Grade 10 Mathematics

Term 3 - 58 complete lesson plans

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

ABOUT THIS PACK

58 complete, ready-to-teach Grade 10 Mathematics lesson plans for Term 3, covering vectors I, linear motion, statistics I and probability 1.

TOPICS IN THIS PACK

Topic	Name	Lessons
2.8	Vectors I	15
2.9	Linear Motion	15
3.1	Statistics I	16
3.2	Probability 1	12

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

Scalar and vector quantities

By the end of the lesson, the learner should be able to: a) explain the difference between a scalar and a vector quantity; b) classify quantities as scalars or vectors

> **Scalars and vectors**
> A scalar has size (magnitude) only: distance, speed, mass, time, temperature, area, volume. A vector has size and direction: displacement, velocity, force, acceleration, weight.
> A pupil walks 3 km east and then 4 km north. The distance walked is 3 + 4 = 7 km (a scalar). The displacement is the straight line from the start to the end: 5 km on a bearing of about 037° (a vector).

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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ELIMU254

Scalar and vector quantities

Strand 2.0 Measurements and Geometry > Sub-strand 2.8 Vectors I | Lesson 1 of 15 | 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 the difference between a scalar and a vector quantity; b) classify quantities as scalars or vectors

KEY INQUIRY QUESTION(S)

- What are vectors?
- Where are vectors used in real-life situations?

CORE COMPETENCIES, VALUES AND PCIS IN THIS LESSON

COMPETENCY	**Learning to learn**	Learners say what they found easy or hard and decide their next step.
COMPETENCY	**Self-efficacy**	Learners attempt each task with confidence and see that effort improves results.
VALUE	**Responsibility**	Learners look after shared materials and finish every task.
VALUE	**Unity**	Learners share materials fairly and work as one team.
PCI	**Environmental education**	Examples link to caring for the school and home environment.
PCI	**Learner support programme**	Learners seek and give guidance and support to one another.

LEARNING RESOURCES

Grid paper, rulers and coloured pencils | Charts of the Cartesian plane and of vectors | Regular plane figures cut from card | Manila paper and marker pens | Digital devices for videos and games about vectors (where available)

ORGANISATION OF LEARNING

Pairs for drawing and comparing vectors on grids; groups of four for the treasure-hunt practical with rotating roles; whole class for introducing notation and each operation; peers help one another to write column vectors; individual practice from the board.

KEY WORDS

vector | scalar | magnitude | direction | column vector | position vector | resultant | equivalent vectors | translation | midpoint

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 person says "I walked 5 km". Is that enough to tell you where they are now? What else would you need to know?" 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	Work through the worked example on the next page, thinking aloud. Use grid paper, rulers and coloured pencils, charts of the Cartesian plane and of vectors, regular plane figures cut from card. Ask learners to predict each step 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 can two objects have the same speed but different velocities?"	Say the key idea in their own words and answer the exit question in the exercise book.

WORKED EXAMPLE

Scalars and vectors

A scalar has size (magnitude) only: distance, speed, mass, time, temperature, area, volume. A vector has size and direction: displacement, velocity, force, acceleration, weight.

A pupil walks 3 km east and then 4 km north. The distance walked is 3 + 4 = 7 km (a scalar). The displacement is the straight line from the start to the end: 5 km on a bearing of about 037° (a vector).

Speed is a scalar (60 km/h); velocity is a vector (60 km/h due north). Two cars with the same speed but moving in different directions have different velocities.

PRACTICE QUESTIONS - WITH ANSWERS FOR THE TEACHER

No.	Question	Answer
1	Classify as scalar or vector: mass, force, time, velocity, temperature, displacement.	**Scalars: mass, time, temperature. Vectors: force, velocity, displacement.**
2	A pupil walks 6 km west and then 8 km north. Find the distance walked and the size of the displacement.	**Distance 6 + 8 = 14 km; displacement 10 km (6, 8, 10 triangle).**
3	Give one everyday example of a vector and one of a scalar, and say why.	**Answers vary, for example: wind velocity has direction (vector); the temperature of a room does not (scalar).**

4	Why can two objects have the same speed but different velocities?	**They may move in different directions, and velocity includes direction.**

WATCH OUT FOR

Learners treat speed and velocity as the same thing. Ask for the direction each time.

ASSESSMENT RUBRIC - THE FOUR CBC LEVELS

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

SUPPORT AND EXTENSION

Learners who need support	Give a two-column chart (only size / size and direction) to sort cards of quantities.
Learners ready for more	Can the size of a displacement ever be larger than the distance travelled? Explain. (Answer: No. The straight line is the shortest path, so the displacement is at most equal to the distance)
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 "scalar and vector quantities" 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.

ELIMU254

Vector notation

Strand 2.0 Measurements and Geometry > Sub-strand 2.8 Vectors I | Lesson 2 of 15 | 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) write vectors using the notations AB, a, and column form; b) write the negative of a vector and the zero vector

KEY INQUIRY QUESTION(S)

- What are vectors?
- Where are vectors used in real-life situations?

CORE COMPETENCIES, VALUES AND PCIS IN THIS LESSON

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KEY WORDS

vector | scalar | magnitude | direction | column vector | position vector | resultant | equivalent vectors | translation | midpoint

THE LESSON AT A GLANCE

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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: "How could you write down the journey from A to B so that another learner knows it is a vector and not just a length?" 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	Work through the worked example on the next page, thinking aloud. Use grid paper, rulers and coloured pencils, charts of the Cartesian plane and of vectors, regular plane figures cut from card. Ask learners to predict each step 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: "Describe in words the column vector (3 over -2)."	Say the key idea in their own words and answer the exit question in the exercise book.

WORKED EXAMPLE

Ways of writing a vector

A vector from A to B is written AB with an arrow drawn over the two letters. A single vector may be named with a lower-case letter, a, printed in bold or written with a line underneath. The size (magnitude) of a vector is written |AB| or |a|.

The vector from B to A is BA = -AB, the negative of AB: same size, opposite direction. The zero vector has no size and no direction. A vector can also be written as a column (x over y): x on top for the horizontal move and y underneath for the vertical move, for example (3 over 2) means 3 to the right and 2 up.

In a parallelogram ABCD, AB and DC name the same vector, and BC and AD name another. Writing them on the board: always draw the arrow over the letters or underline the lower-case letter, so that a vector is never confused with a length.

PRACTICE QUESTIONS - WITH ANSWERS FOR THE TEACHER

No.	Question	Answer
1	Write the vector that goes from Q to R in two ways.	**QR (with an arrow) or a single lower-case letter, for example q.**
2	Write BA in terms of AB.	**BA = -AB.**
3	What does |a| mean?	**The magnitude (size or length) of vector a.**
4	Describe in words the column vector (3 over -2).	**3 units to the right and 2 units down.**