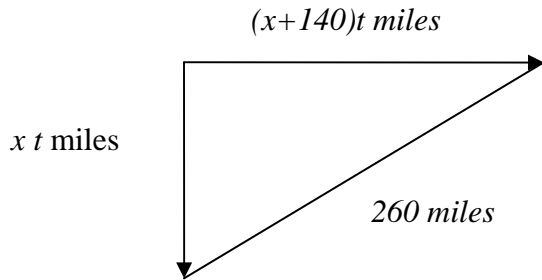


Alg2Trig
2.6 Number 87

First, see figure below. Two aircraft move at right angles. x is the distance they travel and t is the time. Also note, at this time ($t=1$ hour) the second plane has gone 140 more miles and they are 260 miles apart. So you get a nice right triangle – as shown below. Everything is in miles.



Now we have to realize that since this is a right triangle, the Pythagorean Theorem applies. So

$$a^2 + b^2 = c^2$$

Or

$$(xt)^2 + [(x+140)t]^2 = 260^2$$

And since $t=1$ we get

$$x^2 + (x+140)^2 = 260^2 \text{ or } x^2 + x^2 + 280x + 140^2 = 260^2$$

$$2x^2 + 280x + 140^2 - 260^2 = 0$$

And to simplify a bit

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \frac{-280 \pm \sqrt{280^2 - 4 \cdot 2 \cdot (140^2 - 260^2)}}{2 \cdot 2}$$

$$x = -70 \pm \frac{\sqrt{280^2 - 8 \cdot (-48000)}}{4} = -70 \pm \frac{\sqrt{280^2 + 384000}}{4} = -70 \pm \frac{\sqrt{462400}}{4} = -70 \pm \frac{680}{4}$$

$$x = -70 \pm 170 = 100, -240$$

Since x is in miles traveled, the answer cannot be negative, so it must be 100 miles. So the first plane went 100 miles. The second went $100+140$ miles, or 240 miles.