

**ACTIVITY: Time**
**AVIATION TIME – FOR YOUR TRAVELS AROUND THE WORLD!**

Aviators use “military time” or the “24-hour clock”, rather than the 12-hour clock we know that goes around twice each day. Why? To eliminate confusion about “a.m.” and “p.m.” and to make time comparisons and conversions easier. Converting 12-hour to 24-hour time:

**No difference in morning hours, just precede with a “0” (6:00 a.m. = 0600)**

**After 12:00 noon, just add 12 to the hours (3:00 p.m. = 1500)**

**In either case, minutes follow hours (no colon) (0615, 1530)**

**24-HOUR TIME: TRY IT OUT!**

1. 1200 is 12:00 Noon. What time is 1PM? \_\_\_\_\_
2. If you eat dinner at 6PM, what 24-hour time is that? \_\_\_\_\_
3. If you start studying at 8 PM, what time is that? \_\_\_\_\_
4. If you go to bed at 10 PM, it's.... \_\_\_\_\_ in 24-hour time.
5. Oh, it's late! It's one minute before midnight, or \_\_\_\_\_

**DID YOU KNOW? “WORLD TIME” IS AVIATION TIME**

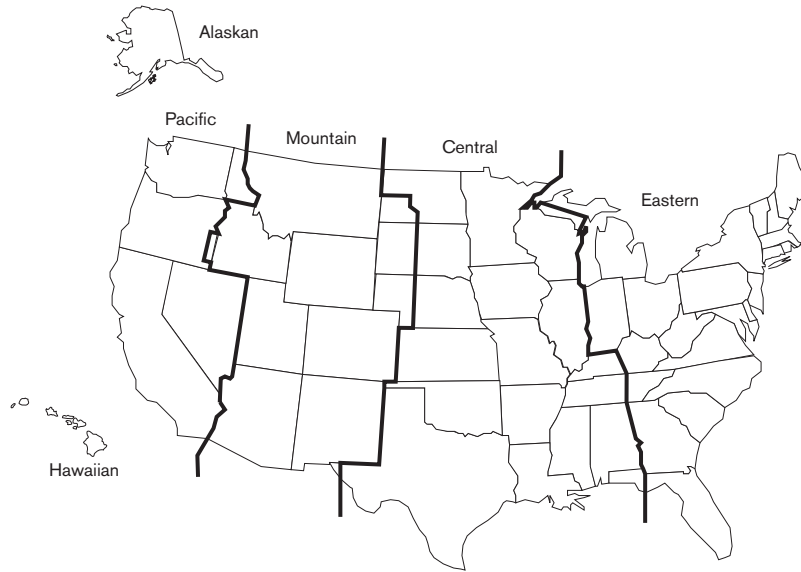
How many time zones are there around the world, allowing the sun to be almost directly overhead at noon in every place? \_\_\_\_\_ (Hint: How many hours in a day... one rotation of the earth?)

One time zone is the basis for all other time. It is centered in Greenwich, England – the historical center of sea and air navigation at 0 degrees longitude. Once called Greenwich Mean Time (GMT), it's now Universal Coordinated Time (UTC).

Each of 24 time zones has a letter. World standard UTC is the last one, the Z or “Zulu” time zone. In the U.S. (being west of England), local time is so many hours “behind” Zulu time. (The sun — rising in the east — rises earlier in England, well before it does here!)

To convert our local time to Zulu time, we add however many hours difference there is between the two time zones.

**ACTIVITY: Time**



**TO CONVERT BETWEEN UTC AND YOUR TIME ZONE, ADD OR SUBTRACT.**

	(HI)*	(AK)	(PT)	(MT)	(CT)	(ET)
Standard (Winter) time:	10	9	8	7	6	5
Daylight (Summer) time:	9	8	7	6	5	4

1. What U.S. time zone are you in? \_\_\_\_\_
2. In winter, you add how many hours to make Zulu time? \_\_\_\_
3. In winter, when is your local noon in Zulu time? \_\_\_\_\_ Z
4. In winter, when is your local midnight in Zulu time? \_\_\_\_\_ Z
5. In winter, your 7 a.m. breakfast is at what time, Zulu? \_\_\_\_\_ Z
6. In summer (daylight time), 1200Z is at what local time? \_\_\_\_\_ Local Time
7. In summer, 0000Z (the end of the 24-hour clock and the beginning of a new day GMT) is at what time where you live? \_\_\_\_\_ Local Time

\* Hawaiian Aleutian Standard Time (HAST)

**ACTIVITY: Temperature**

Aviation, uses the Celsius (C) temperature scale rather than Farenheit (F). It makes temperature calculations easier. Celsius is also called Centigrade because it has only 100 degrees between water freezing (0C rather than 32F) and water boiling (100C, not 212F)

Use the following formulas to convert from Celsius to Farenheit or Farenheit to Celsius:

$$C = (F - 32) \times 5/9 \quad \text{or} \quad F = (C \times 9/5) + 32$$

**WHAT DOES CELSIUS FEEL LIKE? (FILL IN THE BLANKS)**

- 15C is a slightly chilly...                      \_\_\_ \_\_\_ F
- 20C is a comfortable...                        \_\_\_ \_\_\_ F
- 30C is a pretty warm...                        \_\_\_ \_\_\_ F
- Body temperature is 98.6F or about...    \_\_\_ \_\_\_ C
- 40C is a hot, hot....                            \_\_\_ \_\_\_ \_\_\_ F

**C to F? Try it in your head!**

- Double Celsius
- Subtract 10%
- Add 32

**Why do pilots care about temperature?**

**AIRPLANE PERFORMANCE DECREASES WITH TEMPERATURE**

Higher temperatures really mean that air molecules are moving faster. The air is therefore “less dense.” The propeller cannot “grab” the air as well. The wing cannot generate as much lift.

1. Airplane A’s takeoff performance decreases 10% for each 10C increase in temperature. If it normally needs 2,000 feet for a safe take-off, how much runway is needed when temperature is 30C above normal? \_\_\_\_\_ feet of runway
2. Will a 3,000 foot runway be enough? **YES / NO**



## ACTIVITY: Speed

**THE SPEED OF PLANES, LIKE BOATS, IS MEASURED IN “KNOTS” OR NAUTICAL MILES (NM) PER HOUR.**

A nautical mile is 15% larger than a regular “statute” mile.

To convert from miles to nautical miles, or mph to knots: Divide by 1.15

To convert from nautical miles to miles, or knots to mph: Multiply by 1.15

**TRY IT:**

1. 100 knots is \_\_\_ \_\_\_ miles per hour.
2. 100 miles per hour is \_\_\_ \_\_\_ knots.
3. Surface winds near a thunderstorm can be 70 knots or \_\_\_ \_\_\_ mph!
4. A jet flying at 500 knots is going \_\_\_ \_\_\_ miles per hour.

**AVIATION WEATHER REPORTS SHOW WIND SPEEDS IN KNOTS. WHY?****Airspeed + / - Winds Aloft = Groundspeed**

To the plane’s airspeed, the pilot has to add a tailwind or subtract a headwind to know “groundspeed” — how fast the plane is travelling over the ground.

1. You’re flying at 100 knots with a 20-knot tailwind. Your groundspeed is \_\_\_ \_\_\_ knots.
2. You’re flying at 100 knots with a 20-knot headwind. Your groundspeed is \_\_\_ \_\_\_ knots.
3. This 20-knot headwind (at 100 knots airspeed) cuts the plane’s groundspeed by \_\_\_ \_\_\_ per cent.
4. In a plane flying at 200 knots airspeed, a 20-knot headwind cuts the plane’s groundspeed by \_\_\_ \_\_\_ per cent.

**ACTIVITY:** Time/Speed/Distance

**TIME/SPEED/DISTANCE CALCULATIONS ARE KEY TO FLIGHT PLANNING – TO PREDICT WHEN YOU’LL ARRIVE, AND TO KNOW HOW MUCH FUEL TO CARRY.**

1. With 100 knots airspeed and 20 knot headwind, how long will it take to fly to a city 160 nm ahead?  
\_\_\_ hours
2. With a 150 knot airspeed and 30 knot tailwind, how long will it take to fly to a city 360 nm ahead?  
\_\_\_ hours

**LET’S DO SOME REAL-WORLD FLIGHT PLANNING:**

**Assume the following for the questions below:**

Your destination is 300nm away from you.

Your airplane flies at a cruise speed of 120 knots.

Fuel consumption is a constant 8 gallons per hour (gph).

For safety, you must have at least 30 minutes of fuel remaining on arrival.

1. It’s 12:00 noon and you must be at your destination by 2 p.m. You will make it on time if you have a \_\_\_ knot tailwind.
2. If you have NO tailwind, how long will it take you to reach your destination?  
\_\_\_ hours \_\_\_ minutes
3. If you have 24 gallons of fuel remaining, you’ll need a tailwind of \_\_\_ knots to land with one hour of fuel remaining.
4. With NO tailwind and clear weather at your destination, will you have 30 minutes of fuel remaining when you arrive? **YES / NO**
5. If there is bad weather at your destination, and you have NO tailwind, how much flying time will you have left to fly and find an alternate airport for landing? \_\_\_\_\_ minutes.