BT-13 Valiant Warbird Math Problems

BT-13 Valiant Facts

Fuel capacity: 120 US Gallons.
                         17 of which is only for reserve/emergency

Average fuel burn per hour: 19.8 gallons per hour (gph)

Maximum diving speed: 230 miles per hour (mph)

Max speed: 183 mph   Cruise speed: 140 mph

Maximum Range: 725 miles approximate

Ceiling: 16,503 ft (highest plane is rated to fly)

Max takeoff weight: 4,495 lbs   Empty weight: 2,978 lbs   Length: 28.7 ft   Width: 43.2 ft   Height: 12.3 ft

You are the pilot of a BT-13 on a training mission.
Here are some important calculations you need to make before leaving the base.

1. How far from base can the BT-13 fly before turning back safely?
   A: 725/2 = approximately 362 miles

2. Your BT-13 is flying at the ceiling when the engine quits and the plane starts gliding down to earth at a rate of 500 feet per minute. How long do you have to start the engine before crashing?
   A: 16,503/500 = 33 minutes

3. You are taking off with your fuel tanks full. How far can you fly at cruise speed before you have to land to refuel?
   A: 120 gallons - 17 reserve = 103 gallons. 103 gallons /19.8 gph = 5.2 hours
   5.2 hours X 140 mph = 728 miles

4. You take off and need to get to the highest you can possibly fly. You can climb at 1000 feet per minute. How long will it take you to get to the BT-13 ceiling.
   A: 16,503/1000 = 16.5 minutes or 16 minutes, 30 seconds

5. How much payload can your plane carry with full fuel tanks? Fuel weighs 6 lbs per gallons?
   A: 4,495 lbs - 2,978 lbs = 1,517 lbs available. 120 gallons X 6 = 720 lbs of fuel
   1,517 lbs - 720 lbs = 797 lbs available for payload

6. You are at the ceiling when you start to dive at the maximum diving speed. How long will it take you to dive to 5,000 feet?
   A in minutes: 230 mi/hr/(60 min/hr) = 3.83 mi/min;   2.18 mi/3.83 mi per min = 0.57 min
   or slightly more than a half min or 30 sec
   A in seconds: 230 mi/hr/3600 sec/hr = .0639 mi/sec; 2.18 mi/.0639 mi/sec = approx 34 sec
   You could also start by converting 230 mph to feet per (hr, min, sec): 230x5280 feet / (1 hr, 60 min, or 3600 sec)

7. The airplane you are flying with left the base 20 minutes before you left. That plane's maximum cruising speed is 120 mph. How long will it take you to catch up with him?
   A: simplest approach is to calculate the head start distance: 20 min/(60 min/hr) x 120 mi/hr = 40 miles (or 20 min is 1/3 hr and you can go 40 mi in 1/3 hr at 120 mph). Chaser must cover the head start of 40 miles with the extra 20 mph in airspeed, so 40 mi/ 20 mi/hr = 2 hr

Saga of an Aviation Survivor
by Howard "Mike" Hunt
Biography from Fathom Publishing

fathompublishing.com/biography/hunt

The story of a World War II pilot's experiences in the war and later in Alaska where he joined with other vets to form a non-scheduled airline. Hunt was devoted to preserving warbirds like the BT-13.
Answers: fathompublishing.com/solutions