



## basic education

Department:  
Basic Education  
REPUBLIC OF SOUTH AFRICA

# NATIONAL ASSESSMENT GENERAL EDUCATION CERTIFICATE (GEC) MARKING GUIDELINE 2021: NATURAL SCIENCE (ENGLISH) GRADE 9

## SECTION A

- One mark per answer.
- There are no half marks.
- Tick (✓) only the correct answer and underline the incorrect one.

No.	Expected answer	Key (✓)	Rational
1.	A		Because objects experience air resistance when the fall learner relates it to gravitational force
	B		Learner do not understand the concept of contact and non-contact forces
	C		Learner do not understand the concept of contact and non-contact forces
	D	✓	Correct option
2.	A		Learners will identify normal force as a non – contact force instead of contact force
	B		Learners who choose this option based on misconception that contact and non-contact forces always act in opposite directions.
	C		Learners will choose this option because of lack of understanding of contact and non-contact forces
	D	✓	Learners will choose this option if they can differentiate between contact and non – contact forces and understand that weight is a force.
3.	A		Learner does not understand the relationship between the two.
	B	✓	Correct option
	C		Learner does not understand the relationship that exists between the mass of an object and how it affects its gravitational pull

No.	Expected answer	Key (✓)	Rational
	D The mass of the object is always greater than the gravitational force.		Learner does not understand the relationship that exists between the mass of an object and how it affects its gravitational pull
4.	A Charge = $4 + (-4) = 0$		Learner will choose this option because of lack of understanding of distribution of charges
	B Charge = $3 + (-6) = -3$		Learner will choose this option because of lack of understanding of distribution of charges
	C Charge = $7 + (-3) = 4$	✓	Correct option
	D Charge = $7 + (-4) = -3$		Learner will choose this option because of lack of understanding of distribution of charges
5.	A Change the shape of the object.		Learner does not understand the effect of force
	B Change the motion of an object.		Learner does not understand the effect of force
	C Change the direction of an object.		Learner does not understand the effect of force
	D Change the mass of an object.	✓	Correct option
6.	A He should run home so that he can be safe.		The learners knows that it is safe to be indoors and forgets that they will be the tallest in the field.
	B He should stand next to the telephone lines so that he can make call home.		In case of emergency learner thinks of calling emergency numbers
	C He should look for a low – lying part away from trees and high tall objects.	✓	Correct response
	D He should run and hide under pylons.		Learner believes the high pylons will help him and discharge the charges from the lightning
7.	A 		The learner only looked at the arrows in between the two magnets
	B 		The learner cannot interpret the direction of the field lines
	C 	✓	Correct option
	D 		The learner cannot interpret the direction of the field lines
8.	A Because the chair is stronger than the body of the puppet.		Every day common language and lack of understanding of concept of applied forces
	B Because the puppet has no weight that can break the chair.		Every day common language and lack of understanding of concept of applied forces

	C	Because the puppet is not sitting properly on the chair.		Every day common language and lack of understanding of concept of applied forces
	D	Because the chair is exerting equal opposite force on the puppet.	✓	Correct option
9.	A	Electrons were transferred from the balloon to the hair and the hair were positively charged		Learners will choose this option because of lack of understanding of transfer of charges between objects
	B	electrons move from the atoms and molecules in your hair onto the balloon	✓	Correct option
	C	The object has neither gained or lost electrons they both remained neutral		Lack of understanding of electron transfer due to friction between objects
	D	The object cannot be positively charged because electrons can't move		Learners will choose this option because of misconceptions in the movement of charges in electric circuits
10.	A	Zinc electrode, zinc sulphate solution, copper sulphate solution and copper electrode	✓	Correct option
	B	Copper sulphate solution, copper electrode, zinc sulphate solution and zinc electrode		Learner does not understand the difference between an electrode and a solution
	C	Zinc electrode, zinc sulphate, copper electrode and salt bridge		Learner does not know what is a salt bridge and its function
	D	Copper sulphate solution, zinc sulphate solution copper electrode and zinc electrode		Learner does not understand the difference between an electrode and a solution
11.	A	redox reactions	✓	Correct option
	B	oxidation reactions		Learner lacks of understanding what oxidation is.
	C	reduction reactions		Learner lacks of understanding what reduction is.
	D	combination reactions		Learner does not understand how redox reactions occur.
12.	A	structure		Learner does not understand resistance.
	B	insulation		They have learnt about conductors and insulators and can relate to "conducting ability" but does not understand it.
	C	resistivity	✓	Correct option
	D	ohm		Learner relate resistance to its SI unit.
13.	A	$V = IR$	✓	Correct option.

	B	$V = I + R$		Learner does not understand voltage drop.
	C	$V = I - R$		Learner relates the word 'drop' to 'minus' sign in this formula.
	D	$V = I / R$		Learner relates the word 'drop' to 'divide' sign in this formula.
14.	A	Copper		The diagram above has a copper wire connected to it and learners can therefore choose this option based on what is on the circuit.
	B	Silver	✓	Correct option
	C	Silicon		Learners who choose this option do so based on their understanding of silicon as semiconductor and its relationship to higher temperature
	D	Glass		Learners will choose this option based on their understanding of conductors and insulators
15.	A	joules		Learner does not know the unit for resistance.
	B	ampere		Learner does not know the unit for resistance.
	C	volts		Ohm is equal to voltage over current and therefore learners might be tempted to choose volt
	D	ohm	✓	Correct option
16.	A	Increase in resistance		Learner does not understand short circuit.
	B	Short circuit	✓	Correct option
	C	Decrease in resistance		Understanding of factors affecting resistance
	D	Low current in the circuit		Relationship between current and electricity
17.	A	The total resistance in a parallel circuit has no effect on the flow of electric charges in a circuit		The learner does not understand the concept of parallel connection
	B	The total resistance in a parallel circuit opposes the passage of electrons and increases resistance.		The learner does not understand the concept of parallel connection
	C	The total resistance of a parallel circuit is always more than any of the individual resistance values.		The learner does not understand the concept of parallel connection
	D	The total resistance of a parallel circuit is always less than any of the individual resistance values.	✓	Correct option

18.	A	Decreasing the number of cells connected in series will increase the current and potential difference in the circuit.		Learner doesn't understand the purpose of the cell or battery in the circuit
	B	Increasing the number of cells connected in series will decrease the current and potential difference in the circuit.		Learner doesn't the relationship between potential difference and the current in a circuit
	C	Increasing the number of cells connected in series will increase the current and potential difference in the circuit.	✓	Correct option
	D	Decreasing the number of cells connected in series will increase the current and decreases potential difference in the circuit.		Learner does not know the relationship between potential difference and the current in a circuit
19.	A	2 A	✓	Correct option
	B	0.5 A		Learner is unable to manipulate the formula and do calculation
	C	8 A		Learner is unable to manipulate the formula and do calculation
	D	12 A		Learner is unable to manipulate the formula and do calculation
20.	A	The reading on ammeter 2 and ammeter 3 add up to the reading on ammeter 1 <b>or</b> ammeter 4.	✓	Correct option
	B	The reading on ammeter 2 and ammeter 3 is equal to the zero because no current is flowing.		Learner does not understand than current is shared equally in the branches in the circuit
	C	The reading on ammeter 2 and ammeter 3 is equal to the reading on ammeter 4 only in the circuit.		Learner does not understand than current is shared equally in the branches in the circuit.
	D	The reading on ammeter 2 and ammeter 3 is equal to the reading on ammeter 1 only in the circuit.		Learner does not understand than current is shared equally in the branches in the circuit.
21.	A	The plug is not accessible when there are many items		Learner does not know how a multiple socket adapter.
	B	The wire and other components might heat up and cause fire	✓	Correct option.

No.	Expected answer	Key (✓)	Rational
	C The appliances look clumsy when put together in one place		Learner is concerned of tidiness.
	D The current flows through one wire and misses other wires		Learner does not know how a multiple socket adapter.
22.	A A circuit breaker is like a fuse as it also melts when there is excessive power in the circuit.		Learners misses the fact that circuit break can be switched on again unlike a fuse.
	B A circuit breaker acts in the same way as a switch as it breaks the circuit if current surges.	✓	Correct option.
	C A circuit breaker consists of a switch that is connected to a battery to complete the circuit.		Learner does not understand a circuit breaker.
	D A circuit breaker has a reset button that can only be used when there is fire in the circuit.		Learner does not understand a circuit breaker.
23.	A Oil		Learner does not know the main source of electric power generation.
	B natural gas		Learner does not know the main source of electric power generation.
	C Coal	✓	Correct option
	D Uranium		Learner does not know the main source of electric power generation.
24.	A it is unstable and undergoes radioactive decay at a slow rate.	✓	Correct option
	B it is stable and undergoes radioactive decay at a fast rate.		Learner does not know the purpose of using uranium in nuclear power station.
	C it is unstable and cannot be controlled in the nuclear reactor vessels.		Learner does not know the purpose of using uranium in nuclear power station.
	D it is stable and is also the only available element in the planet.		Learner does not know the purpose of using uranium in nuclear power station.
25.	A Power plant, transformer, high-voltage transmission, national grid lines, step down transformer.		Learner does not know the order in which energy is generated.
	B Power plant, transformer, national grid lines. high-voltage transmission, step down transformer,		Learner does not know the order in which energy is generated.

No.	Expected answer	Key (✓)	Ratio nal
	C Power plant, step down transformer, transformer, high-voltage transmission, national grid lines.	✓	Correct option
	Power plant, national grid lines, high-voltage transmission, transformer, step down transformer.		Learner does not know the order in which energy is generated.
26.	A there will be an increase in current through all other resistors		Learner believes that the remaining bulb now uses all the energy.
	B There will be a decrease in current through all other resistors		Learner do not understand the principle regarding flow of charge.
	C there will be no current flowing throughout the circuit	✓	Correct option.
	D there is same amount of current flowing throughout the circuit		Learner do not understand the principle regarding flow of charge.
27.	A Wind power		Learner chooses just renewable energy not considering sustainability and environment
	B Hydroelectric power		Learner chooses just renewable energy not considering sustainability and environment
	C Solar energy power	✓	Correct option
	D Nuclear power		Learner takes it as an alternative to coal power not considering disadvantages
28.	A Temperature increases as you gain altitude in the stratosphere and the Thermosphere		Learners believes moving away from Earth means approaching the Sun, therefore higher temperature.
	B Temperature decreases as you gain altitude in the stratosphere and the Thermosphere		The learner goes with the common saying that 'the higher you go the colder it becomes'.
	C Temperature increases as you gain altitude in the troposphere and mesosphere	✓	Correct option
	D Temperature remains the same as you gain altitude in the troposphere and Mesosphere		Learner does not understand the relationship between the temperature and altitude in these spheres.
29.	A It contains all solid, liquid and gaseous water of the plant		The learner does not understand the characteristics of Lithosphere
	B It contains all the planet's living things and microorganisms		The learner does not understand the characteristics of Lithosphere

No.	Expected answer	Key (✓)	Ratio nal
	C It contains all the air in the Earth's system and absorbs heat.		The learner does not understand the characteristics of Lithosphere
	D It contains all the cold, hard solid land of the planet's crust	✓	Correct option
30.	A Lithosphere, atmosphere, mesosphere and stratosphere		Learner cannot distinguish between the layers of the atmosphere and layers of the Earth
	B The crust, the mantle, the outer core and the inner core		Learner cannot distinguish between the layers of the Earth and its components
	C Geosphere, atmosphere, hydrosphere and biosphere	✓	Correct option
	D The crust, the mantle, mesosphere and outer core		The learner cannot distinguish between the layers of the Earth and its components
31.	A The amount of mass in the mesosphere makes it difficult to penetrate the mesosphere.		The learner is confusing the mesosphere with the troposphere
	B There is too much heat from surrounding layers hence mesosphere is not accessible.		The learner is confusing mesosphere with thermosphere
	C The force of attraction between the layers makes it difficult to penetrate mesosphere		Learner does not understand the concept of mesosphere
	D The weather balloons and other aircrafts cannot fly high enough to reach mesosphere.	✓	Correct option
32.	A Thermosphere is the form of oxygen found in the stratosphere which absorbs high levels of energy.		Learner does not understand the different between different layers of the atmosphere
	B Thermosphere is the second layer of the atmosphere from the Earth's surface lying between 10 – 50 km.		Learner does not understand the different between different layers of the atmosphere
	C Thermosphere is the fourth and the thickest layer of the atmosphere lying from 80 – 700 km from the Earth.	✓	Correct option
	D Thermosphere is lowest layer of the atmosphere closest the surface of the Earth and extends to 10 km above.		Learner does not understand the different between different layers of the atmosphere
33.	Atomic oxygen, atomic nitrogen and helium	✓	Correct option
	Carbon dioxide, water vapour and helium		Learner is confusing gases found in the atmosphere with those found in the thermosphere

No.	Expected answer	Key (✓)	Rational
	Hydrogen, carbon monoxide and argon		Learner does not understand the concept of gases making up thermosphere
	Helium, atomic oxygen and nitrogen.		Learner does not understand the concept of gases making up thermosphere
34.	Weather patterns will change drastically.	✓	Correct option
	Food security will increase drastically.		Learner does not understand the concept of global warming and how it affects life
	Northern hemisphere will be drier.		Learner does not understand the concept of global warming and how it affects life
	Southern hemisphere will be wetter.		Learner does not understand the concept of global warming and how it affects life
35.	A Troposphere		Learner does not understand the concept of ozone layer
	B Stratosphere	✓	Correct option
	C Mesosphere		Learner does not understand the concept of ozone layer
	D Thermosphere		Learner does not understand the concept of ozone layer
36.	A Blast furnace is the process of drilling holes into the rock to put explosives such as dynamites.		Learner misconstrues the key word blast which is normally the term used in the construction of roads during blasting of huge rocks
	B Blast furnace is the process of exposing coal seam by removing layers above the rock surface.		Learners does not understand the concept of production of metals
	C Blast furnace is the huge oven where iron ore is burned with oxygen and coal to produce metal.	✓	Correct option
	D Blast furnace is the replacement of overburden surface soil so that minerals can be extracted.		Learners does not understand the concept of production of metals
37.	A Exploration, drilling and blasting, crushing and milling, separation, refining and distribution.	✓	Correct option
	B Exploration, crushing and milling, separation, drilling and blasting, refining and distribution.		Learner does not know the order of steps for extracting metals from ores.
	C Exploration, refining and distribution, crushing and milling, separation, drilling and blasting.		Learner does not know the order of steps for extracting metals from ores.

No.	Expected answer	Key (✓)	Ratio nal
	D Exploration, separation, crushing and milling, drilling and blasting, refining and distribution.		Learner does not know the order of steps for extracting metals from ores.
38.	Silicon dioxide		Learner does not know the chemical name.
	Calcium carbonate	✓	Correct option
	Manganese		Learner does not know the chemical name.
	Phosphate		Learner does not know the chemical name.
39.	A Pit mining and shaft mining	✓	Correct option
	B Physical and shaft mining		Learner does not remember pit mining
	C Chemical and pit mining		Learner does not remember shaft mining
	D Pit mining and rock mining		Learner does not remember shaft mining
40.	A Gold is dug out from the face of the mine and pillars of gold are left behind to support the roof of the mine.		The learner does not understand the concept of chemical reactions of elements
	B Gold is crushed into appropriate size and used as fuel for electricity generation or the iron making process.		The learner does not understand the concept of chemical reactions of elements
	C Gold is dissolved in a solvent and it is then separated from the ore by washing and recovered by precipitation.	✓	Correct option
	D Gold is first washed to make it into the high-grade gold and then sorted into sizes for fuel production process.		The learner does not understand the concept of chemical reactions of elements
41.	A Local communities from the mine surrounding areas.	✓	Correct option
	B Foreign nationals mining in the closed mines.		Learner views the option as job opportunities for societies
	C Big companies owning the mining rights only.		Learner accepts the status quo
	D Board members of the companies owning rights.		Learner accepts the status quo
42.	A Main sequence	✓	Correct option
	B Red giant		Learner doesn't know the correct order of stages of the life cycle of a star

No.	Expected answer	Key (✓)	Rational
	C T-Tauri Phase		Learner doesn't know the correct order of stages of the life cycle of a star
	D Protostar		Learner doesn't know the correct order of stages of the life cycle of a star
43.	A Earth is the closest planet to the sun and keeps us warm.		Learner choose this option because of everyday life where people talk about vitamin D when referring to the sun and therefore provides life
	B Earth is exposed to solar radiation through its magnetic field		The learner does not understand the concept of habitable (language barrier)
	C Earth is kept cooler by its insulating atmosphere to sustain life		The learner does not understand the concept of habitable
	D Earth has the right chemical ingredients for life, including water	✓	Correct option
44.	A Igneous rock, sedimentary rock, metamorphic rock	✓	The does not know different types of rocks.
	B Magma rock, sedimentary rock, metamorphic rock		Correct option
	C Weathering rock, clay particles, quartzite rock		Weathering is a process not a type of rock
	D Marble rock, igneous rock, surface magma rock.		The does not know different types of rocks.
45.	A The red-hot part in the above picture is the formation of the metamorphic rock		Learner does not understand how different rocks are formed
	B Metamorphic rock forms deep below the surface where there is high temperature		Learner does not understand how different rocks are formed
	C Wind, water and ice transport particles to the red-hot area to form metamorphic rock		Learner does not understand how different rocks are formed
	D Metamorphic rock forms as the sand particles are covered by sandstone in the red-hot area.	✓	Correct option
46.	A Atmosphere is the layer of gasses surrounding a planet or other celestial bodies	✓	Correct option
	B Atmosphere is the invisible layer that forms part of the energy from the sun		Learner cannot differentiate between atmosphere and the photosphere
	C Atmosphere is the form of oxygen found in the stratosphere at high altitude		Learner cannot differentiate between atmosphere and the Ozone layer
	D Atmosphere is the amount of matter of an object found on Earth's surface		Learner does not know the concept of atmosphere

No.	Expected answer	Key (✓)	Rational
47.	A		Learner cannot differentiate between the stratosphere and troposphere
	B	✓	Correct option
	C		Learner cannot differentiate between the stratosphere and mesosphere
	D		Learner cannot differentiate between the stratosphere and thermosphere
48.	A	✓	Correct option
	B		The learner does not understand the basic principles of chemical reactions
	C		The learner does not understand the basic principles of chemical reactions
	D		Confusing the chemical reactions with extraction of ores
			<b>[48]</b>

## SECTION B

- Do not penalise the learner for the same mistake more than once.
- There are no half marks.
- Underline errors committed by learners do not place a cross (X).

No.	Expected answer	Rational/Clarification	Mark
1.	All objects would float off into the space ✓	<b>1 mark</b> for the correct answer <b>0 mark</b> for incorrect answer	1
2.	The potential differences across the two resistors must add together to give the potential difference across the battery. ✓  This means that the missing reading is $9 - 4 = 5$ V. ✓	<b>2 Marks</b> when the correct explanation and calculation of the missing reading is given  <b>1 Mark</b> for the correct explanation and no calculation of the missing reading is given <b>Or</b> Only correct calculation of the missing reading and no correct explanation is given  <b>0 Marks</b> when no explanation and no calculation of a missing reading is given/ Incorrect explanation and/or incorrect answer is given.	2
3.	a) If 100 J of energy is transferred to the light bulb then 90% of the energy is transferred to the surroundings as "wasted" heat. ✓ Only 10% of the energy is used to produce light. ✓	<b>2 Marks</b> if the correct explanation includes 'energy transfer'; 90% of energy is transferred to the surroundings as wasted heat; only 10% of energy is used to produce light  <b>1 Mark</b> for explanation of one energy form	2
	b) The purpose of the incandescent light bulb is to produce light. ✓ <b>or</b> 90% of the energy it transfers is given of as 'wasted' energy and only 10% is useful in the form of light energy. ✓	<b>1 Mark</b> for the correct explanation	1
4.	Biosphere ✓	<b>1 Mark</b> for the correct answer	1
5.	You buy what you can afford ✓ <b>Or</b> You can see from the meter-box how much you spend a month, and you will learn to use it sparingly at the same time saving your electricity. ✓	<b>1 Mark</b> for any correct or relevant explanation  <b>0 Mark</b> for the explanation that doesn't make sense	1

No.	Expected answer	Rational/Clarification	Mark
6.	1. Igneous ✓ 2. Metamorphic ✓ 3. Sedimentary ✓	<b>3 Marks</b> for all the 3 correct answers in any order <b>2 Marks</b> for 2 correct answers in any order <b>1 Mark</b> for 1 correct answer <b>0 Mark</b> if all answers are incorrect	3
7.	Gravity causes the Star to collapse inwards and form a very dense Star.	<b>1 Mark</b> for the correct explanation  <b>0 Mark</b> when there is no explanation or when the explanation is irrelevant	1
			<b>[12]</b>