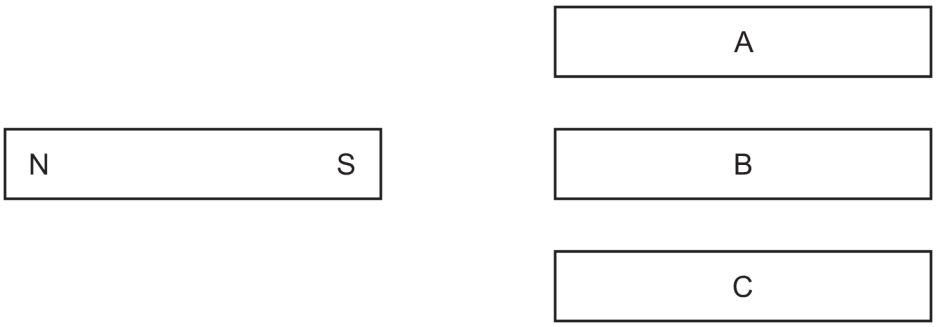
1 A student tests whether a bar magnet affects three different materials.

The diagram shows the bar magnet and a sample of each material A, B and C.



The student tests each sample by holding each pole of the magnet close to one end of the sample. The table shows his observations.

sample	effect of N pole	effect of S pole
A	attraction	attraction
B	no effect	no effect
C	attraction	repulsion

Using the information in the table, draw a straight line from each sample to its correct property. Draw **three** lines.

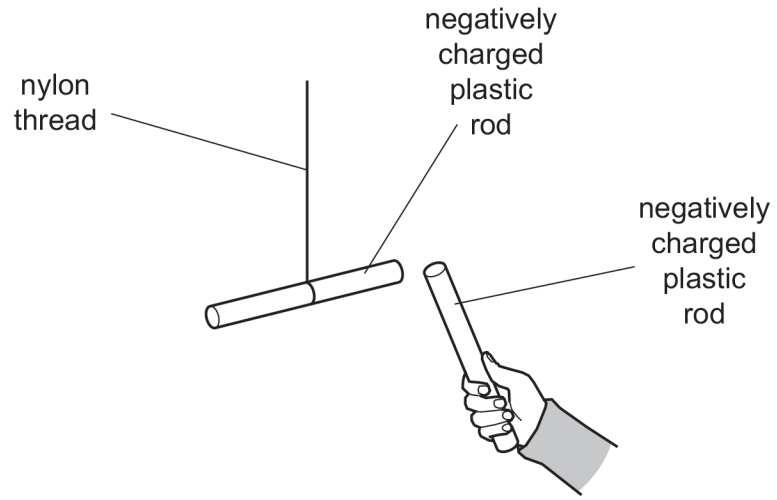
sample	**property**
A	magnetic and magnetised
B	magnetic but not magnetised
C	non-magnetic

[2]

[Total: 2]

2 A student does an experiment with some electrostatically charged plastic rods.

The diagram shows the student's arrangement.



Describe and explain what happens as the student brings one negatively charged rod close to the other negatively charged rod.

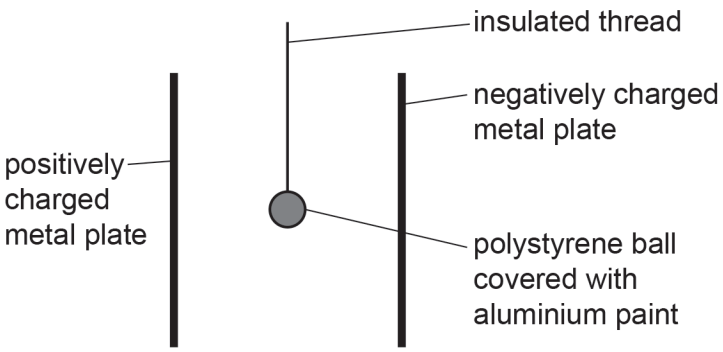
.....

.....

..... [2]

[Total: 2]

3 The diagram shows a polystyrene ball covered with aluminium paint. The polystyrene ball is suspended between two charged metal plates by an insulated thread.



The ball oscillates between the two charged plates.

Explain why the ball oscillates.

.....

.....

.....

.....

.....

..... [4]

[Total: 4]

4

(a) Describe what is meant by an *electric field*.

.....

..... [1]

(b) State what is meant by the *direction* of an electric field.

.....

..... [1]

[Total: 2]

5 A student is experimenting with electric charges.

The student rubs a plastic rod with a dry cloth. The plastic rod becomes positively charged.

Explain why the friction between the plastic and the cloth causes the plastic to become positively charged.

.....

.....

.....

..... [2]

[Total: 2]

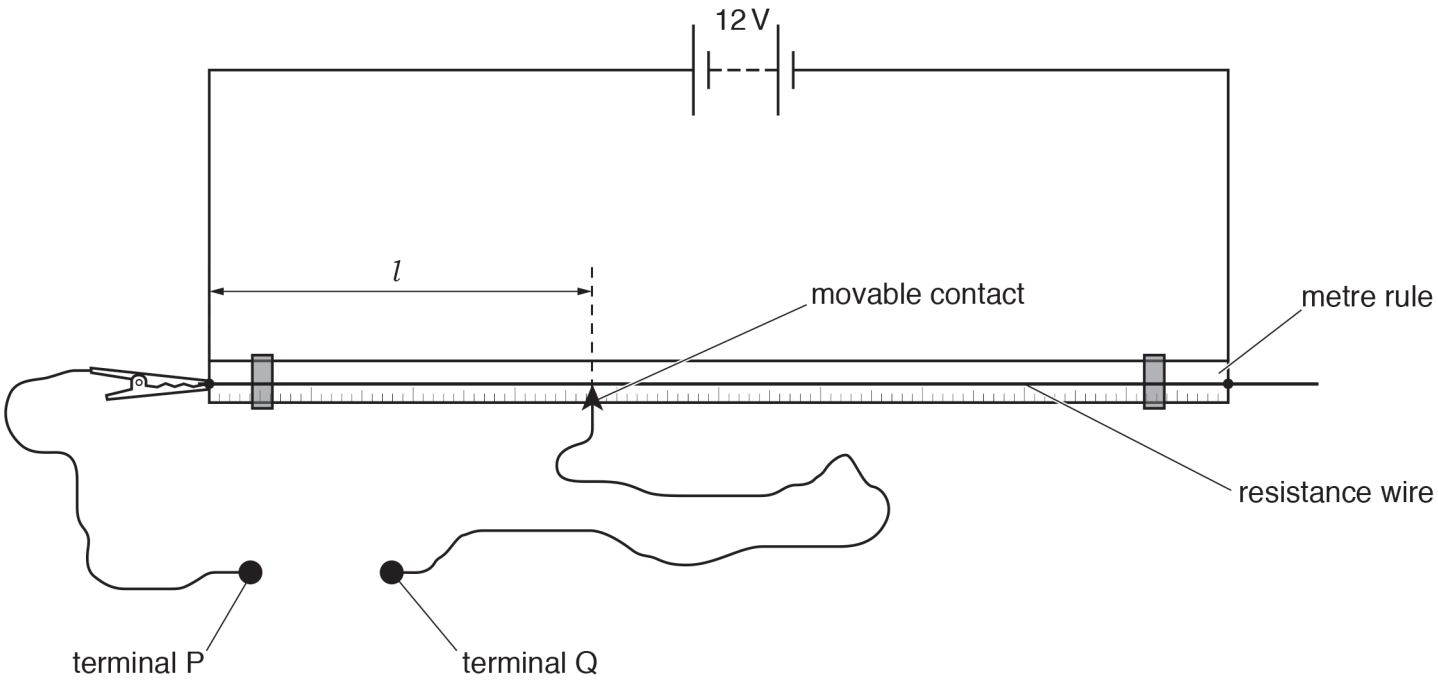
6 Describe what is meant by the term *electric field*.

.....

..... [1]

[Total: 1]

7 The diagram shows a battery of electromotive force (e.m.f.) 12 V connected across a 1.0 m length of resistance wire.



(a) Calculate the current in the resistance wire.

current = ... [2]

(b) Calculate the potential difference (p.d.) between terminal P and terminal Q when l = 0.35 m.

p.d. = ... [1]

(c) Calculate the charge that passes through the resistance wire in 5.5 minutes.

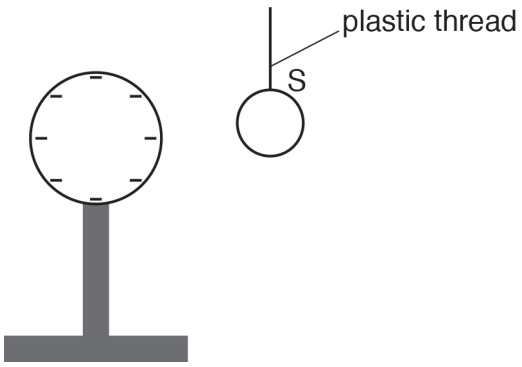
charge = ... [2]

[Total: 5]

8 The diagram shows two spheres.

One of the spheres is negatively charged and attached to a plastic stand.

The smaller, uncharged metal sphere S is suspended by a plastic thread and brought close to a negatively charged sphere.



(a) By drawing on the diagram, indicate the distribution of charge on S when it is brought close to the negatively charged sphere. [2]

(b) State what happens to S.

.....

..... [1]

(c) An earth wire is then touched against S.

Describe what happens in the wire and state how this affects the charge on S.

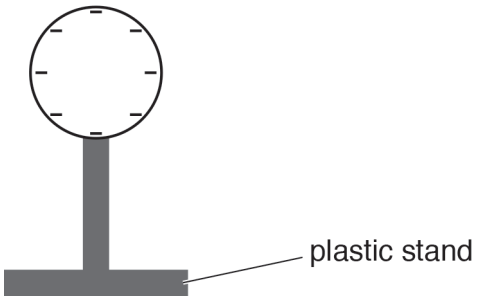
.....

.....

..... [2]

[Total: 5]

9 The diagram shows a sphere that is negatively charged. The sphere is attached to a plastic stand.



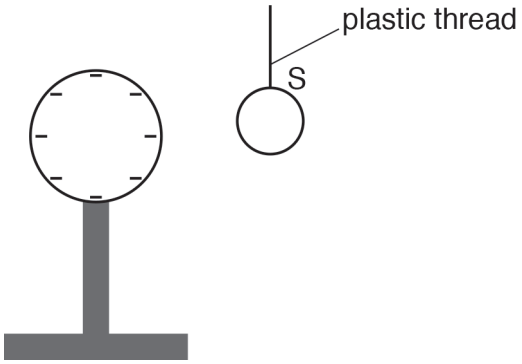
On the diagram, draw arrows to indicate the pattern and direction of the electric field in the region surrounding the sphere. [2]

[Total: 2]

10 The diagram shows two spheres.

One of the spheres is negatively charged and attached to a plastic stand.

The smaller, uncharged metal sphere S is suspended by a plastic thread.



The metal sphere S is an electrical conductor. The plastic thread is an electrical insulator.

Explain this difference by referring to the structures of the two materials.

.....

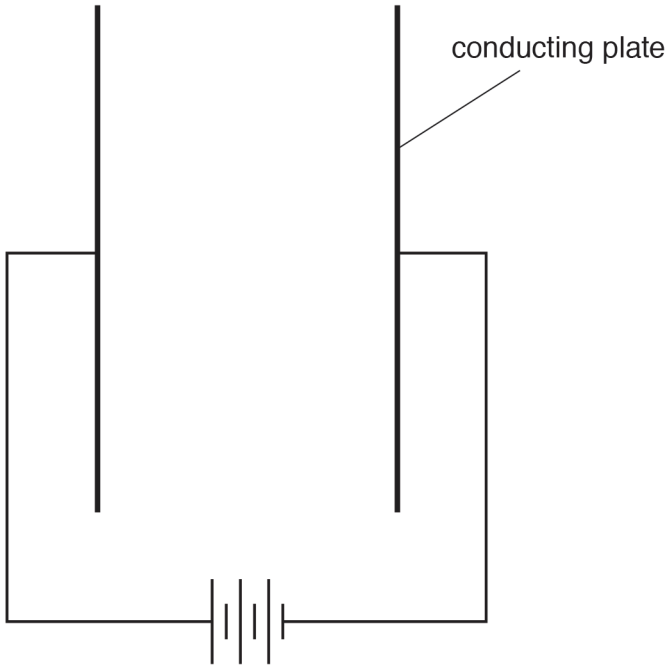
.....

..... [2]

[Total: 2]

ANSWER QUESTIONS 11 TO 20
BEHIND YOUR EXERCISE BOOK OR ON THE PAPER ITSELF.

11 The diagram shows two parallel conducting plates connected to a battery.



On the diagram, draw **five** lines to show the electric field pattern between the two plates.

[2]

[Total: 2]

12 State which materials are electrical conductors.

Put a tick in the box next to each material that is an electrical conductor.

plastic ☐ rubber ☐ copper ☐ gold ☐

[1]

[Total: 1]

13 A device has a metal case. Any charge on the case must be able to move to earth.

(a) Draw **one** ring around a material that is suitable for the connection to earth.

copper glass plastic rubber

[1]

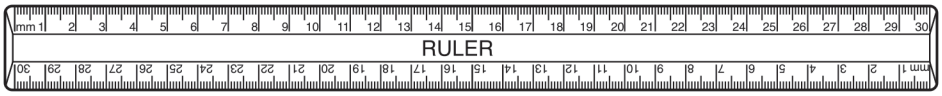
(b) Explain your answer to **(a)**.

.....

..... [1]

[Total: 2]

14 The diagram shows a plastic ruler.



Suggest and explain how a student could give a positive charge to a plastic ruler.

.....

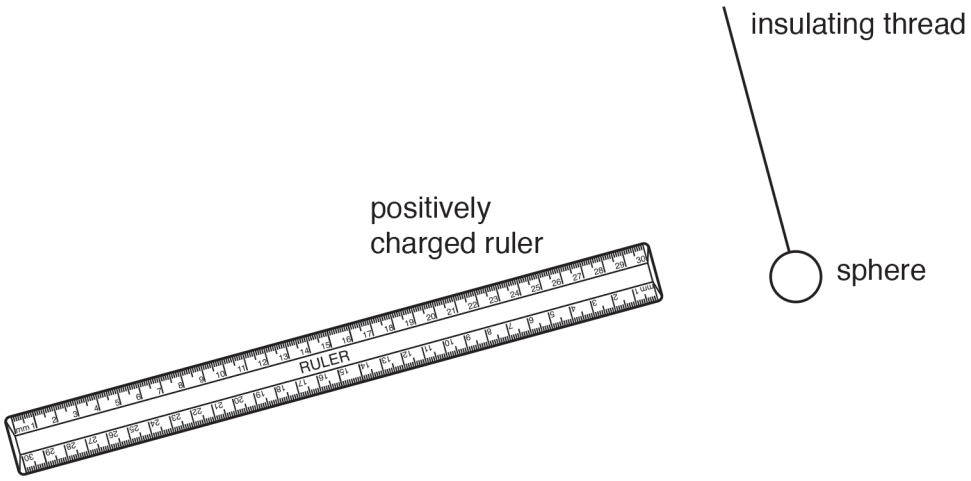
.....

..... [3]

[Total: 3]

15 A plastic ruler is given a positive charge. A sphere hangs from an insulating thread.

A student holds the ruler near the sphere, as shown in the diagram. The ruler repels the sphere.



(a) State what charge, if any, the sphere carries.

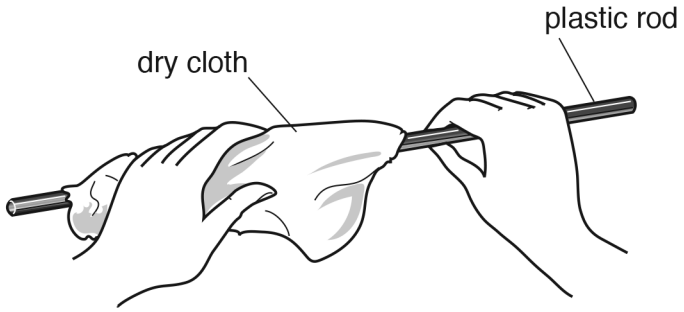
..... [1]

(b) Explain your answer to **(a)**.

..... [1]

[Total: 2]

16 A student rubs a plastic rod with a dry cloth, as shown in the diagram. The rod becomes negatively charged.



(a) The student moves the rod close to a suspended, charged rod. The two rods repel each other.

State the type of charge on the suspended rod.

..... [1]

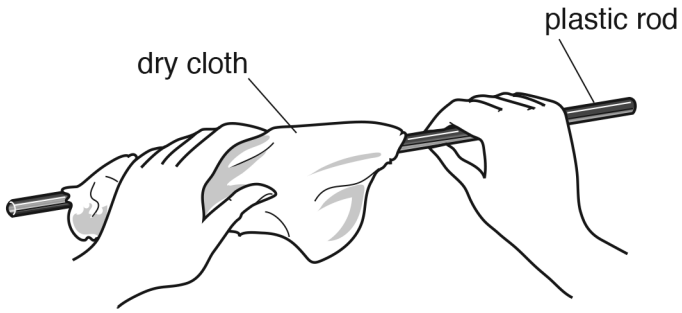
(b) Explain your answer to **(a)**.

.....

..... [1]

[Total: 2]

17 A student rubs a plastic rod with a dry cloth, as shown in the diagram. The rod becomes negatively charged.



Use words from the box to complete the sentence.

air	cloth	electrons	hand	neutrons	protons

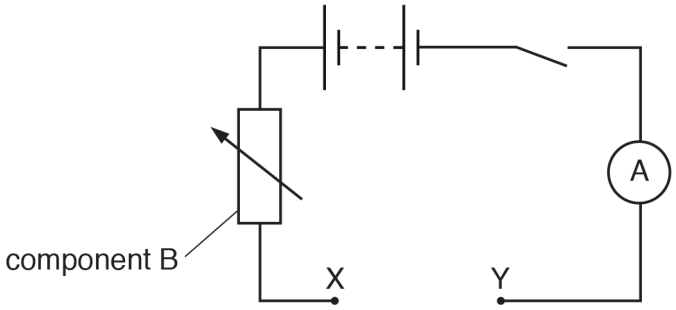
The rod becomes negatively charged because ..... move from the

..... to the rod. [2]

[Total: 2]

18 A student tests some materials to find which ones are electrical conductors.

He uses the circuit shown in the diagram.



Describe how the student can use this circuit to test whether a material is an electrical conductor.

.....

.....

.....

..... [2]

[Total: 2]

19 Referring to a simple electron model, state what distinguishes electrical conductors from electrical insulators.

.....

.....

.....

..... [1]

[Total: 1]

20 A conducting sphere is mounted on an insulating stand. Explain how you would use a positively charged rod of insulating material to charge the sphere by induction.

.....

.....

.....

.....

..... [3]

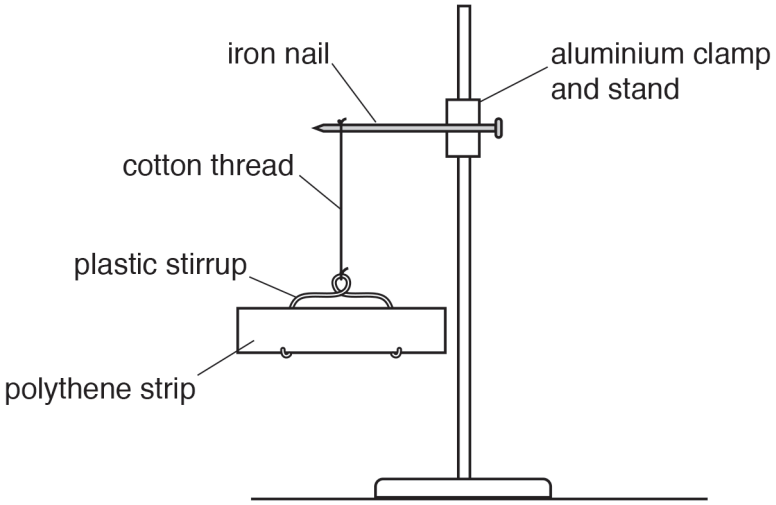
[Total: 3]

WEEK 4 WEEKEND ASSIGNMENT

LABEL YOUR WORK CLEARLY AND APPROPRIATELY

ANSWER QUESTIONS 21 TO 40
BEHIND YOUR EXERCISE BOOK OR ON THE PAPER ITSELF.

21 The diagram shows the apparatus for an experiment on electrostatics.



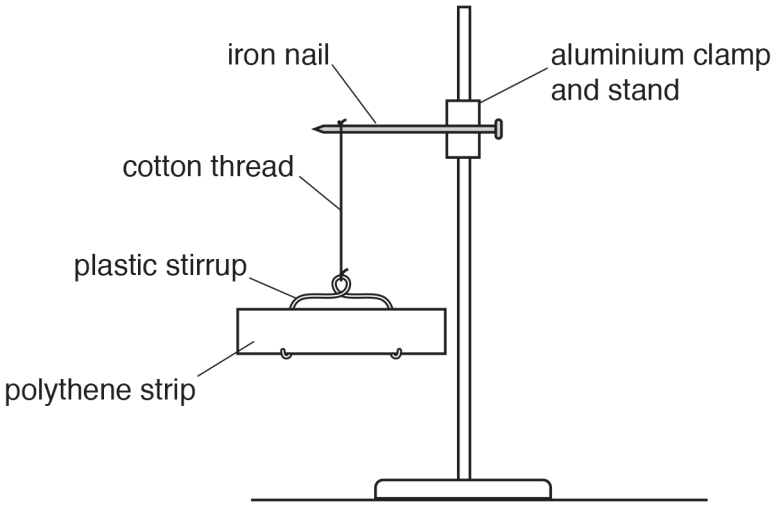
Identify the pieces of equipment that are electrical conductors and those that are electrical insulators. Draw a line from each piece of equipment to the correct box.

aluminium clamp and stand	conductor
plastic stirrup	insulator
iron nail	
cotton thread	

[1]

[Total: 1]

22 The diagram shows the apparatus for an experiment on electrostatics.



State and explain how the polythene strip can be given a negative charge.

.....

.....

..... [2]

[Total: 2]

23 A student experiments with electric charge.

The student uses a dry cloth to rub a plastic rod. The rod becomes positively charged.

Explain how the friction between the rod and the cloth causes the rod to become positively charged.

Use your ideas about the movement of charge.

.....

.....

..... [2]

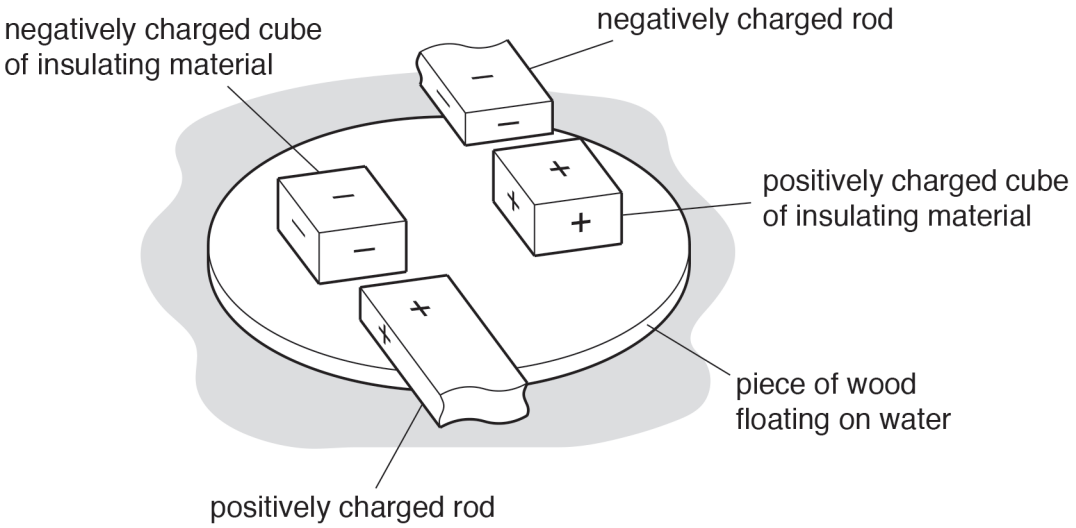
[Total: 2]

24 On the diagram, draw the electric field pattern around a single point positive charge.

[1]

[Total: 1]

25 The diagram shows two cubes of insulating material. One is positively charged and the other is negatively charged. The cubes are fixed to a piece of wood that is floating on water. Charged rods are held above the piece of wood and brought close to the cubes, as shown.



State and explain any movement of the piece of wood.

.....

.....

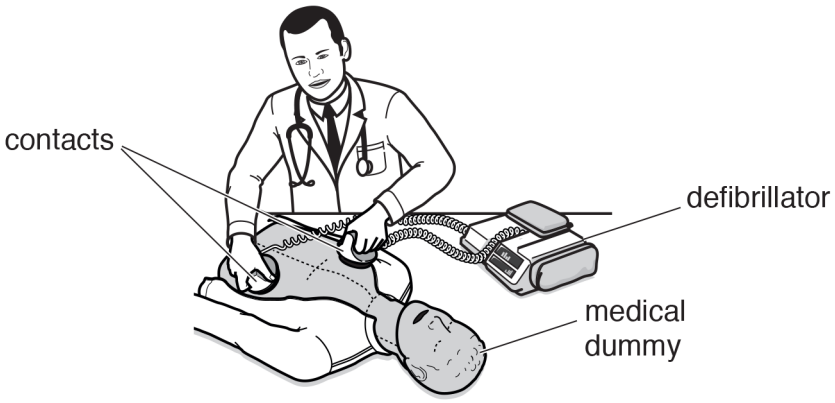
.....

..... [2]

[Total: 2]

26 A defibrillator is a machine that sends an electrical charge through the heart of a patient whose heart is not beating correctly. Doctors learn to use a defibrillator by practising on a medical dummy.

The diagram shows the two contacts of a defibrillator attached to a medical dummy.



The contacts that touch the dummy are made from metal, and when the defibrillator is being used, one contact becomes strongly negatively charged and the other contact becomes strongly positively charged. The handles of the contacts are made from plastic, which is an electrical insulator.

(a) State how the structure of an electrical insulator differs from the structure of a conductor.

.....

..... [1]

(b) Suggest why the handles are made from an electrical insulator.

.....

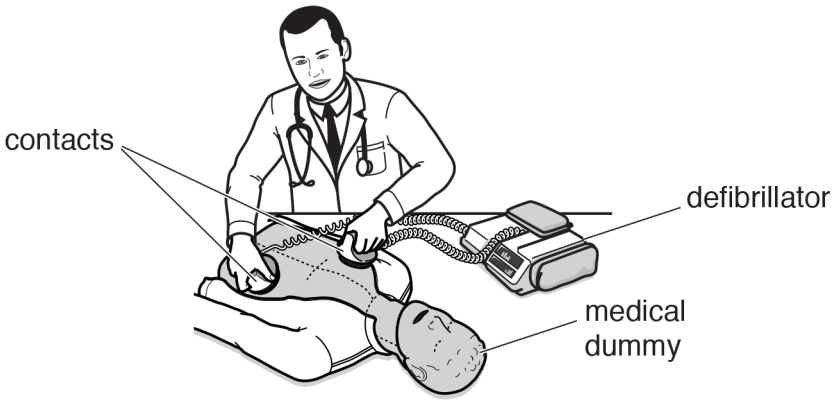
.....

..... [2]

[Total: 3]

27 A defibrillator is a machine that sends an electrical charge through the heart of a patient whose heart is not beating correctly. Doctors learn to use a defibrillator by practising on a medical dummy.

The diagram shows the two contacts of a defibrillator attached to a medical dummy.



The contacts that touch the dummy are made from metal, and when the defibrillator is being used, one contact becomes strongly negatively charged and the other contact becomes strongly positively charged. The handles of the contacts are made from plastic, which is an electrical insulator.

Explain, in terms of the particles involved, how one contact becomes negatively charged and how the other contact becomes positively charged.

.....

.....

..... [2]

[Total: 2]

28 Electrical charges can move easily through some materials.

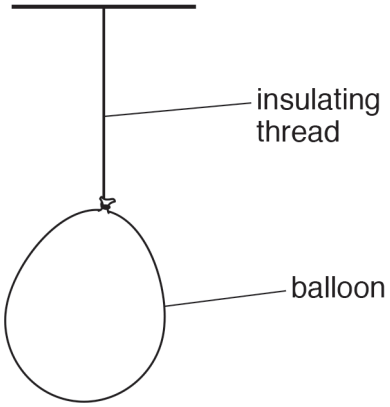
Draw a circle around each material that charges can move through easily.

copper plastic rubber silver wood

[1]

[Total: 1]

29 The diagram shows a balloon hanging from an insulating thread.



A student gives the balloon a positive charge.

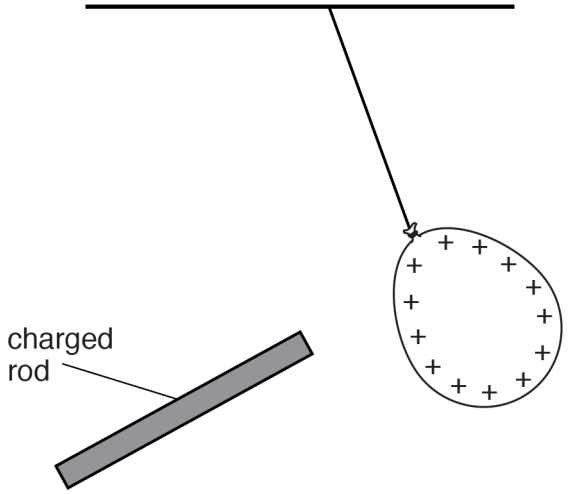
Which statement explains why the balloon becomes positively charged? Tick **one** box.

- ☐ the balloon gains electrons
- ☐ the balloon loses electrons
- ☐ the balloon gains protons
- ☐ the balloon loses protons

[1]

[Total: 1]

30 A student brings a charged rod close to a positively charged balloon as shown in the diagram.



State the type of charge on the rod. .....

Explain your answer. .....

..... [2]

[Total: 2]

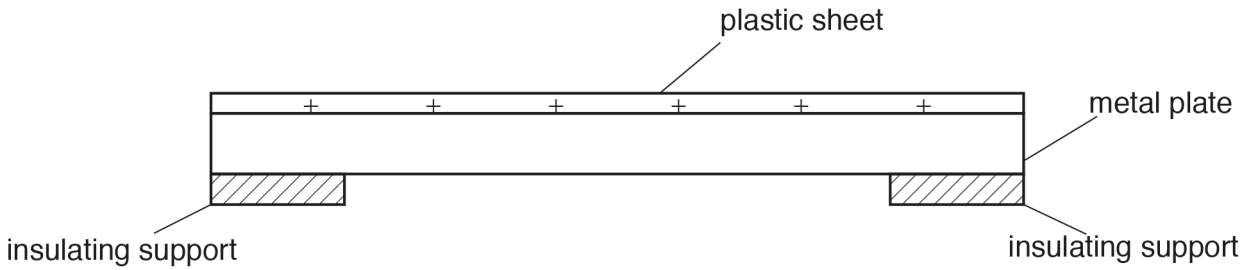
31 State, in terms of their structure, why metals are good conductors of electricity.

.....

..... [1]

[Total: 1]

32 An uncharged conducting metal plate rests on insulating supports. The diagram shows the plate and a positively charged insulating plastic sheet placed on top of the metal plate.



(a) Describe any flow of charge that takes place when the plastic sheet is placed onto the metal plate.

.....

..... [1]

(b) On the diagram, draw how charges are now arranged within the metal plate. [1]

(c) State and explain if this arrangement of charge helps to keep the plastic sheet in place.

.....

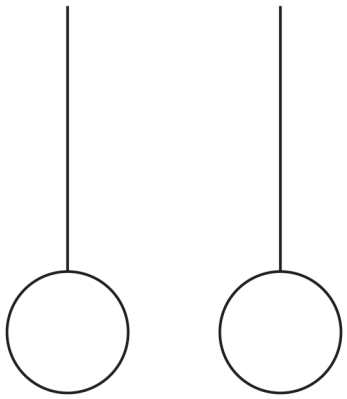
.....

.....

..... [2]

[Total: 4]

33 The diagram shows two uncharged conducting spheres suspended on insulating threads.



1. The spheres are now both given positive charges. On the diagram, draw a possible position of each sphere and thread.

2. Explain the positions you have drawn.

.....

..... [2]

[Total: 2]

34 A student rubs a polythene rod with a dry cloth. The polythene rod becomes negatively charged.

Describe and explain how the rod becomes negatively charged.

.....

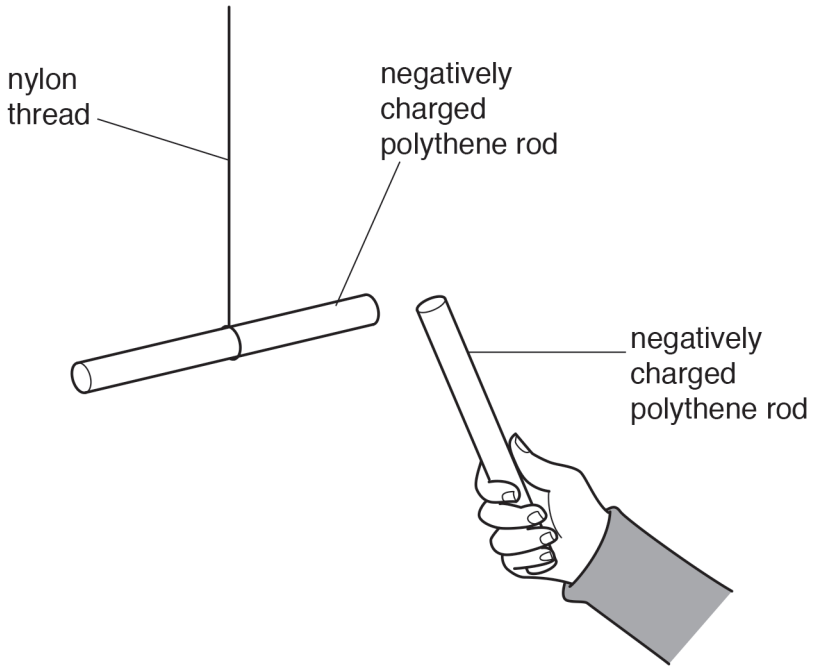
.....

..... [3]

[Total: 3]

35 A negatively charged polythene rod hangs from a nylon thread so that it is free to turn.

A student charges a second polythene rod and brings it close to the negatively charged rod, as shown in the diagram.



Describe and explain what happens when the negatively charged rods are close to each other.

.....

..... [2]

[Total: 2]

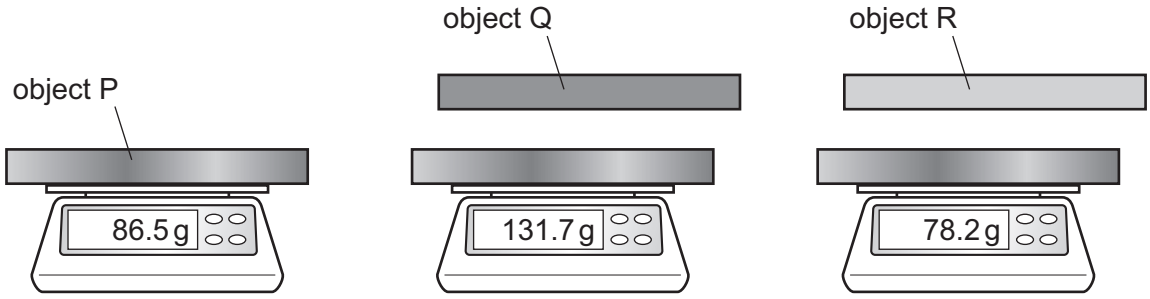
36 A student investigates the electrostatic charges on three objects P, Q and R.

The student places object P on the insulated pan of a balance and notes the reading on the balance.

The student then holds object Q a small distance above object P and notes the reading on the balance.

Finally, the student holds object R a small distance above object P and notes the reading on the balance.

The student's observations are shown.



Which row gives possible charges that explain these observations?

	charge on P	charge on Q	charge on R
A	negative	positive	negative
B	negative	negative	negative
C	positive	positive	negative
D	positive	negative	positive

[1]

[Total: 1]

37 A positively-charged rod is held near to, but not touching, an uncharged metal sphere.

The sphere is briefly now connected to earth.

The rod is removed.

Which statement about the charge on the sphere is correct?

A It is charged negatively because negative charges have moved from earth to the sphere.

B It is charged negatively because positive charges have moved from the sphere to earth.

C It is charged positively because negative charges have moved from the sphere to earth.

D It is charged positively because positive charges have moved to earth from the sphere.

[1]

[Total: 1]

38 What is the unit of charge?

A ampere

B coulomb

C ohm

D volt

[1]

[Total: 1]

39 Which quantity is measured in coulombs?

A charge

B current

C electromotive force

D power

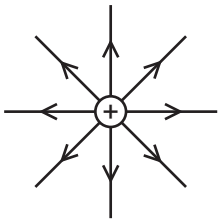
[1]

[Total: 1]

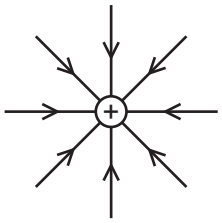
40 The diagrams each show a positive point charge.

Which diagram represents the pattern and the direction of the electric field due to the charge?

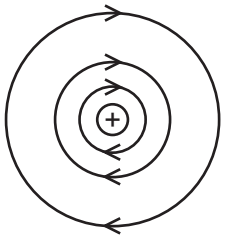
A



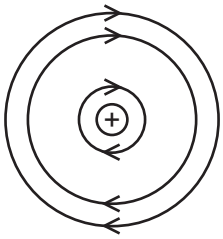
B



C



D



[1]

[Total: 1]