Engine Failure After Takeoff in a Single-Engine Airplane

The Possible Turn

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Disclaimer: These procedures should be practiced at a safe altitude and considered only when landing straight ahead is not a viable option. If you are uncomfortable performing this maneuver, obtain advice and training from a certified flight instructor. The turnaround maneuver described here is strictly an emergency procedure. It should not be utilized unless the pilot considers it more hazardous not to perform this maneuver.
DETERMINING MINIMUM TURNBACK ALTITUDE

To be accomplished at a safe altitude—NOT in the pattern

(for a given aircraft and configuration)
(“height” = above ground; “altitude” = read on altimeter)

1. Establish aircraft in a stabilized climb halfway between \( V_X \) and \( V_Y \) on a cardinal heading.
2. Upon reaching a safe cardinal altitude, retard throttle.
3. Do nothing for 5 seconds and hold the nose up without stalling.
4. After these 5 seconds, simultaneously roll the aircraft into a 45°-banked turn and pitch for no faster than best glide speed (or slightly slower).
5. Continue this maneuver until completing a 360-degree turn.
6. Roll out of the turn.
7. Perform a moderately aggressive flare to simulate a landing.
8. Note altitude when vertical speed becomes zero.
9. Subtract this altitude from the cardinal altitude at which the throttle was retarded.
10. The result is the altitude lost during a 360° gliding turn. This is observed altitude loss.
11. Increase the altitude lost in a 360° maneuver by 50% to arrive at the turnaround height.
12. Add the turnaround height to airport elevation to determine the minimum turnback altitude.
13. Do not consider turning around unless 1) the aircraft has reached at least 2/3 of the observed altitude loss when passing over the departure end of the runway, and 2) it has reached at least the minimum turnback altitude.

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ALTITUDE LOSS WORKSHEET
For Practice at a Safe Altitude

CARDINAL ALTITUDE ……………………………. ______________
Minus ALTITUDE AT END OF MANEUVER……. - ____________
Equals OBSERVED ALTITUDE LOSS ………. = ____________
Add 50% SAFETY MARGIN ……………………….. + ____________
Equals minimum TURNBACK HEIGHT ………. = ____________

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### Takeoff Planning Worksheet

| OBSERVED ALTITUDE LOSS                      | __________ |
| Multiply                                    | x 2/3      |
| MINIMUM HEIGHT OVER END OF RUNWAY           | = __________ |
| Add FIELD ELEVATION                        | + __________ |

**MINIMUM ALTITUDE OVER END OF RUNWAY =**

(If below this altitude when crossing end of runway: DO NOT TURN BACK)

| TURNBACK HEIGHT                             | = __________ |
| Add FIELD ELEVATION                        | + __________ |

**MINIMUM TURNBACK ALTITUDE =**

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