Converting between times units

The base unit of time in the International System of Units is the second, abbreviated s.

Table for converting between common unites of time:

Unit	Seconds	Minutes	Hours	Days	Weeks	Months (approx.)	Years
1 Second	1	1/60	1/3600	1/86400	1/604800	3.8×10^{-7}	3.2×10^{-8}
1 Minute	60	1	1/60	1/1440	1/10080	2.3×10^{-5}	1.9×10^{-6}
1 Hour	3600	60	1	1/24	1/168	1.4×10^{-3}	1.1×10^{-4}
1 Day	86400	1440	24	1	1/7	0.033	0.0027
1 Week	604800	10080	168	7	1	0.23	0.019
1 Month	2592000	43200	720	30	4.3	1	0.083
1 Year	31536000	525600	8760	365	52.14	12	1

Converting between times units

Note: This table uses approximate values for months and years. In practice:
A month can vary from 28 to 31 days.
A year is typically counted as 365 days, but leap years have

Note: In general time calculations at this level, we consider the year to be 365 days and the month to be 30 days, except in special cases mentioned in the case of the problem.

1 **minute** = 60 seconds	1 **hour** = 60 minutes = 3600 seconds
1 **day** = 24 hours	1 **week** = 7 days
1 **year** = 12 months = 365 days	1 **decade** = 10 years
	1 **century** = 100 years
	1 **millennium** = 1000 years

Example

a) Convert 3 hours to minutes

b) Convert 150 seconds to minutes

c) Convert 4 days to hours

a) Convert 3 hours to minutes

$3\ \text{h} = 3 \times 60\ \text{min} = 180\ \text{min}$

b) Convert 150 seconds to minutes

$150\ \text{s} = 150 \div 60 = 2.5\ \text{min}$

c) Convert 4 days to hours

$4\ \text{days} = 4 \times 24\ \text{h} = 96\ \text{h}$

Example

a) Convert 3 weeks 4 days to hours

b) Convert 1 year 2 months to days (assuming 30 days per month)

a) Convert 3 weeks 4 days to hours

3 weeks = 3 × 7 × 24 h = 504 h
4 days = 4 × 24 h = 96 h
Total = 504 h + 96 h = 600 h

b) Convert 1 year 2 months to days (assuming 30 days per month)

1 year = 365 days
2 months = 2 × 30 = 60 days
Total = 365 + 60 = 425 days

Example

a) Express 40 minutes as a fraction of an hour

b) Convert 0.75 hours to minutes

a) Express 40 minutes as a fraction of an hour

$$40 \text{ min} = 40 \div 60 = \frac{40}{60} = \frac{2}{3} \text{ h}$$

b) Convert 0.75 hours to minutes

$$0.75 \text{ h} = 0.75 \times 60 \text{ min} = 45 \text{ min}$$

12-Hour Clock
24-Hour Clock

12-Hour Clock:

The 12-hour clock divides the day into two 12-hour periods:
1. AM (ante meridiem) and PM (post meridiem).
2. Hours run from 12 (midnight/noon) to 11.
3. Minutes are expressed as 00 to 59.
4. AM indicates times from midnight to just before noon.
5. PM indicates times from noon to just before midnight.

24-Hour Clock (Military Time):

1. The 24-hour clock runs from 00:00 (midnight) to 23:59 (11:59 PM).
2. Hours are numbered from 00 to 23.
3. Minutes are always expressed as 00 to 59.
4. No AM or PM is needed.

Converting between 24-hour and 12-hour clock

1. From 24-hour to 12-hour:

For times from 00:00 to 11:59, simply add AM.
For 12:00, it's 12:00 PM (noon).
For times from 13:00 to 23:59, subtract 12 from the hours and add PM.

2. From 12-hour to 24-hour:

For AM times, use the same numbers (except 12 AM becomes 00:00).
For PM times, add 12 to the hours (except 12 PM stays as 12:00).

Example

a) Convert 14:30 (24-hour) to 12-hour clock

b) Convert 3:45 PM (12-hour) to 24-hour clock

a) Convert 14:30 (24-hour) to 12-hour clock

14:30 - 12:00 = 2:30 PM

b) Convert 3:45 PM (12-hour) to 24-hour clock

3:45 PM + 12:00 = 15:45

Adding and subtracting hours

1. Adding Time

Step 1: Add the minutes.

- If the sum of minutes is 60 or more, convert the excess into hours (1 hour = 60 minutes).
- Example: 45 minutes+30 minutes=75 minutes = 1 hour 15 minutes.

Step 2: Add the hours, including any extra hours from Step 1.

Note:

- Always work with minutes and hours separately.
- When borrowing or carrying over, remember that 1 hour = 60 minutes.

Example: Add 2 hours 45 minutes and 1 hour 30 minutes.

Minutes: $45 + 30 = 75 \rightarrow$ 1 hour+15 minutes.

Hours: $2 + 1 + 1 = 4$.

Answer: 4 hours 15 minutes4.

Adding and subtracting hours

2. Subtracting Time

Step 1: Subtract the minutes.

- If the result is negative, borrow 1 hour (convert 1 hour into 60 minutes).
- Example: 15 minutes−30 minutes = −15. Borrow 1 hour → 60−30 = 45

Step 2: Subtract the hours, accounting for any borrowing.

Example: Subtract 3 hours 15 minutes from 5 hours 30 minutes.

Minutes: $30 - 15 = 1530 - 15 = 1530 - 15 = 15.$

Hours: $5 - 3 = 25 - 3 = 25 - 3 = 2.$

Answer: 2 hours 15 minutes.

Another Example (with borrowing): Subtract 2 hours 45 minutes from 4 hours 10 minutes.

Minutes: 10−45= −35. Borrow 1 hour → $70 - 45 = 25$ minutes.

Hours: $4 - 1 - 2 = 1.$

Answer: 1 hour 25 minutes.

Example

a) Add 2 h 45 min and 3 h 30 min

b) Subtract 1 h 20 min from 4 h 5 min

a) Add 2 h 45 min and 3 h 30 min

2 h 45 min + 3 h 30 min = 5 h 75 min = 6 h 15 min

b) Subtract 1 h 20 min from 4 h 5 min

4 h 5 min - 1 h 20 min = 2 h 45 min

Example

a) A movie starts at 7:15 PM and lasts 2 hours 20 minutes.
What time does it end?

b) John starts his homework at 4:30 PM and finishes at 6:15 PM.
How long did he spend on his homework?

a) A movie starts at 7:15 PM and lasts 2 hours 20 minutes. What time does it end?

7:15 PM + 2 h 20 min = 9:35 PM

b) John starts his homework at 4:30 PM and finishes at 6:15 PM. How long did he spend on his homework?

6:15 PM - 4:30 PM = 1 h 45 min

Example

If it's 3:00 PM in London and New York is 5 hours behind.

What time is it in New York?

3:00 PM - 5 h = 10:00 AM

Example

a) Calculate the duration between 22:15 and 01:30 the next day.

b) Add 2 hours and 45 minutes to 10:20 AM.

a) Calculate the duration between 22:15 and 01:30 the next day

24:00 - 22:15 = 1:45
1:45 + 1:30 = 3:15 (3 hours and 15 minutes)

b) Add 2 hours and 45 minutes to 10:20 AM.

10:20 AM + 2:45 = 1:05 PM

Example

a) Subtract 3 hours and 30 minutes from 17:45 (24-hour clock).

b) Express 11:59 PM in 24-hour notation.

c) Calculate the time 5 hours before 03:30 (24-hour clock).

a) Subtract 3 hours and 30 minutes from 17:45 (24-hour clock).

17:45 - 3:30 = 14:15

b) Express 11:59 PM in 24-hour notation.

11:59 PM = 23:59

c) Calculate the time 5 hours before 03:30 (24-hour clock).

03:30 - 5:00 = 22:30 (previous day)

Example

If it's currently 9:45 AM, what time will it be in 3 hours and 30 minutes?

Starting time: 9:45 AM
Adding 3 hours and 30 minutes:

- Adding 3 hours: 9 + 3 = 12 (noon)
- Adding 30 minutes: 45 + 30 = 75 minutes. For 75 minutes equals 1 hour and 15 minutes, we add 1 hour to the current hour and set the minutes to 15.

The time will be 1:15 PM.

Example

If it's currently 1751, what time will it be in 3 hours and 30 minutes?

Starting time: 1721
Adding 3 hours and 30 minutes:

- Adding 3 hours: 17 + 3 = 20
- Adding 30 minutes: 51+ 30 = 81 minutes. For 81 minutes equals 1 hour and 21 minutes, we add 1 hour to the current hour and set the minutes to 21.

The time will be 2121

Example

If it is now 1310, what was the time 3 hours and 30 minutes ago?

Starting time: 1310
Subtract 3 hours and 30 minutes:

- Subtract 3 hours from the current time:
  1310 - 0300 = 1010

- Subtract 30 minutes from the result:
  1010 - 0030 = 0940

The time was 0940.

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