



eduresourcza.com

**NATURAL SCIENCES GRADE 9
MARKING GUIDELINE**
**TERM 3 PROJECT
MARKS: 30**

1. A = Solar panel ✓
Energy is converted from light energy✓ (OR solar energy) to electrical energy.✓ (3)
2. Electrical energy✓ is converted to kinetic energy.✓ (2)

3.

	Advantages	Disadvantages
Solar energy	Solar energy is an inexhaustible and renewable energy source. Solar power is pollution-free and produces no harmful greenhouse gases. Solar power reduces our country's dependence on foreign oil and fossil fuels as an energy source. Solar energy is a safe energy source with no potential harmful radiation like nuclear power.	Large areas (of land) need to be covered with solar panels for effective generation of solar energy. Solar power is not 100% reliable. E.g., when the sun is not shining or during night-time, there is no generation of electricity. Expensive to install.
Fossil fuels	Large amounts of energy can be produced in a reliable manner (including during night-time). Fossil fuels are considered as a cheap energy source. Fossil fuels as a resource to generate electricity is considered as a mayor job creator,	All fossil fuels are non-renewable sources of energy which will be depleted over time. Fossil fuels are responsible for global warming and climate change. Other disadvantages include: • Water pollution and oil spills. • Refinery- and oil-rig explosions. • Acid rain. • Air pollution that causes lung disease in animals and humans.

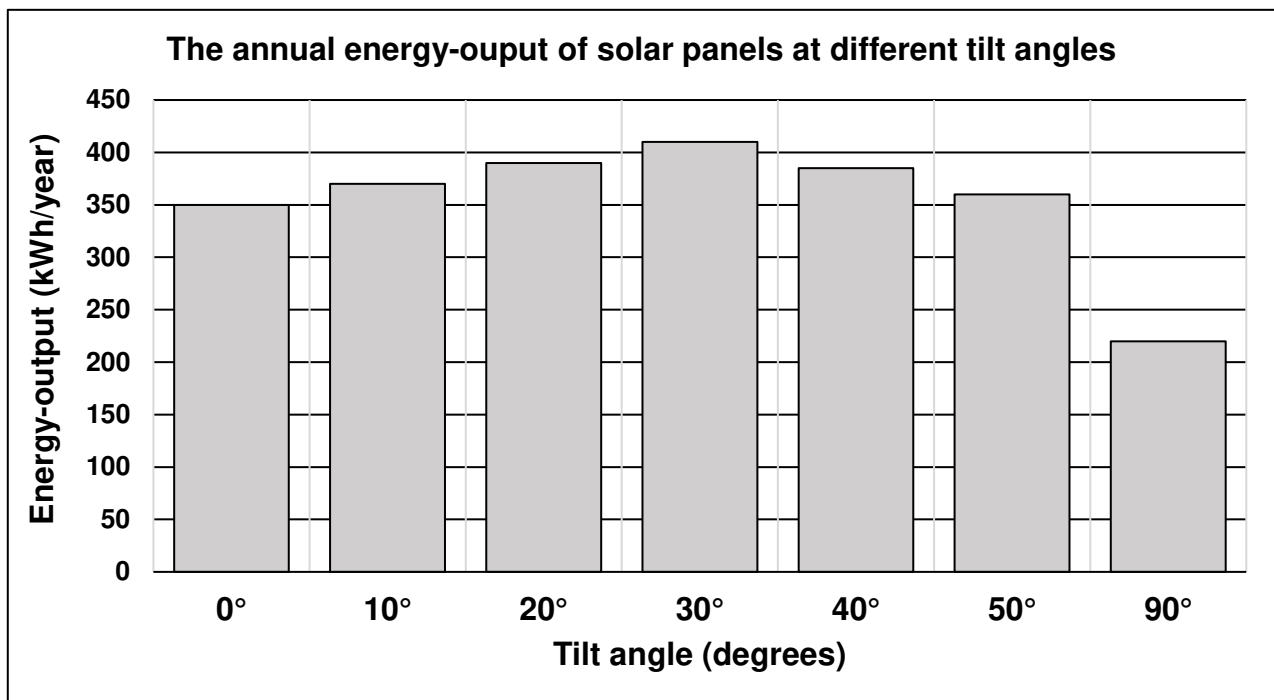
One advantage✓ and one disadvantage✓ of solar energy.

One advantage✓ and one disadvantage✓ of fossil fuels.

Alternative answers (not included in the table) can also be considered.

(4)
[9]

4.1.1



4.1

Marking criteria	Marks
Type of graph; bar graph , with equal spaces between y-axis and other bars	✓
Heading; containing both variables (energy-output and tilt angles)	✓
Label on x-axis; degrees indicated	✓
Label on y-axis, with unit (kWh/year)	✓
First four bars plotted correctly;	✓
Last three bars plotted correctly	✓

(6)

4.1.1 30° ✓

(1)

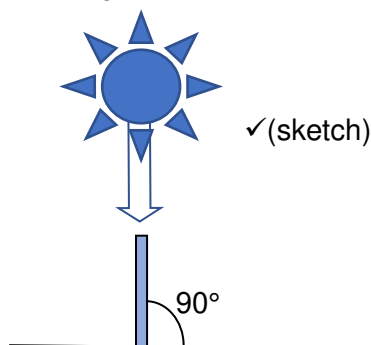
- 4.2 Type/size of solar panels / Ability of the solar panels to convert solar energy ✓
 Time / Period ✓ (The experiment was conducted over a period of one year.)
 Amount of daily sunlight. ✓ (All panels were installed in the same open field; therefore, all the panels received the same amount of sunlight per day.)

(3)

4.3 The tilt angle ✓

(1)

4.4.



With a tilt angle of 90° the flat surface of the solar panel receives very little direct sunlight. ✓ The panel will be able to absorb only a small amount of solar energy ✓ and therefore produce a small amount of electrical energy (output-energy).

(3)

[14]

- 5.1 Each parallel branch consists of two 12 V-panels connected in series which can produce a potential difference of:

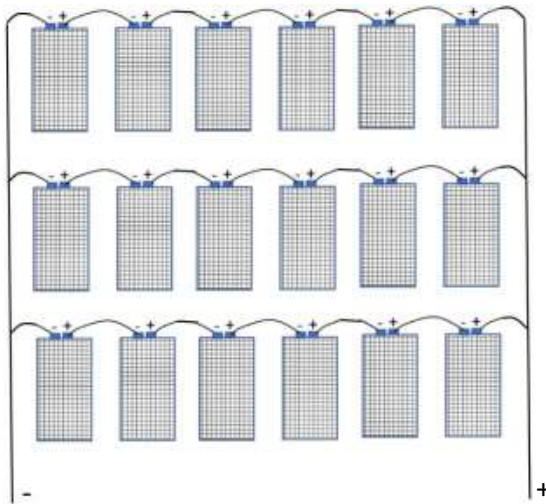
$$12\text{ V} \times 2 = 24\text{ V} \checkmark \text{ per branch}$$

The total potential difference (voltage) of the two branches connected in parallel remains 24 V. ✓ (2)

- 5.2 If one solar panel connected in series gets damaged / malfunction / is in the shade, then the current stops flowing, and no solar energy can be converted to useful electrical energy. ✓

The voltage of solar panels connected in series are added up to get the total voltage of a solar panel installation. When installing a large number of panels in series ONLY the total voltage output might exceed the maximum potential difference that the regulator can handle. ✓ Therefore a combination of series and parallel connections are more practical. (2)

- 5.3



SIX panels connected in series with each other, in each of THREE branches. ✓

Three branches connected in parallel with each other. ✓

Positive and negative terminals indicated, and panels wired correctly to each other. ✓

(3)

[7]

TOTAL: 30