

Problem 8

A pilot has just started on the glide path for landing at an airport where the length of the runway is 9000 feet. The angles of depression to the ends of the runway are 17.5° and 18.8°

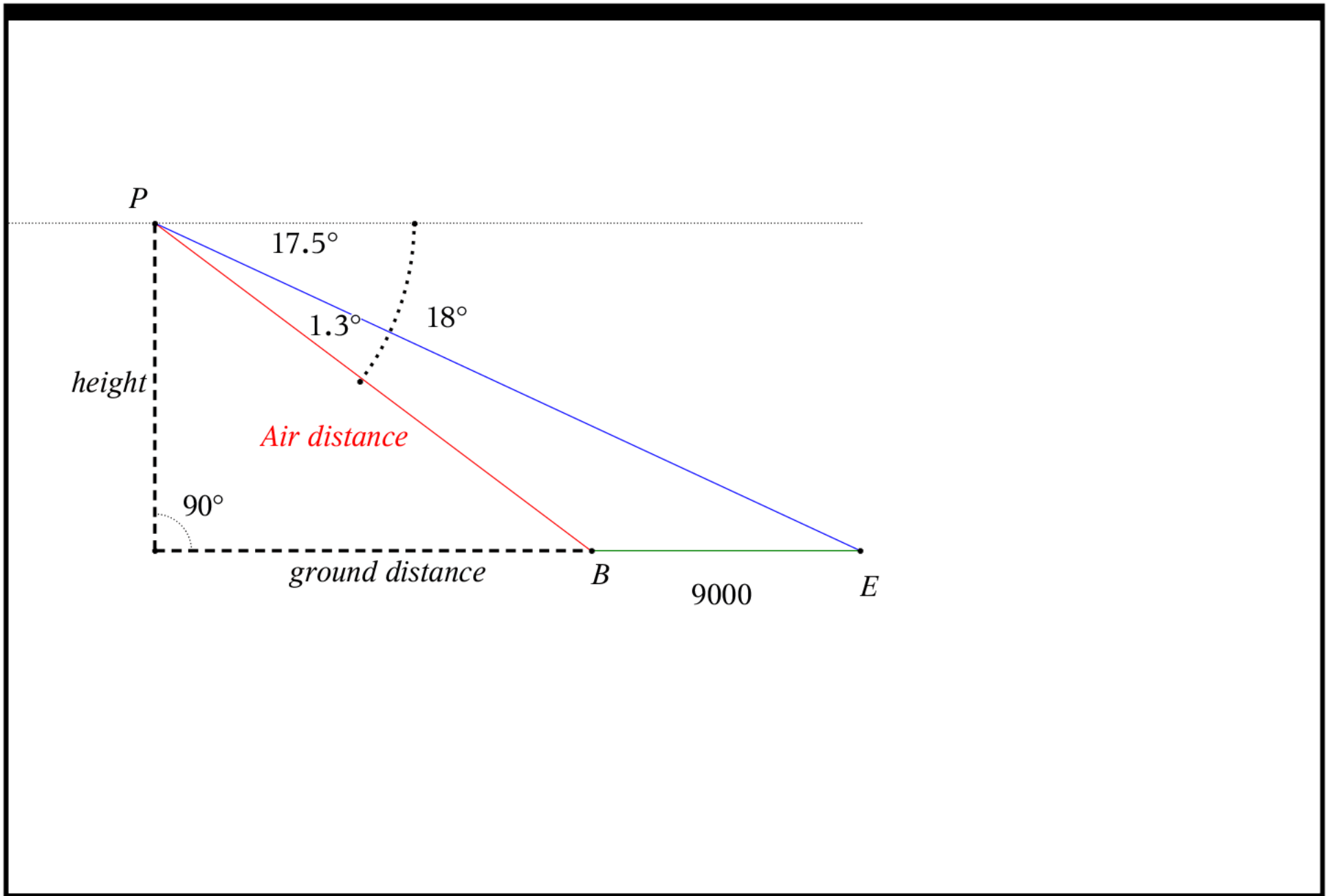
Note: angles of depression must be formed from a horizontal in the AIR

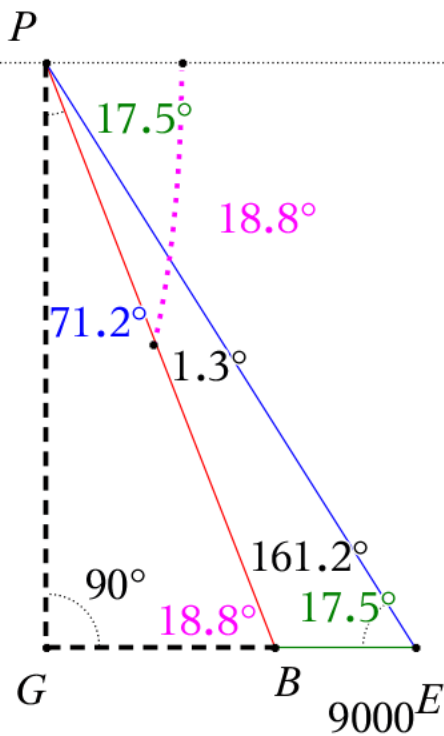
Note: planes fly HIGH in the sky

Note: distances found in this figure are HUGE in feet

Note: these angles of depression overlap

	A x_list	B y_list	C	D	E	F	G	H	I	J	K	L	M
=													
1													
2													
3													
4													
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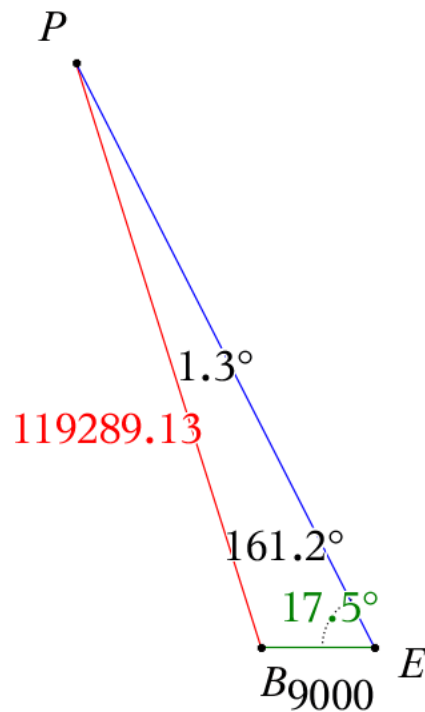




We need to use either right triangles to find missing angles or alternate interior angles to replace all the angles in the figure

$$m\angle GPB = 90 - 18.8$$

$$m\angle PBE = 180 - 18.8$$



Note: Figure NOT drawn to scale

Now that we have the missing angles in the triangle and at least one side we can use the law of sines to find the missing sides if we want.

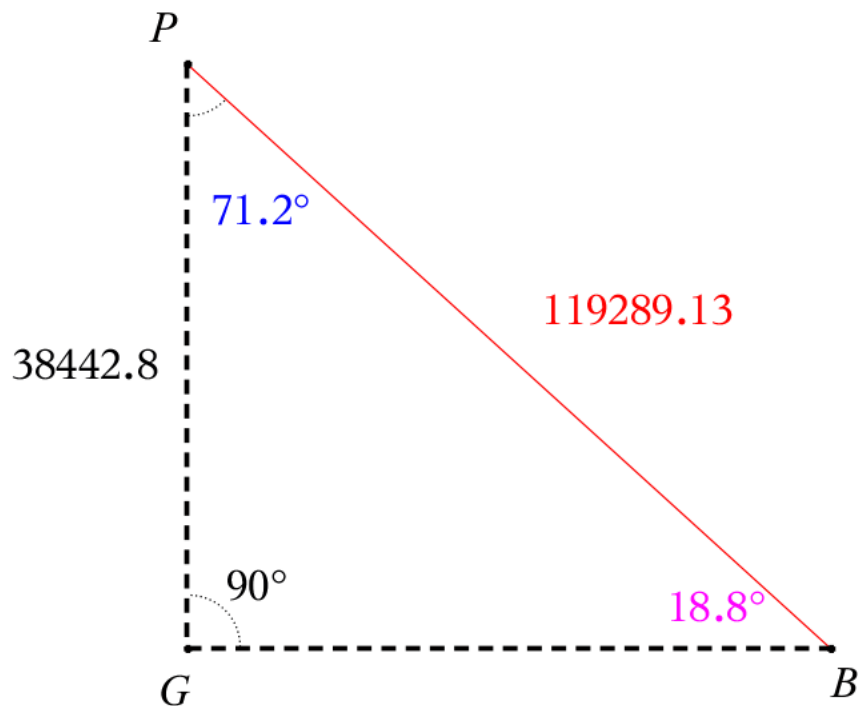
We only need PB

$$\frac{PB}{\sin(17.5)} = \frac{9000}{\sin(1.3)}$$

$$PB = \frac{9000 \cdot \sin(17.5)}{\sin(1.3)} \approx 119289.13$$

$$119289.13 \text{ feet} \approx \frac{119289.13}{5280} \approx 22.5926 \text{ miles}$$

Now we know the air distance traveled by the plane and the hypotenuse of the related right triangle PBG



note: figure NOT drawn to scale

We can use SOHCAHTOA to find the distances GB and PG

$$\sin(18.8) = \frac{PG}{119289.13}$$

$$PG = 119289.13 \cdot \sin(18.8) \blacktriangleright 38442.8$$

this gives us plane's HEIGHT

$$38442.8 \text{ feet} \approx \frac{38442.8}{5280} \approx 7.28083 \text{ miles}$$

$$\cos(18.8) = \frac{GB}{119289.13}$$

$$GB = 119289.13 \cdot \cos(18.8) \blacktriangleright 112925.$$

$$112925 \text{ feet} \approx \frac{112925}{5280} \approx 21.3873 \text{ miles}$$

This gives us the distance that the plane traveled along the ground before touching down on its descent.