

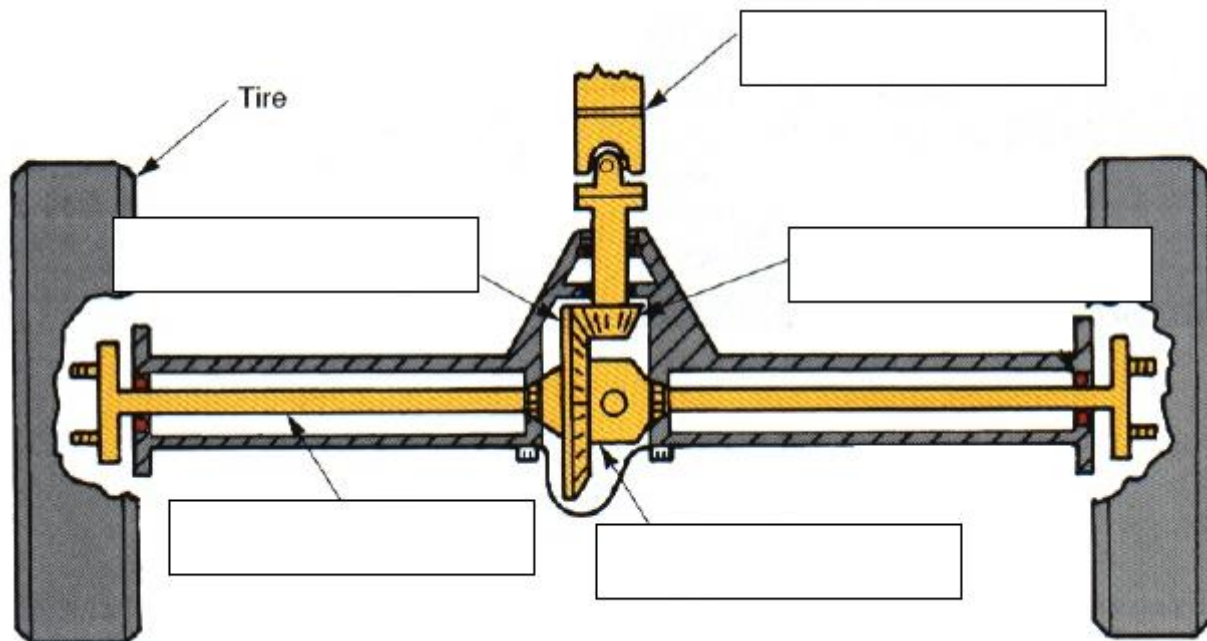
QUESTIONS - Differentials

Theory

Using the information in <https://gwellwood.com/subjects/mechanics/differentials/>, the internet and other sources to answer the questions below.

There are NO Partial Marks - when it says "describe" – DESCRIBE

1. Fill in the missing names on the diagram below:



2. Describe, using your own words, why a differential is needed

3. Describe in your own words, how an Open Differential works (if it sounds like Wikipedia, or a "copy-and-paste" I'm going to hand it back to you):



- a. What is its Advantage?

- b. What is its Disadvantage?

4. Describe in your own words, how a Clutch-Type Limited Slip works (if it sounds like Wikipedia, or a "copy-and-paste" I'm going to hand it back to you):



- a. What is its Advantage?

- b. What is its Disadvantage?

5. Describe in your own words, how a Ratchet-Type (Detroit Locker) Limited Slip works (if it sounds like Wikipedia, or a "copy-and-paste" I'm going to hand it back to you):



a. What is its Advantage?

b. What is its Disadvantage?

6. Describe in your own words, how a Torsen (Helical) Limited Slip works (if it sounds like Wikipedia, or a "copy-and-paste" I'm going to hand it back to you):



a. What is its Advantage?

b. What is its Disadvantage?

7. Describe in your own words, how a Viscous Limited Slip works (if it sounds like Wikipedia, or a "copy-and-paste" I'm going to hand it back to you):



a. What is its Advantage?

b. What is its Disadvantage?

8. Describe in your own words, how an Auburn (Cone-Type) Limited Slip works (if it sounds like Wikipedia, or a "copy-and-paste" I'm going to hand it back to you):



a. What is its Advantage?

b. What is its Disadvantage?

9. Describe in your own words, how the GM G80 (Gov-Loc) Limited Slip works (if it sounds like Wikipedia, or a "copy-and-paste" I'm going to hand it back to you):



a. What is its Advantage?

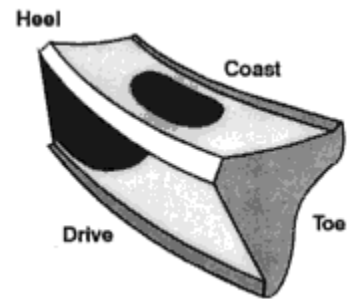
b. What is its Disadvantage?

10. Based on your answers above, pick the type of differential that you think is the best. Give at least three reasons for your answer.

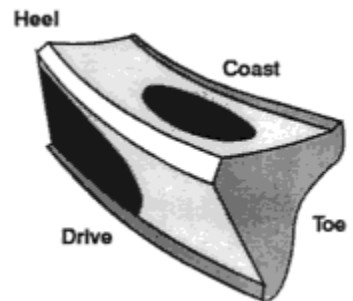
11. Describe how to adjust Pinion DEPTH on a GM 12-Bolt Axle (Google):

12. Describe how to adjust Backlash on a GM 12-Bolt Axle (Google):

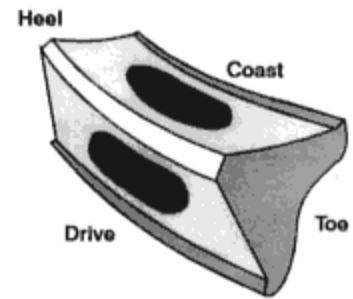
13. What needs to be done about this wear pattern:



14. What needs to be done about this wear pattern:



15. What needs to be done about this wear pattern:



16. Looking at the shape of a pinion gear, if you increase pinion depth, what will happen to backlash?

17. Looking at the shape of a ring gear, if you decrease backlash, what will happen to pinion depth?

18. If you wanted to swap from an open differential to a limited slip differential (keeping the original gear set), you often do not have to change the pinion depth. Why is this?



19. Most differentials can be determined if they are open or LSD by spinning one wheel by hand. If the opposite wheel spins in the same direction, it is likely an LSD. The Eaton differential (from the video), on the other hand, will not do this. Why not?

20. Why should you NOT run a Spool (or "Welded Diff" or "Lincoln Locker") on the street?

21. All Wheel Drive (AWD) vehicles need a Center Differential in the transfer case. Why?

22. What would be the result if there was NO differential action (ie: "Fixed" like a Spool or a Welded Diff) in the center of an All-Wheel-Drive vehicle?