

## Notes on Clocks & Calendars for MAH MCA CET Exam

### Clocks

Clocks-related questions test your ability to calculate angles between hands, time gain/loss, and mirror/water images of the clock.

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### Important Formulas for Clocks

#### 1 Angle Between Hour and Minute Hand

$$\text{Angle} = |(30H - 5.5M)| \quad \text{Angle} = \left| (30H - 5.5M) \right|$$

- **H** = Hour
- **M** = Minutes
- 30° per hour, 5.5° per minute

**Example:** Find the angle at 4:20.

$$\text{Angle} = |(30 \times 4 - 5.5 \times 20)| = |120 - 110| = 10^\circ \quad \text{Angle} = |(30 \times 4 - 5.5 \times 20)| = |120 - 110| = 10^\circ$$

☒ **Answer:** 10°

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#### 2 Time for Hands to Coincide

$$\text{Time} = \frac{(11M)}{2} \quad \text{Time} = \frac{(11M)}{2}$$

- Used when the hour and minute hands are at 90°, 180°, or overlapping.
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#### 3 Clock Gains/Loses Time

If a clock gains/loses **X minutes in Y hours**, then the total gain/loss in **Z hours** is:

$$XY \times Z \quad \frac{X}{Y} \times Z$$

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#### 4 Mirror Image of Time

$$\text{Mirror Time} = (11:60 - \text{Given Time}) \quad \text{Mirror Time} = (11:60 - \text{Given Time})$$

**Example:** Mirror image of 3:25

$$11:60 - 3:25 = 8:35 \quad 11:60 - 3:25 = 8:35$$

☒ **Answer:** 8:35

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### Calendars

Calendar-based questions focus on leap years, day calculations, and odd days.

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## 1 Leap Year Identification

- A year is a **Leap Year** if:
  - ☒ Divisible by **4** but **not 100**, OR
  - ☒ Divisible by **400**

Example: 2000 ☒ (Divisible by 400)

1900 ☒ (Divisible by 100 but not 400)

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## 2 Odd Days Concept

- 1 Normal Year = **1 odd day**
- 1 Leap Year = **2 odd days**
- 100 Years = **5 odd days**

**Example:** Find the number of odd days in 200 years.

$$200 = 2 \times 100 = 2 \times 5 = 10 \quad 200 = 2 \times 100 = 2 \times 5 = 10$$

☒  $10 \bmod 7 = 3$  odd days

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## 3 Day of the Week Formula

$$\text{Day} = (\text{Last Two Digits of Year} + \text{Last Two Digits} \div 4 + \text{Month Code} + \text{Date} + \text{Century Code}) \bmod 7$$
  
$$(\text{Last Two Digits of Year} + \frac{\text{Last Two Digits}}{4} + \text{Month Code} + \text{Date} + \text{Century Code}) \bmod 7$$

- **Month Codes:** Jan = 0, Feb = 3, Mar = 3, Apr = 6, May = 1, Jun = 4, Jul = 6, Aug = 2, Sep = 5, Oct = 0, Nov = 3, Dec = 5
- **Century Codes:** 1600-1699 → 6, 1700-1799 → 4, 1800-1899 → 2, 1900-1999 → 0, 2000-2099 → 6

☒ **Example:** Find the day on 15th August 1947

$$(47 + 4 \div 4 + 2 + 15 + 0) \bmod 7 = (47 + 11 + 2 + 15 + 0) \bmod 7 = 75 \bmod 7 = 5$$
  
$$(47 + 11 + 2 + 15 + 0) \bmod 7 = 75 \bmod 7 = 5$$

**Code 5 = Friday**

☒ **Answer: Friday**

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## MCQs on Clocks & Calendars

### 1. Clocks – Angle Between Hands

At **10:10**, what is the angle between the hands?

A)  $45^\circ$

- B) 50°
- C) 55°
- D) 60°

☒ Answer: 50°

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## 2. Clocks – Mirror Image

What is the mirror image of 5:45?

- A) 6:15
- B) 7:15
- C) 6:45
- D) 7:45

☒ Answer: 6:15

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## 3. Leap Year Identification

Which of the following is a leap year?

- A) 1900
- B) 2000
- C) 2100
- D) 1800

☒ Answer: 2000

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## 4. Odd Days Calculation

How many odd days are there in 400 years?

- A) 0
- B) 1
- C) 2
- D) 3

☒ Answer: 0 (since 400 years is a multiple of 7, giving 0 odd days)

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## 5. Day of the Week Calculation

If 1st January 2000 was a Saturday, what was 1st January 2001?

- A) Monday
- B) Tuesday
- C) Sunday
- D) Friday

☒ Answer: Monday (since 2000 was a leap year, it had 2 odd days, making it Monday)

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