

YEAR 12 Essentials Mathematics  
Semester 2 2018  
Test 7 – Arc Length & Time Zones



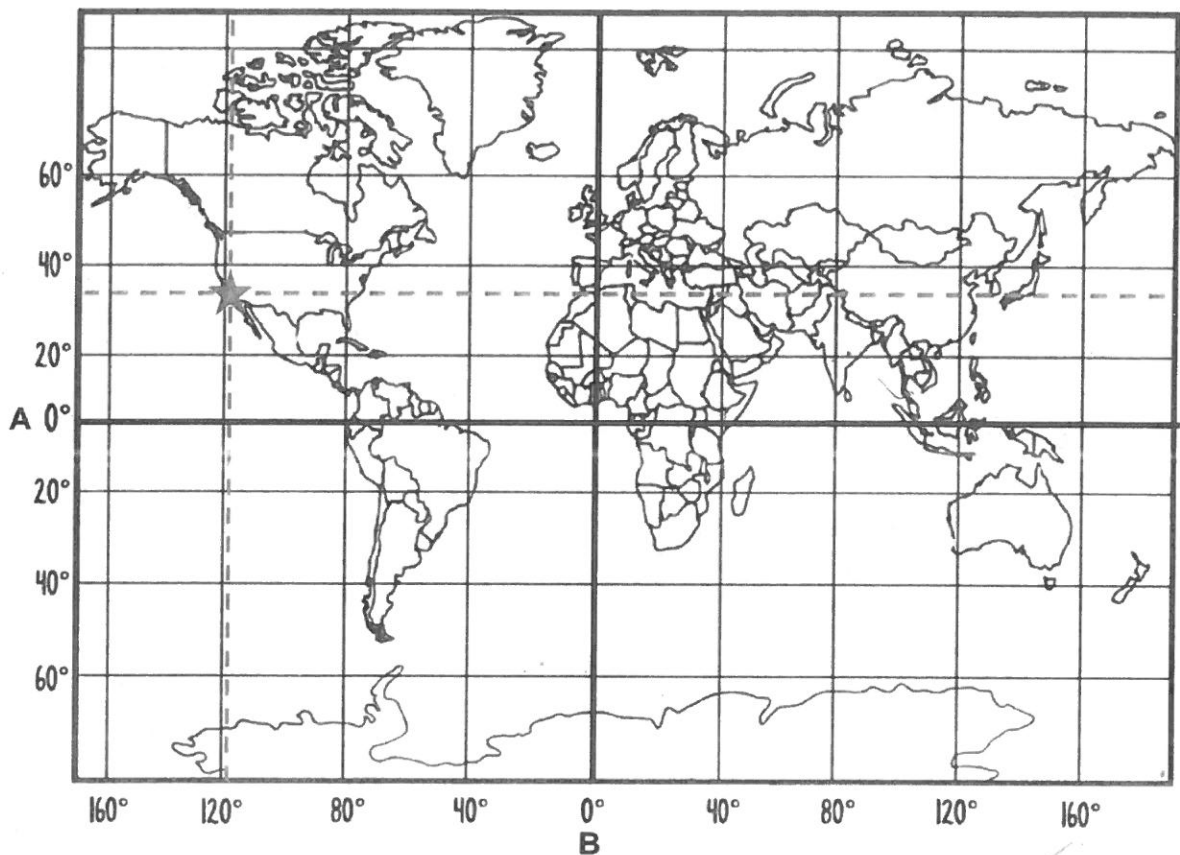
Name: Solutions

Total Marks: \_\_\_\_\_ / 38 marks  
Total Time: 55 minutes

Full working out must be shown to get full marks.  
Attempt all questions

Resources allowed:  
1 A4 page, (1 side) of hand written notes, ruler, calculator

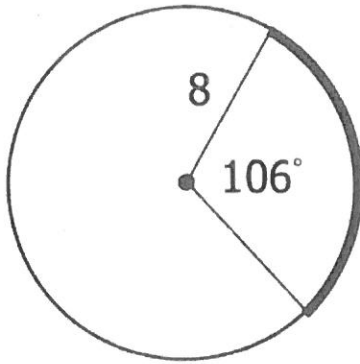
1. Use the map of the world to answer the following questions: (4 marks)



- (a) Name the significant line labeled A. Equator ✓  
(b) Name the significant line labeled at B. Prime meridian ✓  
(c) Los Angeles is located on the map with a star. What are the coordinates of Los Angeles? 34°N 118°W ✓ ✓

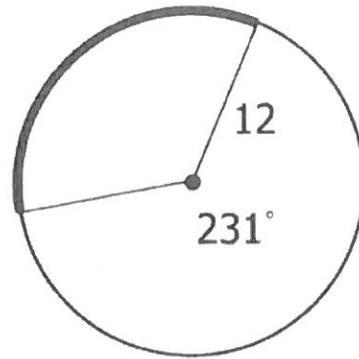
2. Calculate the arc length (shown in bold) in the following circles:  
(a)

(5 marks)



$$\text{Arc Length} = 2 \times \pi \times 8 \times \frac{106}{360}$$

$$= 14.80 \checkmark$$



$$\theta = 360 - 231$$

$$= 129^\circ$$

$$\text{Arc Length} = 2 \times \pi \times 12 \times \frac{129}{360}$$

$$= 27.02 \checkmark$$

3. Find the arc angle between Bali (8°S 115°E) and Mandurah (33°S 115°E) correct to the nearest degree. (1 Mark)

$$33 - 8 = 25^\circ \checkmark$$

4. Find the arc angle between the points on Earth with coordinates of (15°N, 12°W) and (35°S, 12°W). (2 Mark)

$$15 + 35 = 50^\circ \checkmark$$

5. A (33°N, 121°W) and B (40°N, 121°W) are two points on the surface of the Earth. Find the distance in kilometres between the points A and B. (Approximate the radius of the Earth as 6 400 km and give your answer to the nearest kilometer) (3 Marks)

$$\theta = 40 - 33$$

$$= 7^\circ \checkmark$$

$$\text{Arc Length} = 2 \times \pi \times 6400 \times \frac{7}{360} \checkmark$$

$$= 781.9 \text{ km}$$

$$\underline{782 \text{ km}}$$

$$781.91 \text{ km}$$

6. Find the distance between Stockholm (59°N 18° E) and Cape Town (34°S 18°E) correct to the nearest kilometer. (Approximate the radius of the Earth as 6 400 km) (3 Marks)

$$\theta = 59 + 34$$

$$= 93^\circ \checkmark$$

$$\text{Arc Length} = 2 \times \pi \times 6400 \times \frac{93}{360} \checkmark$$

$$= 10\,388.2 \text{ km}$$

$$\underline{10,388 \text{ km}}$$

7. If it is 8:23 AM in Sydney in Daylight Savings Time, what time would it be in Eastern Standard Time? (1 Mark)

7:23am ? ~~9:23am~~ ✓

8. Using the Time Zones table below answer the following questions (3 Marks)

| City      | Time     |
|-----------|----------|
| Sydney    | GMT+10   |
| Melbourne | GMT+10   |
| Adelaide  | GMT+9:30 |
| Perth     | GMT+8    |
| Darwin    | GMT+9:30 |
| Brisbane  | GMT+10   |
| Hobart    | GMT+10   |

- a) If it is 3:51 PM in Sydney, what time would it be in Darwin?

3:21pm ✓

- b) If it is 11:45 pm in Perth, what time would it be in Melbourne?

1:45am ✓

9. Calculate the time difference between Bangkok (GMT + 7) and Beirut (GMT +3). (1 Mark)

4 hours ✓

10. In the following map, the countries are defined by their time zone band, with their time relative to GMT given at the bottom of the band. (5 Marks)



- a). What is the time difference between Rome(L) and Rio De Janeiro(M)?

4 hours ✓

- b). If it is 3 am on Tuesday in Beijing<sup>+8</sup>(E). What day and time is it in Johannesburg<sup>-10</sup>(J)?

9pm Monday ✓

- c). We are starting the school day on Monday at 8:30am in Perth(D). What day and time would it be in Anchorage(W)?

2.30pm Sunday ✓

-18 hrs.

- 11  
10. Han, who is in Canberra (GMT +10) at the moment, has an interview over Skype with the human resources manager of an American trading firm scheduled for 3 pm on Monday, New York (GMT -5) time. (3 Marks)

a) Calculate the time difference between the two cities.

15 hours ✓

b) Hence find the time in Canberra when it is 3pm on Monday in New York.

6:00 am?  
~~8:00 am~~ ✓

c) What day will the interview fall on in Canberra?

Tuesday ✓

- 12  
3. The table shows the time of several locations relative to GMT. (7 Marks)

a) Using the table, which location is ahead of the other in time?

Cuba or Brazil (west) ✓

b) What is the time difference between Cuba and Brazil (west)?

1 hour ✓

c) When it is 7 pm on the 11<sup>th</sup> day of the month in Brazil (west), what time and date is it in India? +9.5 ✓

4:30am 12<sup>th</sup> day ✓

| GMT offset | Location   |
|------------|--|
| -5         | New York, Cuba, Peru                                 |
| -4         | Chile, Barbados, Brazil (west), Bolivia              |
| -3         | Argentina, Brazil (east), Uruguay, Greenland         |
| -2         | South Sandwich Islands                               |
| -1         | Azores   |
| 0          | UK, Ireland, Iceland, Portugal, Ghana, Liberia, Mali |
| +1         | Algeria, Angola, Chad, Bosnia, Croatia               |
| +2         | Finland, Greece, Lebanon, Egypt, South Africa        |
| +3         | Russia (west), Saudi Arabia, Kenya, Madagascar, Iraq |
| +3.5       | Iran   |
| +4         | Mauritius, United Arab Emirates, Armenia             |
| +4.5       | Afghanistan  |
| +5         | Pakistan, Maldives, Kazakhstan                       |
| +5.5       | India, Sri Lanka                                     |

d) What is the time difference between Pakistan and Egypt?

3 hours ✓

e) When it is 02:25 on the 19<sup>th</sup> day of the month in Egypt, what time is it in Pakistan? Give your answer in 24 hour time.

05:25 19<sup>th</sup> Day (same day) ✓

END OF TEST

