Grade 10 Computer Science

Term 2 - 55 complete lesson plans

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

ABOUT THIS PACK

55 complete, ready-to-teach Grade 10 Computer Science lesson plans for Term 2, covering data transmission media, computer network elements, network topologies, computer programming concepts and program development.

TOPICS IN THIS PACK

Topic	Name	Lessons
2.2	Data Transmission Media	8
2.3	Computer Network Elements	10
2.4	Network Topologies	8
3.1	Computer Programming Concepts	14
3.2	Program development	15

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

Basic concepts in data transmission

By the end of the lesson, the learner should be able to: a) define key terms used in data transmission; b) distinguish analogue signals from digital signals

> **Signals, bandwidth and attenuation**
> A signal is the electrical, optical or radio representation of data as it travels across a transmission medium. An analogue signal varies smoothly and continuously, like a sound wave rising and falling; a digital signal has only a limited number of distinct states, usually represented as two levels, high and low, matching binary 1s and 0s.

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.

CONTENTS

No.	Lesson	Topic	Page
1	Basic concepts in data transmission	2.2 Data Transmission Media	5
2	Guided transmission media I: twisted pair and coaxial cable	2.2 Data Transmission Media	9
3	Guided transmission media II: fibre optic cable	2.2 Data Transmission Media	13
4	Unguided (wireless) transmission media	2.2 Data Transmission Media	17
5	Practical: connecting digital devices using transmission media	2.2 Data Transmission Media	21
6	Factors affecting communication over a network I: distance, interference and bandwidth	2.2 Data Transmission Media	25
7	Factors affecting communication over a network II: medium, environment, cost and security	2.2 Data Transmission Media	29
8	Appreciating the role of transmission media in networking	2.2 Data Transmission Media	33
9	Types of computer networks by size and coverage	2.3 Computer Network Elements	37
10	Types of computer networks by architecture: client-server and peer-to-peer	2.3 Computer Network Elements	41
11	Elements of a network I: nodes, servers, clients and workstations	2.3 Computer Network Elements	45
12	Elements of a network II: networking devices	2.3 Computer Network Elements	49
13	Elements of a network III: network interface cards and network software	2.3 Computer Network Elements	53
14	Criteria for evaluating a computer network	2.3 Computer Network Elements	57
15	Practical: evaluating a network scenario against the criteria	2.3 Computer Network Elements	61
16	Practical: connecting a computing device to an available network	2.3 Computer Network Elements	65
17	The role of computer networks in communication	2.3 Computer Network Elements	69
18	Computer networks: review and appreciation	2.3 Computer Network Elements	73
19	What is a network topology? Physical vs logical topology	2.4 Network Topologies	77
20	Bus and ring topology	2.4 Network Topologies	81
21	Star and mesh topology	2.4 Network Topologies	85
22	Tree and hybrid topology	2.4 Network Topologies	89
23	Practical: creating a physical network topology diagram I	2.4 Network Topologies	93
24	Practical: creating a physical network topology diagram II	2.4 Network Topologies	97
25	Comparing topologies and choosing the right one	2.4 Network Topologies	101
26	Network topologies: review and appreciation	2.4 Network Topologies	105
27	What is a programming language? Basic terminology	3.1 Computer Programming Concepts	109
28	More programming terminology: programs, algorithms, bugs and IDEs	3.1 Computer Programming Concepts	113

29	Evolution of programming languages I: machine language and assembly language	3.1 Computer Programming Concepts	117
30	Evolution of programming languages II: high-level languages	3.1 Computer Programming Concepts	121
31	Categorising programming languages by paradigm I: procedural and declarative	3.1 Computer Programming Concepts	125
32	Categorising programming languages by paradigm II: object-oriented and functional	3.1 Computer Programming Concepts	129
33	Practical: simulating low-level programming instructions	3.1 Computer Programming Concepts	133
34	Practical: tracing simulated low-level instructions with memory addresses	3.1 Computer Programming Concepts	137
35	How programs are executed: compilation and interpretation	3.1 Computer Programming Concepts	141
36	Translators: compilers, interpreters and assemblers	3.1 Computer Programming Concepts	145
37	Case study: matching languages to their generation and era	3.1 Computer Programming Concepts	149
38	Practical: identifying paradigms in simple code descriptions	3.1 Computer Programming Concepts	153
39	Why programming languages matter	3.1 Computer Programming Concepts	157
40	Programming concepts: review and appreciation	3.1 Computer Programming Concepts	161
41	The program development cycle: an overview	3.2 Program development	165
42	Problem analysis and design in more detail	3.2 Program development	169
43	Coding, testing and debugging, documentation and maintenance in more detail	3.2 Program development	173
44	Introduction to pseudocode	3.2 Program development	177
45	Writing pseudocode I: sequential algorithms	3.2 Program development	181
46	Writing pseudocode II: algorithms with decisions	3.2 Program development	185
47	Writing pseudocode III: algorithms with loops	3.2 Program development	189
48	Introduction to flowcharts: symbols and their meaning	3.2 Program development	193
49	Drawing flowcharts I: sequential problems	3.2 Program development	197
50	Drawing flowcharts II: decisions	3.2 Program development	201
51	Practical: drawing flowcharts with loops	3.2 Program development	205
52	Designing an algorithm for a real-life problem I: decomposition	3.2 Program development	209
53	Practical: designing a complete algorithm for a real-life problem	3.2 Program development	213
54	Why algorithms are designed: their importance in problem solving	3.2 Program development	217

55	Program development and algorithms: review and appreciation	3.2 Program development	221

Basic concepts in data transmission

Strand 2.0 Computer Networking (32 Lessons) > Sub-strand 2.2 Data Transmission Media | Lesson 1 of 8 | 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) define key terms used in data transmission; b) distinguish analogue signals from digital signals

KEY INQUIRY QUESTION(S)

- How is data transmitted in a transmission medium?

CORE COMPETENCIES, VALUES AND PCIS IN THIS LESSON

COMPETENCY	**Communication and collaboration**	Learners explain their thinking to a partner and report their findings to the group.
COMPETENCY	**Digital literacy**	Learners use a phone, tablet or the class computer to explore or check the idea.
COMPETENCY	**Critical thinking and problem solving**	Learners choose a method, check their answers and give reasons for their choices.
VALUE	**Unity**	Learners share materials fairly and work as one team.
VALUE	**Peace**	Learners settle differences calmly during group work.
PCI	**Life skills**	Learners practise decision making and working with others.
PCI	**Safety and security**	Learners follow safety rules when using materials and moving about.

LEARNING RESOURCES

Real or pictured samples of twisted pair, coaxial and fibre optic cable | A diagram of the electromagnetic spectrum showing radio, microwave and infrared | Manila paper and marker pens | Notebooks and pencils

ORGANISATION OF LEARNING

Whole class for introducing new media types; pairs for the connecting-devices practical; groups of four for comparing media and factors; individual work for the review.

KEY WORDS

signal | bandwidth | attenuation | noise | twisted pair | coaxial cable | fibre optic | radio waves | microwave | infrared

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: "Your voice, when you speak, rises and falls smoothly and continuously. A computer's data is stored as separate 1s and 0s. How do you think these two very different kinds of information both end up travelling down the same telephone or network cable?" 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 "Signals, bandwidth and attenuation" (key ideas on the next page), explaining as you go. Use real or pictured samples of twisted pair, coaxial and fibre optic cable, a diagram of the electromagnetic spectrum showing radio, microwave and infrared, manila paper and marker pens. 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: "What is noise, in the context of data transmission?"	Say the key idea in their own words and answer the exit question in the exercise book.

KEY IDEAS

Signals, bandwidth and attenuation

A signal is the electrical, optical or radio representation of data as it travels across a transmission medium. An analogue signal varies smoothly and continuously, like a sound wave rising and falling; a digital signal has only a limited number of distinct states, usually represented as two levels, high and low, matching binary 1s and 0s. Bandwidth is the maximum rate at which data can be transmitted over a medium in a given amount of time, often measured in bits per second; a higher bandwidth allows more data to be sent in the same time. Attenuation is the weakening of a signal's strength as it travels further along a medium or through the air, which is why long cable runs or wireless connections over a great distance may need boosting, amplifying or repeating, to stay clear and usable. Noise is any unwanted signal that mixes with, and can distort, the intended signal during transmission, for example electrical interference from other devices, which can reduce the accuracy of the data received.

PRACTICE QUESTIONS - WITH ANSWERS FOR THE TEACHER

No.	Question	Answer
1	What is the difference between an analogue signal and a digital signal?	**An analogue signal varies smoothly and continuously; a digital signal has only a limited number of distinct states, usually two levels representing binary 1s and 0s.**
2	What does bandwidth measure?	**The maximum rate at which data can be transmitted over a medium in a given amount of time.**
3	What is attenuation?	**The weakening of a signal's strength as it travels further along a medium or through the air.**
4	What is noise, in the context of data transmission?	**Any unwanted signal that mixes with and can distort the intended signal during transmission.**

WATCH OUT FOR

Learners think digital signals are 'better' in every situation just because computers use them. Both analogue and digital signals have their place; digital signals are generally more resistant to noise and easier to correct for errors, which is a key reason modern systems favour them for data.

ASSESSMENT RUBRIC - THE FOUR CBC LEVELS

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

SUPPORT AND EXTENSION

Learners who need support	Give a simple diagram of a smooth wavy line (analogue) beside a stepped high/low line (digital) for learners to label.
Learners ready for more	Explain why a very long, unamplified network cable run might result in a weaker or less reliable connection at the far end than a short one. (Answer: The signal attenuates, weakens, as it travels along the cable, so over a longer distance more of its strength is lost by the time it reaches the far end, which can make the connection weaker or less reliable unless the signal is boosted along the way)
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 "basic concepts in data transmission" 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.