

Pressure and Density Height Exercises #1

1. Determine the pressure height

- 1.1. Altimeter reads 1,120 ft , sub-scale 1017 hPa
- 1.2. Altimeter reads 1,910 ft , sub-scale 1010 hPa
- 1.3. Altimeter reads 10,240 ft, sub-scale 1005 hPa
- 1.4. Altimeter reads 3,000 ft, sub-scale 1015 hPa

2. Determine the ISA temperature at the following pressure heights

- 2.1. 10,000 ft
- 2.2. 5,500 ft
- 2.3. 2,000 ft
- 2.4. 16,500 ft

3. Determine the ISA Variation

- 3.1. PH 10,000, OAT -5°C
- 3.2. PH 5,500, OAT $+6^{\circ}\text{C}$
- 3.3. PH 1,500, OAT $+3^{\circ}\text{C}$
- 3.4. PH 20,000, OAT -21°C

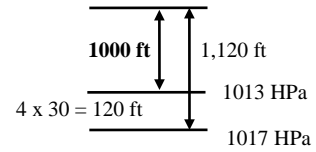
4. Determine the density height given the following conditions

- 4.1. PH 13,000, ISA + 10
- 4.2. PH 1,000, ISA + 2
- 4.3. PH 6,300, ISA - 5
- 4.4. PH 2,000, OAT $+9^{\circ}\text{C}$
- 4.5. PH 3,500, OAT $+13^{\circ}\text{C}$
- 4.6. Altimeter reading 2,240, sub-scale 1021, OAT $+15^{\circ}\text{C}$

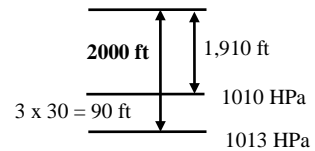
Answers to Exercises #1

1. Determine the pressure height

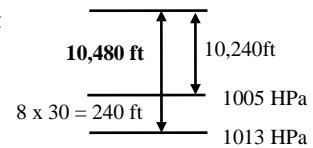
- 1.1 Altimeter reads 1,120 ft, sub-scale setting 1017 hPa
 $1,120 - 4 \times 30 = \mathbf{1,000 \text{ ft}}$



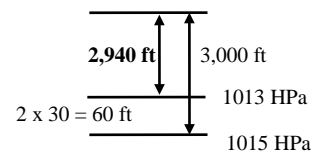
- 1.2 Altimeter reads 1,910 ft, sub-scale setting 1010 hPa
 $1,910 + 3 \times 30 = \mathbf{2,000 \text{ ft}}$



- 1.3 Altimeter reads 10,240 ft, sub-scale setting 1005 hPa
 $10,240 + 8 \times 30 = \mathbf{10,480 \text{ ft}}$



- 1.4 Altimeter reads 3,000 ft, sub-scale setting 1015 hPa
 $3,000 - 2 \times 30 = \mathbf{2,940 \text{ ft}}$



2. Determine the ISA temperature at the following pressure heights

- 2.1 ISA @ 10,000 PH = +15 - 10 x 2
 = **-5 °C**
- 2.2 ISA @ 5,500 PH = +15 - 5.5 x 2
 = **4 °C**
- 2.3 ISA @ 2,000 PH = +15 - 2 x 2
 = **11 °C**
- 2.4 ISA @ 16,500 PH = +15 - 16.5 x 2
 = **-18 °C**

Answers to Exercises #1 cont.

3. Determine the ISA Variation

3.1. PH 10,000, OAT -5°C

$$\begin{aligned}\text{ISA @ 10,000 PH} &= +15 - 10 \times 2 \\ &= -5 \text{ }^\circ\text{C} \\ \text{OAT} &= -5 \text{ }^\circ\text{C} = \text{ISA}\end{aligned}$$

3.2. PH 5,500, OAT +6°C

$$\begin{aligned}\text{ISA @ 5,500 PH} &= +15 - 5.5 \times 2 \\ &= +4 \text{ }^\circ\text{C} \\ \text{OAT} &= +6 \text{ }^\circ\text{C} = \text{ISA} + 2\end{aligned}$$

3.3. ISA @ 1,500 PH

$$\begin{aligned}&= +15 - 1.5 \times 2 \\ &= +12 \text{ }^\circ\text{C} \\ \text{OAT} &= +3 \text{ }^\circ\text{C} = \text{ISA} - 9\end{aligned}$$

3.4. ISA @ 20,000 PH

$$\begin{aligned}&= +15 - 20 \times 2 \\ &= -25 \text{ }^\circ\text{C} \\ \text{OAT} &= -21 \text{ }^\circ\text{C} = \text{ISA} + 4\end{aligned}$$

4. Determine the density height given the following conditions

4.1. PH 13,000, ISA + 10

$$13,000 + 10 \times 120 = \mathbf{14,200}$$

4.2. PH 1,000, ISA + 2

$$1,000 + 2 \times 120 = \mathbf{1,240}$$

4.3. PH 6,300, ISA - 5

$$6,300 - 5 \times 120 = \mathbf{5,700}$$

4.4. PH 2,000, OAT +9°C

$$\begin{aligned}\text{PH 2,000} \\ \text{ISA temp} &= 15 - 2 \times 2 \\ &= 11 \text{ }^\circ\text{C}\end{aligned}$$

$$\text{OAT } 9 \text{ }^\circ\text{C} = \text{ISA} + 2$$

$$\begin{aligned}\text{DH} &= 2,000 + 2 \times 120 \\ &= \mathbf{2,240}\end{aligned}$$

Answers to Exercises #1 cont.

4.5. PH 3,500, OAT +13oC

PH 3,500

$$\begin{aligned} \text{ISA} &= 15 - 3.5 \times 2 \\ &= 8 \text{ }^\circ\text{C} \end{aligned}$$

$$\text{OAT } 13 \text{ }^\circ\text{C} = \text{ISA} + 5$$

$$\begin{aligned} \text{DH} &= 3,500 + 5 \times 120 \\ &= \mathbf{4,100} \end{aligned}$$

4.6. Altimeter reading 2,240, sub-scale 1021, OAT +15oC

Altimeter 2,240 Subscale 1021

$$\begin{aligned} \text{PH} &= 2,240 - 8 \times 30 \\ &= 2,000 \end{aligned}$$

$$\begin{aligned} \text{ISA @ PH } 2,000 &= 15 - 2 \times 2 \\ &= 11 \text{ }^\circ\text{C} \end{aligned}$$

$$\text{OAT } 15 \text{ }^\circ\text{C} = \text{ISA} + 4$$

$$\begin{aligned} \text{DH} &= 2,000 + 4 \times 120 \\ &= \mathbf{2,480} \end{aligned}$$