Started on	Tuesday, 25 March 2025, 5:50 PM
State	Finished
Completed on	Tuesday, 25 March 2025, 5:50 PM
Time taken	9 secs
Grade	**0.00** out of 10.00 (**0**%)

Question 1

Not answered

Marked out of 1.00

The MPP tracking of a GC inverter maintains a PV array at maximum power for the given operating conditions by:

- a. adjusting the output voltage
- b. adjusting the output frequency
- c. adjusting the load resistance
- d. adjusting the input voltage

Your answer is incorrect.

MPP tracking adjusts the load resistance placed on the PV system, to maintain maximum efficiency for a given irradiation and operating temperature.

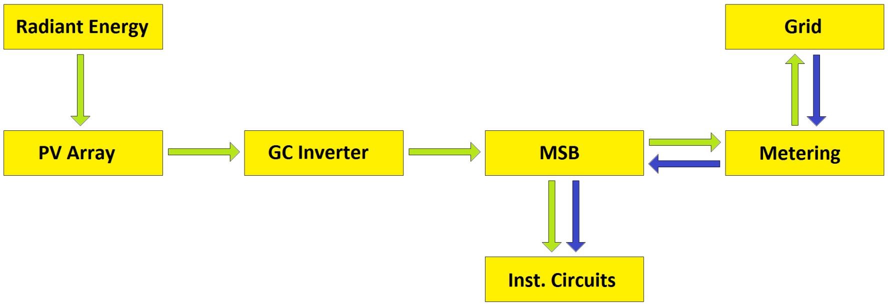
Refer to content page 1.1 for more information.

The correct answer is: adjusting the load resistance

Question 2

Not answered

Marked out of 1.00



In the grid-connected PV system pictured above, the green arrows indicate the flow of:

- a. renewable energy
- b. direct current
- c. electricity supplied from the grid
- d. solar radiation

Your answer is incorrect.

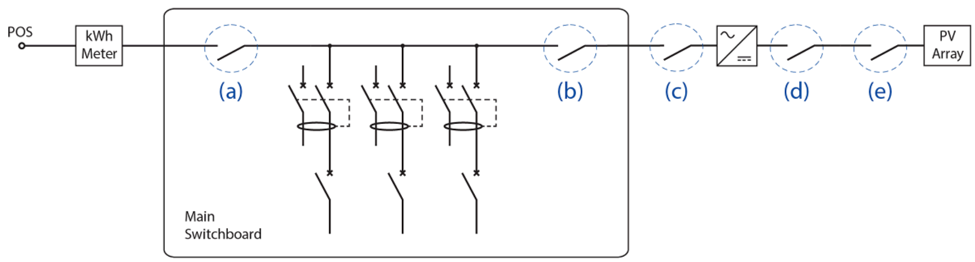
Refer to content page 1.1.

The correct answer is: renewable energy

Question 3

Not answered

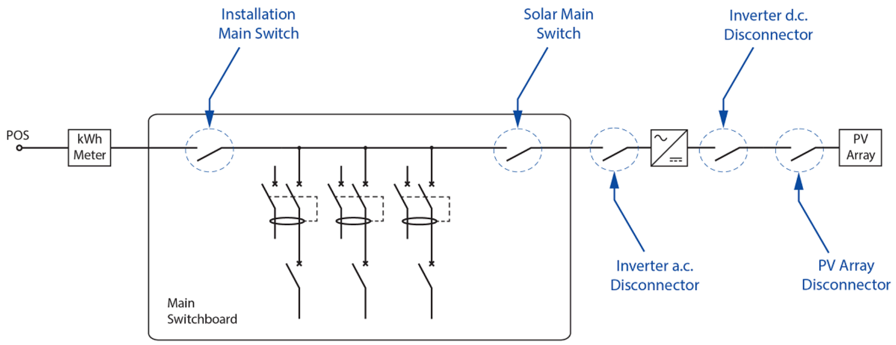
Marked out of 1.00



In the PV system diagram above, (d) indicates:

- the inverter a.c. disconnector
- the inverter d.c. disconnector
- a 30 mA RCD
- the solar main switch

Your answer is incorrect.



The correct answer is: the inverter d.c. disconnector

Question 4

Not answered

Marked out of 1.00

The type of protection that produces a voltage or frequency shift in the event that the grid becomes de-energised, to cause automatic disconnection of the GC inverter is:

- a. overvoltage protection
- b. passive anti-islanding protection
- c. MPP tracking
- d. active anti-islanding protection

Your answer is incorrect.

An active anti-islanding protection device causes a voltage or frequency shift when it senses that the grid has become de-energised.

This shift acts to trip the passive anti-islanding protection, disconnecting the GC inverter from the grid.

The purpose of anti-islanding is to prevent the grid from being supplied from a PV system in the event that it has been shut down (e.g. for maintenance).

Refer to content page 1.1 for more information.

The correct answer is: active anti-islanding protection

Question 5

Not answered

Marked out of 1.00

According to AS/NZS 4777.2:2020, what is the maximum passive protection disconnection time for an over-frequency of 52 Hz for Australian regions A and B?

- a. 0.1 seconds
- b. 0.2 seconds
- c. 1 second
- d. 2 seconds

Your answer is incorrect.

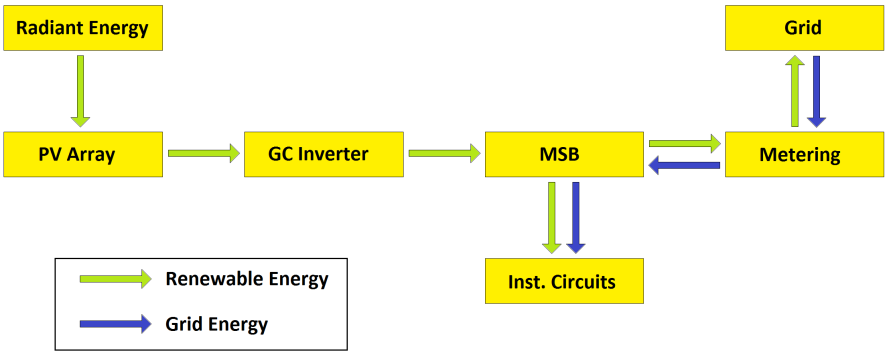
Refer to AS/NZS 4777.2:2020 Clause 4.4 and Table 4.2.

The correct answer is: 0.2 seconds

Question 6

Not answered

Marked out of 1.00



The grid-connected PV system pictured above is:

- a. an uninterruptible system
- b. an unmetered system
- c. a net metered system
- d. a standalone system

Your answer is incorrect.

Refer to content page 1.1.

The correct answer is: a net metered system

Question 7

Not answered

Marked out of 1.00

In the event of a disruption to the grid supply, active anti-islanding protection shall operate within:

- a. 1 second
- b. 0.4 seconds
- c. 5 seconds
- d. 2 seconds

Your answer is incorrect.

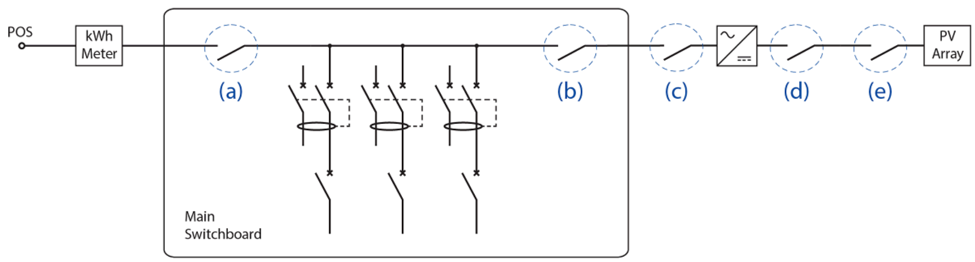
Refer to AS/NZS 4777.2:2020 Clause 4.4 and Table 4.1.

The correct answer is: 2 seconds

Question 8

Not answered

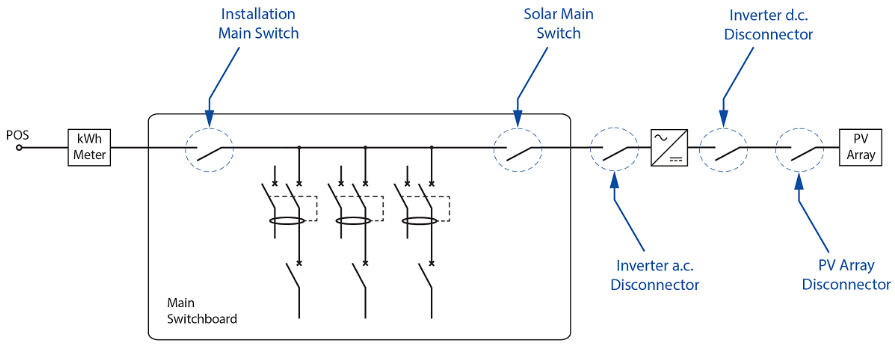
Marked out of 1.00



In the PV system diagram above, (b) indicates:

- the PV array disconnector
- the inverter d.c. disconnector
- the grid supply main switch
- the solar supply main switch

Your answer is incorrect.



The correct answer is: the solar supply main switch

Question 9

Not answered

Marked out of 1.00

According to AS/NZS 4777.2:2020, what is the passive protection undervoltage 1 limit in Australian regions A and B?

- a. 220 V
- b. 160 V
- c. 200 V
- d. 180 V

Your answer is incorrect.

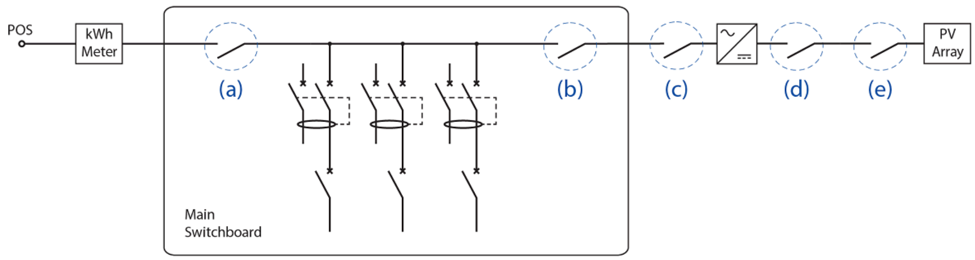
Refer to AS/NZS 4777.2:2020 Clause 4.4 and Table 4.1.

The correct answer is: 180 V

Question 10

Not answered

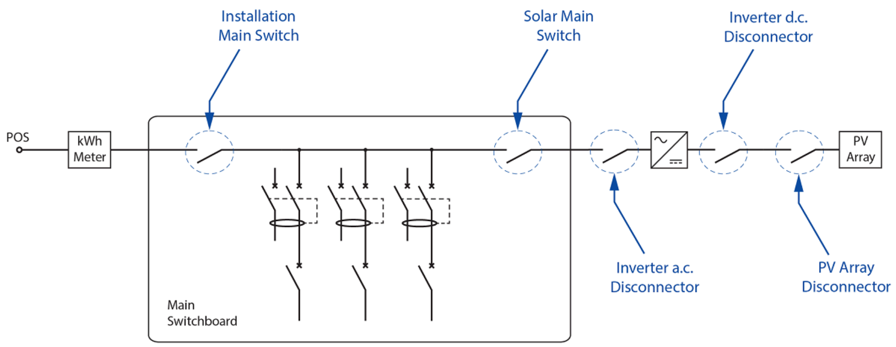
Marked out of 1.00



In the PV system diagram above, (a) indicates:

- the PV array disconnector
- the grid supply main switch
- the inverter a.c. disconnector
- the solar supply main switch

Your answer is incorrect.



The correct answer is: the grid supply main switch

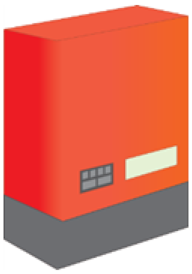
Started on	Saturday, 15 February 2025, 1:35 AM
State	Finished
Completed on	Saturday, 15 February 2025, 1:36 AM
Time taken	12 secs
Grade	**0.00** out of 26.00 (**0**%)

Question 1

Not answered

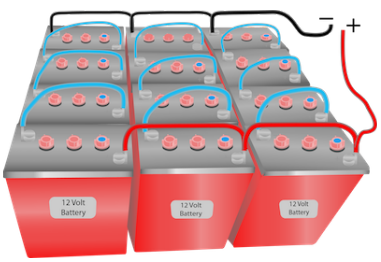
Marked out of 6.00

Identify each of the PV power system components pictured below.



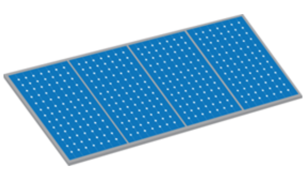
Choose...

Choose...

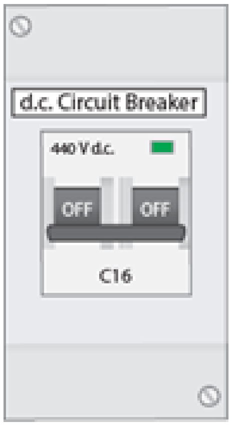


Choose...

Choose...



Choose...

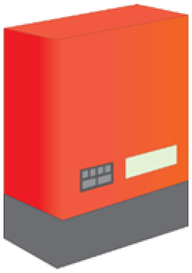


Choose...

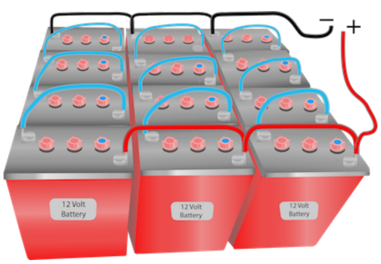
Your answer is incorrect.

Refer to content page 1.1

The correct answer is:

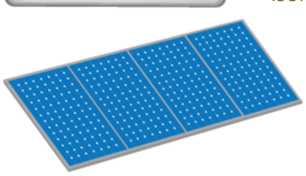

→ Inverter,

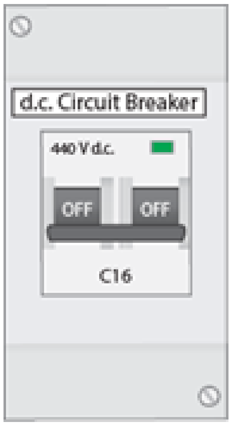
→ Energy meter,



→ Battery bank,

→ Isolator,


→ PV array,



→ d.c. circuit breaker

Question 2

Not answered

Marked out of 4.00

Identify each of the PV system components from the description.

Converts direct current into alternating current	Choose...
Converts radiant energy into electrical energy	Choose...
Stores electrical energy	Choose...
Maintains the d.c. voltage within a set tolerance	Choose...

Your answer is incorrect.

Refer to content page 1.1

The correct answer is: Converts direct current into alternating current → Inverter, Converts radiant energy into electrical energy → PV array, Stores electrical energy → Batteries, Maintains the d.c. voltage within a set tolerance → Regulator

Question 3

Not answered

Marked out of 5.00

Match each of the components to its function within a grid-connected PV power system.

Measures the imported and exported electrical energy	Choose...
Disconnects the PV system from the grid in the event of abnormal grid parameters	Choose...
Protects installation equipment against overcurrent	Choose...
Provides points from which to shut down the PV power system	Choose...

Your answer is incorrect.

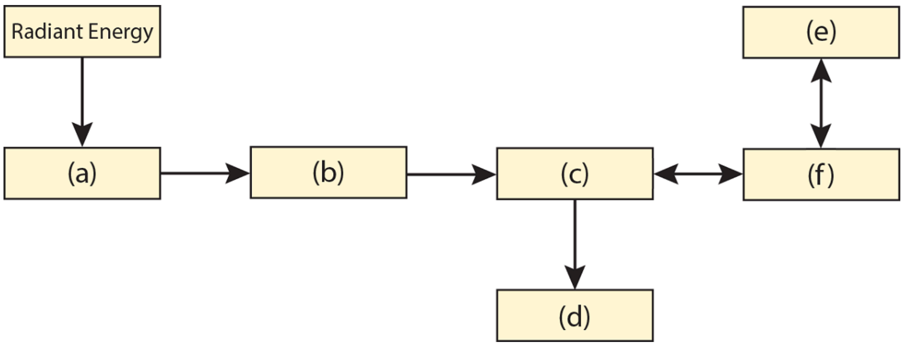
Refer to content page 1.1

The correct answer is: Measures the imported and exported electrical energy → Energy meter, Disconnects the PV system from the grid in the event of abnormal grid parameters → Anti-islanding protection, Protects installation equipment against overcurrent → d.c. circuit breaker, Provides points from which to shut down the PV power system → Isolators

Question 4

Not answered

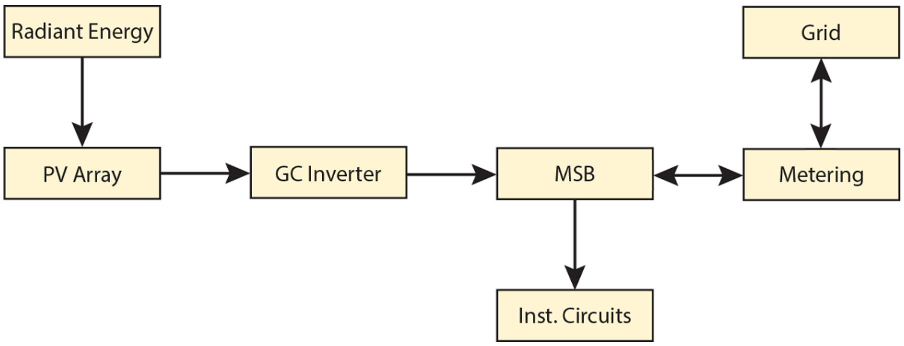
Marked out of 6.00



Identify the missing components, to produce a simple block diagram of a grid connected PV power system.

Grid Connect Inverter	Choose...
Installation Circuits	Choose...
Electricity Grid	Choose...
Metering	Choose...
Main Switchboard	Choose...
PV Array	Choose...

Your answer is incorrect.



The correct answer is: Grid Connect Inverter → (b), Installation Circuits → (d), Electricity Grid → (e), Metering → (f), Main Switchboard → (c), PV Array → (a)

Question 5

Not answered

Marked out of 1.00

According to AS/NZS 4777.2:2020 what are the passive anti-islanding voltage limits in Australian regions A and B for the following protective functions.

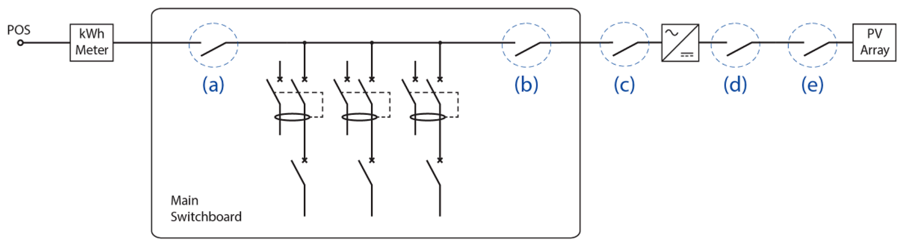
- Undervoltage 1 – less than ✖
- Undervoltage 2 – less than ✖
- Overvoltage 1 – more than ✖
- Overvoltage 2 – more than ✖

Refer to the relevant clauses in AS/NZS 4777.2:2020 Table 4.1

Question 6

Not answered

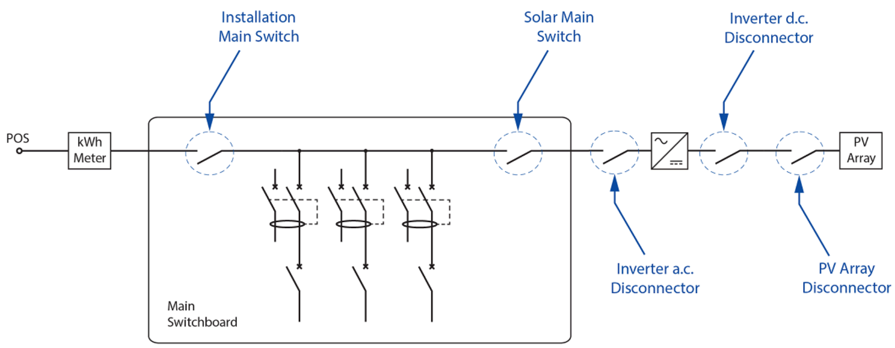
Marked out of 4.00



Identify each type of control/protection device used in a typical PV installation.

Inverter d.c. disconnector	Choose...
Solar main switch	Choose...
Inverter a.c. disconnector	Choose...
PV array d.c. disconnector	Choose...
Grid supply main switch	Choose...

Your answer is incorrect.



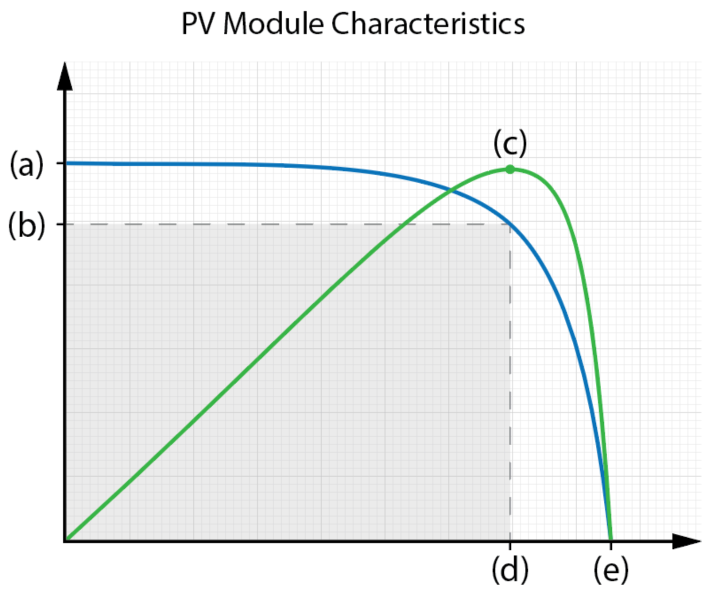
The correct answer is: Inverter d.c. disconnector → (d), Solar main switch → (b), Inverter a.c. disconnector → (c), PV array d.c. disconnector → (e), Grid supply main switch → (a)

Started on	Tuesday, 25 March 2025, 5:51 PM
State	Finished
Completed on	Tuesday, 25 March 2025, 5:52 PM
Time taken	42 secs
Grade	**0.00** out of 18.00 (**0**%)

Question 1

Not answered

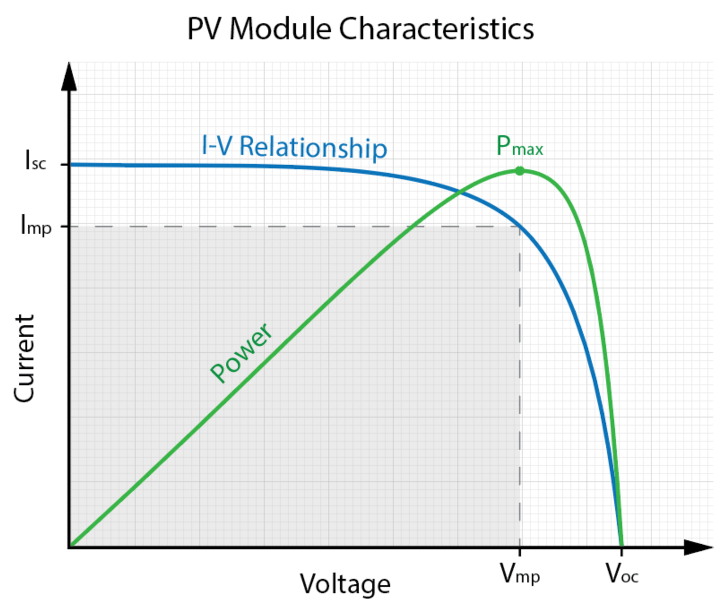
Marked out of 1.00



In relation to the PV module characteristic curves pictured above, point (d) indicates:

- a. the short circuit current
- b. the open circuit voltage
- c. the MPP current
- d. the MPP voltage

Your answer is incorrect.



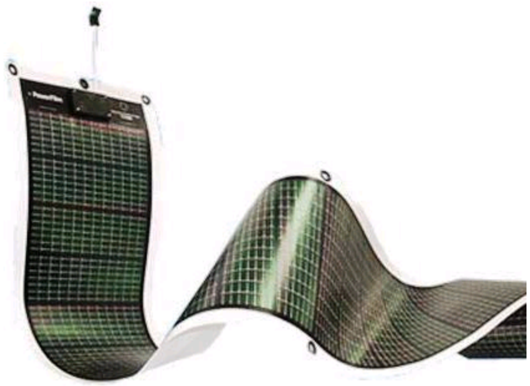
In relation to the PV module characteristic curves pictured above, point (d) indicates:

The correct answer is: the MPP voltage

Question 2

Not answered

Marked out of 1.00



What type of photovoltaic technology is pictured above?

- a. Amorphous
- b. None of these
- c. Monocrystalline
- d. Polycrystalline

Your answer is incorrect.

An amorphous (thin-film) PV cell is made from a non-crystalline form of silicon where layers of doped silicon are applied to a substrate.

Refer to content page 2.1 for further guidance.

The correct answer is: Amorphous

Question **3**

Not answered

Marked out of 1.00

Performance	
Rated Power	165 W
Tolerance	±4%
Electrical Charateristics	*STC (1000 W/m²)*
P_{max}	165 W
V_{mp}	34.3 V
I_{mp}	4.8 A
V_{oc}	43.7 V
I_{sc}	5.4 A
$t_{coeff-Pmax}$	-(0.5±0.05)%/°C
$t_{coeff-Voc}$	-(0.36±0.05)%/°C
$t_{coeff-Isc}$	(0.06±0.02)%/°C
NOCT	47±2°C
Physical Charateristics	
Solar Cells	72 monocrystalline (125mm x 125mm) connected in series
Dimensions	1596 x 793 x 51 mm
Weight	15.7 kg

How many of the modules specified above would be required to produce a 3.3 kW array?

- a. 40 modules
- b. 30 modules
- c. 10 modules
- d. 20 modules

Your answer is incorrect.

3300 / 165 = 20 modules

Refer to content pages 2.1 and 2.2 for further guidance.

The correct answer is: 20 modules

Question 4

Not answered

Marked out of 1.00

Thin-film PV modules are:

- a. most responsive to the blue-end of the visual spectrum
- b. commonly incorporated directly into building materials
- c. typically around 7 to 10% efficient
- d. all of these are correct

Your answer is incorrect.

Amorphous PV cells are cheaper to produce than crystalline cells, are typically around 7 to 10% efficient, are most sensitive to the blue-end of the spectrum, can be manufactured to be flexible, can be easily integrated into building materials.

Refer to content page 2.1 for further guidance.

The correct answer is: all of these are correct

Question 5

Not answered

Marked out of 1.00

An increase in cell operating temperature will cause:

- a. All of these are correct
- b. a reduction in cell voltage
- c. the MPP of the cell to shift
- d. the cell output power to decrease

Your answer is incorrect.

An increase in cell temperature will cause a decrease in cell voltage, and a decrease in cell power, and will result in the MPP shifting to the left on the I-V curve.

Refer to content page 2.1 for further guidance.

The correct answer is: All of these are correct

Question 6

Not answered

Marked out of 1.00

When compared to polycrystalline cells, monocrystalline cells:

- a. are less efficient
- b. have a much longer life
- c. are less expensive to produce
- d. are more expensive to produce

Your answer is incorrect.

Monocrystalline cells are more expensive to produce than polycrystalline and amorphous cells.

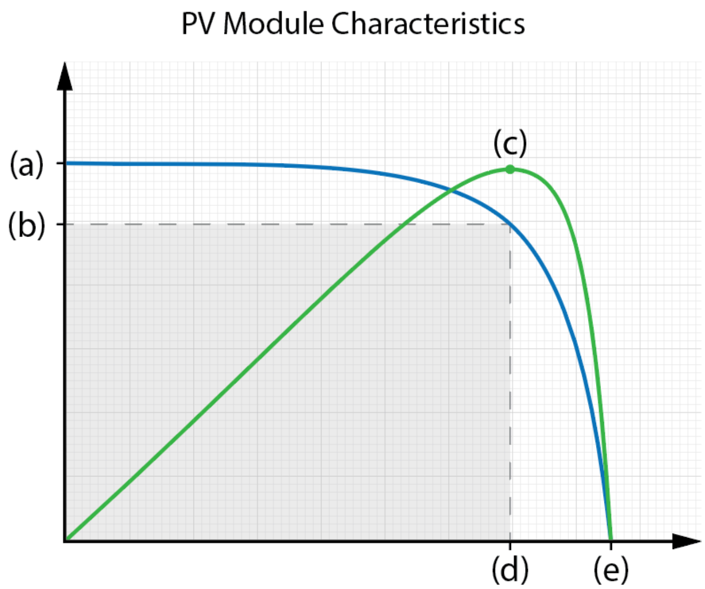
Refer to content page 2.1 for further guidance.

The correct answer is: are more expensive to produce

Question 7

Not answered

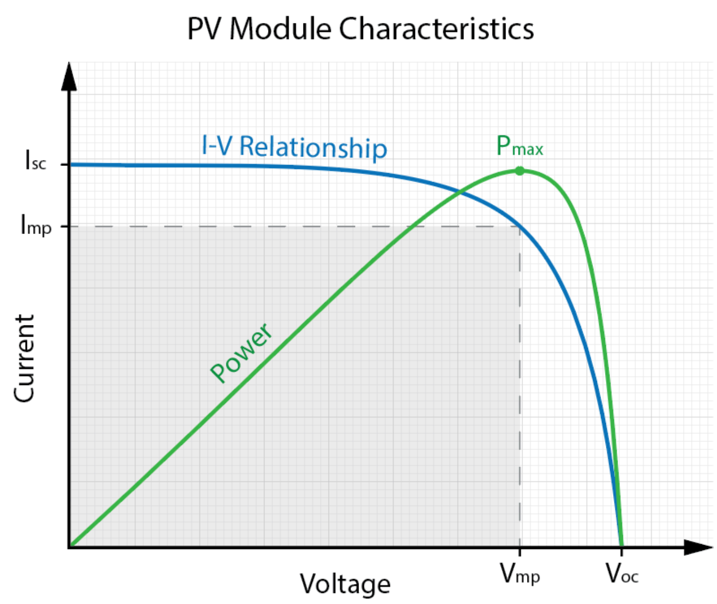
Marked out of 1.00



In relation to the PV module characteristic curves pictured above, which letter indicates the maximum power output of the module?

- (d)
- (c)
- (a)
- (b)
- (e)

Your answer is incorrect.



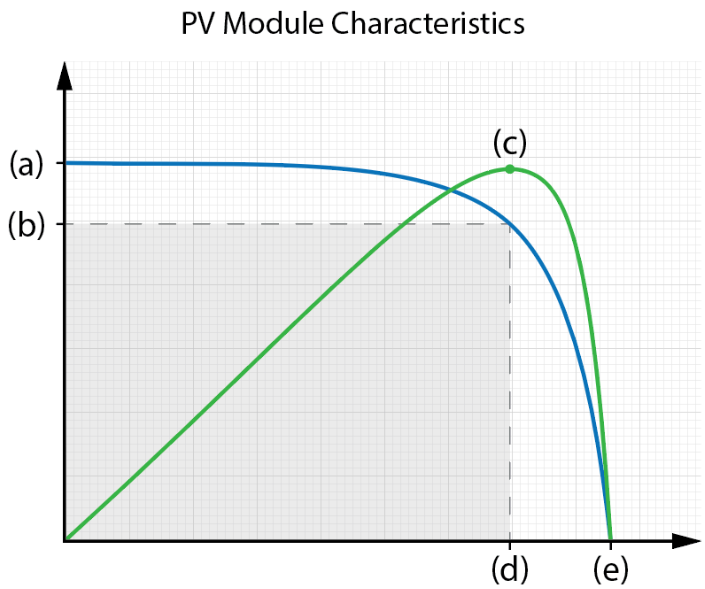
Refer to content page 2.2 for further guidance.

The correct answer is: (c)

Question 8

Not answered

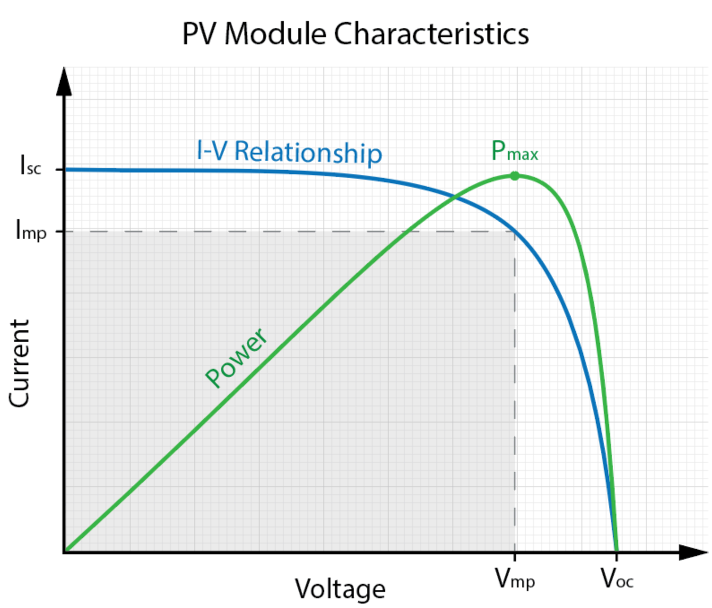
Marked out of 1.00



In relation to the PV module characteristic curves pictured above, point (b) indicates:

- a. the open circuit voltage
- b. the MPP current
- c. the short circuit current
- d. the MPP voltage

Your answer is incorrect.



Refer to content page 2.2 for further guidance.

The correct answer is: the MPP current

Question 9

Not answered

Marked out of 1.00

When compared to bulk silicon technologies, thin-film PV modules:

- a. have a similar spectral response
- b. are more efficient
- c. are less efficient
- d. are more expensive to produce

Your answer is incorrect.

Amorphous PV cells are cheaper to produce than crystalline cells, are typically around 7% to 10% efficient, and are most sensitive to the blue-end of the spectrum.

Refer to content page 2.1 for further guidance.

The correct answer is: are less efficient

Question 10

Not answered

Marked out of 1.00

What type of photovoltaic technology is pictured above?

- a. Monocrystalline
- b. Polycrystalline
- c. Amorphous
- d. None of these

Your answer is incorrect.

A monocrystalline PV cell is made from a thin slice of a single large silicon crystal.

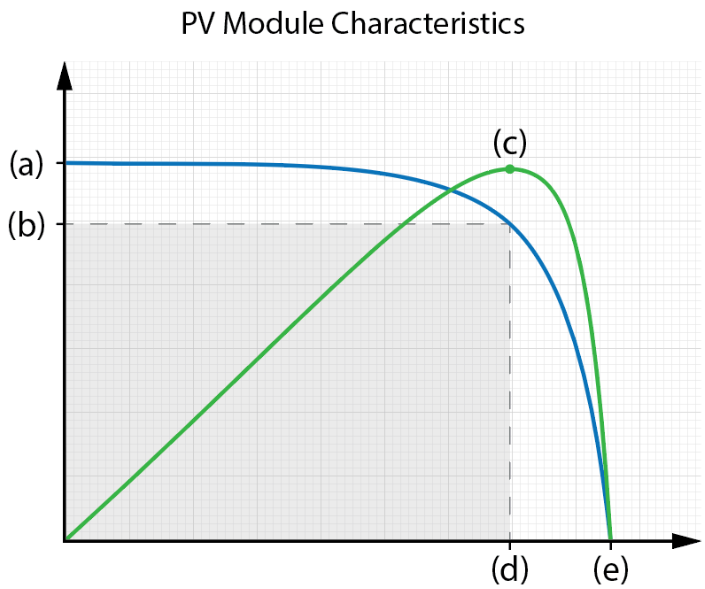
Refer to content page 2.1 for further guidance.

The correct answer is: Monocrystalline

Question **11**

Not answered

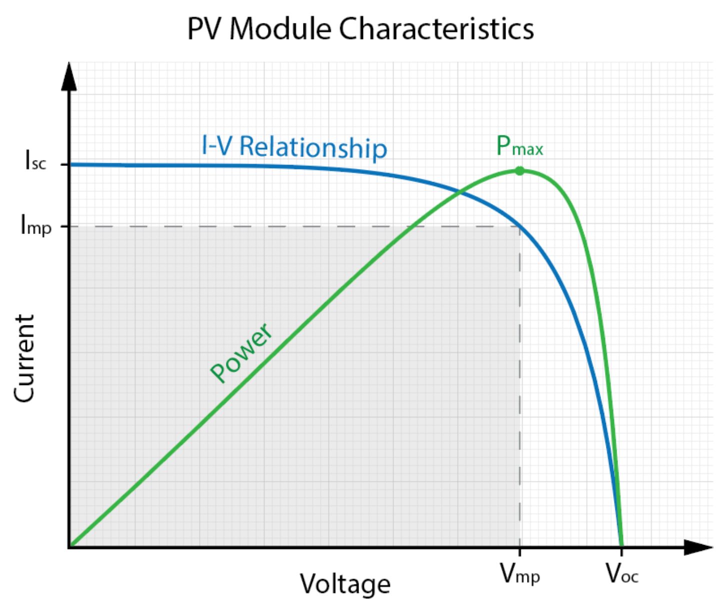
Marked out of 1.00



In relation to the PV module characteristic curves pictured above, point (e) indicates:

- a. the MPP voltage
- b. the MPP current
- c. the short circuit current
- d. the open circuit voltage

Your answer is incorrect.



Refer to content page 2.2 for further guidance.

The correct answer is: the open circuit voltage

Question 12

Not answered

Marked out of 1.00

A PV array consists of eight 180 W modules, each with a temperature coefficient of -0.41 W/^{0}C.

What is the rated maximum power output of the array at a cell operating temperature of 48^{0}C?

- a. 1,449 W
- b. 1,431 W
- c. 1,471 W
- d. 1,479 W

Your answer is incorrect.

180 x 8 = 1,440 W

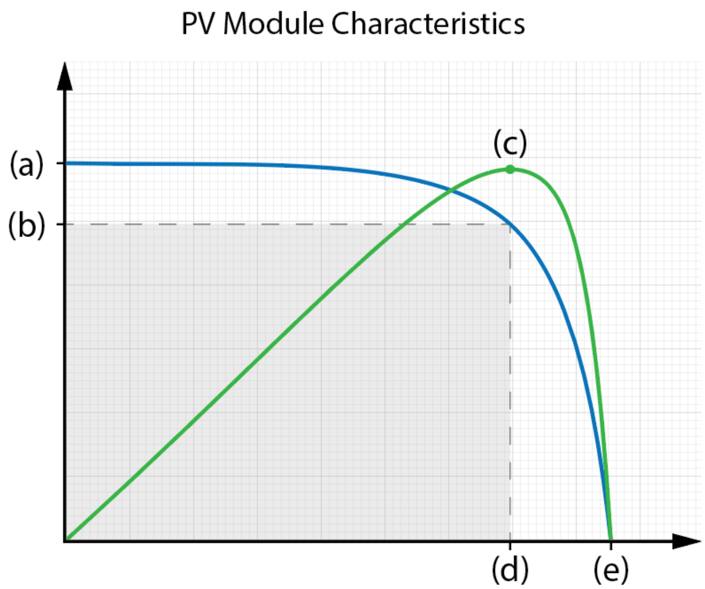
1,440 – [(48 – 25) x 0.41] = 1430.57 W

The correct answer is: 1,431 W

Question **13**

Not answered

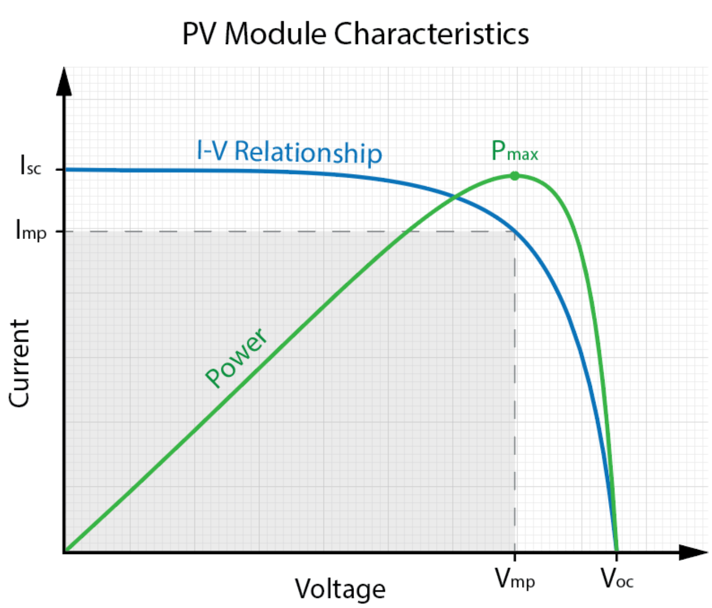
Marked out of 1.00



In relation to the PV module characteristic curves pictured above, point (c) indicates:

- a. None of these are correct
- b. the short-circuit current
- c. the open-circuit voltage
- d. the maximum power point

Your answer is incorrect.



Refer to content page 2.2 for further guidance.

The correct answer is: the maximum power point

Question **14**

Not answered

Marked out of 1.00

Performance	
Rated Power	165 W
Tolerance	±4%
Electrical Charateristics	*STC (1000 W/m^2)*
P_{max}	165 W
V_{mp}	34.3 V
I_{mp}	4.8 A
V_{oc}	43.7 V
I_{sc}	5.4 A
$t_{coeff\text{-}Pmax}$	-(0.5±0.05)%/°C
$t_{coeff\text{-}Voc}$	-(0.36±0.05)%/°C
$t_{coeff\text{-}Isc}$	(0.06±0.02)%/°C
NOCT	47±2°C
Physical Charateristics	
Solar Cells	72 monocrystalline (125mm x 125mm) connected in series
Dimensions	1596 x 793 x 51 mm
Weight	15.7 kg

The job specifications for a particular PV job require that the open circuit voltage of the array does not exceed 120 V.

What is the maximum number of modules, specified above, that can be connected into each string of the array?

- a. 2
- b. 3
- c. 1
- d. 4

Your answer is incorrect.

120 / 43.7 = 2.75

Therefore 2 is the maximum number of modules per string to avoid exceeding an open circuit array voltage of 120 V.

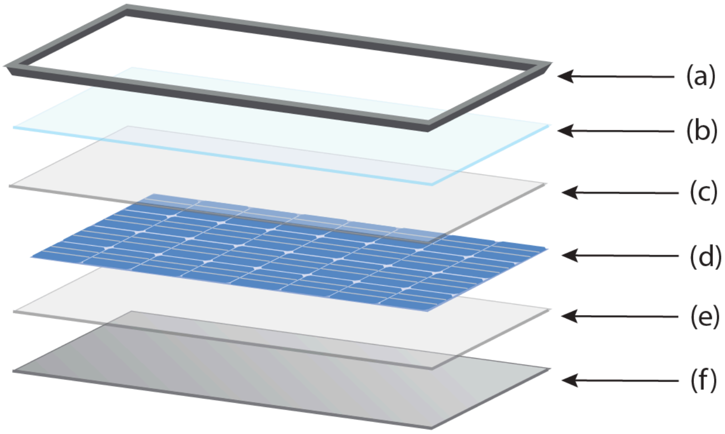
Refer to content pages 2.1 and 2.2 for further guidance.

The correct answer is:
2

Question 15

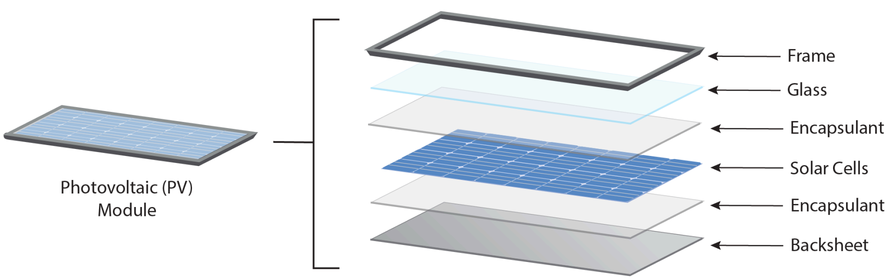
Not answered

Marked out of 1.00



Match the columns to correctly label the PV module structure pictured above.

(a)	✖
(b)	✖
(c)	✖



Question 16

Not answered

Marked out of 1.00

It can be reasonably expected that during the normal service of a PV installation, the modules will be exposed to:

- a. fire
- b. high temperatures
- c. any of these
- d. lightning strikes

Your answer is incorrect.

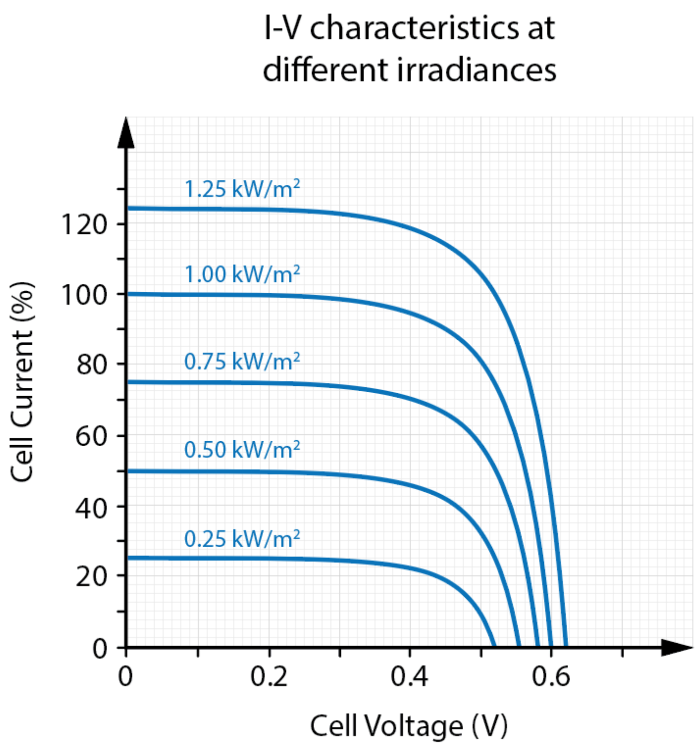
PV modules can reasonably be expected to be exposed to high ambient temperatures, rain and/or hail, and high winds.

The correct answer is: high temperatures

Question **17**

Not answered

Marked out of 1.00



The graph pictured above shows the I-V curves for a PV module. The graph indicates that a decrease in irradiance will cause:

- [ ] ✖ in cell voltage.
- [ ] ✖ in cell current.
- [ ] ✖ in output power.

Refer to content page 2.2

Question 18

Not answered

Marked out of 1.00

What is the output power of a 220 W module operating at a temperature of 32 ^{0}C, if the module temperature coefficient is -0.42W/^{0}C?

- a. 220 W
- b. 206.6 W
- c. 211.2 W
- d. 217.1 W

Your answer is incorrect.

220 – [(32 – 25) x 0.42] = 217.1 W

The correct answer is: 217.1 W

Started on	Saturday, 15 February 2025, 1:36 AM
State	Finished
Completed on	Saturday, 15 February 2025, 1:37 AM
Time taken	17 secs
Grade	**0.00** out of 18.00 (**0**%)

Question 1

Not answered

Marked out of 3.00

Identify each of the following solar panel terms and definitions.

A single photovoltaic unit	Choose...
A number of interconnected modules	Choose...
A number of series connected cells	Choose...

Your answer is incorrect.

A cell is a single PV unit, typically producing a nominal output voltage of 0.5 V.

A module is a number of PV cells (typically 30, 36, or 72) connected in a series 'string', and packed into a robust protective housing.

An array is a number of interconnected modules. The nominal output voltage and current ratings of the array will depend on the series-parallel arrangement of the modules.

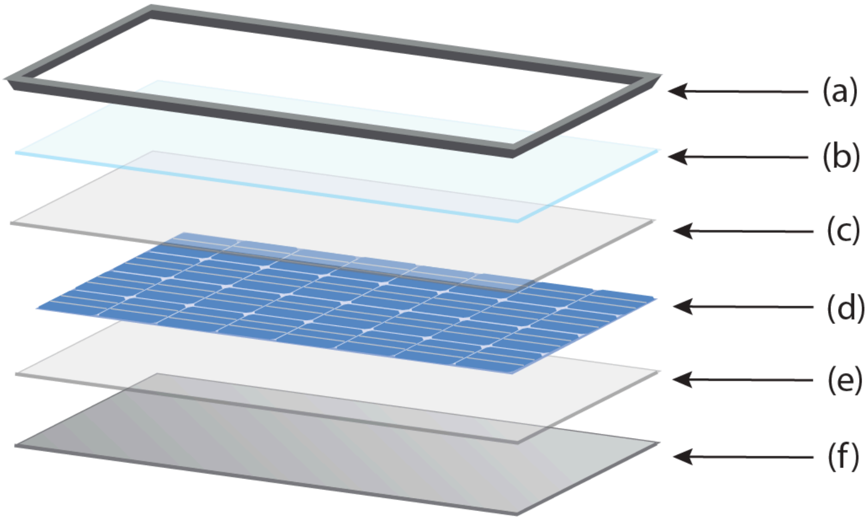
Refer to content page 2.1 for further guidance.

The correct answer is: A single photovoltaic unit → Cell, A number of interconnected modules → Array, A number of series connected cells → Module

Question 2

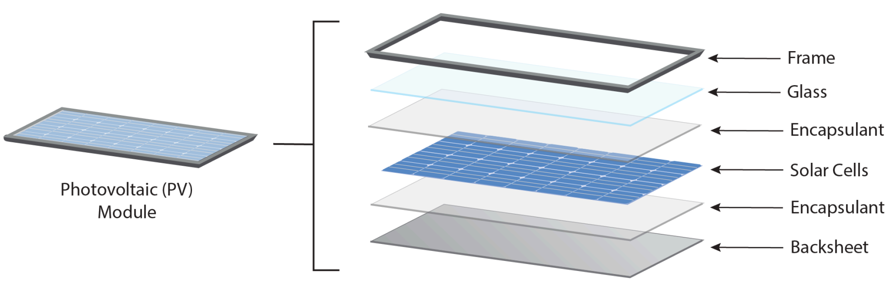
Not answered

Marked out of 6.00



Match the columns to correctly label the PV module structure pictured above.

(a)	✖
(b)	✖
(c)	✖
(d)	✖
(e)	✖
(f)	✖

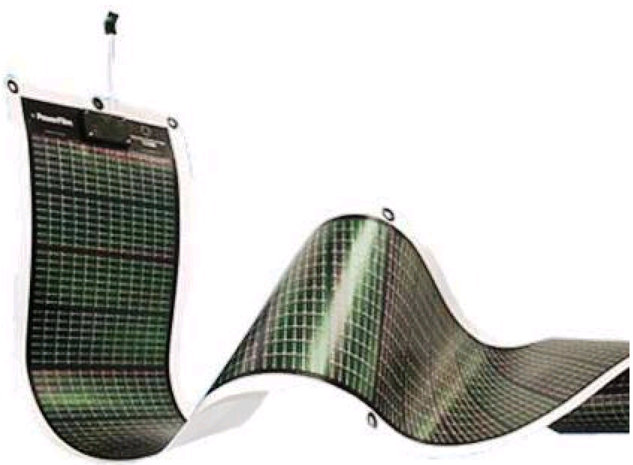


Question 3

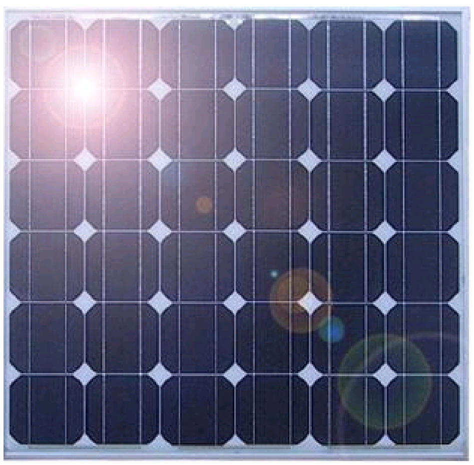
Not answered

Marked out of 3.00

Identify each type of PV module technology pictured below.



Choose...



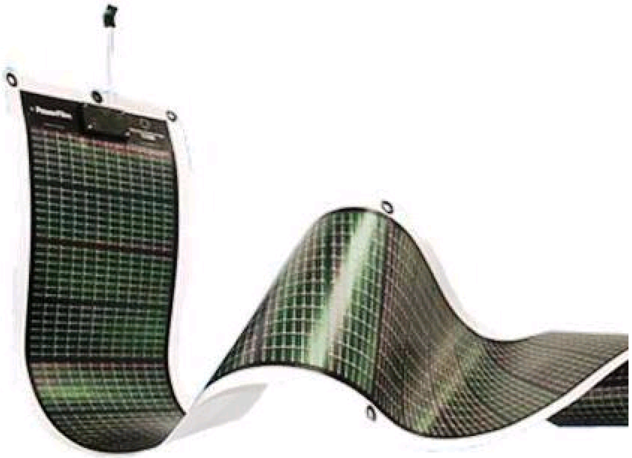
Choose...

Choose...

Your answer is incorrect.

Refer to content page 2.1

The correct answer is:

 → Amorphous (thin-film),

 → Monocrystalline,

 → Polycrystalline

Question 4

Not answered

Marked out of 3.00

Identify the typical efficiency range for each of the PV cell types.

Monocrystalline	Choose...
Amorphous	Choose...
Polycrystalline	Choose...

Your answer is incorrect.

Refer to content page 2.1

The correct answer is: Monocrystalline → 15% to 22%, Amorphous → 7% to 10%, Polycrystalline → 13% to 19%

Question 5

Not answered

Marked out of 3.00

Which of the following factors need to be considered in the design of PV modules?

- a. High temperatures
- b. Dirt and dust
- c. Vandalism
- d. Shading
- e. Hail
- f. Rain
- g. Soiling
- h. Corrosion

Your answer is incorrect.

Refer to content page 2.1

The correct answers are: High temperatures, Rain, Vandalism, Dirt and dust, Corrosion, Hail, Soiling, Shading

Started on	Saturday, 15 February 2025, 1:37 AM
State	Finished
Completed on	Saturday, 15 February 2025, 1:37 AM
Time taken	13 secs
Grade	**0.00** out of 35.00 (**0**%)

Question 1

Not answered

Marked out of 7.00

Match each of the PV terms to the correct definitions.

A graphical representation of the voltage/current characteristic for a given PV cell.	Choose...
The point on the I-V curve at which optimal performance is achieved.	Choose...
A factor by which the output voltage of a PV module will be affected by variations in operating temperature.	Choose...
A factor by which the output current of a PV module will be affected by variations in operating temperature.	Choose...
A factor by which the MPP of a PV module will be reduced by increases in operating temperature.	Choose...
The point on the I-V curve at which maximum output power is achieved.	Choose...

Refer to content page 2.2

The correct answer is: A graphical representation of the voltage/current characteristic for a given PV cell. → I-V curve, The point on the I-V curve at which optimal performance is achieved. → Operating point, A factor by which the output voltage of a PV module will be affected by variations in operating temperature. → Voltage coefficient, A factor by which the output current of a PV module will be affected by variations in operating temperature. → Current coefficient, A factor by which the MPP of a PV module will be reduced by increases in operating temperature. → Cell temperature coefficient, The point on the I-V curve at which maximum output power is achieved. → Maximum power point

Question 2

Not answered

Marked out of 3.00

List the Standard Test Conditions (STC) for PV modules:

Irradiance: ✖ kW/m^2

Ambient Temperature: ✖ ^0C

Air Mass: ✖

The performance of PV modules is tested in a laboratory under Standard Test Conditions (STC) of an irradiance of 1 kW/m^2, ambient temperature of 25 ^0C, and air mass of 1.5.

Refer to content page 2.2 for further guidance.

Question 3

Not answered

Marked out of 3.00

List the test conditions used to determine the Nominal Operating Cell Temperature (NOCT):

Irradiance: ✖ W/m^2

Ambient Temperature: ✖ ^0C

Wind Velocity: ✖ m/s

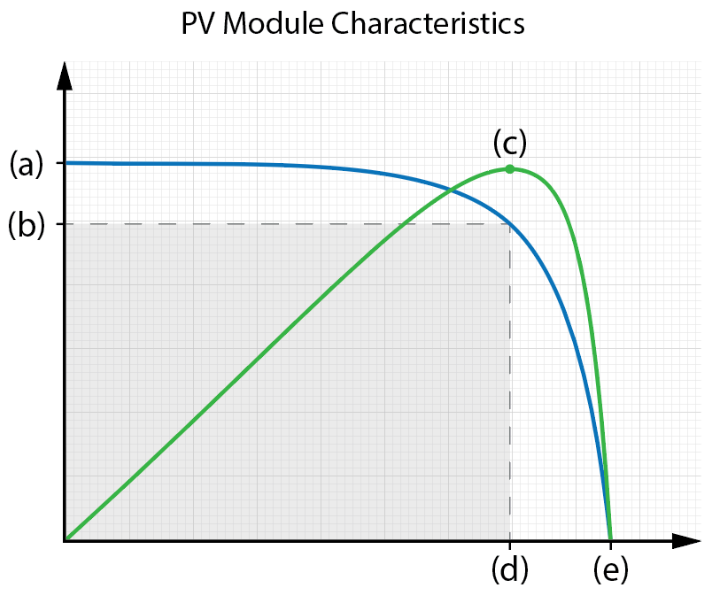
The Nominal Operating Cell Temperature (NOCT) is the temperature reached by a PV cell under an irradiance of 800 W/m^2, an ambient temperature of 20^0C and with a wind velocity of 1 m/s.

Refer to content page 2.2 for further guidance.

Question 4

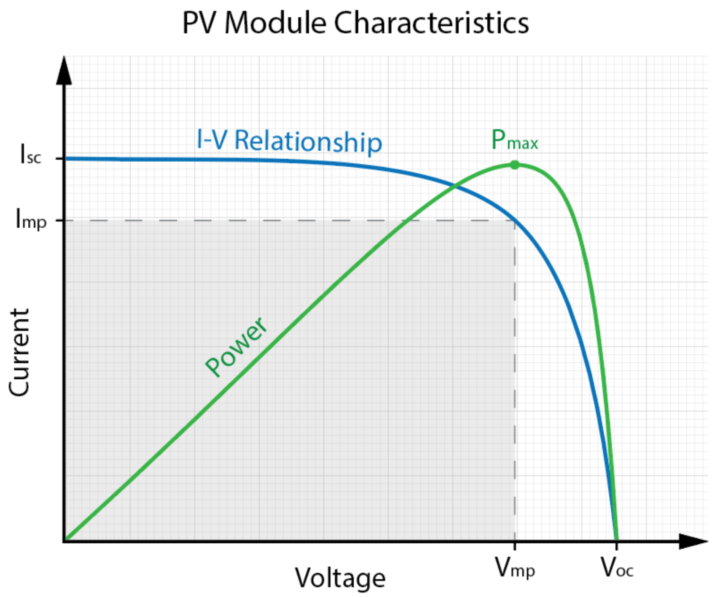
Not answered

Marked out of 6.00



Identify the various parts of the PV cell characteristic curves pictured above.

- (a) indicates the ✖ .
- (b) indicates the ✖ .
- (c) indicates the ✖ .
- (d) indicates the ✖ .
- (e) indicates the ✖ .
- The area of the graph coloured in grey represents the ✖ .

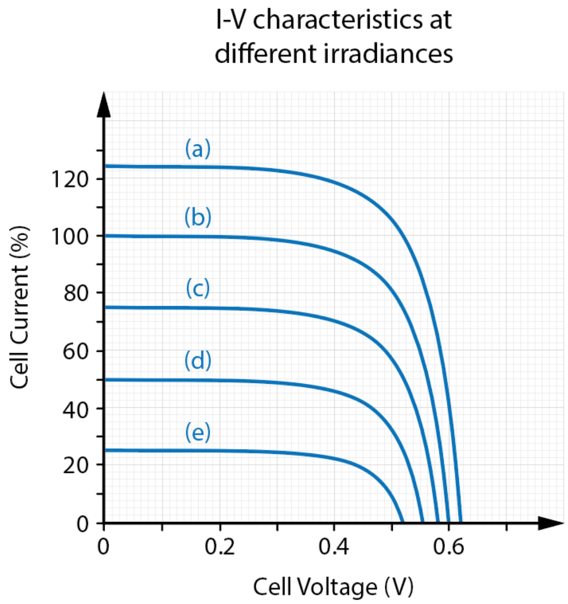


Refer to content page 2.2 for further guidance.

Question 5

Not answered

Marked out of 5.00



Match the irradiances provided to the curves on the graph above to correctly indicate the relationship between irradiance and cell performance.

Curve (d) Choose...

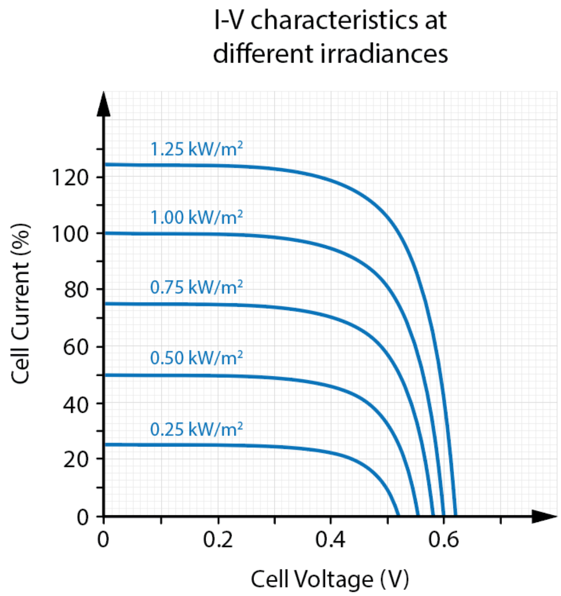
Curve (a) Choose...

Curve (b) Choose...

Curve (c) Choose...

Curve (e) Choose...

Your answer is incorrect.



A decrease in the irradiance arriving at a PV module will result in a decrease in output current, and vice versa.

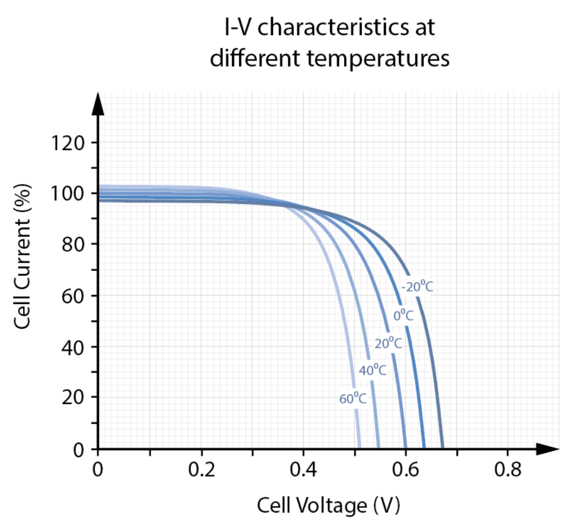
Refer to content page 2.2 for further guidance.

The correct answer is: Curve (d) → 0.50 kW/m2, Curve (a) → 1.25 kW/m2, Curve (b) → 1.00 kW/m2, Curve (c) → 0.75 kW/m2, Curve (e) → 0.25 kW/m2

Question 6

Not answered

Marked out of 1.00



The curve pictured above show that as the temperature of a PV cell increases, the power output of the cell [ ] ✖ .

Refer to content page 2.2

Question 7

Not answered

Marked out of 7.00

Identify each of the following ratings from the descriptions provided.

Indicates the physical size of the panel.	Choose...
Indicates the voltage under open circuit conditions.	Choose...
Indicates how heavy the panel is.	Choose...
Indicates the current under short circuit conditions.	Choose...
Indicates the module current at optimal performance.	Choose...
Indicates the module voltage at optimal performance.	Choose...
Indicates the maximum power output of the module.	Choose...

Your answer is incorrect.

Refer to content page 2.2

The correct answer is: Indicates the physical size of the panel. → Dimensions, Indicates the voltage under open circuit conditions. → Voc, Indicates how heavy the panel is. → Weight, Indicates the current under short circuit conditions. → Isc, Indicates the module current at optimal performance. → Imp, Indicates the module voltage at optimal performance. → Vmp, Indicates the maximum power output of the module. → Pmax

Question 8

Not answered

Marked out of 3.00

Consider that a PV module has the following ratings:

P_{max}	180 W
V_{mp}	32 V
I_{mp}	5.7 A
Temp. coefficient of P_{max}	-0.45%/°C

Based on the temperature coefficient provided (i.e. neglecting all other factors), determine the power output of the PV module when operating at:

- 25°C
- 40°C
- 60°C

Provide your answers in the units indicated, correct to three significant figures.

Power Output at 25°C: ✖ W

Power Output at 40°C: ✖ W

Power Output at 60°C: ✖ W

Power Output at 25°C

25 – 25 = 0°C

Operating at STC temperature so no change in power output

Power Output at 40°C

40 – 25 = 15°C above STC

15 x -0.45 = -6.75%

-0.0675 x 180 = 12.15 W

180 – 12.15 = 167.85 = 168 W

Power Output at 60°C

60 – 25 = 35°C above STC

35 x -0.45 = -15.75%

-0.1575 x 180 = 28.35 W

180 – 28.35 = 151.65 = 152 W

Refer to content page 2.2 for further guidance.

Started on	Tuesday, 25 March 2025, 5:50 PM
State	Finished
Completed on	Tuesday, 25 March 2025, 5:51 PM
Time taken	11 secs
Grade	**0.00** out of 14.00 (**0**%)

Question 1
Not answered
Marked out of 1.00

What is the best method of solving the problem of shading and soiling caused by a tree growing near a PV array?

- a. Relocate the PV array
- b. Change the array tilt angle and/or orientation
- c. Replace the inverter with one having a smaller power rating
- d. Periodic trimming/vegetation control

Your answer is incorrect.

Refer to content page 3.2

The correct answer is: Periodic trimming/vegetation control

Question 2
Not answered
Marked out of 1.00

Trees growing in close proximity to PV arrays can cause:

- a. soiling
- b. all of these
- c. reduced energy yield
- d. shading

Your answer is incorrect.

Refer to content page 3.2

The correct answer is: all of these

Question 3

Not answered

Marked out of 1.00

Reducing the length of the d.c. cable run between a PV array and a grid-connected inverter will:

- a. reduce the efficiency of the inverter
- b. increase the required conductor size for the cable
- c. reduce the voltage drop in the cable
- d. increase the efficiency of the array

Your answer is incorrect.

Refer to content page 3.2

The correct answer is: reduce the voltage drop in the cable

Question 4

Not answered

Marked out of 1.00

A low voltage PV array consisting of two parallel strings:

- a. requires a roof-top load break disconnector
- b. does not require a roof-top load break disconnector
- c. must not have a maximum d.c. voltage exceeding 250 V
- d. must not be installed within 1.5 m of the PCE

Your answer is incorrect.

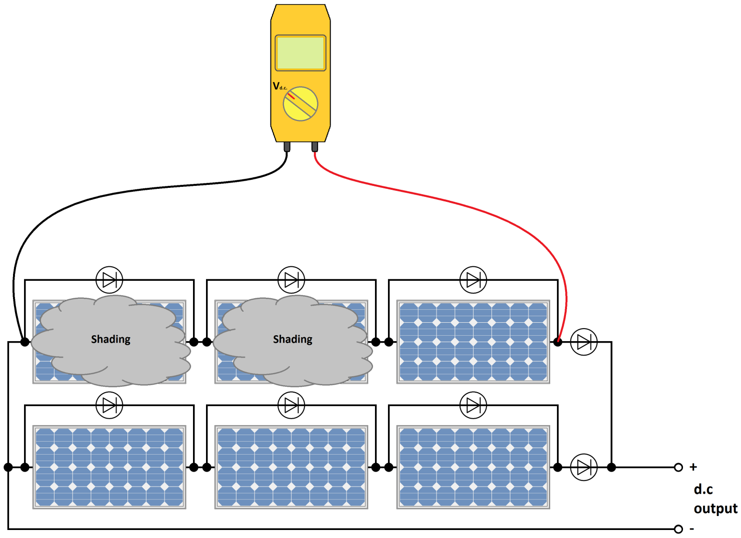
Refer to AS/NZS 5033:2021 Figure 4.2

The correct answer is: does not require a roof-top load break disconnector

Question 5

Not answered

Marked out of 1.00



The PV array pictured above has a nominal array voltage of 48 V d.c. Due to the shading indicated, the d.c. voltmeter will read:

- a. 48 V d.c.
- b. 16 V d.c.
- c. 32 V d.c.
- d. 24 V d.c.

Your answer is incorrect.

(48/3) x 1 = 16 V Refer to content page 3.1 for further guidance.

The correct answer is: 16 V d.c.

Question 6

Not answered

Marked out of 1.00

Module Specifications			
V_{MPP}	34.3 V	V_{OC}	43.7 V
I_{MPP}	4.8 A	I_{SC}	5.4 A

A customer has specified the use of the modules detailed above to produce a 3.3 kW PV array with a nominal operating voltage of approximately 170 V.

What is the minimum number of modules required to create the array?

Answer: ✖ Modules

170 / 34.3 = 4.96

Therefore five modules are required in each series string.

3300 / 170 = 19.4 A

19.4 / 4.8 = 4

Therefore four strings are required to produce the required power at an array voltage of 170 V.

5 x 4 = 20

Therefore twenty modules are required in total. Refer to content page 3.1 for further guidance.

Question 7

Not answered

Marked out of 1.00

According to AS/NZS 5033:2021, where the d.c. cabling running from the PV array to the GC inverter is installed in a ceiling cavity, the cabling shall:

- a. be enclosed in a metal or heavy-duty insulating conduit
- b. be securely fastened to the building structure using PVC cable ties
- c. All of these are correct
- d. have a temperature rating of no less than 110^{0}C

Your answer is incorrect.

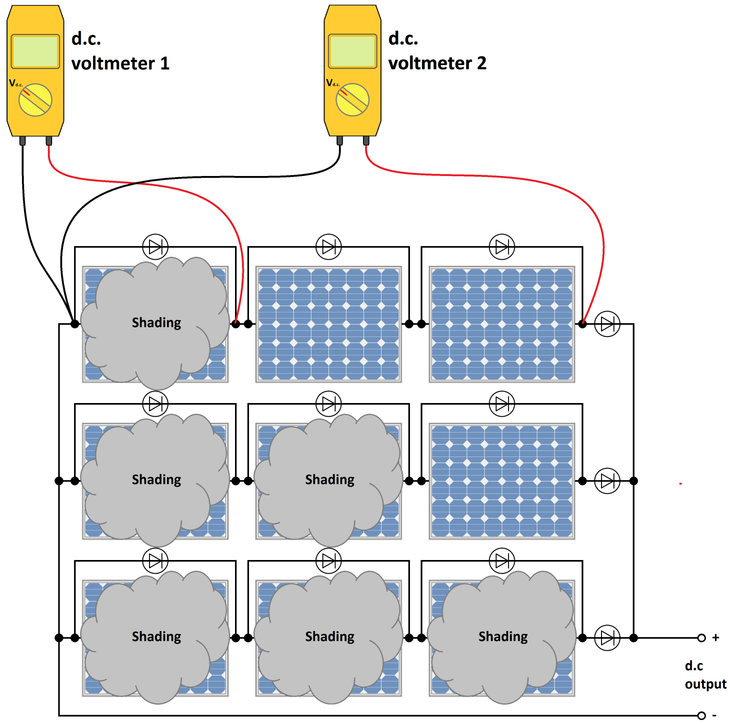
Refer to AS/NZS 5033:2021 Clause 4.4.5.2.2

The correct answer is: be enclosed in a metal or heavy-duty insulating conduit

Question 8

Not answered

Marked out of 1.00



The PV array pictured above has a nominal array voltage of 72 V d.c. and a maximum output power of 1.9 kW. As a result of the shading indicated, the d.c. voltmeters 1 and 2 will read:

- a. 0 V and 48 V respectively
- b. 0 V and 16 V respectively
- c. 24 V and 72 V respectively
- d. 0 V and 24 V respectively

Your answer is incorrect.

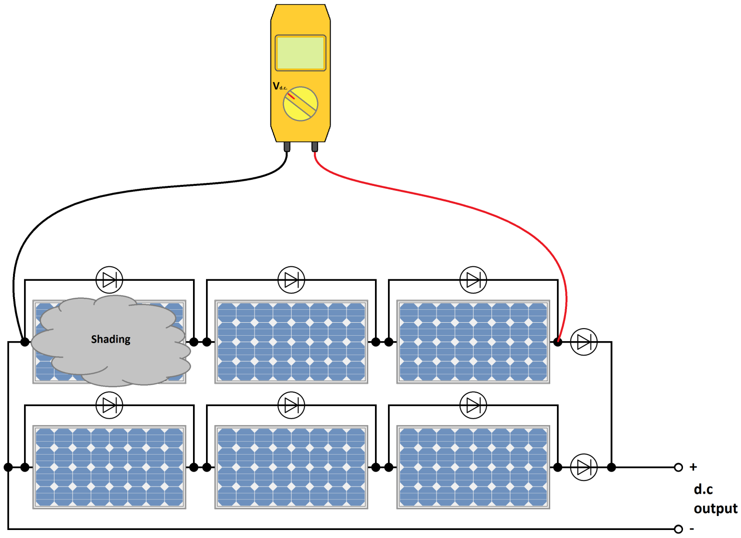
The shaded module will be bypassed and no voltage will be measured across it. If the array voltage is 72 V, this means that the voltage of each module is 24 V. Due to one module being bypassed, the string voltage is reduced to two modules in series. 24 V + 24 V = 48 V. Refer to content page 3.1 for further guidance.

The correct answer is: 0 V and 48 V respectively

Question 9

Not answered

Marked out of 1.00



The PV array pictured above has a nominal array voltage of 48 V d.c. Due to the shading indicated, the d.c. voltmeter will read:

a. 16 V d.c.

b. 24 V d.c.

c. 32 V d.c.

d. 48 V d.c.

Your answer is incorrect.

(48/3) x 2 = 32 V Refer to content page 3.1 for further guidance.

The correct answer is: 32 V d.c.

Question **10**

Not answered

Marked out of 1.00

Module Specifications			
P_{MPP}	175 W		
V_{MPP}	35.4 V	V_{oc}	44.5 V
I_{MPP}	4.9 A	I_{sc}	5.5 A

A customer has specified the use of the modules detailed above to produce a 4.9 kW PV array at their domestic residence, with a maximum d.c. voltage of less than 600 V.

Which of the following arrangements complies with customer and regulatory requirements?

- a. 4 strings, each consisting of 5 modules
- b. 4 strings, each consisting of 7 modules
- c. 2 strings, each consisting of 13 modules
- d. 2 strings, each consisting of 14 modules

Your answer is incorrect.

4900 / 175 = 28 modules required for the array.

Only the arrangement of 4 x 7 module strings provides the required array power, and results in a maximum array voltage of less than 600 V.

Refer to content page 3.1 for further guidance.

The correct answer is: 4 strings, each consisting of 7 modules

Question **11**

Not answered

Marked out of 1.00

Module Specifications			
V_{MPP}	35.1 V	V_{oc}	44.2 V
I_{MPP}	4.6 A	I_{sc}	4.8 A

A customer has specified the use of the modules detailed above to produce a 1.9 kW PV array with a nominal operating voltage of approximately 140 V.
What is the minimum number of modules required to create the array?

Answer: ✖ Modules

140 / 35.1 = 3.99

Therefore four modules are required in each series string.

1900 / 140 = 13.6 A

13.6 / 4.6 = 2.96

Therefore three strings are required to produce the required array power at an array voltage of 140 V.

4 x 3 = 12
Therefore twelve modules are required in total. Refer to content page 3.1 for further guidance.

Question **12**

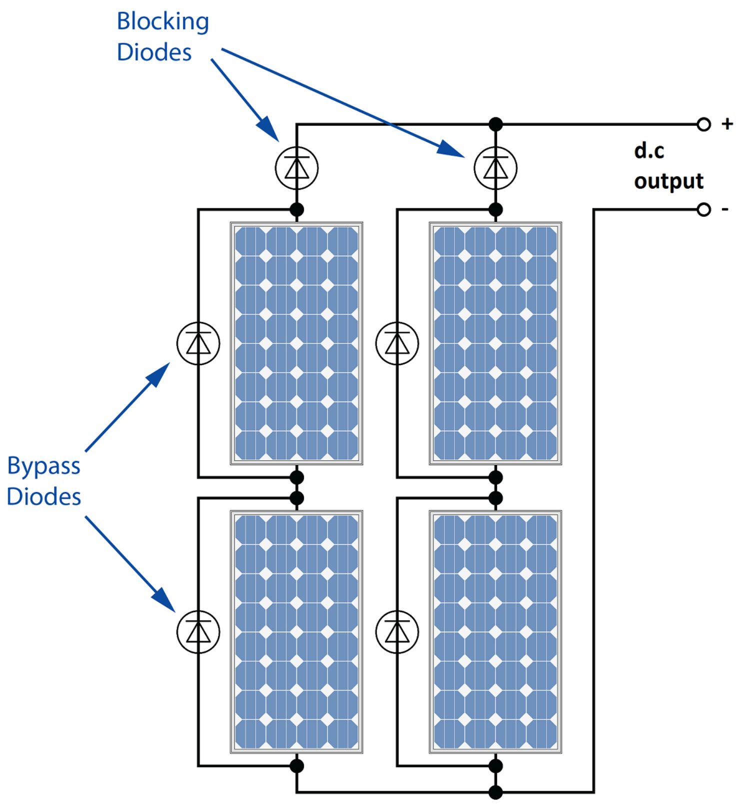
Not answered

Marked out of 1.00

How are bypass diodes connected in a PV array?

- a. In parallel with parallel connected strings
- b. In parallel with series connected modules
- c. In series with parallel connected strings
- d. In series with series connected modules

Your answer is incorrect.



Refer to content page 3.1 for further guidance.

The correct answer is: In parallel with series connected modules

Question 13

Not answered

Marked out of 1.00

Which of the following factors will cause variations in the irradiance at the surface of a fixed PV array?

- a. Shading
- b. All of these
- c. Cloud cover
- d. Time of day

Your answer is incorrect.

The irradiance arriving at the surface of a fixed PV array will not be affected by voltage drop or cell efficiency, but will vary due to seasonal changes. Refer to content page 3.2 for further guidance.

The correct answer is: All of these

Question 14

Not answered

Marked out of 1.00

Which of the following is the most suitable method of preventing shading and soiling of PV arrays caused by vegetation?

- a. Use of netting
- b. Installation of a barrier
- c. Relocation of the array
- d. Regular pruning

Your answer is incorrect.

Regular control of vegetation by pruning will reduce shading and soiling of an array. Placing netting around vegetation may prevent some soiling but will not reduce shading. Installation of a barrier may increase shading rather than reduce it. Relocation of an array is not typically practical. Refer to content page 3.2 for more information.

The correct answer is: Regular pruning

Started on	Saturday, 15 February 2025, 1:38 AM
State	Finished
Completed on	Saturday, 15 February 2025, 1:38 AM
Time taken	11 secs
Grade	**0.00** out of 28.00 (**0**%)

Question 1

Not answered

Marked out of 4.00

Connecting PV modules in series increases the output [ ] ✖ , whilst the output [ ] ✖ remains the same.

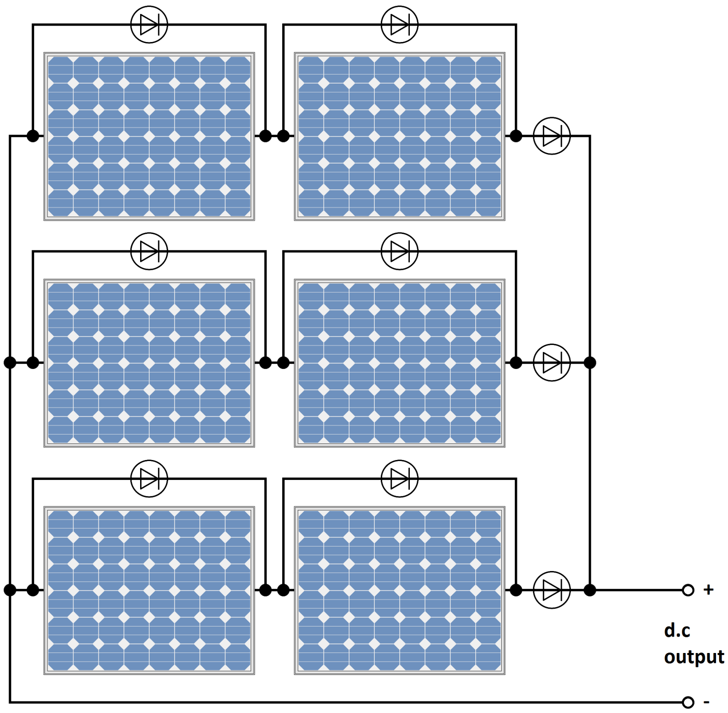
Connecting PV modules in parallel increases the output [ ] ✖ , whilst the output [ ] ✖ remains the same.

Refer to content page 3.1

Question 2

Not answered

Marked out of 6.00



The PV array pictured above has [ ] ✖ strings, each consisting of [ ] ✖ modules.

A bypass diode is connected in [ ] ✖ with each [ ] ✖, and a blocking diode is connected in [ ] ✖ with each [ ] ✖.

Refer to content page 3.1

Question 3

Not answered

Marked out of 3.00

Module Specifications			
P_{MPP}	175 W		
V_{MPP}	36.5 V	V_{oc}	44.3 V
I_{MPP}	4.8 A	I_{sc}	5.6 A

A commercial customer has specified the use of the modules detailed above to produce a 7 kW PV array.

The maximum array voltage must not exceed 400 V, and the maximum current must not exceed 30 A.

Identify the minimum number of modules, and the arrangement required to produce the array.

Number of Modules: ✖

Number of Strings: ✖

Modules in each String: ✖

7000 / 175 = 40 modules

400 / 44.3 = 9 max modules per string

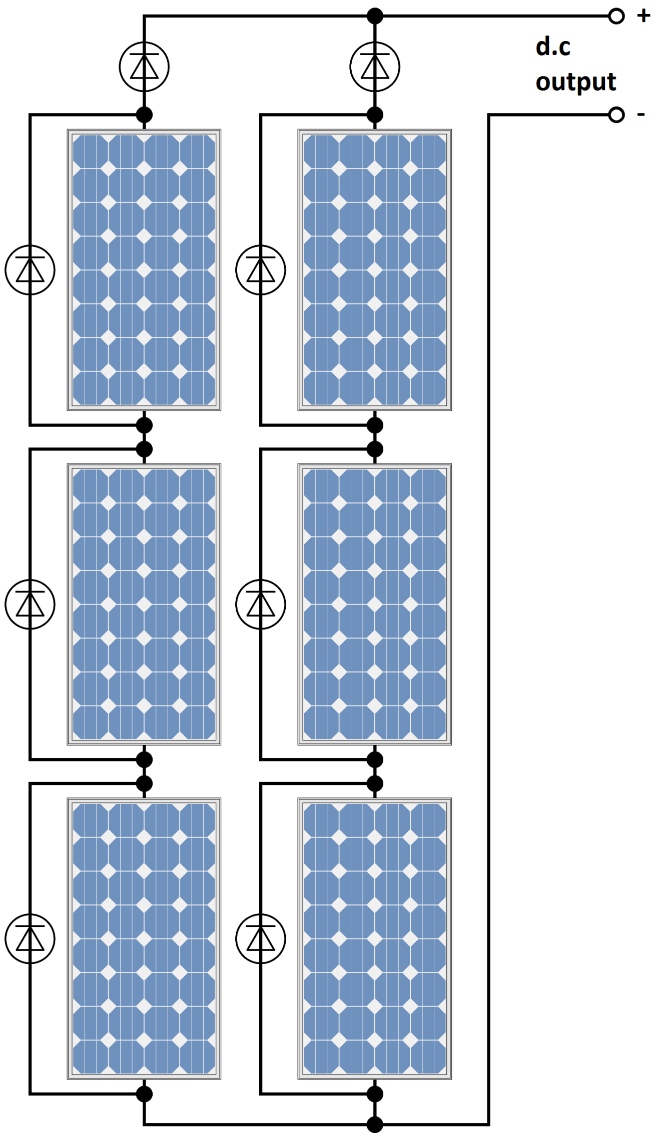
30 / 5.6 = 5.4 max number of strings

Therefore the only acceptable arrangement is to have 5 strings, each consisting of 8 modules. Refer to content page 3.1 for further guidance.

Question 4

Not answered

Marked out of 4.00



Each module in array pictured above has the following ratings:

V_{MPP}	24 V
I_{MPP}	5 A
V_{oc}	29.1 V
I_{sc}	5.8 A

Operating Parameters

What are the rated MPP voltage, current and power values for the array (neglecting de-rating)?

- Array MPP Output Voltage: ✖ V
- Array MPP Output Current: ✖ A
- Array MPP Output Power: ✖ W

If one module becomes shaded, the output voltage of the associated string will drop to [ ] ✖ volts.

Three modules per string:

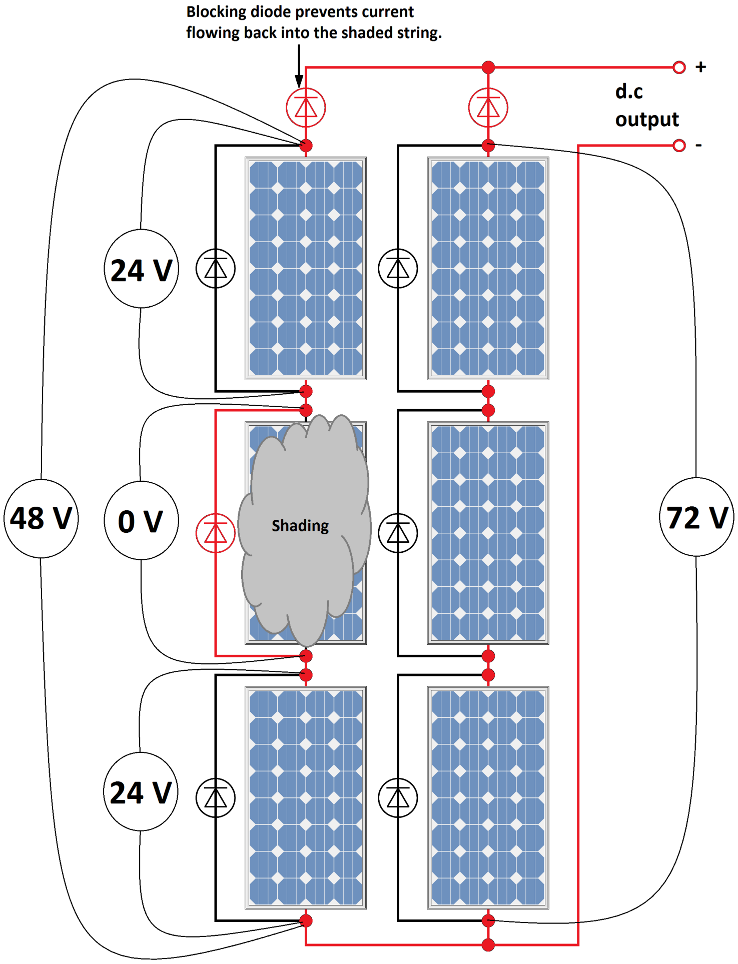
24 x 3 = 72 V

Two strings connected in parallel:

5 x 2 = 10 A

Maximum power = V_{MP} x I_{MP}

72 x 10 = 720 W

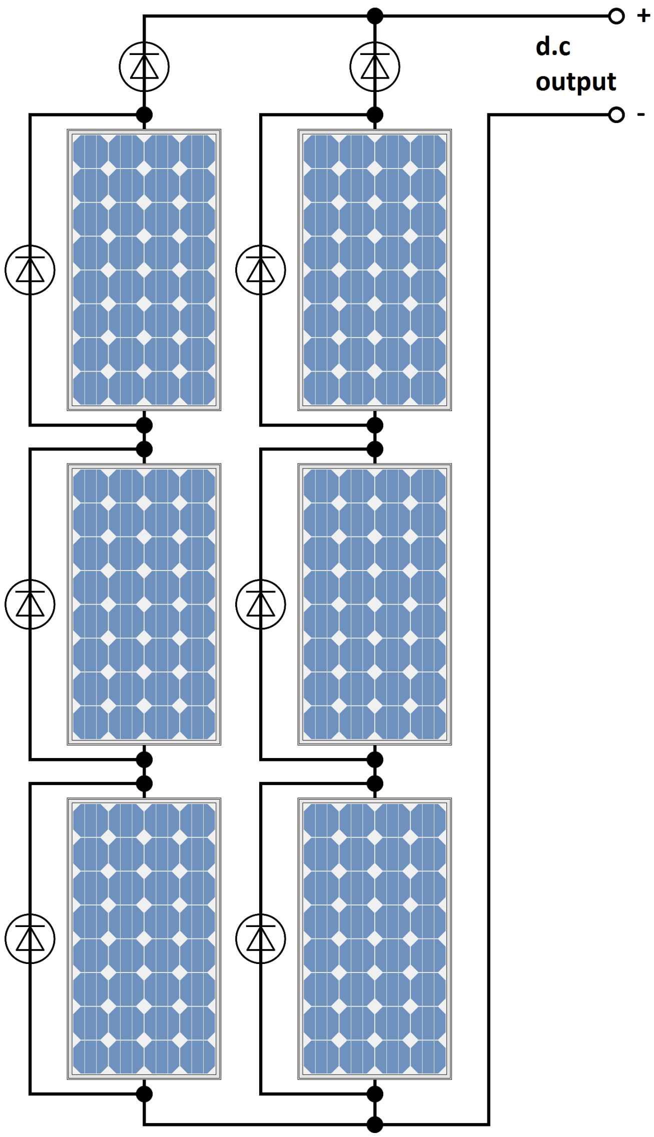


Refer to content page 3.1 for further guidance.

Question 5

Not answered

Marked out of 4.00



Each module in the array pictured above has the following ratings:

- Power: 192 W
- Voltage: 32 V d.c.
- Current: 6 A d.c.

Determine the following PV array operating parameters, correct to three significant figures:

- Total Power: ✖ kW
- Total Voltage: ✖ V
- Total Current: ✖ A

If one module becomes shaded, the output voltage of the associated string will drop to ✖ volts.

Three modules per string:

32 x 3 = 96 V

Two strings connected in parallel:

6 x 2 = 12 A

P = VI

96 x 12 = 1152 W = 1.15 kW

Or

Total power equals the sum of the power ratings of each module:

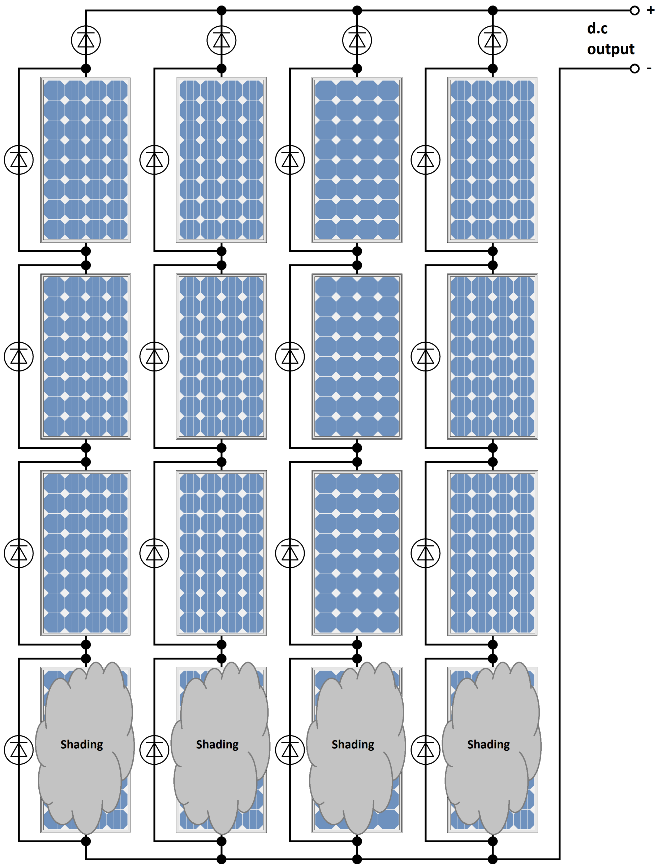
192 + 192 + 192 + 192 + 192 + 192 = 1152 W = 1.15 kW

Refer to content page 3.1 for further guidance.

Question 6

Not answered

Marked out of 3.00



Each module in the array pictured above has the following ratings:

V_{MPP}	16.1 V
I_{MPP}	5.2 A
V_{oc}	19.7 V
I_{sc}	5.9 A

Determine the output values of the array when it becomes shaded as indicated above.

Provide your answers to three significant figures.

- MPP Output Voltage: ✖ V
- MPP Output Current: ✖ A
- MPP Output Power: ✖ W

Shading results in each of the shaded modules being bypassed.

V_{MPP} = 16.1 x 3 = 48.3 V

I_{MPP} = 5.2 x 4 = 20.8 A

P_{MPP} = 48.3 x 20.8 = 1004.6 W

Question 7

Not answered

Marked out of 4.00

AS/NZS 5033:2021 states that PV system wiring:

- Must be installed in accordance with ____ ✖ .
- Must be wired using flexible cables with a minimum c.s.a. of ____ ✖ mm^2.
- ____ ✖ primarily supported by plastic cable ties.
- Must not obstruct ____ ✖ or cause a buildup of leaves.

Refer to AS/NZS 5033:2021 Clause 4.4.1

Started on	Saturday, 15 February 2025, 1:38 AM
State	Finished
Completed on	Saturday, 15 February 2025, 1:38 AM
Time taken	11 secs
Grade	**0.00** out of 18.00 (**0**%)

Question 1

Not answered

Marked out of 1.00

The ideal orientation for a PV array in Australia, is to be facing [ ] ✖ .

Refer to content page 3.2

Question 2

Not answered

Marked out of 4.00

Which of the following factors will directly affect the energy output of a fixed PV array?

- a. Tilt angle
- b. Shading
- c. Cloud cover
- d. Aesthetics
- e. Orientation

Your answer is incorrect.

The orientation and tilt angle will affect the irradiance of the modules due to the solar window at the given latitude.

Shading and cloud cover will reduce the amount of direct incident radiation reaching the panels.

The aesthetic appearance of the panels will not affect the energy output.

Refer to content page 3.2 for more information.

The correct answers are: Orientation, Tilt angle, Cloud cover, Shading

Question 3

Not answered

Marked out of 5.00

Select each correct answer from the list provided.

The solar radiation arriving at the surface of a particular fixed PV panel can vary throughout the year as a result of:

- [ ] a. Cloud cover
- [ ] b. Shading
- [ ] c. The time of day
- [ ] d. The PV panel power rating
- [ ] e. Soiling
- [ ] f. Seasonal change
- [ ] g. Voltage drop in the d.c. cabling
- [ ] h. Latitudinal variations

Your answer is incorrect.

Seasonal changes will result in variations in the angle of incident solar radiation on the panel.

Shading and soiling will act as a barrier to solar radiation arriving at the surface of the panel.

Cloud cover will reduce the amount of direct solar radiation arriving at the panel.

The quantity and angle of incidence of solar radiation will vary throughout each day as the sun moves through the solar window.

Refer to content page 3.2 for more information.

The correct answers are: Seasonal change, Shading, Soiling, Cloud cover, The time of day

Question 4

Not answered

Marked out of 3.00

Grid-connect inverters should be installed [ ] ✖ .

The route length of d.c. cabling between the array and the inverter should be kept as [ ] ✖ as possible, as this will reduce [ ] ✖ .

Refer to content page 3.2

Question 5

Not answered

Marked out of 5.00

Trees growing near PV arrays can cause [ ] ✖ of the array, resulting in [ ] ✖ energy yield.

Where vegetation exists near a PV array, [ ] ✖ may be required.

This can be achieved from the ground using [ ] ✖ or from elevated work platforms (EWPs) such as [ ] ✖ .

Refer to content page 3.2

Started on	Thursday, 31 October 2024, 4:20 PM
State	Finished
Completed on	Thursday, 31 October 2024, 4:21 PM
Time taken	25 secs
Grade	**0.00** out of 18.00 (**0**%)

Question 1

Not answered

Marked out of 1.00

When compared to a central inverter system, an advantage of a micro-inverter system is:

- a. All of these
- b. increased efficiency
- c. module level MPPT
- d. reduced d.c. cabling

Your answer is incorrect.

Advantages of a micro-inverter systems include reduced d.c. cabling, increased efficiency, increased reliability, the effects of partial shading or soiling are limited to the affected module, module level MPPT and monitoring, and modules with in-built micro-inverters reduce installation time.
Refer to content page 4.1 for more information.

The correct answer is: All of these

Question 2

Not answered

Marked out of 1.00

A field effect transistor (FET) is a type of:

- a. current controlled transistor
- b. Triac
- c. voltage-controlled transistor
- d. silicon-controlled rectifier

Your answer is incorrect.

Refer to content page 4.2

The correct answer is: voltage-controlled transistor

Question 3

Not answered

Marked out of 1.00

A PV array consists of 21 modules connected as three strings of seven modules. Each module has the following STC voltage characteristics:

- Nominal Voltage (VMPP): 34.5 V.
- Open Circuit Voltage (Voc): 42.3 V.
- Voltage Temperature Coefficient: -0.35%/^{o}C.

Determine the minimum and maximum nominal array voltages for an ambient temperature range of 4^{o}C to 52^{o}C.

Provide your answer in the units indicated, correctly rounded to three significant figures. Array VMPP @ 4^{o}C: [ ] ✖ V Array VMPP @ 52^{o}C: [ ] ✖ V

Array voltage at STC (25^{o}C)
34.5 x 7 = 241.5 V
Array voltage @ 6^{o}C
-0.35 x (4 – 25) = 7.35%
241.5 x 1.0735 = 259.25025 = 259 V
Array voltage @ 52^{o}C
-0.35 x (52 – 25) = -9.45%
241.5 x 0.9055 = 218.67825 = 219 V
See worked example on content page 4.3 for further guidance.

Question 4

Not answered

Marked out of 1.00

An inverter converts:

- a. radiant energy to direct current
- b. alternating current to direct current
- c. radiant energy to electrical power
- d. direct current to alternating current

Your answer is incorrect.

Refer to content page 4.1

The correct answer is: direct current to alternating current

Question 5

Not answered

Marked out of 1.00

Two types of inverters that are suitable for use in grid-connected applications are:

- a. power inverters and standalone inverters
- b. string inverters and micro-inverters
- c. string inverters and standalone inverters
- d. micro-inverters and power inverters

Your answer is incorrect.

Inverters used in grid-connected applications must comply with AS/NZS 4777.2. Refer to content page 4.1 for more information.

The correct answer is: string inverters and micro-inverters

Question 6

Not answered

Marked out of 1.00

The type of inverter that is typically mounted on or adjacent to a PV module is a:

- a. string inverter
- b. standalone inverter
- c. micro-inverter
- d. power inverter

Your answer is incorrect.

Refer to content page 4.1

The correct answer is: micro-inverter

Question 7

Not answered

Marked out of 1.00

The output of a basic inverter bridge is a:

- a. square wave
- b. true sine wave
- c. modified square wave
- d. modified sine wave

Your answer is incorrect.

Refer to content page 4.2

The correct answer is: square wave

Question 8

Not answered

Marked out of 1.00

AS/NZS 4777.2:2020 requires that the THD for a grid-connected inverter must be:

- a. between 2.5% and 4.5%
- b. greater than 5%
- c. less than 2.5%
- d. less than 5%

Your answer is incorrect.

Refer to AS/NZS 4777.2:2020 Clause 2.7

The correct answer is: less than 5%

Question 9

Not answered

Marked out of 1.00

Which of the following ratings indicates the operating window of a GC inverter?

- a. d.c. voltage range
- b. Surge rating
- c. Peak efficiency
- d. a.c. nominal voltage

Your answer is incorrect.

Refer to content page 4.3

The correct answer is: d.c. voltage range

Question 10

Not answered

Marked out of 1.00

The continuous rating of a GC inverter is measured in:

- a. seconds
- b. amperes
- c. watts
- d. volts

Your answer is incorrect.

The continuous rating defines the maximum power at which the inverter can operate continuously without overheating.
Refer to content page 4.3 for more information.

The correct answer is: watts

Question 11

Not answered

Marked out of 1.00

In Australia, the nominal a.c. voltage rating of a single-phase grid-connected inverter should typically be:

- a. 230 V +6% -10%
- b. 250 V +10% -6%
- c. 250 V +6% -10%
- d. 230 V +10% -6%

Your answer is incorrect.

Refer to AS/NZS 4777.2:2020 Clause 2.5 Note, and AS/NZS 3000:2018 Clause 1.6.2 (c) Note (a)

The correct answer is: 230 V +10% -6%

Question 12

Not answered

Marked out of 1.00

What is meant by the 'operating window' of a grid connected inverter?

- a. The maximum power for continuous operation
- b. The MPP power rating of the inverter
- c. The upper and lower d.c. input voltage limits
- d. The upper and lower a.c. output voltage limits

Your answer is incorrect.

Refer to content page 4.3

The correct answer is: The upper and lower d.c. input voltage limits

Question 13

Not answered

Marked out of 1.00

When compared to a central inverter system, an advantage of a micro-inverter system is:

- a. low cost
- b. increased reliability
- c. reduced maintenance
- d. all of these

Your answer is incorrect.

Micro-inverter systems are initially more expensive than central string inverter systems, and result in increased and more difficult maintenance due to multiple units and roof mounting. The benefit of having multiple units is increased reliability, and individual MPPT for each module/pair of modules.

Refer to content page 4.1 for more information.

The correct answer is: increased reliability

Question 14

Not answered

Marked out of 1.00

A PV array consists of 9 modules connected as a single string. Each module has the following STC voltage characteristics:

- Nominal Voltage (VMPP): 35.2 V.
- Open Circuit Voltage (Voc): 43.8 V.
- Voltage Temperature Coefficient: -0.32%/^{0}C.

Determine the minimum and maximum nominal array voltages for an ambient temperature range of 0^{0}C to 45^{0}C.
Provide your answer in the units indicated, correctly rounded to three significant figures.

Array VMPP @ 0^{0}C: [ ] ✖ V

Array VMPP @ 45^{0}C: [ ] ✖ V

Array voltage at STC (25^{0}C)
35.2 x 9 = 316.8 V
Array voltage @ 0^{0}C
-0.32 x (0 – 25) = 8%
316.8 x 1.08 = 342.144 = 342 V
Array voltage @ 45^{0}C
-0.32 x (45 – 25) = -6.4%
316.8 x 0.936 = 296.5248 = 297 V
See worked example on content page 4.3 for further details.

Question 15

Not answered

Marked out of 1.00

Which rating defines the ability of an inverter to withstand the ingress of water and dust?

- a. Continuous rating
- b. Surge rating
- c. Half-hour rating
- d. IP rating

Your answer is incorrect.

Refer to content page 4.3

The correct answer is: IP rating

Question 16

Not answered

Marked out of 1.00

A feature that distinguishes grid-connect inverters from standalone inverters is:

- a. d.c. boost
- b. a.c. transformation
- c. anti-islanding protection
- d. MPPT

Your answer is incorrect.

Refer to content page 4.3

The correct answer is: anti-islanding protection

Question 17

Not answered

Marked out of 1.00

The type of inverter that uses field effect transistors to rapidly switch the d.c. input is known as:

- a. a full-bridge inverter
- b. a half-bridge inverter
- c. a FET inverter
- d. none of these

Your answer is incorrect.

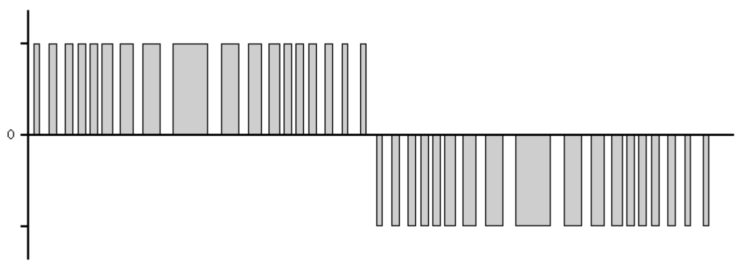
Refer to content page 4.2

The correct answer is: a FET inverter

Question 18

Not answered

Marked out of 1.00



The waveform pictured above is produced by:

- a. connecting an autotransformer in series parallel across the inverter output
- b. connecting an L-C resonant branch across the inverter output
- c. varying the amplitude of the inverter bridge triggering pulses
- d. varying the durations of the inverter bridge triggering pulses

Your answer is incorrect.

Refer to content page 4.2

The correct answer is: varying the durations of the inverter bridge triggering pulses

Started on	Saturday, 15 February 2025, 1:39 AM
State	Finished
Completed on	Saturday, 15 February 2025, 1:39 AM
Time taken	9 secs
Grade	**0.00** out of 12.00 (**0**%)

Question 1

Not answered

Marked out of 2.00

An inverter is a device that converts [ ] ✖ input into [ ] ✖ output.

Refer to content page 4.1

Question 2

Not answered

Marked out of 1.00

Any inverter is suitable for connection to the supply network, provided the inverter output is rated at a minimum of 230/400 V.

[ ] ✖

Inverters used in grid-connected applications must comply with AS/NZS 4777.2:2020. Refer to content page 4.1 for more information.

Question 3

Not answered

Marked out of 3.00

Match the type of inverter to the description given in the right hand column.

An ELV inverter that is limited to the connection of a maximum of two modules, and is mounted directly adjacent to the array.	Choose...
A grid-connect inverter that is capable of operating in several different modes, such as 'independent supply mode'.	Choose...
The most commonly used inverter in domestic grid-connected PV installations, capable of being connected to several modules/strings.	Choose...
An inverter having a fixed output voltage and frequency, which is therefore not suitable for grid-connected applications.	Choose...

Your answer is incorrect.

Refer to content page 4.1

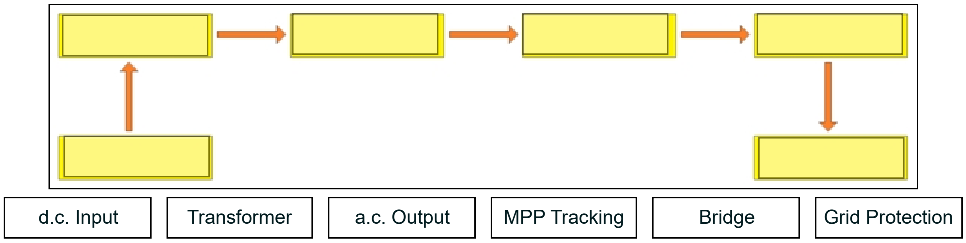
The correct answer is: An ELV inverter that is limited to the connection of a maximum of two modules, and is mounted directly adjacent to the array. → Micro-inverter,
A grid-connect inverter that is capable of operating in several different modes, such as 'independent supply mode'. → Multiple mode inverter,
The most commonly used inverter in domestic grid-connected PV installations, capable of being connected to several modules/strings. → String inverter, An inverter having a fixed output voltage and frequency, which is therefore not suitable for grid-connected applications. → Standalone inverter

Question 4

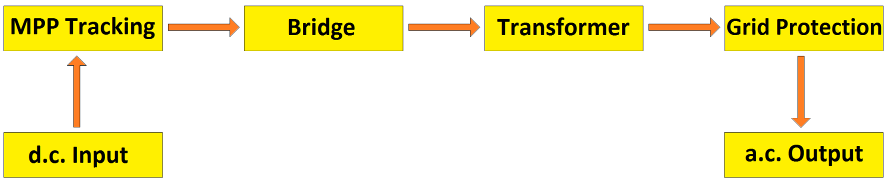
Not answered

Marked out of 6.00

Drag and drop the inverter components to produce a block diagram of a GC inverter.



Your answer is incorrect.



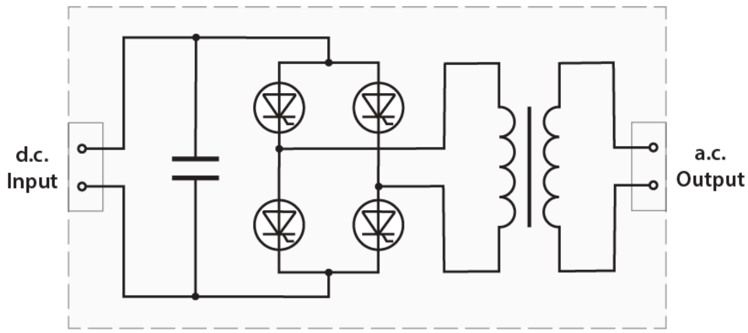
Refer to content page 4.1 for further guidance.

Started on	Saturday, 15 February 2025, 1:39 AM
State	Finished
Completed on	Saturday, 15 February 2025, 1:39 AM
Time taken	8 secs
Grade	**0.00** out of 7.00 (**0**%)

Question 1

Not answered

Marked out of 3.00



The diagram above illustrates a simple inverter [ ] ✖ .

The inverter has two pairs of [ ] ✖ that are switched alternately, producing a [ ] ✖ at the transformer primary winding.

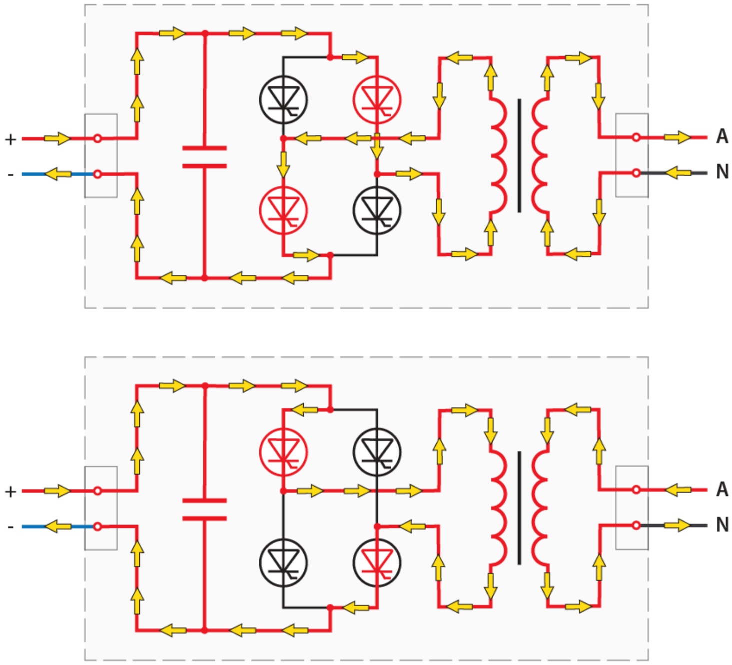
The alternating flux established in the transformer produces a [ ] ✖ at the inverter output.

Refer to content page 4.2

Question 2

Not answered

Marked out of 2.00



The diagrams above show the flow of current during inverter bridge switching.

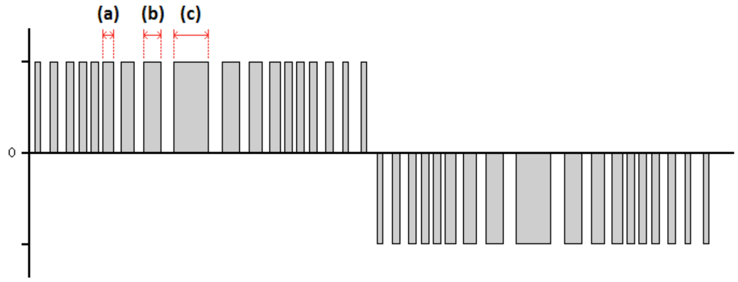
In order to produce a 50 Hz waveform, the ______ ✖ pairs must switch the current ______ ✖ times per second.

The direction of current flow changes twice during a single cycle, therefore the direction of current flow will change 100 times per second for a 50 Hz waveform. Refer to content page 4.2 for more information.

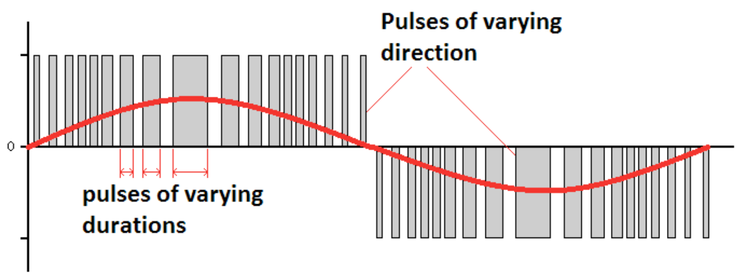
Question 3

Not answered

Marked out of 2.00



Values (a), (b) and (c) on the [ ] ✖ waveform diagram above, indicate variations in the [ ] ✖ of the trigger pulses.



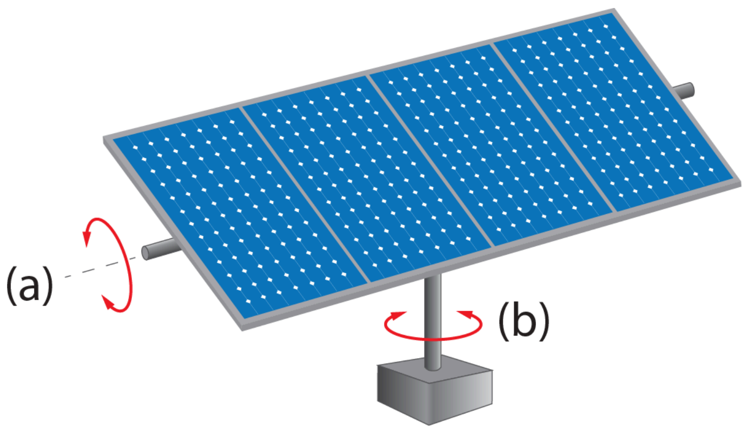
In pulse width modulation, a pattern of triggering pulses that are varied in duration and direction, are sent to the SCRs, to produce a resultant true sine waveform. Refer to content page 2.2 for more information.

Started on	Tuesday, 25 March 2025, 5:53 PM
State	Finished
Completed on	Tuesday, 25 March 2025, 5:53 PM
Time taken	9 secs
Grade	**0.00** out of 16.00 (**0**%)

Question **1**

Not answered

Marked out of 1.00



For the solar tracking system illustrated above, what does (b) indicate?

- a. Latitude adjustment
- b. Zenith adjustment
- c. Tilt angle adjustment
- d. Orientation adjustment

Your answer is incorrect.

Refer to content page 5.1

The correct answer is: Orientation adjustment

Question 2

Not answered

Marked out of 1.00

In a grid-connected PV installation, 'grid protection' is required to operate:

- a. to protect the installation against surge currents
- b. in the event of an earth fault
- c. All of these
- d. to prevent islanding

Your answer is incorrect.

Refer to content page 5.2 and AS/NZS 4777.2:2020 Clause 4.1

The correct answer is: to prevent islanding

Question 3

Not answered

Marked out of 1.00

In a grid-connected PV installation, when is the 'grid protection' required to operate?

- a. When the grid supply is disrupted
- b. When the PV array operates outside of preset voltage limits
- c. All of these
- d. When an overcurrent occurs

Your answer is incorrect.

Refer to content page 5.2 and AS/NZS 4777.2:2020 Clause 4.1

The correct answer is: When the grid supply is disrupted

Question 4

Not answered

Marked out of 1.00

The compliance and functionality of a low voltage grid-connected PV installation must be verified in accordance with:

- a. All of these
- b. AS/NZS 3000
- c. AS/NZS 4777.1
- d. AS/NZS 5033

Your answer is incorrect.

AS/NZS 4777.1, AS/NZS 5033, and AS/NZS 3000 all contain requirements for the installation of the wiring and equipment of low voltage grid-connected PV systems, each of which require verification in accordance with their respective standards.

The correct answer is: All of these

Question 5

Not answered

Marked out of 1.00

A hazard that is typically present when installing a PV array on a tile roof is:

- a. all of these
- b. a.c. current
- c. d.c. current
- d. falling from heights

Your answer is incorrect.

Hazards that may typically be encountered when installing PV arrays on roofs include: working at heights (working on the roof), manual handling (handling PV modules), UV radiation (from the sun), d.c. current (produced by illuminated modules), a.c. current (flowing through consumer's mains or other installation cables) and asbestos (roofing materials).
Refer to content page 5.1 for more information.

The correct answer is: all of these

Question 6

Not answered

Marked out of 1.00

When installing PV arrays, a typical control measure used to reduce the risk of falling from a roof top is:

- a. the use of a safety harness
- b. the use of a safety observer
- c. conducting work from an EWP
- d. the use of non-slip sandshoes

Your answer is incorrect.

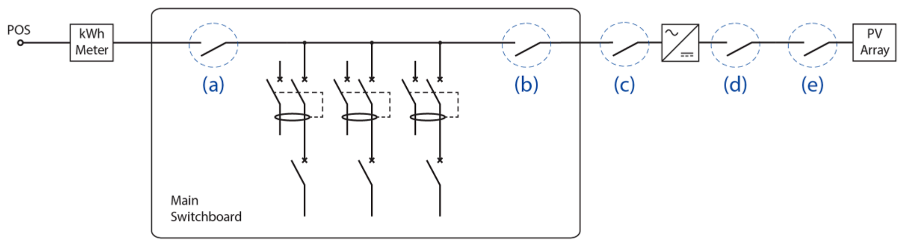
Safety harnesses are typically used to reduce the risk of falling from heights when installing PV arrays on roofs.
Refer to content page 5.1 for more information.

The correct answer is: the use of a safety harness

Question 7

Not answered

Marked out of 1.00



Which of the following labels is suitable for identifying switch (b) in the grid-connected PV installation pictured above?

a. **MAIN SWITCH (GRID SUPPLY)**

b. **MAIN ISOLATOR (NORMAL SUPPLY)**

c. **PV ARRAY D.C. ISOLATOR**

d. **MAIN SWITCH (INVERTER SUPPLY)**

Your answer is incorrect.

Refer to AS/NZS 4777.1:2024 Clause 6.3 (a) and Figure A.4

The correct answer is:

MAIN SWITCH (INVERTER SUPPLY)

Question 8

Not answered

Marked out of 1.00

Which of the following requirements applies to the main switch of a grid-connected PV system?

- a. All of these
- b. Must isolate the inverter system from the switchboard
- c. Must be capable of breaking the full rated output current of the inverter
- d. Must operate in all active conductors

Your answer is incorrect.

Refer to AS/NZS 4777.1:2024 Clause 3.4.3.1

The correct answer is: All of these

Question 9

Not answered

Marked out of 1.00

The type of PV mounting system pictured above is:

- a. a top of pole system
- b. a top-down rail system
- c. an adjustable tracking system
- d. a side of pole system

Your answer is incorrect.

Refer to content page 5.1

The correct answer is: a top-down rail system

Question 10
Not answered
Marked out of 1.00

Which of the following specific requirements applies to multiple mode grid-connected inverters with independent supply functionality?

- a. Circuits supplied by the inverter must be RCD protected in accordance with AS/NZS 3000
- b. The inverter grid-interactive port submain must be RCD protected
- c. All of these are correct
- d. The independent supply must satisfy the conditions of SELV

Refer to AS/NZS 4777.1:2024 Clause 5.4.6.4

The correct answer is: Circuits supplied by the inverter must be RCD protected in accordance with AS/NZS 3000

Question 11
Not answered
Marked out of 1.00

In a grid-connected PV installation, ‘grid protection’ is required to operate:

- a. if the grid supply is disrupted
- b. to prevent islanding
- c. All of these
- d. if the grid supply voltage operates outside preset limits

Your answer is incorrect.

Refer to content page 5.2 and AS/NZS 4777.2:2020 Clause 4.1

The correct answer is: All of these

Question 12
Not answered
Marked out of 1.00

According to AS/NZS 5033:2021, a conduit enclosing PV wiring running between an array and an inverter is required to be:

- a. not be longer than 3 m
- b. installed out of reach
- c. identified with labels marked with the word ‘SOLAR’
- d. identified with labels marked with the words ‘ALTERNATIVE SUPPLY, DO NOT DISCONNECT’

Your answer is incorrect.

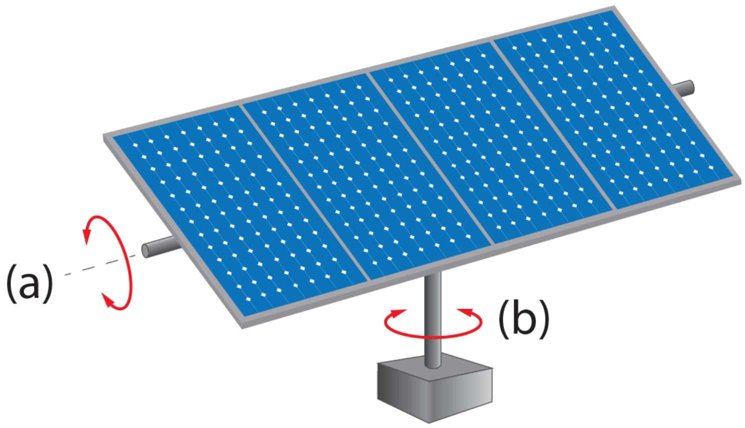
Refer to AS/NZS 5033:2021 Clause 5.3.1

The correct answer is: identified with labels marked with the word ‘SOLAR’

Question **13**

Not answered

Marked out of 1.00



For the solar tracking system illustrated above, what does (a) indicate?

- a. Orientation adjustment
- b. Longitude adjustment
- c. Tilt angle adjustment
- d. Zenith adjustment

Your answer is incorrect.

Refer to content page 5.1

The correct answer is: Tilt angle adjustment

Question **14**

Not answered

Marked out of 1.00

What is the maximum open circuit voltage for a domestic grid-connected PV power system, according to AS/NZS 5033:2021?

- a. 1,500 V d.c.
- b. 750 V d.c.
- c. 600 V d.c.
- d. 1000 V d.c.

Your answer is incorrect.

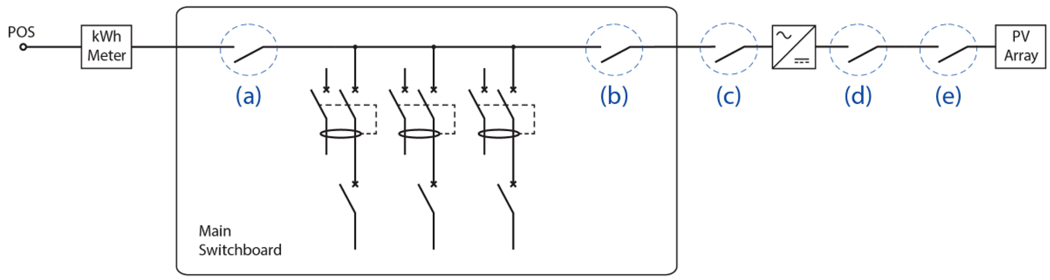
Refer to AS/NZS 5033:2021 Clause 3.1

The correct answer is: 1000 V d.c.

Question 15

Not answered

Marked out of 1.00



Which of the following requirements applies to switch (b) in the grid-connected PV installation pictured above?

- a. Must be an RCD with a rated residual current not greater than 30 mA
- b. Must provide both active and passive grid protection
- c. Must automatically disconnect in the event of overcurrent
- d. Must be able to be secured in the open position

Your answer is incorrect.

Refer to AS/NZS 4777.1:2024 Clause 3.4.3.1 (b)

The correct answer is: Must be able to be secured in the open position

Question 16

Not answered

Marked out of 1.00

A hazard that is typically present when installing a PV array on a steel sheet roof is:

- a. traffic
- b. toxic gases
- c. corrosive chemicals
- d. ultraviolet radiation

Your answer is incorrect.

UV radiation from the sun can result in sunburn and sun stroke. Control measures including UV protective clothing, polarised sunglasses, hat and sun cream should be used when working outdoors.
Refer to content page 5.1 for more information.

The correct answer is: ultraviolet radiation

Started on	Saturday, 15 February 2025, 1:40 AM
State	Finished
Completed on	Saturday, 15 February 2025, 1:41 AM
Time taken	10 secs
Grade	**0.00** out of 35.00 (**0**%)

Question 1

Not answered

Marked out of 6.00

Hazards commonly associated with installing PV arrays on roofs include:

- a. a.c. current
- b. UV radiation
- c. Chemical burns
- d. Asbestos
- e. Working at heights
- f. d.c. current
- g. Fire
- h. Manual handling

Your answer is incorrect.

Hazards that may typically be encountered when installing PV arrays on roofs include:

- Working at heights (working on the roof)
- Manual handling (handling PV modules)
- UV radiation (from the sun)
- d.c. current (produced by illuminated modules)
- a.c. current (flowing through consumer's mains or other installation cables)
- asbestos (roofing materials).

Refer to content page 5.1 for more information.

The correct answers are: Working at heights, Manual handling, UV radiation, d.c. current, a.c. current, Asbestos

Question 2

Not answered

Marked out of 4.00

Match each hazard/risk, associated with the installation of PV arrays on roofs, to an appropriate control measure:

Sunburn or sunstroke	Choose...
Electric shock from energised overhead lines	Choose...
Falling from heights	Choose...
Sprains and strains from manually handling PV modules	Choose...

Your answer is incorrect.

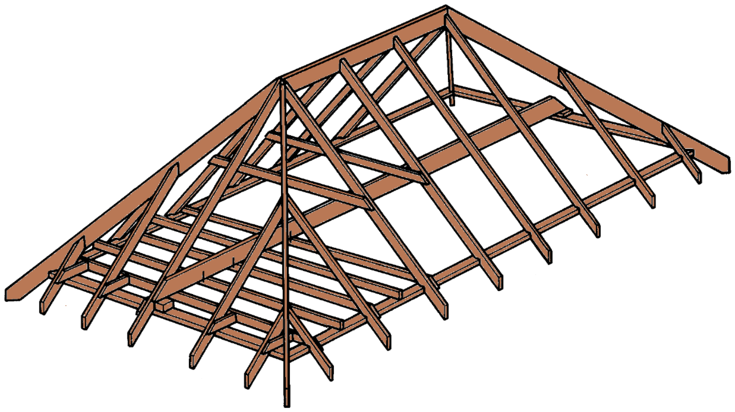
Refer to content page 5.1 and information provided by the Work Health and Safety regulator in your State or Territory.

The correct answer is: Sunburn or sunstroke → Sun cream, sunglasses, hat and UV protective clothing, Electric shock from energised overhead lines → Awareness and the establishment of exclusion zones, Falling from heights → Safety harness and non-slip footwear, Sprains and strains from manually handling PV modules → Correct lifting techniques and/or mechanical lifting aids

Question 3

Not answered

Marked out of 6.00



Which of the following roofing materials are typically used with the type of roof structure pictured above?

- a. Steel sheet
- b. Asphalt shingles
- c. Concrete slab
- d. Clay tiles
- e. Ceramic tiles
- f. Concrete tiles
- g. Plasterboard sheet
- h. Slate tiles

Your answer is incorrect.

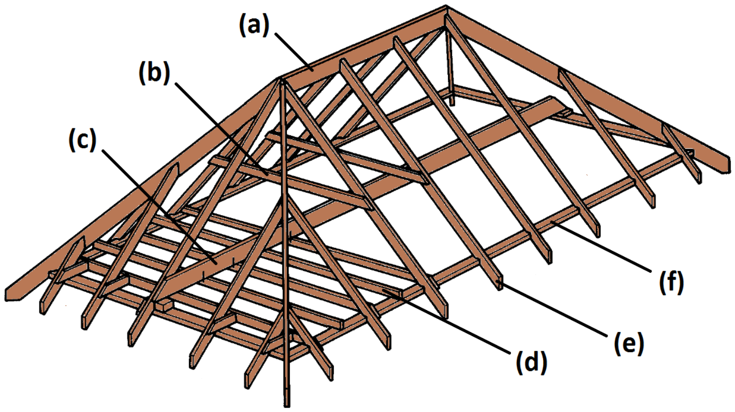
Roofing materials typically used with frame roofs include various tiles, various shingles and various types of steel sheet.
Refer to content page 5.1 for more information.

The correct answers are: Ceramic tiles, Steel sheet, Clay tiles, Concrete tiles, Slate tiles, Asphalt shingles

Question **4**

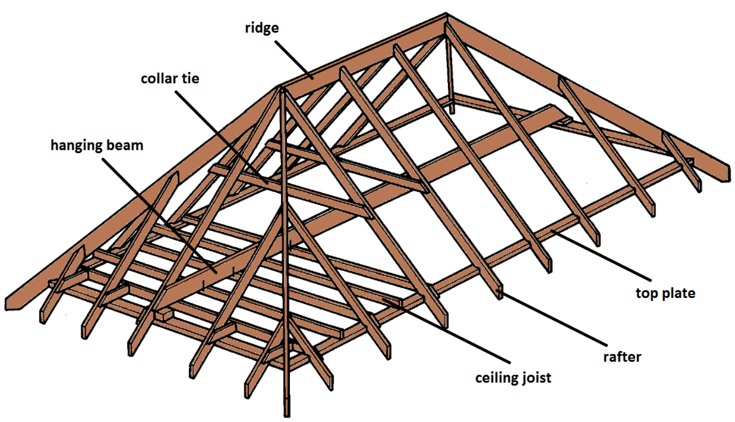
Not answered

Marked out of 6.00



In relation to the roof structure diagram pictured above, select the correct name for the timbers indicated:

- (a): ✖ .
- (b): ✖ .
- (c): ✖ .
- (d): ✖ .
- (e): ✖ .
- (f): ✖ .



Refer to content page 5.1 for more information.

Question 5

Not answered

Marked out of 1.00

When mounting a PV array on a tile roof, the mounting system brackets should be fixed directly to [ ] ✖ .

When mounting a PV array onto a slab roof, the mounting system brackets are fixed directly to [ ] ✖ using suitable [ ] ✖ .

Refer to content page 5.1

Question 6

Not answered

Marked out of 3.00

When mounting a PV array on a steel roof, the brackets are fixed to the [ ] ✖ by screwing through the [ ] ✖ at the appropriate points.

Care must be taken to ensure that all holes are appropriately sealed to maintain [ ] ✖ .

Brackets for fixing PV array mounting systems to steel roofing typically sit on the surface of the roof, and are fastened to the structural beams by screws penetrating the roofing material.

Refer to content page 5.1 for more information.

Question 7

Not answered

Marked out of 2.00

In relation to solar tracking systems:

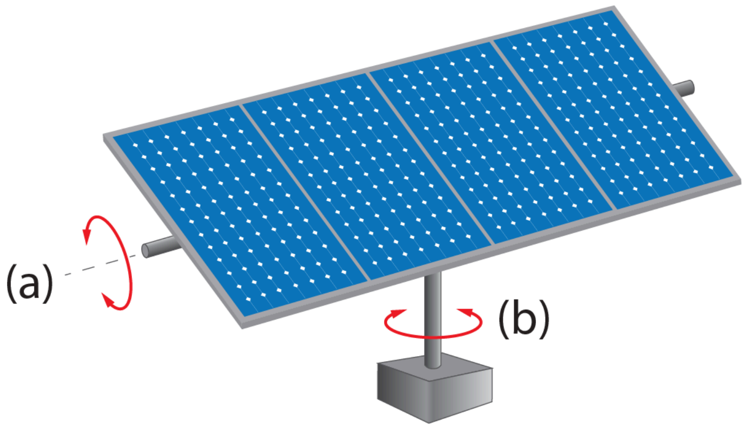
- Single-axis systems adjust [ ] ✖ to follow the sun's path across the sky.
- Dual-axis systems adjust [ ] ✖ to track the sun's movement throughout the day and throughout the year.

Refer to content page 5.1

Question 8

Not answered

Marked out of 2.00



For the dual-axis tracking system pictured above:

- (a) indicates [ ] ✖ adjustment.
- (b) indicates [ ] ✖ adjustment.

Refer to content page 5.1

Question 9

Not answered

Marked out of 5.00

Solar tracking [ ] ✖ array performance, thereby [ ] ✖ energy production.

However solar tracking systems also:

Cost [ ] ✖ than fixed systems.

Require [ ] ✖ maintenance.

Consumes [ ] ✖ to operate.

Refer to content page 5.1

Started on	Thursday, 31 October 2024, 4:22 PM
State	Finished
Completed on	Thursday, 31 October 2024, 4:23 PM
Time taken	25 secs
Grade	**0.00** out of 20.00 (**0**%)

Question 1

Not answered

Marked out of 1.00

When carrying out safe isolation procedures on a grid-connected PV system, what should you do immediately after testing for voltage to verify isolation?

- a. Notify the customer
- b. Test your test equipment on a known live source
- c. Place a padlock on each isolation lock-off device
- d. Check the PV terminals for signs of corrosion

Your answer is incorrect.

Refer to AS/NZS 4836:2023 and content page 6.1 for more information.

The correct answer is: Test your test equipment on a known live source

Question 2

Not answered

Marked out of 1.00

What is the purpose of commissioning PV power systems?

- a. To ensure connection of the system will not result in danger or damage
- b. To verify system wiring is correctly connected
- c. To document initial system performance
- d. All of these

Your answer is incorrect.

Refer to content page 6.2

The correct answer is: All of these

Question 3

Not answered

Marked out of 1.00

Consider that you need to isolate a grid-connected PV system in order to carry out maintenance work. What is the first thing you should do when you arrive on-site?

- a. Check the modules for soiling
- b. Test for voltage at the inverter
- c. Carry out a risk assessment
- d. Isolate each isolation device

Your answer is incorrect.

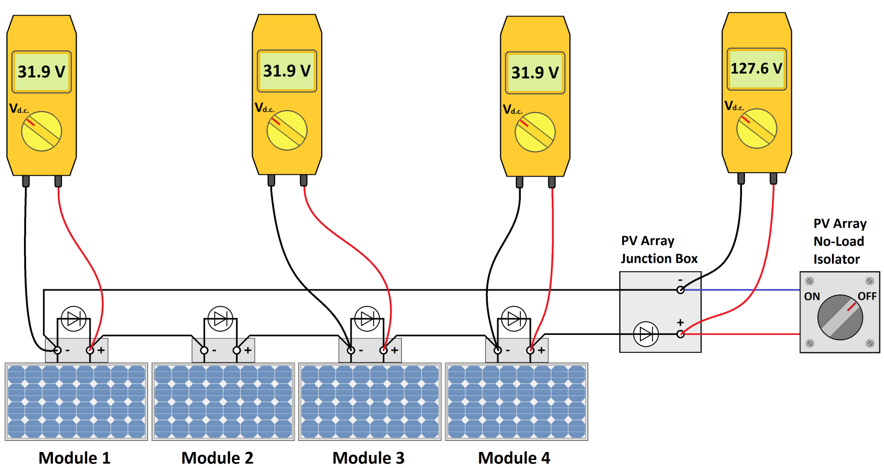
A risk assessment should always be carried out prior to commencing work.
Refer to content page 6.1 for more information.

The correct answer is: Carry out a risk assessment

Question 4

Not answered

Marked out of 1.00



The diagram above shows a PV array, consisting of four 145 W modules, undergoing voltage testing.
What do the test results indicate?

- a. One module is open-circuit
- b. Module polarity is correct
- c. One module is shorted
- d. The bypass diodes are connected in reverse

Your answer is incorrect.

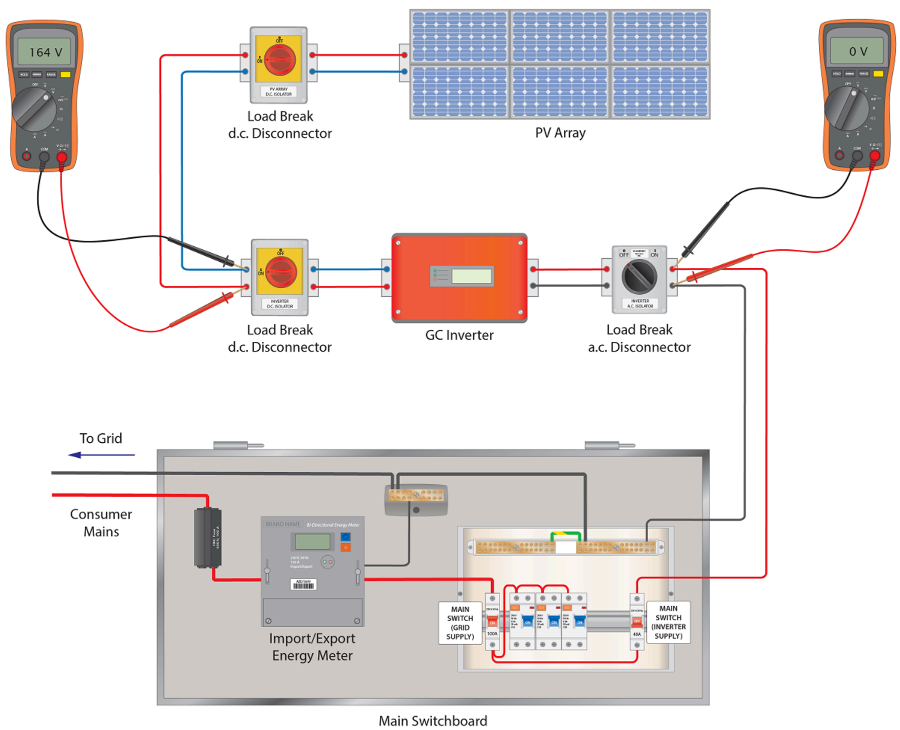
Module 1 + module 2 + module 3 + module 4 = string voltage
31.9 + 31.9 + 31.9 + 31.9 = 127.6 V

The correct answer is: Module polarity is correct

Question 5

Not answered

Marked out of 1.00



The power output of the PV array pictured above has dropped to zero.
Given the voltage measurements indicated, what is the most likely root cause of the problem?

- a. The grid supply has been disrupted
- b. Array interconnect wiring has come loose
- c. The inverter has blown a capacitor
- d. A high impedance on the service neutral

Your answer is incorrect.

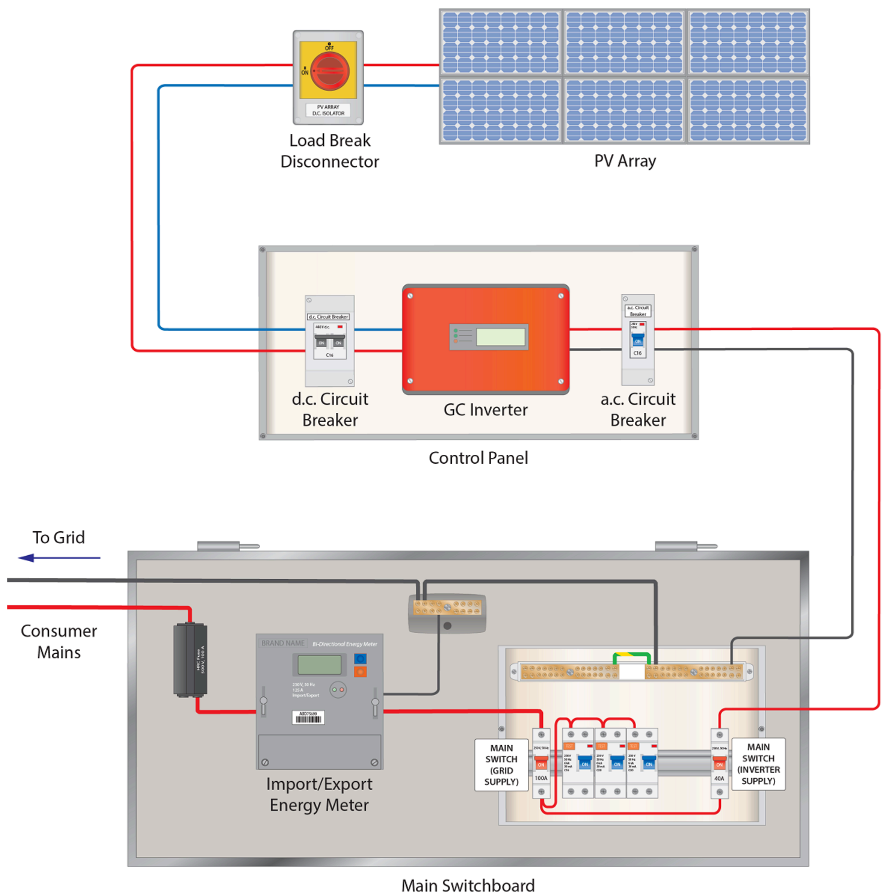
Refer to content page 6.3

The correct answer is: The grid supply has been disrupted

Question 6

Not answered

Marked out of 1.00



Which of the following requirements apply to the PV array switch disconnector in the PV system pictured above?

- a. Must be capable of interrupting the PV array prospective fault current
- b. All of these
- c. Must not be polarised
- d. Must have a utilisation of DC-PV2

Your answer is incorrect.

Refer to AS/NZS 5033:2021 Clause 4.3.4.2.2

The correct answer is: All of these

Question 7

Not answered

Marked out of 1.00

Which of the following are required to be documented in the PV system manual, provided to the customer at completion of installation and commissioning activities?

- a. All of these are correct
- b. Maintenance checklist and schedule
- c. Shutdown and isolation procedures
- d. Warranty information

Your answer is incorrect.

Refer to AS/NZS 5033:2021 Clause 6.2

The correct answer is: All of these are correct

Question 8

Not answered

Marked out of 1.00

The most suitable control measure to reduce the risk of electric shock posed by working on low voltage electrical systems is:

- a. the use of a safety observer
- b. the use of insulated gloves and safety glasses
- c. the application of safe isolation LOTO procedures
- d. the use of insulated tools

Your answer is incorrect.

Refer to content page 6.1

The correct answer is: the application of safe isolation LOTO procedures

Question 9

Not answered

Marked out of 1.00

Place the steps in the correct order to indicate the general procedure for restarting an alternative supply system.

Step 1 Choose...

Step 2 Choose...

Step 3 Choose...

Step 4 Choose...

Step 5 Choose...

Your answer is incorrect.

Refer to content page 6.1

The correct answer is: Step 1 → Identify and locate all points of isolation, Step 2 → Notify relevant personnel of your intent to reinstate the supply, Step 3 → Initiate start-up of the energy source (where applicable), Step 4 → Remove isolator lockout devices and tags, and switch on the isolators, Step 5 → Test to verify correct output voltage(s) at the system terminals

Question 10

Not answered

Marked out of 1.00

When isolating a grid-connected low voltage PV system to perform routine maintenance work on the inverter:

- a. only the load side of the inverter should be isolated
- b. it is sufficient to isolate the PV main switch
- c. only the line side of the inverter should be isolated
- d. both the line and load sides of the inverter should be isolated

Your answer is incorrect.

When isolating a PV system, the d.c. and a.c. sides of the GC inverter should be isolated. Refer to content page 6.1 for more information.

The correct answer is: both the line and load sides of the inverter should be isolated

Question 11

Not answered

Marked out of 1.00

During commissioning, continuity testing of PV system wiring should be carried out:

- a. All of these
- b. with the solar and grid supplies de-energised
- c. at night
- d. after system start-up

Your answer is incorrect.

Refer to content page 6.2

The correct answer is: with the solar and grid supplies de-energised

Question 12

Not answered

Marked out of 1.00

Which of the following is a hazard that may be encountered during the isolation of a low voltage PV array?

- a. Rise in voltage
- b. d.c. arcing
- c. All of these
- d. Working at heights

Your answer is incorrect.

Isolation of the array will typically involve working at heights.

The output voltage of the array will rise when isolated from the load.

d.c. has a tendency to arc when the flow of current is stopped. Installation disconnectors must be correctly selected with suitable breaking capacities and voltage ratings.

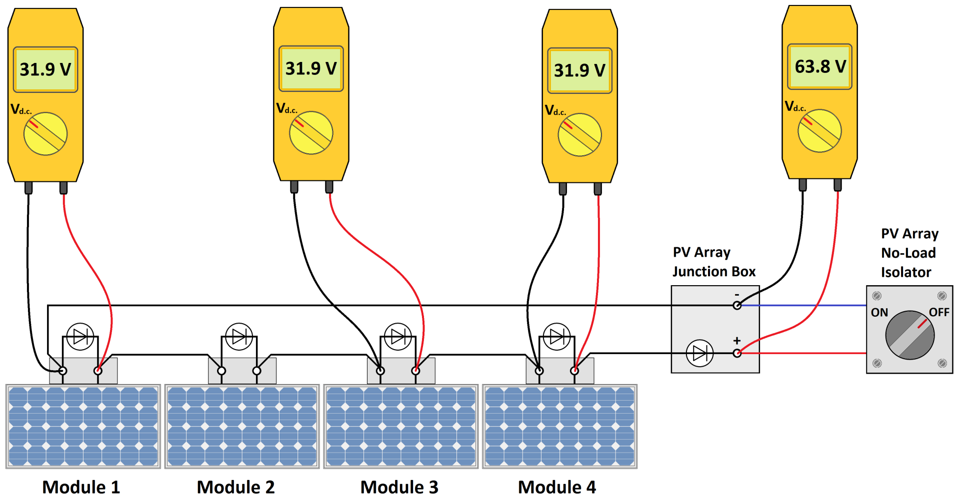
Refer to content page 6.1 for more information.

The correct answer is: All of these

Question **13**

Not answered

Marked out of 1.00



The diagram above shows a PV array, consisting of four 180 W modules, undergoing voltage testing.
What do the test results indicate?

- a. The array is functioning correctly
- b. Module 2 has been connected with incorrect polarity
- c. The bypass diodes of modules 1, 3 and 4 have been connected in reverse
- d. Module two bypass diode is shorted

Your answer is incorrect.

Module 1 + module 2 + module 3 + module 4 = string voltage
63.8 – 31.9 – 31.9 – 31.9 = -31.9 V

The correct answer is: Module 2 has been connected with incorrect polarity

Question **14**

Not answered

Marked out of 1.00

PV supply systems should be isolated under:

- a. full-load conditions
- b. fault conditions
- c. no-load conditions
- d. direct supervision

Your answer is incorrect.

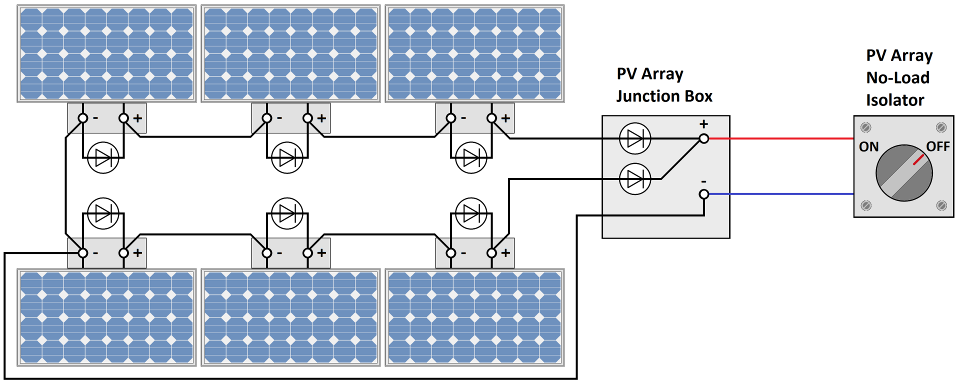
Refer to content 6.1

The correct answer is: no-load conditions

Question 15

Not answered

Marked out of 1.00



The PV array pictured above consists of six modules, each having a maximum voltage (VMOD MAX) of 29.1 V d.c..
In order to verify the insulation resistance of the array interconnect wiring:

- a. at least 1 MΩ should be measured using a test voltage of 1000 V
- b. at least 0.5 MΩ should be measured using a test voltage of 250 V
- c. at least 1 MΩ should be measured using a test voltage of 250 V
- d. at least 1 MΩ should be measured using a test voltage of 500 V

Your answer is incorrect.

Refer to AS/NZS 5033:2021 Table 4.7.
The array consists of two strings, each having three modules, resulting in a maximum array voltage of 87.3 V.
Therefore, according to Table 4.7, a test voltage of 250 V and a minimum IR of 0.5 MΩ is required.

The correct answer is: at least 0.5 MΩ should be measured using a test voltage of 250 V

Question 16

Not answered

Marked out of 1.00

Place the steps in the correct order to indicate the general procedure for safe isolation of an electrical supply.

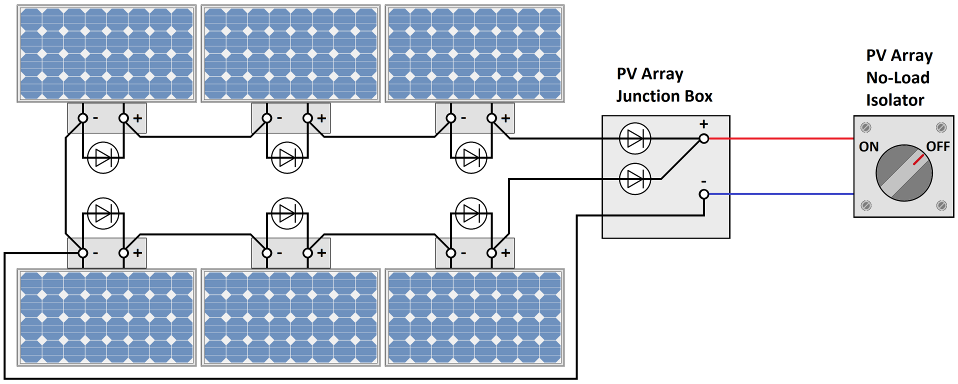
Step 1	✖
Step 2	✖
Step 3	✖
Step 4	✖
Step 5	✖
Step 6	✖

Refer to AS/NZS 4836:2023 and content page 6.1

Question 17

Not answered

Marked out of 1.00



The PV array pictured above consists of six modules, each having a maximum voltage (VMOD MAX) of 45 V d.c..
In order to verify the insulation resistance of the array interconnect wiring:

- a. at least 0.5 MΩ should be measured using a test voltage of 250 V
- b. at least 1 MΩ should be measured using a test voltage of 250 V
- c. at least 1 MΩ should be measured using a test voltage of 1000 V
- d. at least 1 MΩ should be measured using a test voltage of 500 V

Your answer is incorrect.

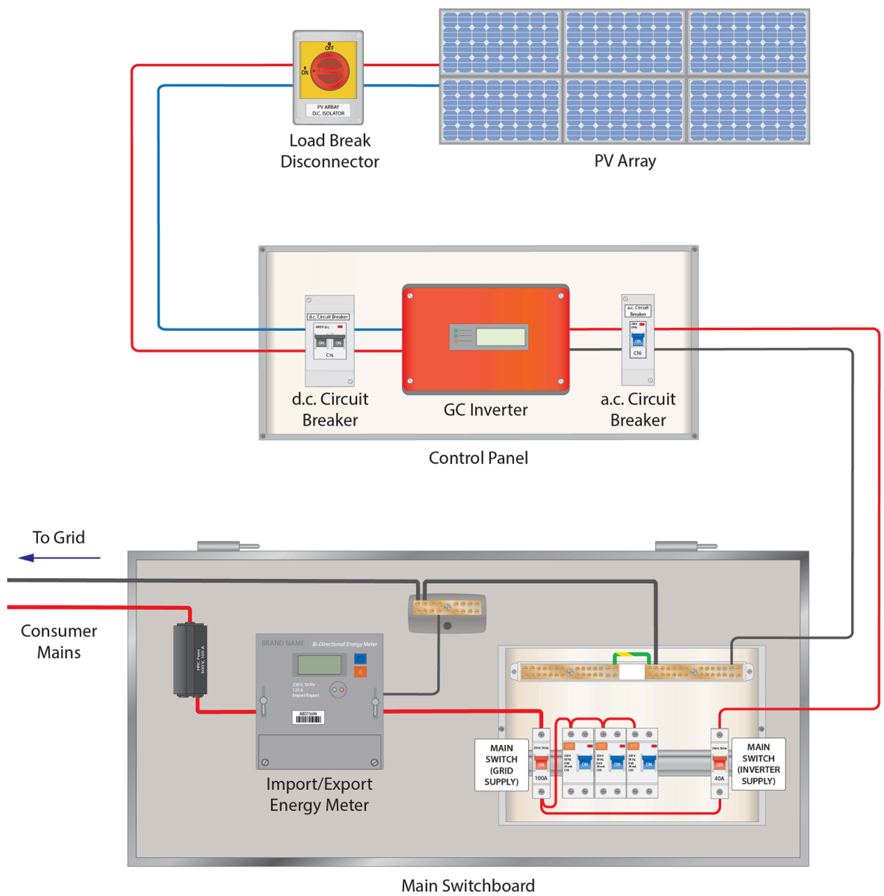
Refer to AS/NZS 5033:2021 Table 4.7.
The array consists of two strings, each having three modules, resulting in a maximum array voltage of 135 V d.c.
Therefore according to Table 4.7, a test voltage of 500 V and a minimum IR of 1 MΩ is required.

The correct answer is: at least 1 MΩ should be measured using a test voltage of 500 V

Question 18

Not answered

Marked out of 1.00



The 'd.c. Circuit Breaker' in the PV system diagram above must:

- a. have a utilisation category of at least AC5
- b. disconnect both the positive and negative conductors simultaneously
- c. be polarised
- d. have a current rating equal to that of the solar main switch

Your answer is incorrect.

Refer to AS/NZS 5033:2021 Clause 4.3.4.2.2 (d)

The correct answer is: disconnect both the positive and negative conductors simultaneously

Question 19

Not answered

Marked out of 1.00

After isolating, locking off and tagging a circuit, you should always test to verify that the circuit is de-energised, and then:

- a. place the key to the locking device on top of the switchboard for safe keeping
- b. commence work
- c. notify the customer that the supply has been de-energised
- d. test your test equipment to verify functionality

Your answer is incorrect.

Refer to content 6.1

The correct answer is: test your test equipment to verify functionality

Question 20

Not answered

Marked out of 1.00

Before an energy source is applied to a PV system installation, wiring should be tested to verify:

- a. continuity
- b. insulation
- c. All of these
- d. polarity

Your answer is incorrect.

Refer to AS/NZS 3000:2018 Section 8 and content page 6.2

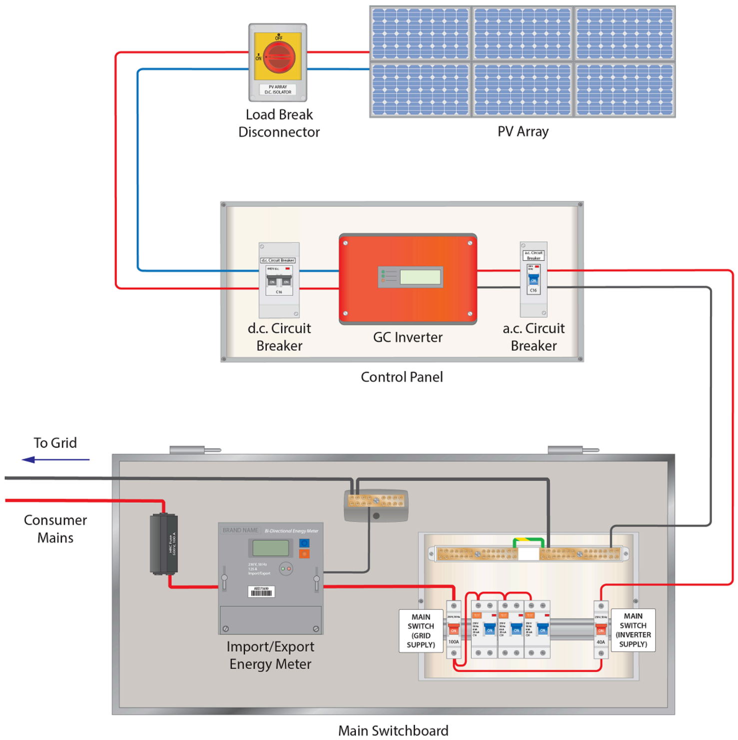
The correct answer is: All of these

Started on	Tuesday, 25 March 2025, 6:13 PM
State	Finished
Completed on	Tuesday, 25 March 2025, 6:13 PM
Time taken	9 secs
Grade	**0.00** out of 15.00 (**0**%)

Question 1

Not answered

Marked out of 7.00



Arrange the safe isolation procedure into the correct sequence, to carry out routine maintenance on the PV array pictured above.

Step 1	✖
Step 2	✖
Step 3	✖
Step 4	✖
Step 5	✖
Step 6	✖
Step 7	✖

Step 1: a risk assessment should always be carried out prior to commencing work.

Step 2: all isolation points should be located and identified prior to commencing isolation.

Step 3: the person in charge of the installation should be made aware that you intend to isolate the PV system.

Step 4: the line and load sides of the inverter should be isolated, along with the PV array and inverter supply main switch.

Step 5: test equipment should be tested on a known live source to verify functionality prior to testing for isolation, in accordance with AS/NZS 4836.

Step 6: line and load sides of the inverter should be tested for voltage to verify system isolation, in accordance with AS/NZS 4836.

Step 7: test equipment should be tested on a known live source to verify functionality prior to testing for isolation, in accordance with AS/NZS 4836.

Additional - Step 8: the PV modules may need to be covered with a PV blanket to prevent generation.

Question 2

Not answered

Marked out of 2.00

Identify whether or not the following statements are true or false in relation to safe shut-down and isolation of grid-connected PV systems.

PV power systems should only be isolated under full-load conditions.	✖
Isolating a PV array will cause the array voltage to rise.	✖

Refer to content page 6.1

Question 3

Not answered

Marked out of 1.00

What information should you provide on a personal danger tag?

- ☐ a. The time and date of the isolation
- ☐ b. Your contact phone number
- ☐ c. Your business/company name
- ☐ d. Your electrical license number
- ☐ e. An expected completion date
- ☐ f. Your name
- ☐ g. Instructions for re-energising the supply

Your answer is incorrect.

Refer to content page 6.1

The correct answers are: Your name, Your contact phone number, Your business/company name, The time and date of the isolation

Question 4

Not answered

Marked out of 4.00

A [ ] ✖ voltage tester may read [ ] ✖ volts, even when equipment terminals are at 230/400 V a.c.

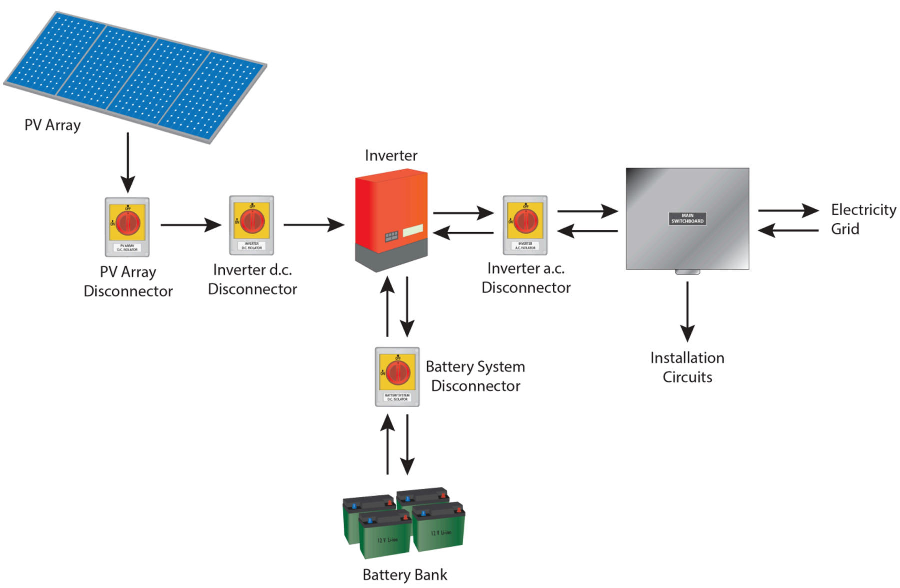
Testing the voltage tester [ ] ✖ and after testing for zero volts, reduces your risk of receiving an electric [ ] ✖ .

Refer to content page 6.1

Question 5

Not answered

Marked out of 1.00



In relation to the installation pictured above, which disconnectors (isolators) need to be locked out and tagged, as a minimum, so that repair work can be safely carried out on the inverter?

- a. Battery system disconnector
- b. PV array disconnector
- c. Inverter a.c. disconnector
- d. Inverter d.c. disconnector

Your answer is incorrect.

Refer to content page 6.1

The correct answers are: Inverter d.c. disconnector, Inverter a.c. disconnector, Battery system disconnector

Started on	Tuesday, 25 March 2025, 6:14 PM
State	Finished
Completed on	Tuesday, 25 March 2025, 6:14 PM
Time taken	8 secs
Grade	**0.00** out of 36.00 (**0**%)

Question 1

Not answered

Marked out of 5.00

The purpose of commissioning PV power systems is to:

- Verify that wiring and equipment is installed and connected [ ] ✖ .
- Verify that wiring and equipment [ ] ✖ .
- Ensure connection to the grid will not result in [ ] ✖ .
- [ ] ✖ initial system [ ] ✖ .

Refer to content page 6.2

Question 2

Not answered

Marked out of 2.00

Requirements for commissioning of PV power systems can be found in:

- AS/NZS 4509.1:2009 Section [ ] ✖ , and
- AS/NZS 5033:2021 Clause [ ] ✖ .

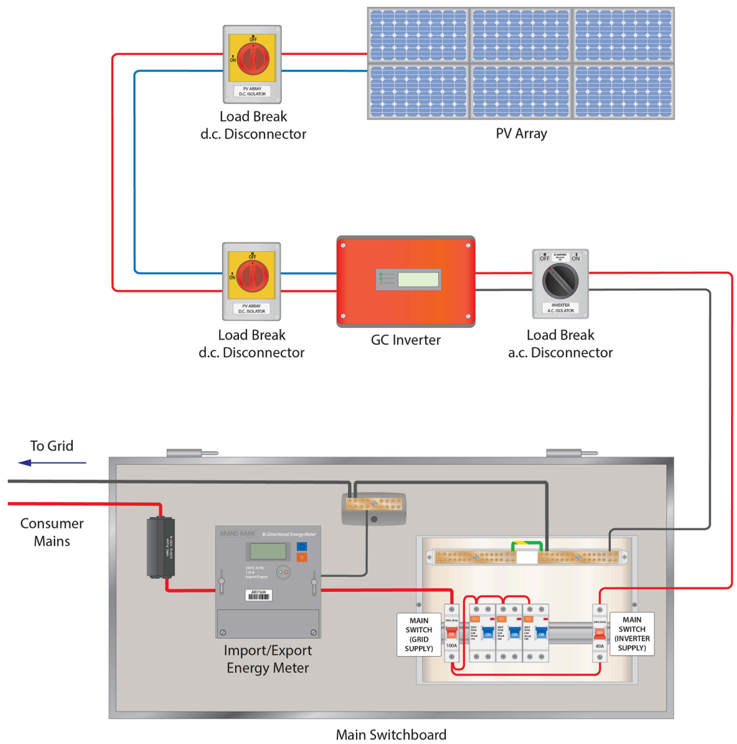
Refer to AS/NZS 4509.1:2009 Section 10 and AS/NZS 5033:2021 Clause 6.3.

Question 3

Not answered

Marked out of 10.00

Arrangement of System Components



Arrange the following items into the correct order to create a commissioning procedure, complying with AS/NZS 5033:2021 and AS/NZS 3000:2018, for the grid-connected PV installation pictured above.

The array has a maximum power of 2.2 kW, and a nominal voltage of 92 V.

Part 1 – System Wiring

Test continuity of wiring between inverter and solar main switch and document results	Choose...
Test continuity of wiring between PV array disconnector and inverter and document results	Choose...
Isolate grid supply by removing service fuse in accordance with local SIRs	Choose...
Test continuity of wiring between solar main switch and kWh meter and document results	Choose...
Test polarity of wiring between PV array disconnector and inverter and document results	Choose...
Test insulation resistance of wiring between PV array disconnector and inverter and document results	Choose...
Test insulation resistance of wiring between the inverter and solar main switch and document results	Choose...
Test insulation resistance of wiring between solar main switch and kWh meter and document results	Choose...
Test polarity of wiring between solar main switch and kWh meter and document results	Choose...
Test polarity of wiring between the inverter and solar main switch and document results	Choose...

Your answer is incorrect.

Refer to AS/NZS 4509.1:2009 Section 10 and AS/NZS 3000:2018 Section 8

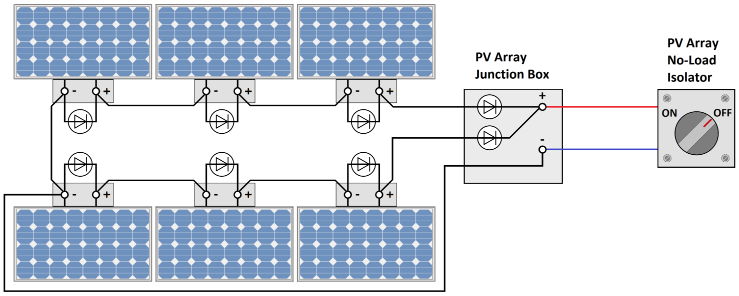
The correct answer is: Test continuity of wiring between inverter and solar main switch and document results → Step 5, Test continuity of wiring between PV array disconnector and inverter and document results → Step 1, Isolate grid supply by removing service fuse in accordance with local SIRs → Step 4, Test continuity of wiring between solar main switch and kWh meter and document results → Step 6, Test polarity of wiring between PV array disconnector and inverter and document results → Step 3, Test insulation resistance of wiring between PV array disconnector and inverter and document results → Step 2, Test insulation resistance of wiring between the inverter and solar main switch and document results → Step 7, Test insulation resistance of wiring between solar main switch and kWh meter and document results → Step 8, Test polarity of wiring between solar main switch and kWh meter and document results → Step 10, Test polarity of wiring between the inverter and solar main switch and document results → Step 9

Question 4

Not answered

Marked out of 11.00

PV String/Array Wiring



Part 2 - PV Array

Measure the open-circuit voltage and polarity of each string and document results	Choose...
Test insulation resistance between array positive (+) conductor and earth, and document results	Choose...
Measure the open-circuit voltage of the array at the PV array disconnector and document results	Choose...
Measure string short-circuit currents (where required) and document results	Choose...
Test insulation resistance between array negative (-) conductor and earth, and document results	Choose...
Isolate PV strings	Choose...
Test continuity of wiring between array junction box and PV array disconnector and document results	Choose...
Connect strings to the d.c. cabling in the array junction box, ensuring PV array disconnector is in the OFF position	Choose...
Test each string for continuity and document results	Choose...
Test each array earthing conductor for continuity and document results	Choose...
Test the insulation resistance of wiring between array junction box and PV array disconnector and document results	Choose...

Your answer is incorrect.

Refer to AS/NZS 5033:2021 Clause 6.3

The correct answer is: Measure the open-circuit voltage and polarity of each string and document results → Step 16, Test insulation resistance between array positive (+) conductor and earth, and document results → Step 20, Measure the open-circuit voltage of the array at the PV array disconnector and document results → Step 19, Measure string short-circuit currents (where required) and document results → Step 17, Test insulation resistance between array negative (-) conductor and earth, and document results → Step 21, Isolate PV strings → Step 11, Test continuity of wiring between array junction box and PV array disconnector and document results → Step 14, Connect strings to the d.c. cabling in the array junction box, ensuring PV array disconnector is in the OFF position → Step 18, Test each string for continuity and document results → Step 12, Test each array earthing conductor for continuity and document results → Step 13, Test the insulation resistance of wiring between array junction box and PV array disconnector and document results → Step 15

Question 5

Not answered

Marked out of 7.00

Part 3 - System Start-Up

Measure d.c. voltage at inverter input and document results	Choose...
De-energise grid main switch and inspect inverter to verify operation of grid protection	Choose...
Measure a.c. voltage at inverter output and document results	Choose...
Energise PV array disconnector, d.c. inverter disconnector, a.c. inverter disconnector and solar main switch in accordance with inverter manufacturers start-up guidelines	Choose...
Measure operating currents of each string and document results	Choose...
Inspect inverter display to verify grid synchronisation	Choose...
Re-energise grid supply in accordance with local supply authority regulations	Choose...

Your answer is incorrect.

Refer to AS/NZS 4509.1:2009 Section 10 and AS/NZS 5033:2021 Clause 6.3

The correct answer is: Measure d.c. voltage at inverter input and document results → Step 25, De-energise grid main switch and inspect inverter to verify operation of grid protection → Step 27, Measure a.c. voltage at inverter output and document results → Step 26, Energise PV array disconnector, d.c. inverter disconnector, a.c. inverter disconnector and solar main switch in accordance with inverter manufacturers start-up guidelines → Step 23, Measure operating currents of each string and document results → Step 28, Inspect inverter display to verify grid synchronisation → Step 24, Re-energise grid supply in accordance with local supply authority regulations → Step 22

Question 6

Not answered

Marked out of 1.00

Which of the following are required to be documented in the PV system manual, provided to the customer at completion of installation and commissioning activities?

- a. Shutdown and isolation procedures
- b. System ratings and commissioning date
- c. Commissioning records
- d. System diagram(s)
- e. System performance estimate
- f. Warranty information
- g. Disconnection device's locations and cable routing
- h. Procedures in the event of an earth fault alarm
- i. Installed equipment and associated manufacturer's manuals
- j. Maintenance checklist and schedule

Your answer is incorrect.

Refer to AS/NZS 5033:2021 Clause 6.2

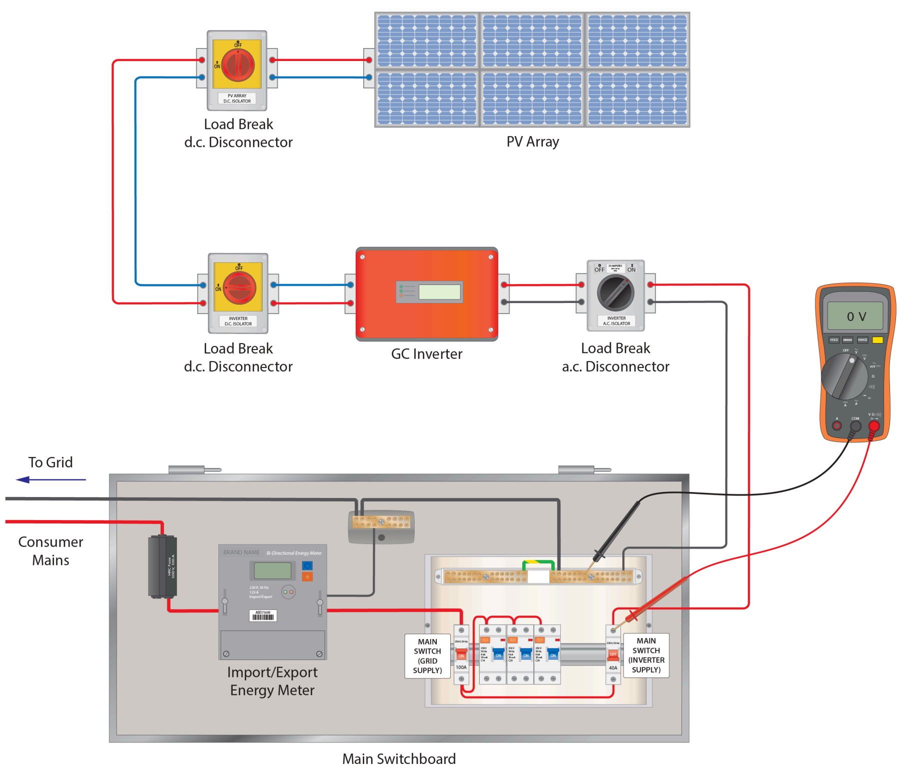
The correct answers are: System ratings and commissioning date, Installed equipment and associated manufacturer's manuals, Procedures in the event of an earth fault alarm, Shutdown and isolation procedures, System diagram(s), Disconnection device's locations and cable routing, System performance estimate, Maintenance checklist and schedule, Commissioning records, Warranty information

Started on	Tuesday, 25 March 2025, 6:14 PM
State	Finished
Completed on	Tuesday, 25 March 2025, 6:14 PM
Time taken	7 secs
Grade	**0.00** out of 15.00 (**0**%)

Question 1

Not answered

Marked out of 1.00



Examine the diagram above, showing a PV system undergoing operational testing.

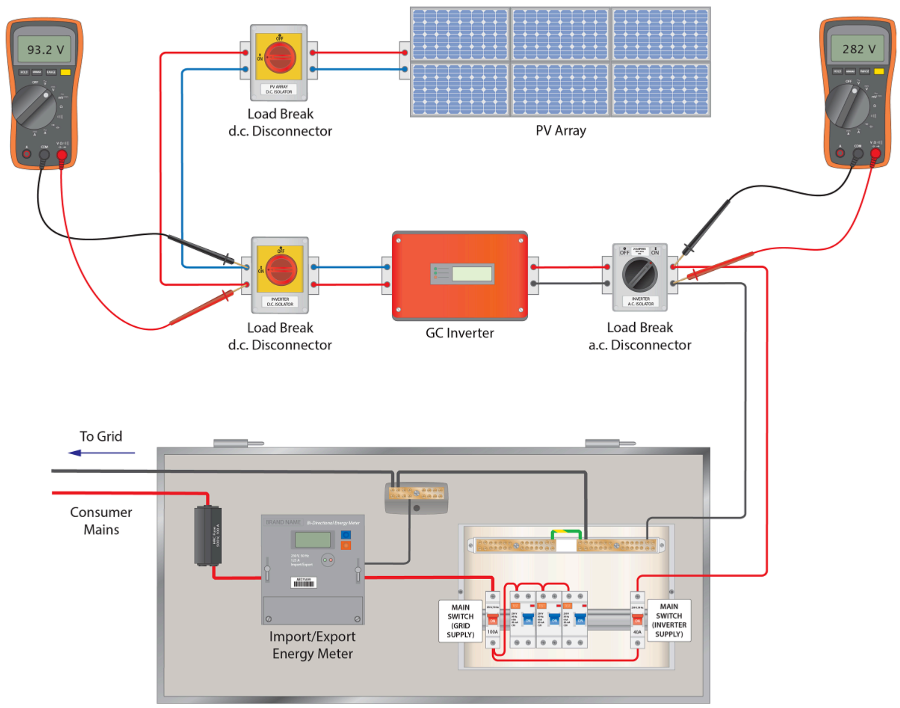
The most likely reason for the test result indicated is that ______ ✖ .

The no-load isolator has been left in the OFF position. Refer to content page 6.3 for further guidance.

Question 2

Not answered

Marked out of 1.00



Examine the diagram above, showing a 1.2 kW PV system, having a nominal voltage of 72 V d.c.

The array power has dropped to zero, and so the installation is undergoing operational testing to determine the cause.

The most likely cause of the fault, given the symptoms and test results indicated is that

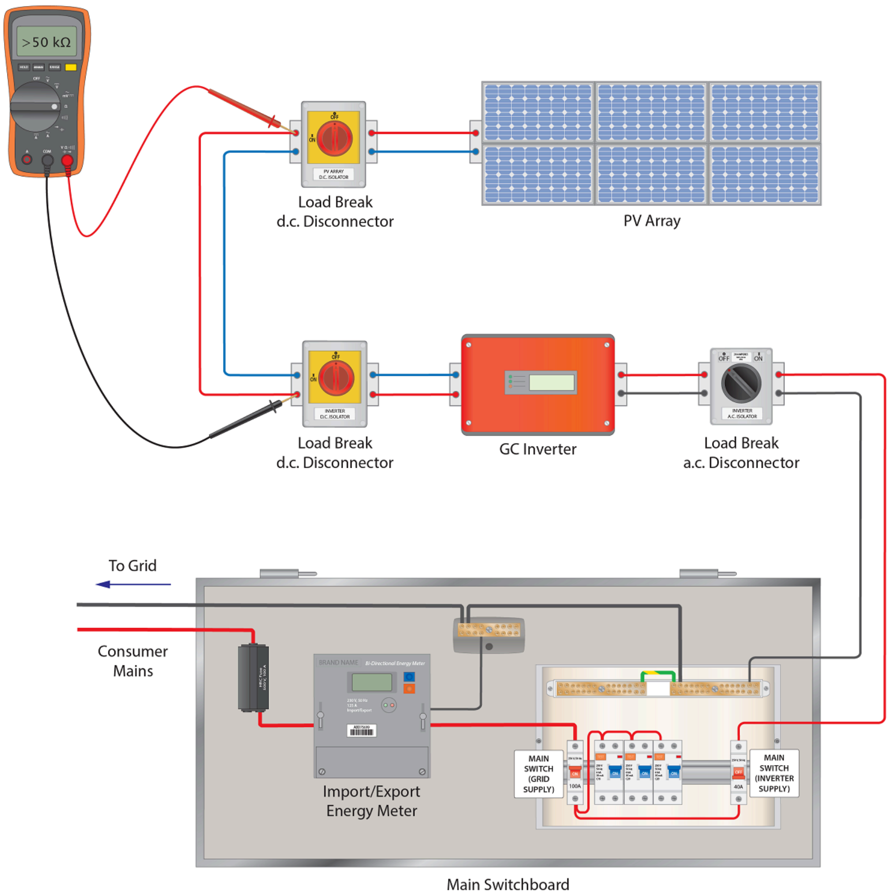
[ ] ✖ .

A grid voltage of 282 V will have exceeded the upper limit of the inverter passive grid protection, causing automatic disconnection of the circuit. The open circuit array voltage is being measured at the line side terminals of the inverter switch disconnector. Refer to content page 6.3 for further guidance.

Question 3

Not answered

Marked out of 1.00



Examine the diagram above, showing the active conductor of the d.c. cabling between the array and the inverter under test during system commissioning.

The test result shown indicates [ ] ✖ .

The high resistance indicates an open-circuit, likely caused by mechanical damage to the conductor. Refer to content page 6.3 for further guidance.

Question 4

Not answered

Marked out of 4.00

Match the PV array faults to the most likely cause from the list provided:

Shading	Choose...
Open-circuit interconnection wiring	Choose...
Broken module glass	Choose...
Delamination	Choose...

Your answer is incorrect.

Refer to content page 6.3

The correct answer is: Shading → Vegetation growth, Open-circuit interconnection wiring → Wind loading, Broken module glass → Hail, Delamination → Thermal stress

Question 5

Not answered

Marked out of 4.00

Match the PV array problems to the most suitable solution from the list provided:

Delamination	✖
Shading	✖
Soiling	✖
Broken module glass	✖

Refer to content page 6.3

Question 6

Not answered

Marked out of 4.00

Match the PV array problems to the most suitable solution from the list provided:

Accumulation of dust	✖
Open-circuit cells	✖
Open-circuit interconnection wiring	✖
Short-circuit cells	✖

Refer to content page 6.3