# Hangover Clock Reading

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This is another clock puzzle from the 1978 *Eureka* magazine ([1]).

The hands on my alarm clock are indistinguishable, and there are no numbers around the outside. Accidentally woken up by it one morning, I observed with a snarl that the hands were both pointing at minute divisions, and that they were 9 minutes apart.

Had it not been for my hangover, what could I have deduced?

## Solution

This is virtually the same as the "Fallen Clock Puzzle"[1]. The only real difference is that we don't know which of the hands is the hour hand. Using the argument in that problem:

> Each hour represents 5 minutes on the clock and each minute is 1/60 of an hour and therefore 1/60 of a 5 minute interval. So in terms of minutes, the total time for the hour hand is given by

$$5h + m/12 \text{ (minutes)}$$

where $h$ is the hour and $m$ is the minute. So the minute hand's position in minutes is $m$.

Therefore either $$(5h + m/12) - m = 9$$

or $$m - (5h + m/12) = 9.$$

That is, $$5h = 9 + 11m/12$$

or $$5h = 11m/12 - 9.$$

Now the problem only involves integral values, so the minutes $m$ must be divisible by 12, and so equal to 12, 24, 36, or 48. Since the problem involves the morning, the hour $h$ must 6, 7, 8, or 9. So we have the following table of results. We are looking for cases where the last two rows are divisible by 5.

| $m$ | 12 | 24 | 36 | 48 |
|---|---|---|---|---|
| $11m/12$ | 11 | 22 | 33 | 44 |
| $11m/12 + 9$ | 20 | 31 | 42 | 53 |
| $11m/12 - 9$ | 2 | 13 | 24 | 35 |

So we get two cases: either $h = 4$ and $m = 12$ (4:12 am) or $h = 7$ and $m = 48$ (7:48 am). Since 4:12 am is still in the night, the time of the alarm was 7:38 am in the morning.

## References


[1] "The Problems Drive #9", *Eureka*, No. 39, Spring 1978. p.39 (https://www.archim.org.uk/eureka/archive/Eureka-39.pdf)




[1] http://josmfs.net/2020/05/23/fallen-clock-puzzle/