning that it is 15:00 hours in Damascus when it is 12:00 hours GMT.
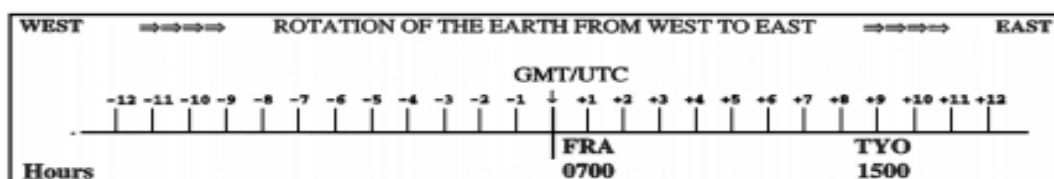
Example 4

In everyday work, it is often necessary to determine time differences between two places neither of which is on GMT. For instance, what is the local time in Frankfurt (FRA), Germany when it is 15:00 hours local time in Tokyo (TYO), Japan on 20th March?

In Germany, on 20th March the local time corresponds with standard time, that is GMT + 1.

In Japan, the local time is GMT + 9.

This means that the local time in Frankfurt is 8 hours (9 minus 1 = 8) behind that of Tokyo and it is, therefore, necessary to subtract 8 hours from the local time in Tokyo (15:00 hours) to arrive at the local time in Frankfurt, that is, 07:00 hours on the same day.

Example 5

What is the local time in Rome (ROM), Italy when it is 02:00 in La Paz (LPB), Bolivia on 24th March? On that date, the local time in Italy is GMT + 1 (standard time). In Bolivia the local time is GMT - 4. This means that the local time in Italy is 5 hours (1 plus 4 = 5) ahead of that of Bolivia.

It is therefore necessary to add 5 hours to the local time in La Paz (02:00) to arrive at the local time in Rome, that is, 07:00 on the same day.
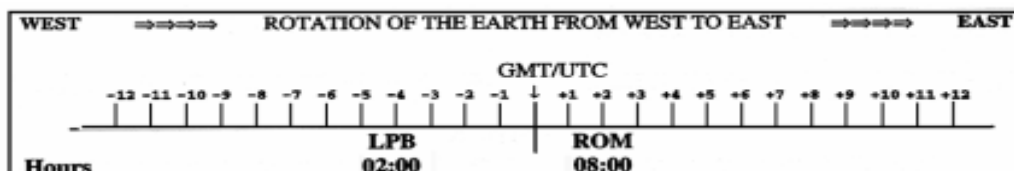
```
WEST        ⇒⇒⇒⇒     ROTATION OF THE EARTH FROM WEST TO EAST     ⇒⇒⇒⇒   EAST
                                  GMT/UTC
         -12 -11 -10 -9  -8  -7  -6  -5  -4  -3  -2  -1  ↓  +1 +2 +3 +4 +5 +6 +7 +8 +9 +10 +11 +12
         | | | | | | | | | | | | | | | | | | | | | | | |
                                  LPB      |ROM
  Hours                           02:00    07:00
```
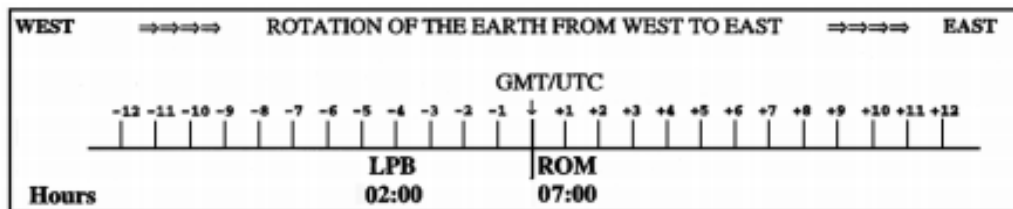
Example 6

What would the local time in Rome be on 15th June when it is 02:00 in La Paz?

On that date, the local time in Italy is GMT + 2, since daylight saving time applies from 31st March to 26th October.

The local time in Bolivia remains at GMT - 4.

This means that the local time in Italy would be 6 hours (2 plus 4 = 6) ahead of that of Bolivia. It is therefore necessary to add 6 hours to the local time in La Paz (02:00) to arrive at the local time in Rome, that is 08:00 on the same day.

```
WEST        ⇒⇒⇒⇒     ROTATION OF THE EARTH FROM WEST TO EAST     ⇒⇒⇒⇒   EAST
                                  GMT/UTC
         -12 -11 -10 -9  -8  -7  -6  -5  -4  -3  -2  -1  ↓  +1 +2 +3 +4 +5 +6 +7 +8 +9 +10 +11 +12
         | | | | | | | | | | | | | | | | | | | | | | | |
                                  LPB      |ROM
  Hours                           02:00    08:00
```

In very large countries where territories spread over several time zones, such as Australia, Brazil, Canada, Greenland, Indonesia, the Russian Federation, and the USA, several different standard times have been established for application in determined areas or states. The names of these multi-time zone countries are followed in the OAG International Time Calculator by two asterisks (**).

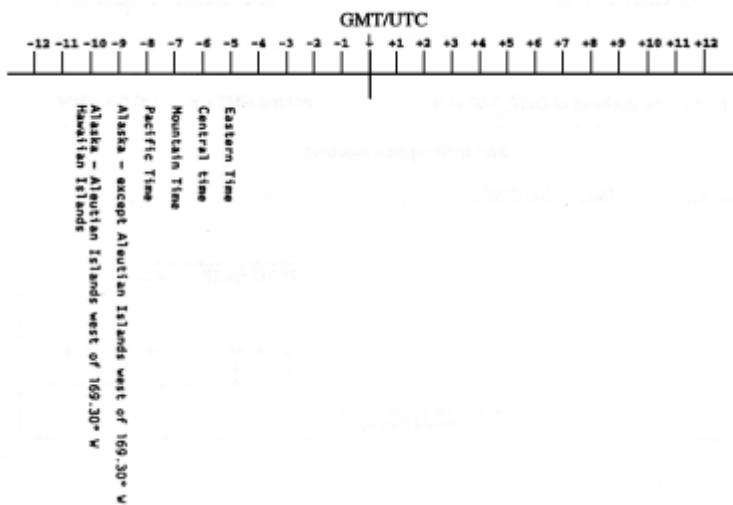Example In the USA the standard time is GMT - 5 in the Eastern Time Zone, whereas it is GMT - 8 in the Pacific Time Zone.

USA**	Hours (+/- GMT)	DST +/- GMT	Daylight Saving Time DST period
Eastern Time (except Indiana)	-5	-4	13Mar – 06Nov
Central Time	-6	-5	13Mar – 06Nov
Mountain Time (except Arizona)	-7	-6	13Mar – 06Nov
Mountain Time, Arizona	-7		
Pacific Time	-8	-7	13Mar – 06Nov
Alaska	-9	-8	13Mar – 06Nov
Aleutian Islands	-10	-9	13Mar – 06Nov
Hawaiian islands	-10		
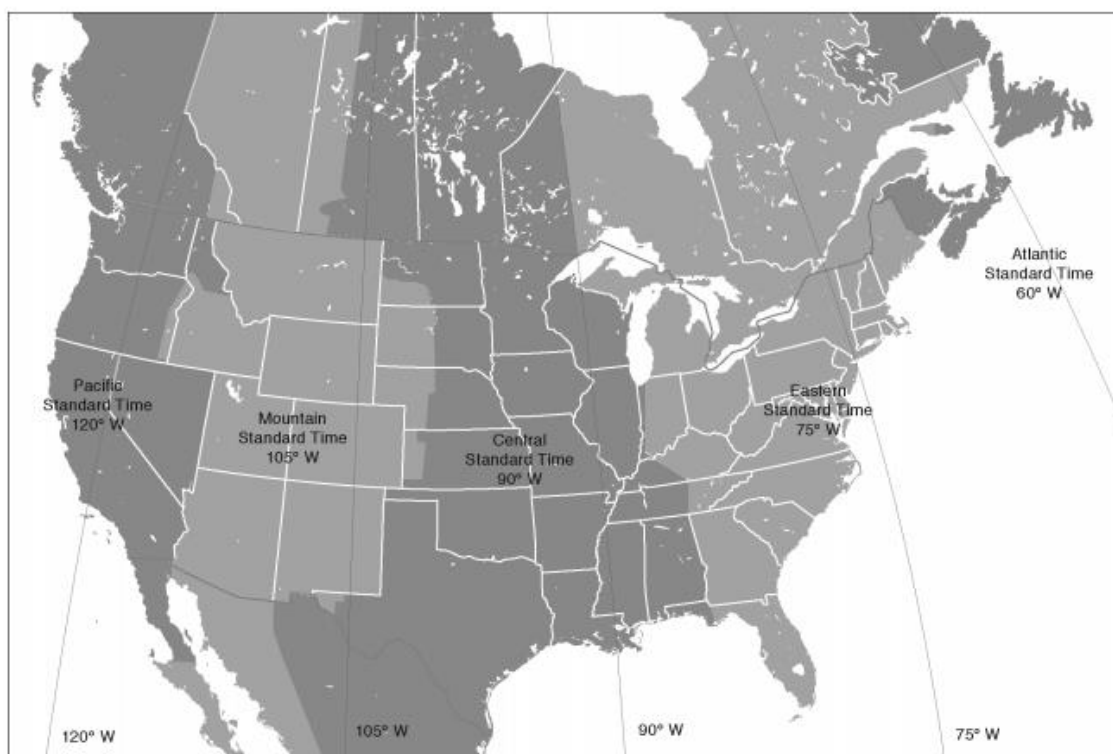
The same variations generally apply with respect to the daylight saving time, if any.

North American time zones from east to west	Some major destination cities
Atlantic	Halifax (YHZ) Port of Spain (POS) Santo Domingo (SDQ)
Eastern	Atlanta (ATL) Boston (BOS) Detroit (DTT) Kingston (KIN) Miami (MIA) Montreal (YMQ) Nassau (NAS) New York City (NYC) Orlando (MCO) Ottawa (YOW) Toronto (YTO) Washington DC (WAS)
Central	Acapulco (ACA) Chicago (CHI) Dallas (DAL) Houston (HOU) Mexico City (MEX) New Orleans (MSY)
Mountain	Calgary (YYC) Salt Lake City (SLC)
Pacific	Los Angeles (LAX) San Diego (SAN) San Francisco (SFO) Vancouver (YVR)

Note: Airlines' schedules are always published in Local Time. The time variation from GMT/UTC of each city is specified in airline timetables.

GMT/UTC

-12 -11 -10 -9 -8 -7 -6 -5 -4 -3 -2 -1 │ +1 +2 +3 +4 +5 +6 +7 +8 +9 +10 +11 +12

Eastern Time
Central time
Mountain Time
Pacific Time
Alaska — except Aleutian Islands west of 169.30° W
Alaska — Aleutian Islands west of 169.30° W
Hawaiian Islands

The time difference between two points can be determined as follows:

(a) If the local time at both points is ahead of GMT (GMT +) or behind GMT (GMT -), deduct the smaller from the larger figure.

Example

GMT + 2 and GMT + 10
10 minus 2 = 8 hours time difference

| WEST | ⇒⇒⇒⇒ | ROTATION OF THE EARTH FROM WEST TO EAST | ⇒⇒⇒⇒ | EAST |

GMT/UTC

-12 -11 -10 -9 -8 -7 -6 -5 -4 -3 -2 -1 ↓ +1 +2 +3 +4 +5 +6 +7 +8 +9 +10 +11 +12

Hours   Difference 8 hours
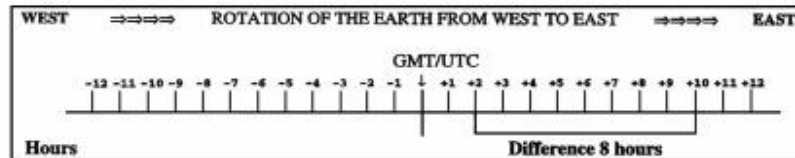
Figure 5.13

(b) If the local time is ahead of GMT (GMT +) at one point and behind GMT (GMT -) at the other, add both figures together.

Example

GMT + 2 and GMT - 5
2 plus 5 = 7 hours time difference

Example 1

| WEST | ⇒⇒⇒⇒ | ROTATION OF THE EARTH FROM WEST TO EAST | ⇒⇒⇒⇒ | EAST |

GMT/UTC

-12 -11 -10 -9 -8 -7 -6 -5 -4 -3 -2 -1 ↓ +1 +2 +3 +4 +5 +6 +7 +8 +9 +10 +11 +12

Hours   Difference 7 hours
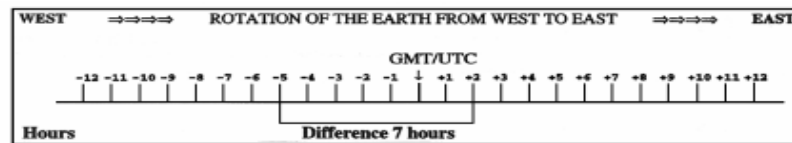
Figure 5.14

The local time in Tokyo (TYO), Japan is 18:30 hours on the 1st of March. What is the local time and date in Sydney (SYD), NS, Australia?

| TYO | GMT + 9 |
| SYD New South Wales | GMT + 11 (Daylight Saving Time) |

As the local time at both points is ahead of GMT (GMT +) we deduct the smaller from the larger figure.

SYD	GMT + 11
TYO	GMT + 9
Difference:	2 hours

The local time in Sydney is 2 hours ahead (+) of Tokyo.

18:30 hours + 2 hours = 20:30 hours on the same day (1st March).
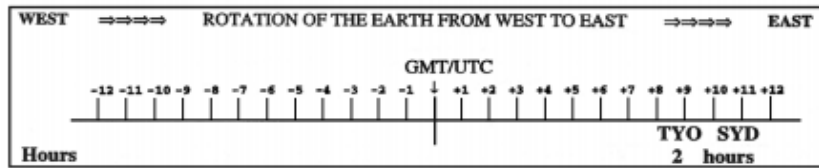
Figure 5.15

Example 2

The local time in Buenos Aires (BUE), Argentina is 15:25 hours on 22nd May. What is the local time and date in Honolulu (HNL), Hawaiian Islands, USA?

BUE	GMT - 3
HNL Hawaiian Islands	GMT - 10 (Standard Clock Time)

As the local time at both points is behind GMT (GMT -), we deduct the smaller from the larger figure.

HNL		GMT - 10
BUE		GMT - 3
	Difference:	7 hours

The local time in Honolulu is 7 hours behind (-) Buenos Aires.

15:25 hours - 7 hours = 08:25 hours on the same day (22nd May).
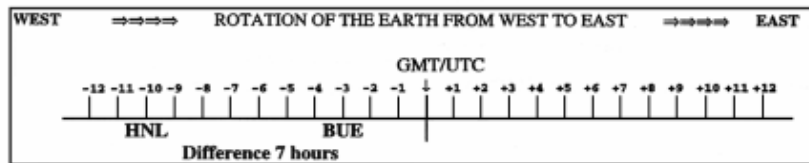
Example 3

The local time in Madrid (MAD), Spain is 05:00 hours on 30 November. What is the local time and date in Vancouver (YVR), BC, Canada?

MAD	GMT + 1
YVR Pacific Time	GMT - 8

As the local time is ahead of GMT (GMT +) at one point and behind GMT (GMT -) at the other, we add both figures together.

MAD		GMT + 1
YVR		GMT - 8
	Difference:	9 hours

The local time in Vancouver is 9 hours behind (-) Madrid.

05:00 hours - 9 hours = 20:00 hours on the previous day (November 29th).
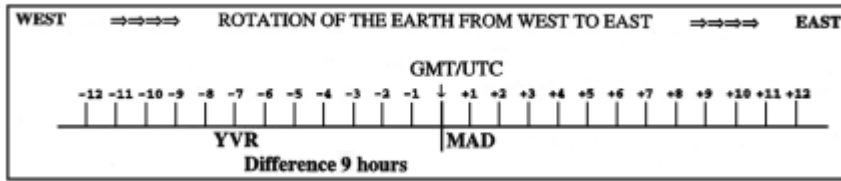
Example 4

The local time in Santiago (SCL), Chile is 20:25 hours on 15th February. What is the local time and date in Karachi (KHI), Pakistan?

| SCL | GMT - 3 (Daylight Saving Time) |
| KHI | GMT + 5 |

As the local time is ahead of GMT (GMT +) at one point and behind GMT (GMT -) at the other, we add both figures together.

SCL		GMT - 3
KHI		GMT + 5
	Difference:	8 hours

The local time in Karac is 8 hours ahead of (+) Santiago.

20:25 hours + 8 hours = 04:25 hours on the next day (16th February).
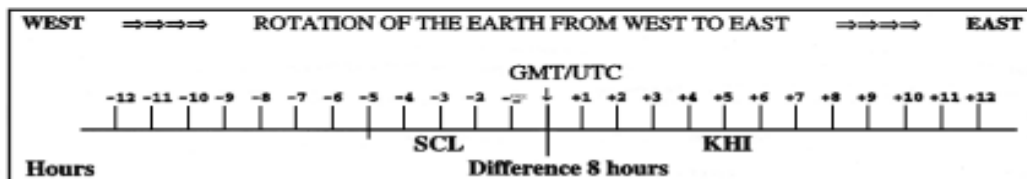
International Date Line

Crossing the International Date Line makes the calculation of time differences between countries more complicated, because travelers either gain or lose a day during the process.

When a customer crosses the International Date Line travelling west, the day changes to the following day—Wednesday would immediately become Thursday.

Travelling the opposite direction has the opposite effect. So a customer crossing the International Date Line travelling east gains a day—in other words, Thursday becomes Wednesday.

It should be noted that the time of day (except at midnight) means nothing.

A customer could cross the date line at 15:00 or 02:00 and it has no effect on time of day. The only difference is the date—the hour remains the same.

The International Date Line is an imaginary north-south line through the Pacific Ocean, east and west of which the date differs (east being one day earlier).
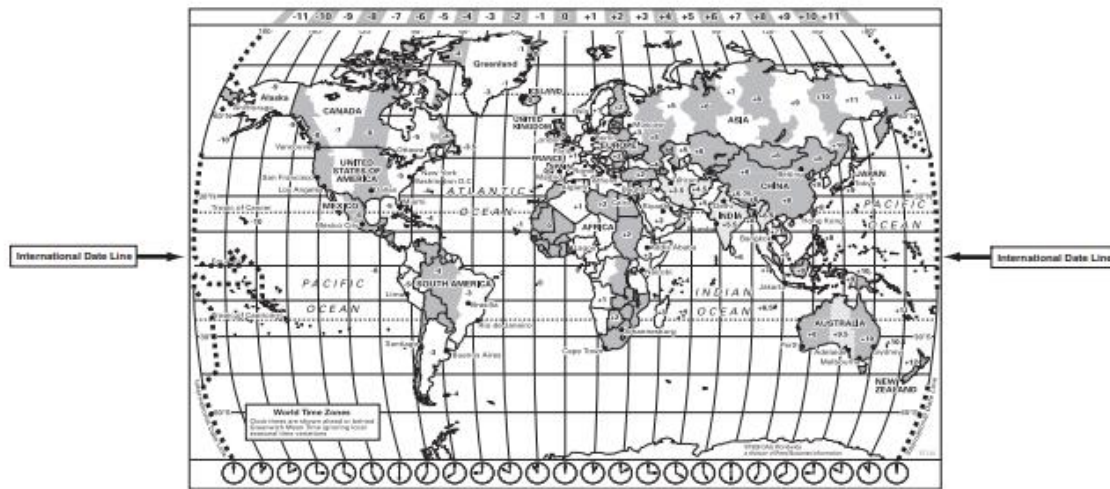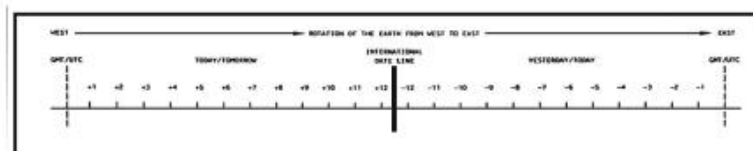

Figure 5.19—International Date Line

THE **INTERNATIONAL DATE LINE** MUST BE CONSIDERED AS A WALL WHICH CANNOT BE CROSSED WHEN CALCULATING TIME DIFFERENCES.
ALL CALCULATION MUST ALWAYS BE DONE BY USING THE **GMT/UTC TIME ZONE** AS THE REFERENCE.

The following example should help clarify matters.

If your customers depart on Tuesday morning and travel from Honolulu to Tokyo, they would arrive after a nine-hour flight. But it would be Wednesday in Tokyo because they crossed the International Date Line.

Conversely, if they leave from Tokyo on Sunday morning and return to Honolulu, they will arrive on Saturday because now they crossed the date line travelling west to east.

However, if customers depart later in the day and cross the date line, matters can be trickier.

For example if customers leave Honolulu at 23:00 for Tokyo on Thursday it becomes Friday one hour after departure from Honolulu (23:00, Thursday plus one hour flying time = midnight which changes Thursday to Friday), and they have not even crossed the date line yet.

Later on the flight, on Friday, they cross the date line and instantaneously it becomes Saturday!

So the customers who left Honolulu midweek (Thursday) arrive Tokyo on the weekend (Saturday) after a 9-hour flight.

These types of time change considerations are particularly important to the business traveler who must do business during normal business hours.

Although these types of calculations can be complicated, most airline schedules give arrival times that are already adjusted for time-zone crossings and gained or lost days. Also a travel agent's computerized reservation system (GDS) will list the elapsed flying times of scheduled flights as do many online flight schedules displayed on the Internet.

Read the following examples.

They will give you a better understanding of calculating time differences involving the International Date Line.

Example 1

The distance between Nadi (NAN), Fiji and Apia (APW), Samoa is only 1,225 km, but when it is Monday in Nadi, it is Sunday in Apia. The time difference between these two islands is 23 hours.

```
NAN                          GMT + 12
APW                          GMT -11
        Difference:          23 hours
```
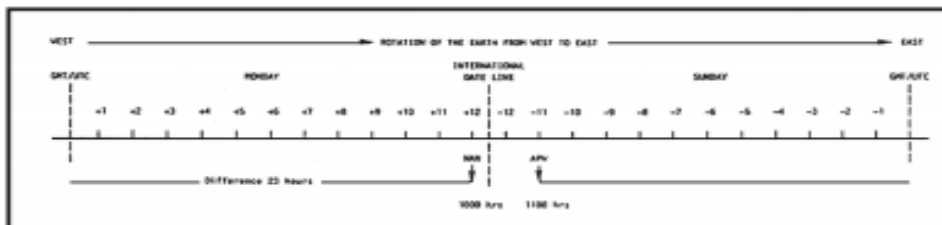
The local time in Nadi is 23 hours ahead of Apia.

Figure 5.21

When the local time in Nadi, is 01:00 on Monday, the local time in Apia is 02:00 on the previous day, that is, Sunday.

Nadi and Apia are separated by the International Date Line. When calculating the time difference between these two cities, the International Date Line cannot be crossed. The calculation must be done using GMT/UTC.

When the date line is crossed eastbound, for example from Nadi to Apia on Monday, a day is "gained" as the arrival in Apia will take place on Sunday.

Thus aircraft crossing the International Date Line while flying eastbound over the Pacific Ocean could reach their destination on the day before their departure:

For example, the flight Air Pacific FJ 252 has an effective flying time of 2 hours 55 minutes and with a departure from Nadi (NAN), Fiji on Monday at 15:05 hours produces an arrival in Apia (APW), Samoa on Sunday at 19:00 hours.

Trans-Pacific flights leaving Japan or New Zealand in the evening arrive on the West Coast of the United States on the afternoon of the same day:

For example, flight Japan Airlines JL 064 on 21st May has an effective flying time of 9 hours 45 minutes with a departure from Tokyo (NRT), Japan on Thursday at 21:30 hours, which produces an arrival in Los Angeles (LAX), USA on Thursday at 15:15 hours.

Example 2

Although Papeete (PPT), Tahiti is not very far from Auckland (AKL), New Zealand, there is a time difference of 22 hours, in July for example:
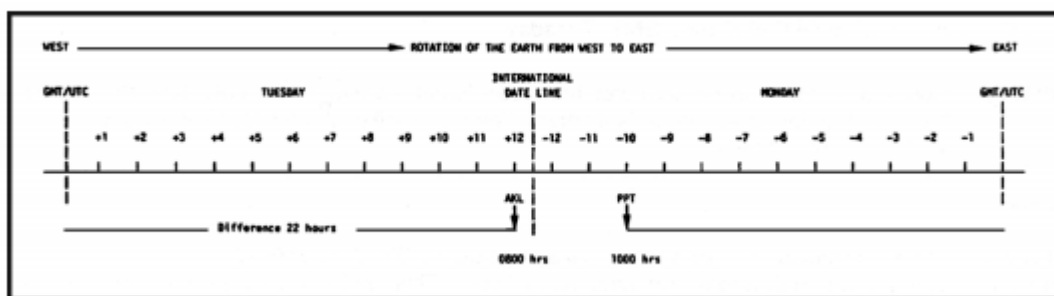
PPT GMT – 10

 AKL GMT + 12 (Standard Time)

As the local time is ahead of GMT (GMT +) at one point and behind GMT (GMT -) at the other, we add both figures together.

PPT GMT - 10

AKL GMT + 12 Difference: 22 hours

The local time in Papeete is 10:00 hours on Monday; the local time in Auckland is 08:00 hours on Tuesday.

Papeete and Auckland are separated by the International Date Line.

When calculating the time difference between two cities, the International Date Line cannot be crossed. The calculation must be done using GMT/UTC.

When the International Date Line is crossed westbound, for example from Papeete to Auckland on Monday, a day is "lost" as the arrival date in New Zealand will be on Tuesday:

The flight Air New Zealand NZ 005 on 17th July (effective flying time 5 hours 45 minutes) departs from Papeete (PPT), Tahiti on Tuesday at 02:30 hours and arrives in Auckland (AKL), New Zealand on Wednesday at 06:15 hours.

The fact that a flight arrives at its destination on the day before or after is highlighted in airline timetables by means of a special sign printed next to the time of arrival at destination.

The transport time is the number of hours and minutes from the time of departure at the airport of origin until the time of arrival at the airport of final destination. This includes eventual transit and/or transfer times.

 In airline timetables, departure and arrival times are always expressed in local time.

Time differences must, therefore, always be taken into account when calculating the total transport time.

 Example 1

Flight AF 033 leaves Paris at 12:30 on Tuesday, 12th December and arrives in Montreal at 13:55 on the same day.

What is the total transport time?

Montreal is situated in the Eastern Time zone of Canada.

The calculation should be made as follows:

• First Step: Ascertain the local time applicable at departure and arrival cities. PAR = GMT + 1 (Standard Clock Time) YMQ = GMT - 5 (Standard Clock Time)

• Second Step: Convert arrival and departure times to GMT. To convert departure and arrival times to GMT:

 • Deduct the number of hours from the local time when it is ahead of GMT (+)

 • Add the number of hours to the local time when it is behind GMT (-) PAR 12:30 TUE at GMT + 1 = 11:30 GMT Tuesday YMQ 13:55 TUE at GMT - 5 = 18:55 GMT Tuesday

• Third Step: Now that a common denominator has been found, namely GMT, calculate the difference between the departure and arrival times.

 The result will give the total transport time, that is,

7 hours 25 minutes.

Example 2

What is the total transport time for a journey leaving Lusaka (Zambia) at 0910 on Friday, 6th January, and arriving in Hong Kong on Saturday, 7th January, at 1450? This trip includes several connections.

The method of calculation used in the first example can also be applied to this one, as follows:

• First Step: Determine the local time at departure and arrival points:

LUN = GMT + 2 HKG = GMT + 8

 • Second Step: Convert departure and arrival times to GMT:

 LUN 09:10 FRI = 07:10 GMT Friday HKG 14:50 SAT = 06:50 GMT Saturday

 • Third Step: Calculate the difference: From 07:10 GMT FRI To 06:50 GMT SAT

Total transport time: 23 hours 40 minutes

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