

Hours of daylight/day-length throughout the year

Purpose:

To determine how latitude (Position north or south of the equator) affects the length of day.

To understand how the tilt of the axis of the earth will affect length of day during different times of year.

To understand that latitudes north and south of the equator have opposite patterns of day-length.

Overview:

In class we have learned that seasons and length of day are NOT caused by our distance from the sun but by the 23.5 degree tilt of the axis of the earth. Because of the tilt of the axis, in some parts of the Earth's orbit around the sun the northern hemisphere is tilted toward the sun while the southern hemisphere is tilted away from the sun. In other parts of the orbit, the northern hemisphere is tilted away from the sun while the southern hemisphere is tilted toward the sun. This tilt affects 2 things: seasons and day-length. This graph will help you to determine the relationship between latitude and day-length, as well as seasonal changes of day-length for northern and southern hemispheres of the Earth.

Procedure:

1. Find the data for day-length at **latitude 0**. Graph the length of daylight for each month, connect the dots with a **red** line.
2. Find the data for day-length at **latitude 26 North and South**. Graph the length of daylight for each month, connect the dots with an **orange** line.
3. Find the data for day-length at **latitude 38 North and South**. Graph the length of daylight for each month, connect the dots with a **green** line.
4. Find the data for day-length at **latitude 70 North and South**. Graph the length of daylight for each month, connect the dots with a **blue** line.
5. **Answer the analysis and conclusion questions regarding your finished graph**

Analysis and conclusion questions:

1. Look at the information you have graphed for latitude 0. If the data make a straight line, what does that mean about the change in day-length over the course of the year? _____

2. What season is it at latitude 38 North in June and July? _____ how long is the day-length?
_____ What season is it at latitude 38 South in June and July? _____
how long is the day-length? _____

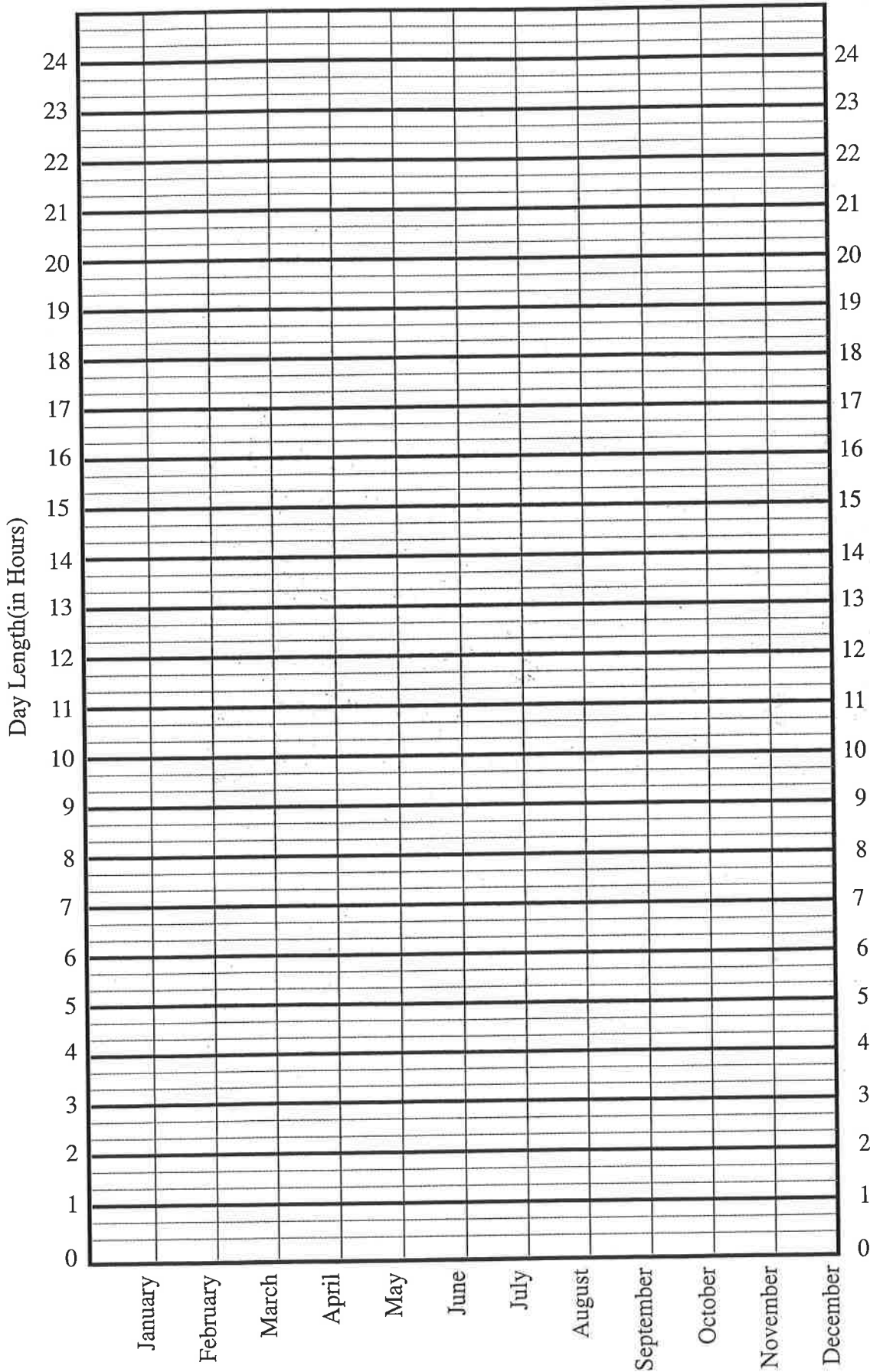
3. Are there any places where the sun never comes up? _____ at what latitudes does this occur? _____
what cities are located at these latitudes? _____

4. At what latitude does the sun stay up for 24 hours? _____ what cities are located at these
latitudes? _____

5. Is there a place(places) on the graph where all the lines converge? _____ During which months
does this occur? _____ What seasons correspond to these months?
_____ How long is the day-length at this time of
year? _____

6. Days and Nights Around the World: Seasonal Changes in Number of Hours of Daylight

Label each plot line:
a. latitude and
b. state/country



Latitude: 70° North

| Date | Sunrise (AM) | Sunset (PM) | Day Length |
|------|--------------|-------------|------------|
| Jan | NONE | NONE | 0 |
| Feb | 8:14 | 4:34 | 8:20 |
| Mar | 6:04 | 6:32 | 12:28 |
| Apr | 3:35 | 8:46 | 17:11 |
| May | NONE | NONE | 24:00 |
| Jun | NONE | NONE | 24:00 |
| Jul | NONE | NONE | 24:00 |
| Aug | 3:36 | 8:46 | 17:10 |
| Sep | 5:46 | 6:17 | 12:31 |
| Oct | 7:49 | 3:58 | 8:09 |
| Nov | NONE | NONE | 0 |
| Dec | NONE | NONE | 0 |

Tromsø, NORWAY
Prudhoe Bay, ALASKA, USA
Clyde, Baffin Island, CANADA

Latitude: 57° North

| Date | Sunrise (AM) | Sunset (PM) | Day Length |
|------|--------------|-------------|------------|
| Jan | 8:28 | 4:15 | 7:47 |
| Feb | 7:23 | 5:25 | 10:02 |
| Mar | 6:09 | 6:26 | 12:17 |
| Apr | 4:50 | 7:25 | 14:35 |
| May | 3:41 | 8:24 | 16:43 |
| Jun | 3:15 | 9:08 | 17:53 |
| Jul | 3:48 | 8:43 | 16:55 |
| Aug | 4:49 | 7:35 | 14:46 |
| Sep | 5:53 | 6:12 | 12:19 |
| Oct | 6:56 | 4:52 | 9:56 |
| Nov | 8:04 | 3:47 | 7:43 |
| Dec | 8:47 | 3:29 | 6:42 |

Kodiak, ALASKA, USA
Glasgow, SCOTLAND
Copenhagen, DENMARK
Moscow, RUSSIA

Latitude: 38° North

| Date | Sunrise (AM) | Sunset (PM) | Day Length |
|------|--------------|-------------|------------|
| Jan | 7:22 | 5:21 | 9:59 |
| Feb | 6:52 | 5:55 | 11:03 |
| Mar | 6:12 | 6:23 | 12:11 |
| Apr | 5:26 | 6:51 | 13:25 |
| May | 4:55 | 7:18 | 14:23 |
| Jun | 4:47 | 7:36 | 14:49 |
| Jul | 5:04 | 7:28 | 14:24 |
| Aug | 5:30 | 6:55 | 13:25 |
| Sep | 5:57 | 6:08 | 12:11 |
| Oct | 6:24 | 5:24 | 11:00 |
| Nov | 6:57 | 4:54 | 9:57 |
| Dec | 7:22 | 4:54 | 9:32 |

USA: San Francisco, CALIFORNIA
Charleston, W. VIRGINIA
Wichita, KANSAS
St. Louis, MISSOURI
Louisville, KENTUCKY
Pueblo, COLORADO
Richmond, VIRGINIA
Sendai, JAPAN
Tientsin, CHINA
Athens, GREECE
Cordoba, SPAIN

**6. Days and Nights Around the World:
Seasonal Changes in Number of Hours of Daylight**

All dates are the 21th day of the month

Latitude: 26° North

| Date | Sunrise (AM) | Sunset (PM) | Day Length |
|------|--------------|-------------|------------|
| Jan | 6:58 | 5:44 | 10:46 |
| Feb | 6:41 | 6:06 | 11:25 |
| Mar | 6:12 | 6:22 | 12:10 |
| Apr | 5:41 | 6:36 | 12:55 |
| May | 5:21 | 6:52 | 13:31 |
| Jun | 5:19 | 7:05 | 13:46 |
| Jul | 5:30 | 7:02 | 13:32 |
| Aug | 5:45 | 6:40 | 12:55 |
| Sep | 5:58 | 6:07 | 12:09 |
| Oct | 6:12 | 5:37 | 11:25 |
| Nov | 6:32 | 5:19 | 10:47 |
| Dec | 6:53 | 5:23 | 10:30 |

Monterey, MEXICO
Kunming CHINA
Karachi, PAKISTAN
Luxor, EGYPT
Taipei, TAIWAN
Patna, INDIA
Riyadh, SAUDI ARABIA
Wau El Kebir, LIBYA

Latitude: 0°

| Date | Sunrise (AM) | Sunset (PM) | Day Length |
|------|--------------|-------------|------------|
| Jan | 6:18 | 6:25 | 12:07 |
| Feb | 6:20 | 6:27 | 12:07 |
| Mar | 6:14 | 6:20 | 12:06 |
| Apr | 6:05 | 6:12 | 12:07 |
| May | 6:03 | 6:10 | 12:07 |
| Jun | 6:08 | 6:15 | 12:07 |
| Jul | 6:13 | 6:20 | 12:07 |
| Aug | 6:09 | 6:16 | 12:07 |
| Sep | 6:00 | 6:06 | 12:06 |
| Oct | 5:51 | 5:58 | 12:07 |
| Nov | 5:52 | 5:59 | 12:07 |
| Dec | 6:04 | 6:12 | 12:08 |

Quito, ECUADOR; Nairobi, KENYA;
Singapore, MALAYA

Latitude: 26° South

| Date | Sunrise (AM) | Sunset (PM) | Day Length |
|------|--------------|-------------|------------|
| Jan | 5:36 | 7:06 | 13:30 |
| Feb | 5:59 | 6:48 | 12:49 |
| Mar | 6:14 | 6:20 | 12:06 |
| Apr | 6:28 | 5:48 | 11:20 |
| May | 6:44 | 5:29 | 10:45 |
| Jun | 6:56 | 5:27 | 10:31 |
| Jul | 6:54 | 5:38 | 10:44 |
| Aug | 6:33 | 5:53 | 11:20 |
| Sep | 6:00 | 6:05 | 12:05 |
| Oct | 5:29 | 6:20 | 12:51 |
| Nov | 5:11 | 6:41 | 13:30 |
| Dec | 5:15 | 7:01 | 13:46 |

Pretoria, SOUTH AFRICA
Curitiba, BRAZIL
Brisbane, AUSTRALIA
Asuncion, PARAGUAY

Latitude: 38° South

| Date | Sunrise (AM) | Sunset (PM) | Day Length |
|------|--------------|-------------|------------|
| Jan | 5:11 | 7:31 | 14:20 |
| Feb | 5:46 | 7:00 | 13:14 |
| Mar | 6:14 | 6:20 | 12:06 |
| Apr | 6:42 | 5:34 | 10:52 |
| May | 7:09 | 5:04 | 9:55 |
| Jun | 7:26 | 4:47 | 9:21 |
| Jul | 7:19 | 5:13 | 9:54 |
| Aug | 6:47 | 5:39 | 10:52 |
| Sep | 6:01 | 6:05 | 12:04 |
| Oct | 5:16 | 6:33 | 13:17 |
| Nov | 4:45 | 7:07 | 14:22 |
| Dec | 4:44 | 7:32 | 14:48 |

Melbourne, AUSTRALIA
Auckland, NEW ZEALAND
Bahia Blanca, ARGENTINA
Curacautin, CHILE

Latitude: 70° South

| Date | Sunrise (AM) | Sunset (PM) | Day Length |
|------|--------------|-------------|------------|
| Jan | NONE | NONE | 24:00 |
| Feb | 4:09 | 8:35 | 16:26 |
| Mar | 6:10 | 6:21 | 12:11 |
| Apr | 8:19 | 3:57 | 7:38 |
| May | NONE | NONE | 0 |
| Jun | NONE | NONE | 0 |
| Jul | NONE | NONE | 0 |
| Aug | 8:24 | 4:03 | 7:39 |
| Sep | 6:00 | 6:07 | 12:07 |
| Oct | 3:37 | 8:15 | 16:38 |
| Nov | NONE | NONE | 24:00 |
| Dec | NONE | NONE | 24:00 |

ANTARCTICA

Data generated with Voyager
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