# Grade 10 Power Mechanics

## Term 3 - 48 complete lesson plans

Ready to teach, in the KICD lesson-plan format | 40-minute lessons | PDF and editable Word

### ABOUT THIS PACK

48 complete, ready-to-teach Grade 10 Power Mechanics lesson plans for Term 3, covering vehicle body joining processes, introduction to engines, types of engines and classifications of engine.

### TOPICS IN THIS PACK

| Topic | Name | Lessons |
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| 3.4 | Vehicle body Joining processes | 18 |
| 4.1 | Introduction to engines | 12 |
| 4.2 | Types of Engines | 8 |
| 4.3 | Classifications of Engine | 10 |

### INSIDE EVERY LESSON PLAN

- The specific learning outcomes, key inquiry question, core competencies, values and PCIs, and the resources needed.
- A timed lesson flow: what the teacher does and what the learners do, from introduction to summary.
- The key content (a worked example, notes or a practical with its expected results), then four practice questions with the answers for the teacher.
- The common mistake to watch for, and ideas for learners who need support and for those ready for more.
- A four-level CBC assessment rubric (EE, ME, AE, BE), homework, and a blank reflection space to fill in after teaching.

### A TASTE OF LESSON 1

**Why body parts are joined, and how joints are classified**

By the end of the lesson, the learner should be able to: a) explain why parts of a vehicle body are joined; b) classify the joining methods used in a vehicle body

> **Joining vehicle body parts**
> A body is made from many panels, brackets and parts that cannot be made in one piece: they are formed separately and then joined. A joint must be strong enough for the loads, be sealed against water and dust when needed, resist vibration and corrosion, and suit the material. Some joints must be undone again, for example to remove a door, and others stay for the life of the vehicle.

You also receive this pack as an editable Word file, so you can change any lesson to suit your class before you print it. Lessons follow the order of the KICD curriculum design.

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# Why body parts are joined, and how joints are classified

Strand 3.0 Vehicle Systems > Sub-strand 3.4 Vehicle body Joining processes | Lesson 1 of 18 | 40 minutes

| SCHOOL | TEACHER | DATE |
|---|---|---|
| CLASS / STREAM | TIME | ROLL (B / G) |

## SPECIFIC LEARNING OUTCOME(S)

By the end of the lesson, the learner should be able to: a) explain why parts of a vehicle body are joined; b) classify the joining methods used in a vehicle body

## KEY INQUIRY QUESTION(S)

- How are joining processes applied in a vehicle body?

## CORE COMPETENCIES, VALUES AND PCIS IN THIS LESSON

| | | |
|---|---|---|
| COMPETENCY | **Digital literacy** | Learners use a phone, tablet or the class computer to explore or check the idea. |
| COMPETENCY | **Self-efficacy** | Learners attempt each task with confidence and see that effort improves results. |
| COMPETENCY | **Learning to learn** | Learners say what they found easy or hard and decide their next step. |
| VALUE | **Respect** | Learners listen while others explain and accept correction politely. |
| PCI | **Analytical thinking** | Developed through the activities in this lesson. |

## LEARNING RESOURCES

Samples of bolts, nuts, screws, studs, washers, split pins and rivets | Charts of thread terms and of locking devices | Pictures of a vehicle body showing where each kind of joint is used | Digital devices or print media for research on fasteners | Manila paper and marker pens | Notebooks and pencils

## ORGANISATION OF LEARNING

Whole class for demonstrations and research feedback; pairs for identifying and measuring fasteners and for the riveting and adhesive practicals; groups of four for the locking-device test; every practical is supervised by the teacher, with goggles worn for drilling and hammering.

## KEY WORDS

bolt | nut | thread | pitch | washer | locking device | rivet | adhesive | torque | joint

## THE LESSON AT A GLANCE

| Introduction | Teacher models | Guided practice | On their own | Wrap-up |
|---|---|---|---|---|
| 6 min | 9 min | 10 min | 9 min | 6 min |

## LESSON FLOW

| Stage | Minutes | The teacher | The learners |
|---|---|---|---|
| **Introduction** | 6 | Greet the class and ask: "A car body is built from hundreds of pieces of steel, plastic and glass. How do you think they are held together, and which pieces might you need to take apart later?" Take two or three answers, link them to earlier work, then state today's outcome. | Answer the starter question, recall what they already know and read the outcome aloud. |
| **Step 1: Teacher models** | 9 | Take learners through "Joining vehicle body parts" (key ideas on the next page), explaining as you go. Use samples of bolts, nuts, screws, studs, washers, split pins and rivets, charts of thread terms and of locking devices, pictures of a vehicle body showing where each kind of joint is used. Ask learners to predict what comes next before you show it. | Watch, predict the next step, ask questions and note the key steps in their exercise books. |
| **Step 2: Guided practice** | 10 | Give questions 1 and 2. Move round the groups, ask "How do you know?" and correct errors kindly on the spot. | Work in pairs or small groups, explain each step to a partner and check one another's answers. |
| **Step 3: Independent practice** | 9 | Set questions 3 and 4 for individual work. Mark as you walk round and note who needs help in the next lesson. | Work on their own, then swap books with a partner to check. |
| **Summary and conclusion** | 6 | Ask two or three learners to state the key idea in their own words. Give this exit question and check the answers: "Why are the doors and wings of a car usually bolted on?" | Say the key idea in their own words and answer the exit question in the exercise book. |

## KEY IDEAS

### Joining vehicle body parts

A body is made from many panels, brackets and parts that cannot be made in one piece: they are formed separately and then joined. A joint must be strong enough for the loads, be sealed against water and dust when needed, resist vibration and corrosion, and suit the material. Some joints must be undone again, for example to remove a door, and others stay for the life of the vehicle.

Temporary (non-permanent) joints can be taken apart without damage: bolts, nuts, screws, studs, clips and pins. Permanent joints cannot be undone without destroying them: rivets, welds, brazed and soldered joints, adhesive bonds, and hemmed or crimped edges.

By the way the joint is made: mechanical joints hold with a fastener or by shape (bolts, screws, rivets, hemming); thermal joints use heat (welding, brazing, soldering); and chemical joints use adhesives. Modern bodies use all of them: spot welds for the main shell, bolts for doors and wings, adhesives for glass and some panels, and sealer in the seams. In the next lessons we study the threaded fasteners, the locking devices, riveting and adhesive joining in detail, and then look at soldering, brazing and welding.

## PRACTICE QUESTIONS - WITH ANSWERS FOR THE TEACHER

| No. | Question | Answer |
|---|---|---|
| 1 | Give one reason why parts of a body are joined. | **The parts cannot be made in one piece, so they are formed separately and joined to make the body.** |
| 2 | Give two examples of temporary joints. | **For example: bolts and nuts, screws, studs, clips.** |
| 3 | Give two examples of permanent joints. | **For example: rivets, welds, brazed and soldered joints, adhesive bonds.** |
| 4 | Why are the doors and wings of a car usually bolted on? | **They may need to be removed for repair or replacement, so a temporary joint is used.** |

## WATCH OUT FOR

Learners think that welding is the only way to join a body. Modern bodies use many methods, each chosen for the job and the material.

## ASSESSMENT RUBRIC - THE FOUR CBC LEVELS

| Level | What the learner can do |
|---|---|
| **Exceeds expectations (EE)** | Can explain why parts of a vehicle body are joined confidently and accurately, explain the method used, and apply the idea to new or unfamiliar problems. |
| **Meets expectations (ME)** | Can explain why parts of a vehicle body are joined accurately in familiar situations; notices and corrects slips without help. |
| **Approaches expectations (AE)** | Can partly explain why parts of a vehicle body are joined, or does so with prompts from the teacher or a partner; makes some errors. |
| **Below expectations (BE)** | Cannot yet explain why parts of a vehicle body are joined without direct help; needs the idea taught again with concrete objects. |

## SUPPORT AND EXTENSION

| | |
|---|---|
| **Learners who need support** | Give pictures of a vehicle with arrows for learners to write the joining method used at each point. |
| **Learners ready for more** | Explain why a windscreen is bonded with adhesive rather than welded. (Answer: Glass cannot be welded, and the adhesive both holds the glass and seals it, and also adds stiffness to the body) |
| **Inclusion** | Seat learners with low vision near the board and read aloud whatever you write; use large, clear, tactile materials; allow extra time; pair with a patient partner; use gestures or Kenyan Sign Language for the key words. |

## HOMEWORK AND FOLLOW-UP

Redo questions 3 and 4 neatly in the exercise book. Then tell someone at home what you learned about "why body parts are joined, and how joints are classified" and bring one question of your own to ask next lesson.

## TEACHER SELF-CHECK

- Did every learner get a turn to handle materials or explain their thinking?
- Did most learners meet the outcome? Write down the names of those who did not.
- Was the pace right — did any step take too long or too short a time?
- Which competency and value did I see learners showing?
- What will I change the next time I teach this lesson?

## REFLECTION ON THE LESSON / SELF-REMARKS

Write this after teaching - what worked, what to change, which learners need follow-up.

# Threaded fasteners: bolts, nuts, screws, studs and washers

Strand 3.0 Vehicle Systems > Sub-strand 3.4 Vehicle body Joining processes | Lesson 2 of 18 | 40 minutes

| SCHOOL | TEACHER | DATE |
|---|---|---|
| CLASS / STREAM | TIME | ROLL (B / G) |

## SPECIFIC LEARNING OUTCOME(S)

By the end of the lesson, the learner should be able to: a) name the common threaded fasteners and state where each is used on a vehicle; b) choose a bolt of the correct length and read its strength grade

## KEY INQUIRY QUESTION(S)

- How are joining processes applied in a vehicle body?

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|---|---|---|---|---|
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