

## WORKSHEET - Mathematics Standard 2

### Measurement (Std 2) M2 Working with Time (Y11)

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Exam Equivalent Time: 36 minutes (based on HSC allocation of 1.5 minutes approx. per mark)



## Questions

### 1. Measurement, 2UG 2011 HSC 3 MC

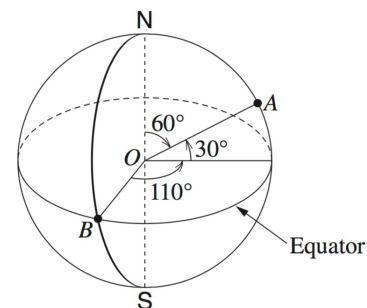
Perth in Western Australia is **8** hours ahead of Greenwich in England. Cape Town in South Africa is **2** hours ahead of Greenwich.

What is the time in Cape Town when it is 1 pm in Perth?

- (A) 3 am
- (B) 7 am
- (C) 7 pm
- (D) 11 pm

### 2. Measurement, 2UG 2010 HSC 15 MC

In this diagram of the Earth,  $O$  represents the centre and  $B$  lies on both the Equator and the Greenwich Meridian.



NOT TO  
SCALE

What is the latitude and longitude of point A?

- (A)  $30^{\circ}\text{N } 110^{\circ}\text{E}$
- (B)  $30^{\circ}\text{N } 110^{\circ}\text{W}$
- (C)  $60^{\circ}\text{N } 110^{\circ}\text{E}$
- (D)  $60^{\circ}\text{N } 110^{\circ}\text{W}$

### 3. Measurement, 2UG 2015 HSC 14 MC

Stockholm is located at  $59^{\circ}\text{N } 18^{\circ}\text{E}$  and Darwin is located at  $13^{\circ}\text{S } 131^{\circ}\text{E}$ .

What is the time difference between Stockholm and Darwin? (Ignore time zones and daylight saving.)

- (A) 184 minutes
- (B) 288 minutes
- (C) 452 minutes
- (D) 596 minutes

4. Measurement, 2UG 2005 HSC 19 MC

The location of Town *A* is **25°N 45°E**. The location of Town *B* is **10°N 105°E**.

Which of the following is true? (Ignore time zones.)

- (A) Town *A* is four hours behind Town *B*.
- (B) Town *A* is four hours ahead of Town *B*.
- (C) Town *A* is one hour behind Town *B*.
- (D) Town *A* is one hour ahead of Town *B*.

5. Measurement, 2UG 2007 HSC 20 MC

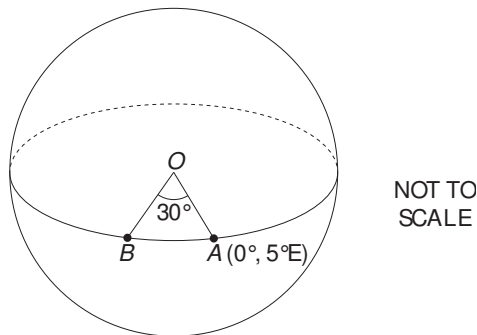
Kim lives in Perth (**32°S, 115°E**). He wants to watch an ice hockey game being played in Toronto (**44°N, 80°W**) starting at **10.00** pm on Wednesday.

What is the time in Perth when the game starts?

- (A) **9.00** am on Wednesday
- (B) **7.40** pm on Wednesday
- (C) **12.20** am on Thursday
- (D) **11.00** am on Thursday

6. Measurement, 2US SM-Bank 01

Island *A* and island *B* are both on the equator. Island *B* is west of island *A*. The longitude of island *A* is 5°E and the angle at the centre of Earth (*O*), between *A* and *B*, is 30°.



- (i) What is the longitude of island *B*? (1 mark)
- (ii) What time is it on island *B* when it is 10 am on island *A*? (1 mark)

7. Measurement, 2UG 2013 HSC 27e

Karin is in Athens, which is two hours ahead of Greenwich Mean Time. Marco is in New York, which is five hours behind Greenwich Mean Time.

- (i) Karin is going to ring Marco at **10 pm** on Tuesday, Athens time.

What day and time will it be in New York when she rings? (1 mark)

- (ii) Marco is going to fly from New York to Athens. His flight will leave on Wednesday at **9 am**, New York time, and will take **11 hours**.

What day and time will it be in Athens when he arrives? (2 marks)

8. Measurement, 2UG 2006 HSC 26d

Cassie flew from London (**52°N, 0°E**) to Manila (**15°N, 120°E**).

Her plane left London at **9.30 am** Monday (London time), stopped for **5 hours** in Singapore and arrived in Manila at **4.00 pm** Tuesday (Manila time).

What was the total flying time? (Ignore time zones.) (3 marks)

9. Measurement, 2UG 2016 HSC 27e

Melbourne is located at (38°S, 145°E) and Dubai is located at (24°N, 55°E).

- (i) Calculate the difference in longitude between Melbourne and Dubai. (1 mark)
- (ii) Show that the time difference between Melbourne and Dubai is **6** hours. (1 mark)
- (iii) A plane leaves Melbourne on Friday at 11.30 pm. The flight time to Dubai is **15** hours.

What will be the time and the day in Dubai when the plane is due to land? (2 marks)

10. Measurement, 2UG 2009 HSC 26b

Osaka is at **34°N, 135°E**, and Denver is at **40°N, 105°W**.

- (i) Show that there is a **16-hour** time difference between the two cities. (Ignore time zones.) (2 marks)
- (ii) John lives in Denver and wants to ring a friend in Osaka. In Denver it is **9 pm** Monday.

What time and day is it in Osaka then? (1 mark)

- (iii) John's friend in Osaka sent him a text message which happened to take **14 hours** to reach him. It was sent at **10 am** Thursday, Osaka time.

What was the time and day in Denver when John received the text? (2 marks)

11. Measurement, 2UG 2014 HSC 26g

Singapore is located at **1°N 104°E** and Sydney is located at **34°S 151°E**.

What is the time difference between Singapore and Sydney? (Ignore daylight saving.) (2 marks)

## Worked Solutions

1. Measurement, 2UG 2011 HSC 3 MC

**Perth is 6 hrs ahead of Cape Town**

**$\therefore$  1pm in Perth = 7 am in Cape Town**

**$\Rightarrow B$**

2. Measurement, 2UG 2010 HSC 15 MC

**Since A is  $30^\circ$  North of the Equator**

**$\Rightarrow$  Latitude is  $30^\circ N$**

**Since A is  $110^\circ$  East of Greenwich**

**$\Rightarrow$  Longitude is  $110^\circ E$**

**$\therefore A$  is  $30^\circ N 110^\circ E$**

**$\Rightarrow A$**

3. Measurement, 2UG 2015 HSC 14 MC

**Stockholm is  $59^\circ N 18^\circ E$ , Darwin is  $13^\circ S 131^\circ E$**

**Angular difference (longitude)**

$$= 131^\circ - 18^\circ$$

$$= 113^\circ$$

$$\therefore \text{Time difference} = 113 \times 4$$

$$= 452 \text{ minutes}$$

**$\Rightarrow C$**

4. Measurement, 2UG 2005 HSC 19 MC

Town A is  $25^\circ N 45^\circ E$

Town B is  $10^\circ N 105^\circ E$

Angular difference (longitude)

$$= 105^\circ - 45^\circ$$

$$= 60^\circ$$

Using  $15^\circ = 1 \text{ hour}$

$$\text{Time Difference} = \frac{60}{15}$$

$$= 4 \text{ hours}$$

Since Town A is further West, Town A  
is 4 hours behind Town B.

$\Rightarrow A$

5. Measurement, 2UG 2007 HSC 20 MC

Perth is East of Toronto  $\Rightarrow$  Ahead

Longitudinal difference

$$= 115 + 80$$

$$= 195^\circ$$

$$\text{Time difference} = \frac{195}{15}$$

$$= 13 \text{ hours}$$

$\therefore$  Time in Perth

$$= 10 \text{ pm (Wed)} + 13 \text{ hours}$$

$$= 11 \text{ am on Thursday}$$

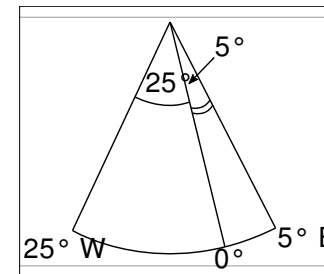
$\Rightarrow D$

6. Measurement, 2US SM-Bank 01

(i) Longitude (island B) =  $5 - 30$

$$= -25$$

$$= 25^\circ W$$



(ii) Time difference =  $30^\circ \div 15^\circ = 2 \text{ hours}$

Since B is west of A,

Time on island B = 10 am less 2 hours

$$= 8 \text{ am}$$

7. Measurement, 2UG 2013 HSC 27e

(i) Athens is Greenwich + 2 hours

New York is Greenwich - 5 hours

$\therefore$  Athens is 7hrs ahead of New York

$\Rightarrow$  10pm Tuesday in Athens = 3pm Tuesday in New York

$\therefore$  It will be 3pm Tuesday when Karin rings

(ii) Flight takes 11 hours

If Marco leaves on Wed at 9am

$\Rightarrow$  He arrives at 9am + 11 hrs + 7 hours

$\therefore$  Marco arrives on Thurs at 3am

8. Measurement, 2UG 2006 HSC 26d

London ( $52^{\circ}\text{N}$ ,  $0^{\circ}\text{E}$ ), Manila ( $15^{\circ}\text{N}$ ,  $120^{\circ}\text{E}$ )

Angular difference (longitude)

$$= 120^{\circ} - 0^{\circ}$$

$$= 120^{\circ}$$

$$\text{Time difference} = \frac{120}{15}$$

$$= 8 \text{ hours}$$

Manila is further East  $\Rightarrow$  Ahead

$$\therefore \text{Flight time} = 9:30 \text{ (Mon) to } 4:00 \text{ pm (Tues)}$$

$$- (\text{stopover} + \text{time difference})$$

$$= 14.5 + 16 - (5 + 8)$$

$$= 17.5 \text{ hours}$$

9. Measurement, 2UG 2016 HSC 27e

(i) Difference in longitude

$$= 145 - 55$$

$$= 90^{\circ}$$

(ii) Since  $1^{\circ} = 4 \text{ min time difference}$ ,

Time difference

$$= 90 \times 4$$

$$= 360 \text{ mins}$$

$$= 6 \text{ hours ... as required}$$

(iii) Arrival time =  $11:30 + 15 \text{ hours}$

$$= 14:30 \text{ (Melbourne time)}$$

$\therefore$  Arrival time in Dubai time

$$= 14:30 - 6 \text{ hours}$$

$$= 8:30 \text{ am on Saturday}$$

10. Measurement, 2UG 2009 HSC 26b

(i) Longitude difference =  $135 + 105$

$$= 240^{\circ}$$

$$\text{Time difference} = \frac{240}{15}$$

$$= 16 \text{ hours ... as required}$$

(ii) Denver is behind Osaka time

(it is further West)

$$\text{Time in Osaka} = 9 \text{ pm Monday plus } 16 \text{ hours}$$

$$= 1 \text{ pm Tuesday}$$

(iii) Denver is 16 hours behind Osaka

$\therefore$  John will receive the text at

10 am Thursday less 16 hours plus 14 hours

i.e. 8 am Thursday.

11. Measurement, 2UG 2014 HSC 26g

Longitude angular difference

$$= 151 - 104$$

$$= 47^{\circ}$$

$$\text{Time difference} = 47 \times 4$$

$$= 188 \text{ mins}$$

$$= 3\text{hrs } 8\text{mins}$$

$\Rightarrow$  Sydney is East of Singapore

$\therefore$  Sydney is 3hrs 8mins ahead.

♦ Mean mark 49%

**MARKER'S COMMENT:** When asked to 'show why', students must include calculations to support their answer. Many did not.

♦ Mean mark 43%

♦ Mean mark 34%

♦ Mean mark 50%