

Roof Support in a Primary Escapeway

Problem Booklet

Instructions

Read the problem situation described on the next page. Then answer each of the 10 questions. Do them one at a time. Some questions will ask you to look at one or more 3-D slides. Follow the directions for each question. Look at the appropriate slide or slides, then continue on with the exercise. Don't jump ahead, but you may look back to earlier questions and your answers. Most questions direct you to choose only one answer unless you are told to "Try again!" Some questions tell you to select as many answers as you think are correct. Follow the directions for each question.

After you have selected your choice to a question, look up the number for that choice on the answer sheet. Rub the developing pen between the brackets for that choice. A hidden message will appear that tells you if the choice is correct and provides you with additional information. When you finish you will learn how to score your performance.

Background

You are a roof bolter with five years job experience.

Your helper, D. R. Light, has one year underground experience.

This coal mine has recently been reopened after being idle for several years. The coal seam is slightly more than six feet thick.

The immediate roof of the mine is approximately 3 1/4 feet of shale. Above this is 4 1/2 feet of limestone.

The following types of bolts are used for roof support: mechanical, resin, or combination (mechanical/resin).

Problem

The section boss is required to walk the escapeways leading out to East Mains each week looking for hazardous conditions. If any are found, he must see that corrections are made. On his last run two days ago, he noticed that the roof and brow in the high fall area at the mouth of 2 North has started to deteriorate. He felt the situation could become hazardous, however, he didn't feel it was urgent at that time. Today the continuous miner is down, so he asks you and D.R. to follow the escapeway out to the high fall area. You are to make corrections and, if necessary, take down any loose top. Turn the page and answer the first question.

Question A

After receiving instructions from the face boss, you and D.R. load a supply jeep with scaling bars, posts, cap blocks and wedges. You head outby to the mouth of 2 North. You arrive and park the vehicle near the edge of the high fall area. You start to inspect the roof beginning at the center of the dome, which you estimate to be thirty feet high. LOOK AT SLIDE 1.

How does the roof look to you? (Choose only ONE unless you are told to "Try again!")

1. The roof is OK because there are more than enough bolts in place throughout the cavity.
2. Assume that the roof is safe, since it is too high to conduct a sound and vibration test.
3. Even though the roof at the center of the dome is very high, you suspect a hazardous condition near the center.
4. The roof is safe. All bolts and plates appear to be in good contact with the immediate roof.
5. The roof is not safe because the absence of rockdust on the surface indicates that sloughing has recently occurred.
6. The roof looks good. Don't be concerned about it.

Question B

You and D.R. have identified this area as potentially hazardous. LOOK AT SLIDE 2. This is a close-up view of the hazardous condition. What should you do? (Choose only ONE unless you are told to "Try again!")

7. By standing on the jeep, scale the top with a bar to remove the loose slab .
8. Report the situation to your section boss. You can't reach the top with the equipment you have with you.
9. Do nothing. You've seen roof like this before and it never caused a problem. You should not be concerned.
10. Add additional support to prevent the top from sloughing.

Question C

You and D.R. decide to take a closer look around the high fall area before you report to your section boss. The lower edge of the cavity, directly above where D.R. is standing, catches your attention. This is what you see. LOOK AT SLIDE 3.

What should you do now? (Choose only ONE unless you are told to "Try again!")

11. Immediately yell to D.R. to move away from the edge of the high fall area into the main entry.
12. Ask D.R. to take a close look at the edge of the cavity and see what he thinks about it.
13. Move to where D.R. is standing and help him inspect the top.
14. Continue with your inspection of the roof and return to this area later.

Question D

You recognized the roof hazard and yelled to D.R. to move away from the brow. He is now standing where he is safe. However, before you and D.R. can begin to make corrections you should recognize the extent of the problem. What are the hazards here? (Select as MANY as you think are correct.)

- 15. The slab could break off and fall at any time.
- 16. There are too few bolts holding the slab up.
- 17. There is a small gap between the slab and the main roof.
- 18. The wrong types of roof bolts were used.
- 19. The slab is large and is probably very heavy.
- 20. Other parts of the roof near the loose slab may also be separated from the main roof.

When you have made your selection(s), do the next question.

Question E

You and D.R. decide the area near the brow should be immediately dangered off and the problem corrected. However, this entry is the primary escapeway out of your section. What should you do now? (Choose only ONE unless you are told to "Try again!")

21. Begin to correct the problem. The escapeway probably won't need to be used until you are finished.
22. Begin working. If anyone comes out the escapeway, detour them around the high fall area until you're finished.
23. Danger the area off and begin to correct the problem.
24. Send D.R. to the face to tell the boss that you have to danger off and correct a roof problem. Since this is the primary escapeway, the boss should tell the miners to use the secondary escapeway.

Question F

D.R. returns from the face after telling the section boss that the primary escapeway will be dangerous until the roof problem is corrected. While at the face, D.R. also reported the roof condition at the center of the cavity. He returns with a longer bar and pipe to scale down the loose slab. Now it's time to start working. You danger off the entry. What should you do next? (Choose only ONE unless you are told to "Try again!")

25. Start to scale the loose top in the dome using the longer bar and pipe.
26. Set temporary supports at random around the high fall area and then scale down the loose top.
27. Set temporary supports under the good roof adjacent to the brow and begin to scale down the top.
28. Begin to pound the bad roof area near the brow using a wood post.

Question G

You and D.R. have safely and successfully pulled down the roof slabs. You leave the temporary posts in place until the fresh roof can be bolted. This should be done immediately, so you proceed to the face to get a jackleg drill and some bolts. The face boss sees you and gives you another job. When you finish rebolting, he wants you to take a look at the roof in East Mains just outby 2 North.

Roof conditions within the cavity, as well as the outside edge (or brow) of high fall areas can be a continuing source of problems. After high falls have been resupported, workers tend to pay little attention to the roof because it's assumed to be safe. These areas need to be examined on a regular basis. LOOK AT SLIDE 4.

What roof hazards do you see? (Select as MANY as you think are correct.)

- 29. Loose, broken roof rock.
- 30. Slickensided roof.
- 31. Loose hanging roof bolts.
- 32. Sloughing of rock between bolts.
- 33. Rusted bolts.
- 34. Hanging slabs of rock at the brow of the high fall area.

When you have made your selection(s), do the next question.

Question H

You complete bolting at the high fall area and remove the temporary posts. You and D.R. walk to East Mains and look at the roof. LOOK AT SLIDE 5.

What can you tell about this roof? (Choose only ONE unless you are told to "Try again!")

- 35. There are more than enough bolts in the roof, so support is OK.
- 36. Most of the bolts and bearing plates are in contact with the roof, so the roof is adequately supported.
- 37. This is an older area of the mine. Since the roof is still intact, it will probably remain that way for a long time.
- 38. There is significant rock sloughing between bolts, so the bolts are probably not supporting the roof.

Question I

You saw in SLIDE 5 what is sometimes called "chandelier roof". The support of this mine roof appears uncertain. It is difficult to predict how long the roof will remain in place. Spalling of rock between bolts may cause the roof support to be ineffective. What can be done with this roof? (Choose only ONE unless you are told to "Try again!")

- 39. Nothing. It will probably stay up as long as the entry remains open.
- 40. Additional roof support should be added to the left side of the entry.
- 41. Leave it alone if it appears solid after the roof is sounded.
- 42. Additional roof support should be added across the width of the entry.

Question J

Chandelier roof is a condition that generally develops in a mine roof of shale or claystone. The rock around roof bolts deteriorates and sloughing occurs. This deterioration of rock, commonly called "slaking", is usually caused by moisture in the mine air. Some mines install "tempering chambers" to remove moisture from incoming air. Others, particularly if the mine has a serious problem, spray sealants to protect the roof from moisture. In some mines, however, chandelier roof is a problem that can be corrected by spot bolting. LOOK AT SLIDES 6 and 7.

These are examples of more advanced rock spalling between bolts. In addition to rebolting with similar bolts, what are some other effective types of additional support that can be used for chandelier roof? (Select as MANY as you think are correct.)

- 43. Wood headers under steel bearing plates.
- 44. Steel I beams or wood beams.
- 45. Lengths of structured steel channel.
- 46. Woven steel/wire mesh.

END OF PROBLEM

Scoring your performance

1. Count the total number of responses you colored in that were marked "Correct". Write this number in the first blank on the answer sheet.
2. Count the total number of incorrect responses you colored in. Subtract this number from 27. Write the difference in the second blank on the answer sheet.
3. Add the numbers on the first and second blanks. This is your score.

The best possible score of 46 results from selecting all the correct answers and no wrong answers. The worst possible score of zero results from selecting all the wrong answers and no correct answers.