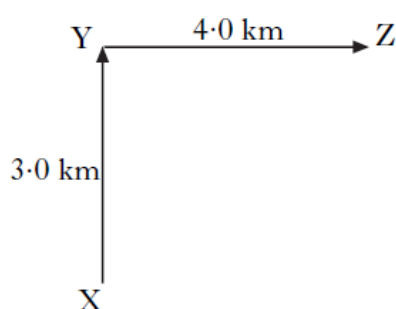


Velocity & Displacement

- Which of the following is a vector quantity?
 - Distance
 - Energy
 - Speed
 - Time
 - Velocity
- A student walks from X to Y and then from Y to Z.



The complete walk takes 2 hours.

Which row in the table shows the average speed and the average velocity for the complete walk?

	<i>Average speed</i>	<i>Average velocity</i>
A	2.5 km/h	2.5 km/h at 053
B	2.5 km/h at 053	2.5 km/h
C	3.5 km/h	2.5 km/h at 053
D	3.5 km/h at 053	3.5 km/h
E	3.5 km/h	3.5 km/h at 053

- A car travelling in a straight line decelerates uniformly from 20 m/s to 12 m/s in 4 seconds. The displacement of the car in this time is
 - 32 m
 - 48 m
 - 64 m
 - 80 m
 - 128 m.

- Which of the following quantities requires both magnitude and direction?
 - Mass
 - Distance
 - Momentum
 - Speed
 - Time

- A cross country runner travels 2.1 km North then 1.5 km East. The total time taken is 20 minutes.

The average speed of the runner is

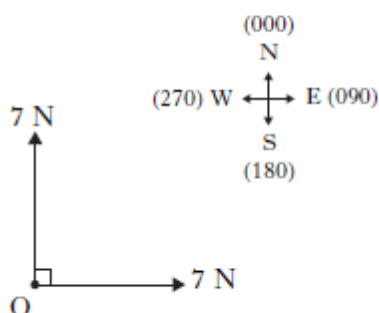
- 0.18 m/s
- 2.2 m/s
- 3.0 m/s
- 130 m/s
- 180 m/s.

1. Which of the following is a scalar quantity?

- A Force
- B Acceleration
- C Momentum
- D Velocity
- E Energy

3. Two forces, each of 7 N, act on an object O.

The forces act as shown.



The resultant of these two forces is

- A 7 N at a bearing of 135
- B 9.9 N at a bearing of 045
- C 9.9 N at a bearing of 135
- D 14 N at a bearing of 045
- E 14 N at a bearing of 135.

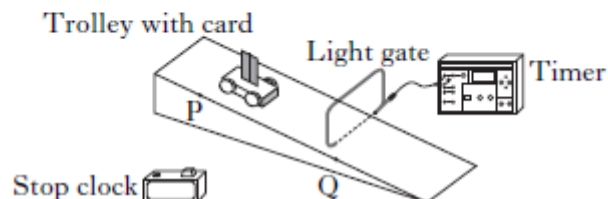
1. During training an athlete sprints 30 m East and then 40 m West.

Which row shows the distance travelled and the displacement from the starting point?

	<i>Distance travelled</i>	<i>Displacement</i>
A	10 m	10 m East
B	10 m	10 m West
C	10 m	70 m East
D	70 m	10 m West
E	70 m	10 m East

2. A student investigates the speed of a trolley as it moves down a slope.

The apparatus is set up as shown.



The following measurements are recorded.

- distance from P to Q = 1.0 m
- length of card on trolley = 0.04 m
- time taken for trolley to travel from P to Q = 2.5 s
- time taken for card to pass through light gate = 0.05 s

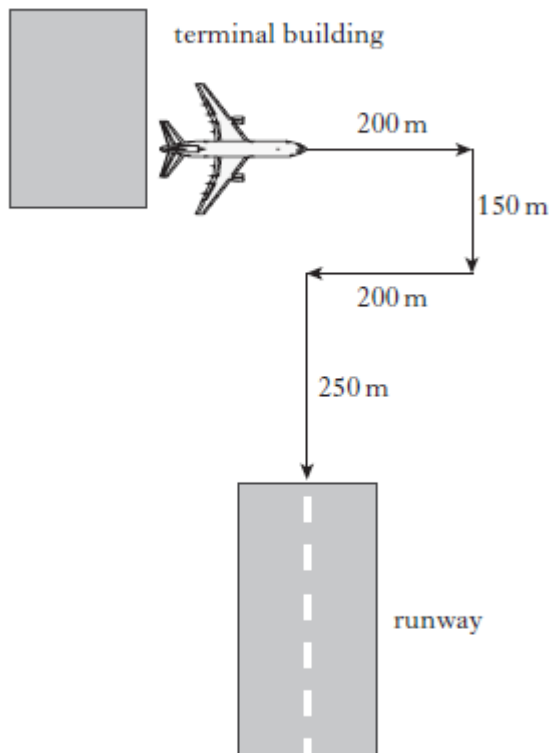
The speed at Q is

- A 0.002 m/s
- B 0.016 m/s
- C 0.40 m/s
- D 0.80 m/s
- E 20 m/s.

1. Which row contains two scalar quantities and one vector quantity?

- A Distance, momentum, velocity
- B Speed, mass, momentum
- C Distance, weight, force
- D Speed, weight, momentum
- E Velocity, force, mass

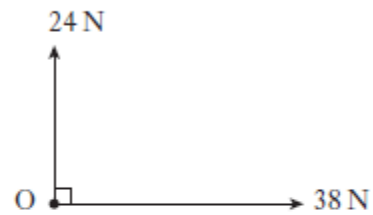
1. At an airport an aircraft moves from the terminal building to the end of the runway.



Which row shows the total distance travelled and the size of the displacement of the aircraft?

	<i>Total distance travelled (m)</i>	<i>Size of displacement (m)</i>
A	400	800
B	450	200
C	450	400
D	800	400
E	800	800

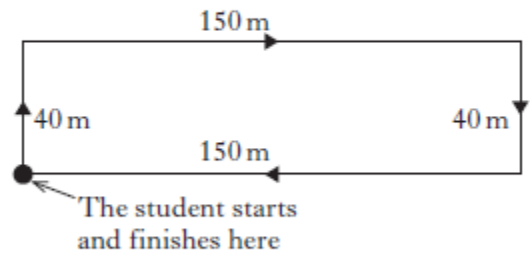
3. Two forces act on an object O in the directions shown.



The size of the resultant force is

- A 14 N
 B 24 N
 C 38 N
 D 45 N
 E 62 N.

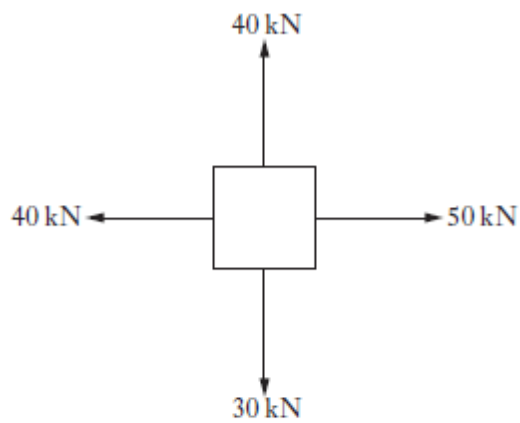
2. A student follows the route shown in the diagram and arrives back at the starting point.



Which row in the table shows the total distance walked and the magnitude of the final displacement?

	<i>Total distance (m)</i>	<i>Final displacement (m)</i>
A	0	80
B	0	380
C	190	0
D	380	0
E	380	380

5. Four tugs apply forces to an oil-rig in the directions shown.

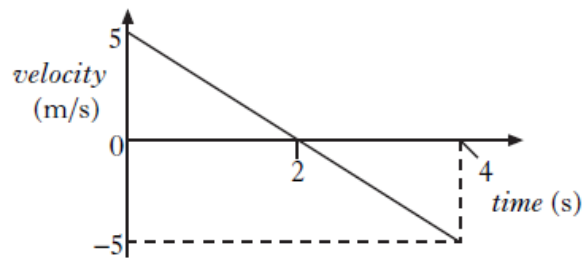


Which of the following could represent the direction of the resultant force?

- A
- B
- C
- D
- E

V = t Graph

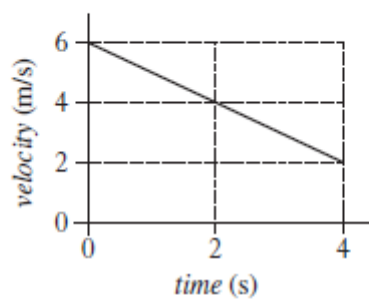
3. The graph shows how the velocity of an object varies with time.



Which row in the table shows the displacement after 4 s and the acceleration of the object during the first 4 s?

	<i>Displacement</i> (m)	<i>Acceleration</i> (m/s ²)
A	10	-10
B	10	2.5
C	0	2.5
D	0	-10
E	0	-2.5

2. The graph shows how the velocity of a ball changes with time.



The acceleration of the ball is

- A -8 m/s^2
- B -1 m/s^2
- C 1 m/s^2
- D 8 m/s^2
- E 24 m/s^2 .

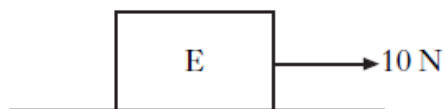
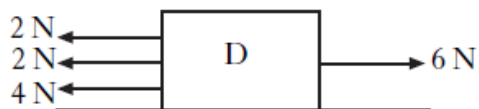
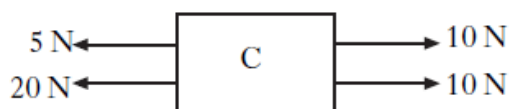
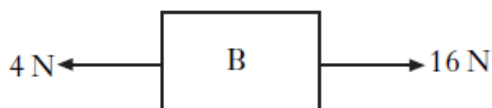
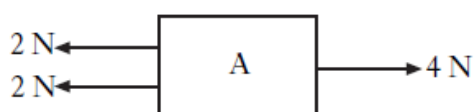
Acceleration

Newton's Laws

4. An unbalanced force of one newton will make a

- A 0.1 kg mass accelerate at 1 m/s^2
- B 1 kg mass accelerate at 1 m/s^2
- C 1 kg mass accelerate at 10 m/s^2
- D 0.1 kg mass move at a constant speed of 1 m/s
- E 1 kg mass move at a constant speed of 10 m/s .

5. Which block has the largest resultant force acting on it?

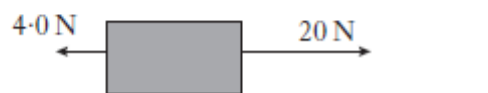


2. Near the Earth's surface, a mass of 6 kg is falling with a constant velocity.

The air resistance and the unbalanced force acting on the mass are:

	<i>air resistance</i>	<i>unbalanced force</i>
A	60 N upwards	0 N
B	10 N upwards	10 N downwards
C	10 N downwards	70 N downwards
D	10 N upwards	0 N
E	60 N upwards	60 N downwards

4. The diagram shows the horizontal forces acting on a box.

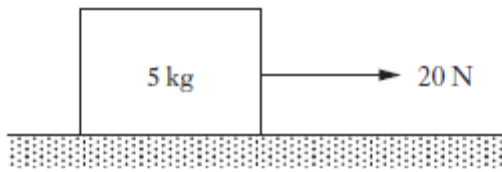


The box accelerates at 1.6 m/s^2 .

The mass of the box is

- A 0.10 kg
- B 10.0 kg
- C 15.0 kg
- D 25.6 kg
- E 38.4 kg.

4. A block is pulled across a horizontal surface as shown.



The mass of the block is 5 kg.

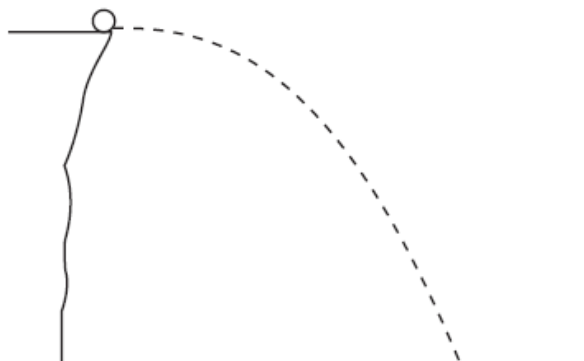
The block is travelling at a constant speed.

The force of friction acting on the block is

- A 0 N
- B 4 N
- C 15 N
- D 20 N
- E 25 N.

Projectile Motion

- 4 A ball is thrown horizontally from a cliff as shown.



The effect of air resistance is negligible.

A student makes the following statements about the ball.

- I The vertical speed of the ball increases as it falls.
- II The vertical acceleration of the ball increases as it falls.
- III The vertical force on the ball increases as it falls.

Which of the statements is/are correct?

- A I only
- B II only
- C I and II only
- D II and III only
- E I, II and III

6. An arrow is fired from a bow as shown.

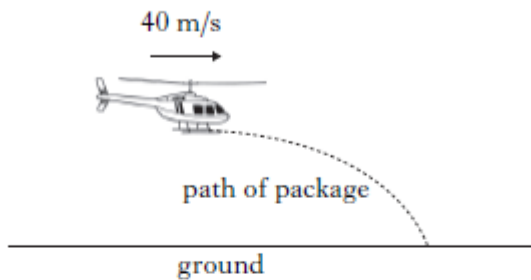


An archer pulls the string back a distance of 0.50 m . The string exerts an average force of 300 N on the arrow as it is fired. The mass of the arrow is 0.15 kg .

The maximum kinetic energy gained by the arrow is

- A 23 J
- B 150 J
- C 600 J
- D 2000 J
- E 6750 J

- 4 A package is released from a helicopter flying horizontally at a constant speed of 40 m/s.



The package takes 3.0 s to reach the ground.

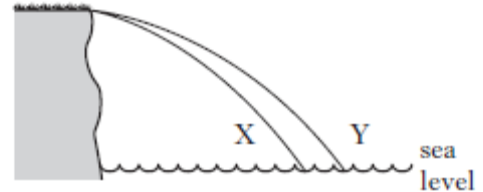
The effects of air resistance can be ignored.

Which row in the table shows the horizontal speed and vertical speed of the package just before it hits the ground?

	<i>Horizontal speed</i> (m/s)	<i>Vertical speed</i> (m/s)
A	0	30
B	30	30
C	30	40
D	40	30
E	40	40

5. Two identical balls X and Y are projected horizontally from the edge of a cliff.

The path taken by each ball is shown.



A student makes the following statements about the motion of the two balls.

- I They take the same time to reach sea level.
- II They have the same vertical acceleration.
- III They have the same horizontal velocity.

Which of these statements is/are correct?

- A I only
- B II only
- C I and II only
- D I and III only
- E II and III only

Space Exploration

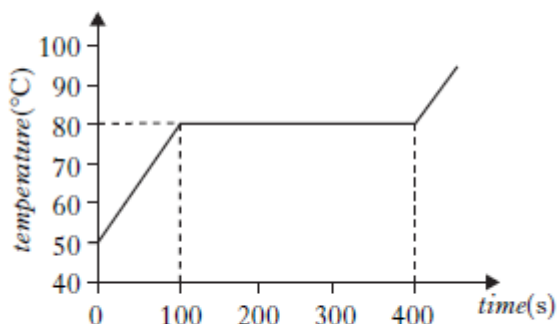
7. A sample of water is at a temperature of 100°C . The sample absorbs $2.3 \times 10^4 \text{ J}$ of energy.

The specific latent heat of vaporisation of water is $22.6 \times 10^5 \text{ J/kg}$.

The mass of water changed into steam at 100°C is

- A 0.01 kg
- B 5.3 kg
- C 100 kg
- D $2.3 \times 10^4 \text{ kg}$
- E $2.3 \times 10^6 \text{ kg}$.

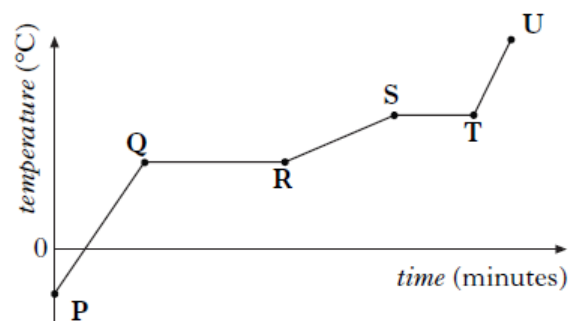
5. 100 g of a solid is heated by a 50 W heater. The graph of temperature of the substance against time is shown.



The specific latent heat of fusion of the substance is

- A $1.3 \times 10^3 \text{ J/kg}$
- B $1.5 \times 10^3 \text{ J/kg}$
- C $3.0 \times 10^3 \text{ J/kg}$
- D $1.5 \times 10^5 \text{ J/kg}$
- E $1.9 \times 10^5 \text{ J/kg}$.

7. A solid substance is placed in an insulated container and is heated at a constant rate. The graph shows how the temperature of the substance changes with time.



During the time interval QR, which of the following statements is/are correct?

- I There is a change in the state of the substance.
- II The substance changes state from a liquid to a gas.
- III Heat is absorbed by the substance.

- A I only
- B III only
- C I and II only
- D I and III only
- E I, II and III

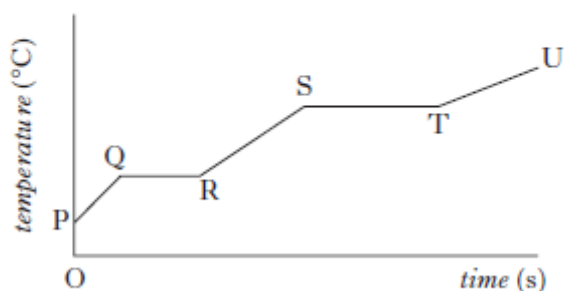
3. A space probe has a mass of 60 kg. The weight of the space probe at the surface of a planet in our solar system is 720 N.

The planet is

- A Venus
- B Mars
- C Jupiter
- D Saturn
- E Neptune.

8. A heater is immersed in a substance. The heater is then switched on.

The graph shows the temperature of the substance over a period of time.



Which row in the table identifies the sections of the graph when the substance is changing state?

	<i>Solid to liquid</i>	<i>Liquid to gas</i>
A	QR	TU
B	QR	ST
C	PQ	RS
D	PQ	TU
E	ST	QR

6. The specific latent heat of fusion of a substance is the energy required to

- A melt 1 kg of the substance at its melting point
- B evaporate 1 kg of the substance at its boiling point
- C change the state of the substance without changing its temperature
- D change the temperature of the substance without changing its state
- E change the temperature of 1 kg of the substance by 1 °C.

7. A block of ice of mass 1.5 kg is placed in a room.

The temperature of the block is 0 °C.

The temperature of the room is 20 °C.

The minimum energy required to **melt** the ice is

- A 0.63×10^5 J
- B 1.25×10^5 J
- C 1.88×10^5 J
- D 5.01×10^5 J
- E 6.26×10^5 J.

Cosmology

Conservation of Energy

6. A crate of mass 200 kg is pushed a distance of 20 m across a level floor.
The crate is pushed with a force of 150 N.
The force of friction acting on the crate is 50 N.
The work done in pushing the crate across the floor is
- A 1000 J
 - B 2000 J
 - C 3000 J
 - D 4000 J
 - E 20 000 J.
4. An engine applies a force of 2000 N to move a lorry at a constant speed.
The lorry travels 100 m in 16 s.
The power developed by the engine is
- A 0.8 W
 - B 12.5 W
 - C 320 W
 - D 12 500 W
 - E 3 200 000 W.
7. An electrical motor raises a crate of mass 500 kg through a height of 12 m in 4 s.
The minimum power rating of the motor is
- A 1.25 kW
 - B 1.5 kW
 - C 15 kW
 - D 60 kW
 - E 240 kW.

8. A student writes the following statements about electrical conductors.

- I Only protons are free to move.
- II Only electrons are free to move.
- III Only negative charges are free to move.

Which of the statements is/are correct?

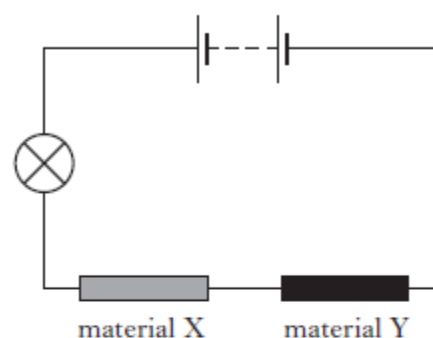
- A I only
- B II only
- C III only
- D I and II only
- E II and III only

15. Which of the following statements is/are correct?

- I In an a.c. circuit the direction of the current changes regularly.
- II In a d.c. circuit positive charges flow in one direction only.
- III In an a.c. circuit the size of the current varies with time.

- A I only
- B II only
- C I and II only
- D I and III only
- E I, II and III

13. A circuit is set up to test electrical conduction in materials.



The lamp lights.

Which row in the table identifies materials X and Y?

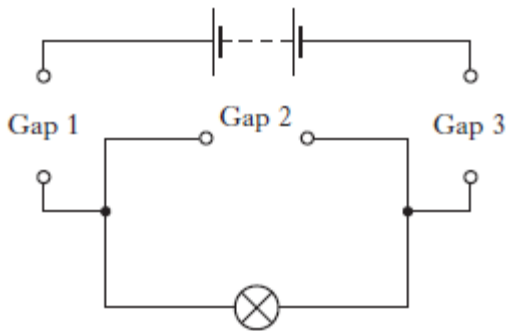
	<i>Material X</i>	<i>Material Y</i>
A	copper	wood
B	copper	aluminium
C	glass	copper
D	aluminium	glass
E	wood	glass

14. The current in an $8\ \Omega$ resistor is 2 A.

The charge passing through the resistor in 10 s is

- A 4 C
- B 5 C
- C 16 C
- D 20 C
- E 80 C.

8. A circuit with three gaps is shown below.

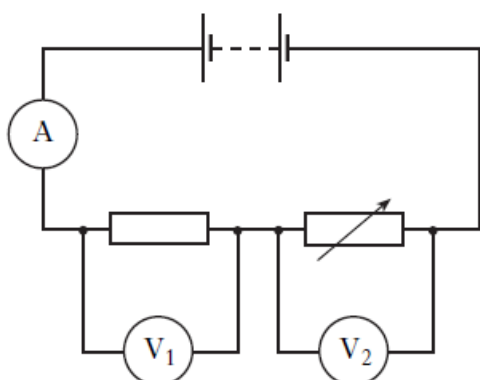


Which row in the table shows the combination of conductors and insulators that should be placed in the gaps to allow the lamp to light?

	<i>Gap 1</i>	<i>Gap 2</i>	<i>Gap 3</i>
A	conductor	insulator	conductor
B	conductor	conductor	insulator
C	conductor	conductor	conductor
D	insulator	insulator	conductor
E	insulator	insulator	insulator

Potential Difference (volts)

10. A circuit is set up as shown.



The resistance of the variable resistor is increased.

Which row in the table shows the effect on the readings on the ammeter and voltmeters?

	<i>Reading on ammeter</i>	<i>Reading on voltmeter V₁</i>	<i>Reading on voltmeter V₂</i>
A	decreases	decreases	decreases
B	increases	unchanged	increases
C	decreases	increases	decreases
D	increases	unchanged	decreases
E	decreases	decreases	increases

7. A student makes the following statements about electrical circuits.

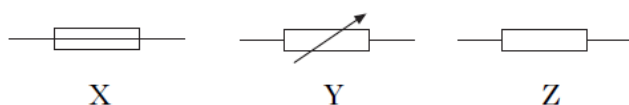
- I The sum of the potential differences across components connected in series is equal to the supply voltage.
- II The sum of the currents in parallel branches is equal to the current drawn from the supply.
- III The potential difference across components connected in parallel is the same for each component.

Which of the statements is/are correct?

- A I only
- B III only
- C I and II only
- D II and III only
- E I, II and III

Practical Electrical & Electronic Circuits

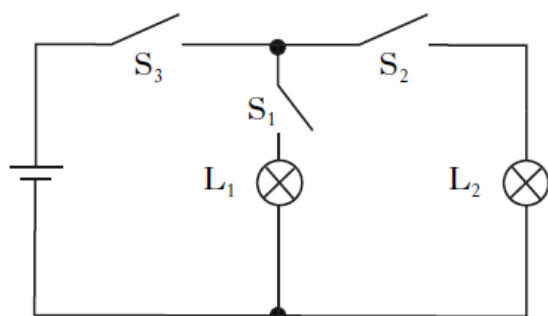
8. Three circuit symbols X, Y and Z are shown.



Which row in the table identifies the symbols X, Y and Z?

	X	Y	Z
A	thermistor	transistor	resistor
B	fuse	variable resistor	thermistor
C	transistor	fuse	variable resistor
D	fuse	variable resistor	resistor
E	variable resistor	resistor	fuse

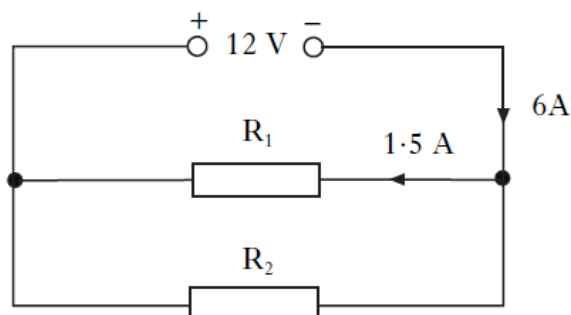
10. A circuit is set up as shown.



Which switch or switches must be closed to light lamp L_1 **only**?

- A S_1 only
- B S_2 only
- C S_1 and S_2 only
- D S_1 and S_3 only
- E S_2 and S_3 only

9. A circuit is set up as shown.

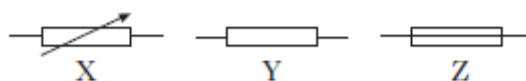


	Potential difference across R_2 (V)	Current in R_2 (A)
A	12	1.5
B	6	1.5
C	12	4.5
D	6	4.5
E	12	7.5

12. Which of the following devices transforms light energy into electrical energy?

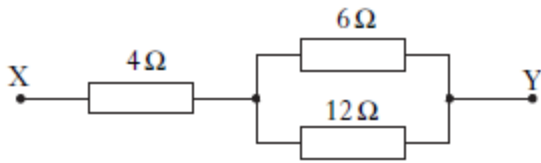
- A LED
- B Thermocouple
- C Microphone
- D Solar cell
- E Transistor

5. Which row in the table identifies the following circuit symbols?



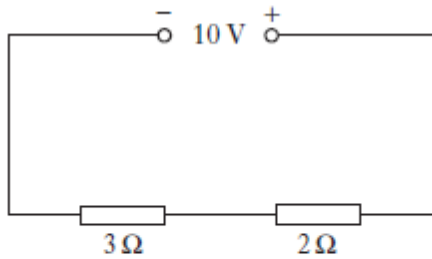
	Symbol X	Symbol Y	Symbol Z
A	fuse	resistor	variable resistor
B	fuse	variable resistor	resistor
C	resistor	variable resistor	fuse
D	variable resistor	fuse	resistor
E	variable resistor	resistor	fuse

8. Three resistors are connected as shown



The total resistance between X and Y is

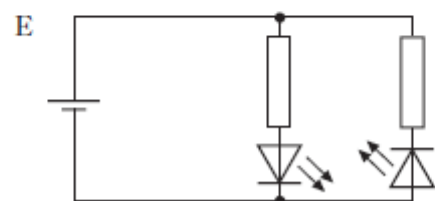
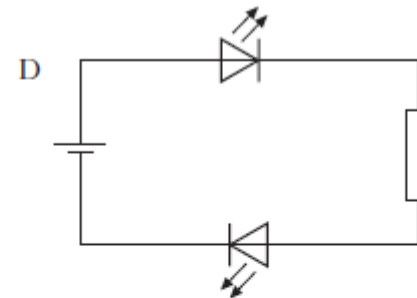
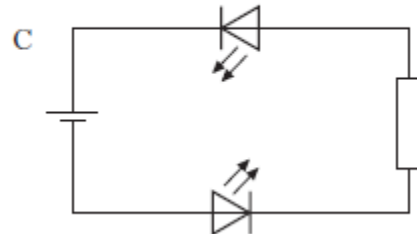
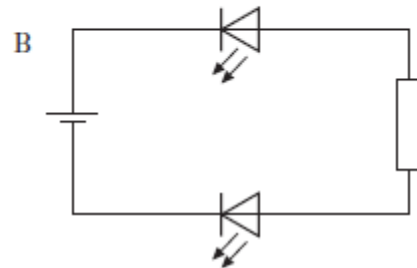
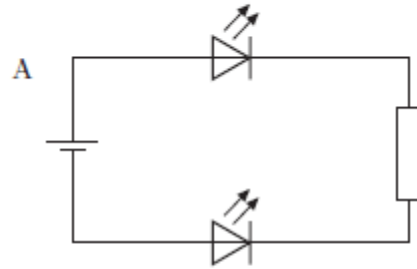
- A 2 Ω
 B 4 Ω
 C 8 Ω
 D 13 Ω
 E 22 Ω.
7. A circuit is set up as shown.



The potential difference across the 2 Ω resistor is

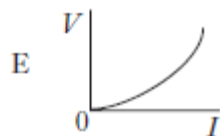
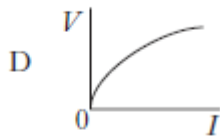
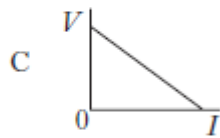
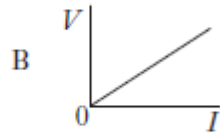
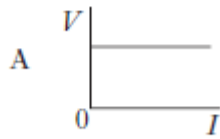
- A 4 V
 B 5 V
 C 6 V
 D 10 V
 E 20 V.

11. A student sets up the circuits shown.
 In which circuit will both LEDs be lit?

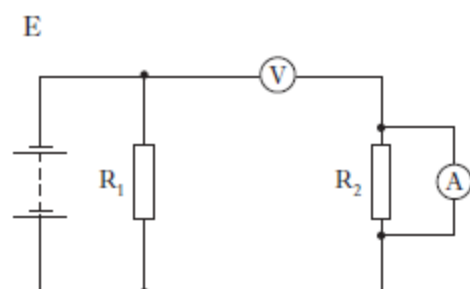
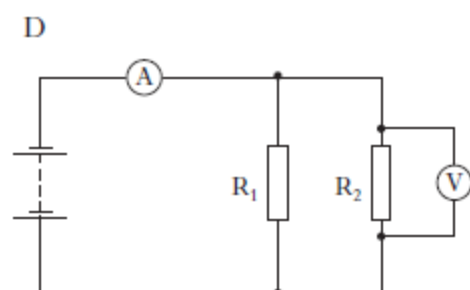
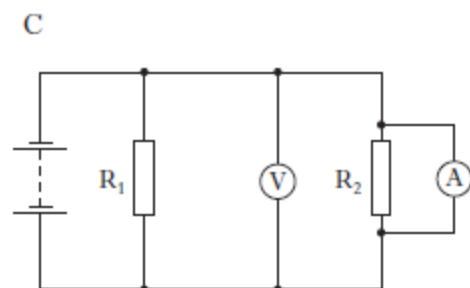
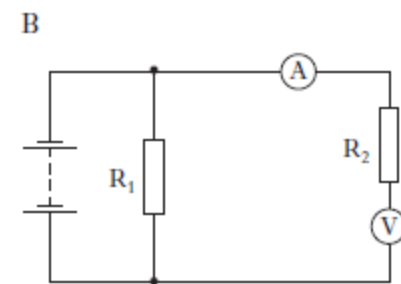
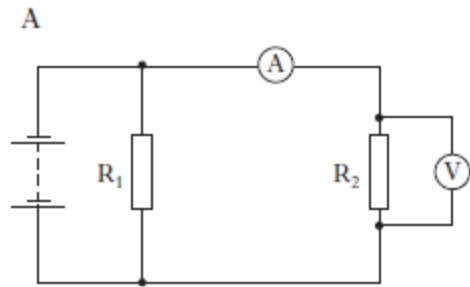


Ohms's Law

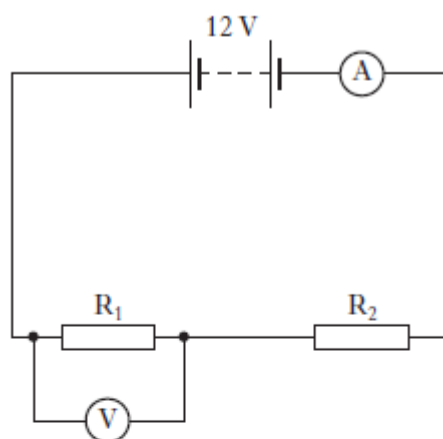
6. Which graph shows how the potential difference V across a resistor varies with the current I in the resistor?



9. In which circuit below would the meter readings allow the resistance of R_2 to be calculated?



10. A circuit is set up as shown.



The reading on the ammeter is 3.0 A.

The reading on the voltmeter is 4.0 V.

Which row in the table shows the current in resistor R₂ and the voltage across resistor R₂?

	<i>Current in resistor R₂ (A)</i>	<i>Voltage across resistor R₂ (V)</i>
A	1.5	8.0
B	3.0	4.0
C	3.0	8.0
D	1.5	12.0
E	6.0	4.0

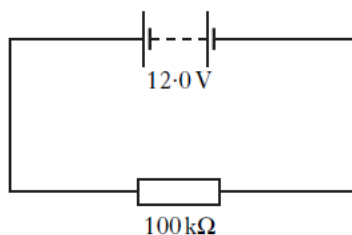
Electrical Power

9. A charge of 15 C passes through a resistor in 12 s . The potential difference across the resistor is 6 V .

The power developed by the resistor is

- A 4.8 W
- B 7.5 W
- C 9.4 W
- D 30 W
- E 1080 W .

11. A circuit is set up as shown.



The power supplied to the resistor is

- A $1.20 \times 10^{-4}\text{ W}$
- B $1.44 \times 10^{-3}\text{ W}$
- C 1.44 W
- D 694 W
- E $1.20 \times 10^6\text{ W}$.

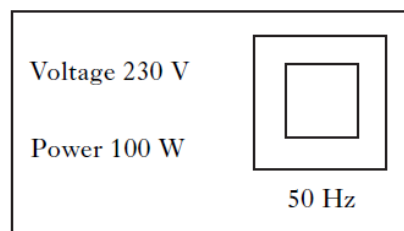
9. The resistance of a wire is $6\ \Omega$.

The current in the wire is 2 A .

The power developed in the wire is

- A 3 W
- B 12 W
- C 18 W
- D 24 W
- E 72 W .

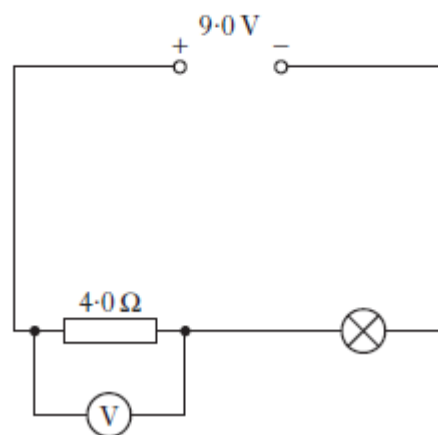
11. The information shown is for an electric food mixer.



The resistance of the mixer is

- A $0.43\ \Omega$
- B $2.3\ \Omega$
- C $4.6\ \Omega$
- D $529\ \Omega$
- E $23\ 000\ \Omega$.

11. A circuit is set up as shown.



The current in the lamp is 1.5 A .

The reading on the voltmeter is 6.0 V .

The power developed in the lamp is

- A 3.0 W
- B 4.5 W
- C 6.0 W
- D 9.0 W
- E 13.5 W .

Specific Heat Capacity

Gas Laws & Kinetic Theory