NWCG INTRODUCTION TO WILDLAND FIRE BEHAVIOR CALCULATIONS (S-390) PRACTICE TEST (SAMPLE)

STUDY GUIDE

SAMPLE STUDY GUIDE WITH LIMITED QUESTIONS

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Introduction

Preparing for a certification exam can feel overwhelming, but with the right tools, it becomes an opportunity to build confidence, sharpen your skills, and move one step closer to your goals. At Examzify, we believe that effective exam preparation isn't just about memorization, it's about understanding the material, identifying knowledge gaps, and building the test-taking strategies that lead to success.

This guide was designed to help you do exactly that.

Whether you're preparing for a licensing exam, professional certification, or entry-level qualification, this book offers structured practice to reinforce key concepts. You'll find a wide range of multiple-choice questions, each followed by clear explanations to help you understand not just the right answer, but why it's correct.

The content in this guide is based on real-world exam objectives and aligned with the types of questions and topics commonly found on official tests. It's ideal for learners who want to:

- Practice answering questions under realistic conditions,
- Improve accuracy and speed,
- Review explanations to strengthen weak areas, and
- Approach the exam with greater confidence.

We recommend using this book not as a stand-alone study tool, but alongside other resources like flashcards, textbooks, or hands-on training. For best results, we recommend working through each question, reflecting on the explanation provided, and revisiting the topics that challenge you most.

Remember: successful test preparation isn't about getting every question right the first time, it's about learning from your mistakes and improving over time. Stay focused, trust the process, and know that every page you turn brings you closer to success.

Let's begin.

How to Use This Guide

This guide is designed to help you study more effectively and approach your exam with confidence. Whether you're reviewing for the first time or doing a final refresh, here's how to get the most out of your Examzify study guide:

1. Start with a Diagnostic Review

Skim through the questions to get a sense of what you know and what you need to focus on. Your goal is to identify knowledge gaps early.

2. Study in Short, Focused Sessions

Break your study time into manageable blocks (e.g. 30 – 45 minutes). Review a handful of questions, reflect on the explanations.

3. Learn from the Explanations

After answering a question, always read the explanation, even if you got it right. It reinforces key points, corrects misunderstandings, and teaches subtle distinctions between similar answers.

4. Track Your Progress

Use bookmarks or notes (if reading digitally) to mark difficult questions. Revisit these regularly and track improvements over time.

5. Simulate the Real Exam

Once you're comfortable, try taking a full set of questions without pausing. Set a timer and simulate test-day conditions to build confidence and time management skills.

6. Repeat and Review

Don't just study once, repetition builds retention. Re-attempt questions after a few days and revisit explanations to reinforce learning. Pair this guide with other Examzify tools like flashcards, and digital practice tests to strengthen your preparation across formats.

There's no single right way to study, but consistent, thoughtful effort always wins. Use this guide flexibly, adapt the tips above to fit your pace and learning style. You've got this!

Questions

1. Which type of cloud is associated with instability?

A. Cumulous type clouds

B. Stratus type clouds

C. Cirrus

D. Nimbostratus

2. Which statement describes the relationship between H and R in fireline intensity calculation?

A. I = H × R, with H in Btu/ft^2 and R in ft/s (R must be converted from ft/min by dividing by 60)

B. I = H + R

C. I = H × R^2

D. I = H × R, with H in Btu/ft and R in m/s

3. What is the purpose of Wind Adjustment Factor (WAF) and Slope Factor (SF) in simple ROS estimation?

A. They adjust the baseline ROS to reflect wind and slope influences

B. They adjust fuel moisture directly

C. They are used to convert units

D. They determine flame height

4. On a 1:24,000 scale map, how many feet are represented in one inch?

A. 2,000 ft

B. 1,000 ft

C. 3,000 ft

D. 4,000 ft

5. How does wind influence ROS in S-390?

A. Increased wind generally increases ROS by tilting flames and enhancing heat transfer; applied via WAF

B. Wind decreases ROS by cooling fuels

C. Wind has no effect on ROS

D. Wind only affects smoke production, not ROS

6. Which statement describes how field observations contribute to S-390 calculations?

A. They are irrelevant if models exist

B. They are optional if you have wind data

C. They are used to validate and adjust model predictions

D. They are only used for training

7. ASOS measures winds at approximately how many feet above ground?

A. 10 ft

B. 20 ft

C. 33 ft

D. 50 ft

8. What does 'dead fuels' mean in wildland fire calculations?

A. Live fuels that are not yet dead

B. Fuels that are dead but not yet dry

C. Non-ignitable materials

D. Fuels that are dead and not living, categorized by size/conditioning (1-hour, 10-hour, 100-hour)

9. In S-390, what is a recommended approach to validate your calculation results?

A. Cross-check with field observations, use multiple methods or calculators, and consult reference tables

B. Use only one calculator

C. Ignore field observations

D. Blindly trust the model

10. What does atmospheric stability measure?

A. Vertical movement within an atmosphere

B. Lateral movement within an atmosphere

C. Humidity level

D. Temperature gradient

Answers

1. A
2. A
3. A
4. A
5. A
6. C
7. C
8. D
9. A
10. A

Explanations

1. Which type of cloud is associated with instability?

A. Cumulous type clouds

B. Stratus type clouds

C. Cirrus

D. Nimbostratus

Instability in the atmosphere shows up as buoyant rise and significant vertical cloud growth. Cumulus clouds form when surface air is warm and begins to rise; as the parcel ascends, it cools and water vapor condenses into puffy, vertically developing clouds. If the environmental lapse rate is large enough, the rising air keeps accelerating upward, producing larger cumulus that can develop into cumulonimbus with strong updrafts and potentially storms. In contrast, stratus clouds indicate a stable, layered atmosphere with little vertical motion, cirrus are high, wispy clouds that signal moisture higher up rather than active convection, and nimbostratus are thick, rain-bearing layers formed by widespread lifting rather than strong buoyant convection. So the cloud type most associated with instability—and the best indicator of convective potential—is the cumulus cloud.

2. Which statement describes the relationship between H and R in fireline intensity calculation?

A. I = H × R, with H in Btu/ft^2 and R in ft/s (R must be converted from ft/min by dividing by 60)

B. I = H + R

C. I = H × R^2

D. I = H × R, with H in Btu/ft and R in m/s

Fireline intensity comes from how much heat is released per unit area of fuel and how fast that fire line moves. That means the intensity is determined by multiplying the heat release per area (H) by the rate of spread (R). So the correct relationship is I = H × R. For consistent units, H should be in Btu/ft^2 and R in ft/s. If R is given in ft/min, convert it to ft/s by dividing by 60 before multiplying. This keeps the physical meaning intact: more heat per area and a faster moving line both drive a higher intensity. Why the other forms don't fit: adding H and R mixes quantities that don't share the same dimensional meaning, so they can't represent a heat-per-length quantity. using H × R^2 would distort the units and the physical interpretation by squaring the rate of spread. using H with units of Btu/ft and R in m/s mixes an incorrect heat-unit (per length instead of per area) and a different length unit, which breaks dimensional consistency. The stated convention (H in Btu/ft^2 and R in ft/s, with the conversion from ft/min to ft/s) aligns with the standard fireline intensity calculation.

3. What is the purpose of Wind Adjustment Factor (WAF) and Slope Factor (SF) in simple ROS estimation?

A. They adjust the baseline ROS to reflect wind and slope influences

B. They adjust fuel moisture directly

C. They are used to convert units

D. They determine flame height

The question is testing how environmental factors are incorporated into a simple rate of spread estimate. Wind Adjustment Factor and Slope Factor are used to modify the baseline ROS so the model reflects how wind and terrain influence fire speed. Start with a baseline ROS that comes from fuel, moisture, and general conditions; then apply WAF to account for how wind speeds and direction accelerate spread, and apply SF to account for how slope—especially uphill—speeds the fire advance. Together, these factors scale the baseline ROS to give a more realistic estimate, rather than changing fuel moisture directly, altering units, or determining flame height. For example, a baseline ROS might be multiplied by both factors to yield the adjusted rate, illustrating how stronger wind and steeper slopes increase spread compared to flat, calm conditions.

4. On a 1:24,000 scale map, how many feet are represented in one inch?

A. 2,000 ft

B. 1,000 ft

C. 3,000 ft

D. 4,000 ft

Understanding map scales is essential here. A 1:24,000 scale means every inch on the map represents 24,000 inches in the real world. Converting inches to feet: 24,000 inches ÷ 12 inches per foot = 2,000 feet. So, one inch on a 1:24,000 map represents 2,000 feet.

5. How does wind influence ROS in S-390?

A. Increased wind generally increases ROS by tilting flames and enhancing heat transfer; applied via WAF

B. Wind decreases ROS by cooling fuels

C. Wind has no effect on ROS

D. Wind only affects smoke production, not ROS

Wind drives fire spread by tilting flames toward unburned fuels and boosting heat transfer to those fuels. This heating preheats and dries fuels ahead of the fire, making ignition sooner and the fire advance faster. In S-390, this effect is accounted for with the Wind Adjustment Factor (WAF), which increases the baseline rate of spread to reflect wind conditions. So, stronger wind typically raises the rate of spread, not lowers it or leaves it unchanged, and wind's main impact is on how quickly the fire moves, not just on smoke.

6. Which statement describes how field observations contribute to S-390 calculations?

A. They are irrelevant if models exist

B. They are optional if you have wind data

C. They are used to validate and adjust model predictions

D. They are only used for training

Field observations provide real-world checks that ground-truth S-390 calculations. They supply actual conditions and outcomes from the field that you can compare against model predictions, allowing you to validate how well the model performs under current fuels, moisture, wind, and terrain. When there are discrepancies, you can adjust the model inputs or parameters so the predictions better reflect reality, improving accuracy for decisions like expected rate of spread, flame length, and fire behavior under similar conditions. This calibration and validation step reduces uncertainty and increases confidence in the calculated outputs. Why the other ideas don't fit as well: simply having models exists doesn't make field data unnecessary—their value is in confirming and fine-tuning those models to match what happens on the ground. Wind data alone doesn't capture all the factors that influence fire behavior, such as slope, fuel type, and moisture, and field observations help integrate those pieces. And field data aren't used only for training; they directly inform and adjust calculations, not just classroom practice.

7. ASOS measures winds at approximately how many feet above ground?

A. 10 ft

B. 20 ft

C. 33 ft

D. 50 ft

ASOS winds are measured at about 10 meters above ground, which is roughly 33 feet. This standardized height (10 m) is used for surface weather observations like ASOS/METAR, providing a consistent reference for wind data in fire behavior calculations. Wind speed does change with height due to surface friction, but the 10 m measurement is the convention used for reporting and modeling, so 33 feet is the commonly cited equivalent.

8. What does 'dead fuels' mean in wildland fire calculations?

A. Live fuels that are not yet dead

B. Fuels that are dead but not yet dry

C. Non-ignitable materials

D. Fuels that are dead and not living, categorized by size/conditioning (1-hour, 10-hour, 100-hour)

Dead fuels are fuels that are not living. In wildland fire calculations, they are grouped by how quickly their moisture content responds to weather, which is expressed as time-lag classes: 1-hour, 10-hour, and 100-hour. This sizing and conditioning concept helps model how fast different fuels dry, ignite, and burn. The idea is that smaller fuels (1-hour) respond quickly to atmospheric changes, while larger woody fuels (10-hour and 100-hour) take longer to dry and affect fire behavior accordingly. So the description that dead fuels are dead and not living, categorized by size/conditioning into 1-hour, 10-hour, and 100-hour matches how these fuels are defined and used in calculations.

9. In S-390, what is a recommended approach to validate your calculation results?

A. Cross-check with field observations, use multiple methods or calculators, and consult reference tables

B. Use only one calculator

C. Ignore field observations

D. Blindly trust the model

The key idea is to verify results through multiple lines of evidence, not rely on a single tool. In S-390, you want a result that makes physical and practical sense under the given conditions. You achieve this by cross-checking with field observations when possible, running the same problem through more than one method or calculator, and consulting reference tables that provide baseline values for similar inputs. This triangulation helps catch input mistakes, unit conversion errors, or tool-specific assumptions that could skew a result. If the different methods or a field check all point to a similar outcome, you gain confidence that your calculation is reasonable. If they don't, you revisit inputs, units, and model assumptions, and you re-calculate or consult additional references to reconcile the discrepancy. Relying on only one calculator, ignoring real-field data, or blindly trusting a model lacks the checks that prevent and reveal errors, making it less trustworthy for real-world decisions.

10. What does atmospheric stability measure?

A. Vertical movement within an atmosphere

B. Lateral movement within an atmosphere

C. Humidity level

D. Temperature gradient

Atmospheric stability describes the tendency of air to move vertically when it is displaced. When a parcel is lifted, stability determines whether it continues to rise (unstable conditions), sinks back or remains where it is (stable conditions), or stays neutral. This vertical motion tendency comes from buoyancy—the parcel's density relative to the surrounding air changes as you move up or down, which is tied to how temperature changes with height. In short, stability is about whether vertical air movement is encouraged or resisted. Lateral movement, humidity, and simply knowing the temperature gradient don't capture this vertical tendency. Lateral motion is about side-to-side spread, humidity is about moisture content, and the temperature gradient helps describe the environment but isn't what stability itself measures.

Next Steps

Congratulations on reaching the final section of this guide. You've taken a meaningful step toward passing your certification exam and advancing your career.

As you continue preparing, remember that consistent practice, review, and self-reflection are key to success. Make time to revisit difficult topics, simulate exam conditions, and track your progress along the way.

If you need help, have suggestions, or want to share feedback, we'd love to hear from you. Reach out to our team at hello@examzify.com.

Or visit your dedicated course page for more study tools and resources:

https://nwcgs390.examzify.com

We wish you the very best on your exam journey. You've got this!