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IGCSE PHYSICS 0625 · TOPICAL PAST PAPERS

Electric Charge — Paper 1

Worked Answer Key (Multiple Choice)

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Electric Charge — Paper 1 · Worked Answer Key

These are **Megalecture worked answers** for the topical multiple-choice compilation on **Electric Charge / Static Electricity (IGCSE Physics 0625, Paper 1)**. Every answer below was solved from first principles by the Megalecture team. Keep three ideas in mind throughout: **(1) charging by friction** only ever transfers *electrons* — never protons; the object that *gains* electrons becomes negative, the one that *loses* them becomes positive. **(2) Charging by induction** separates charge in a conductor: the side *nearest* the inducing charge takes the *opposite* sign (attraction), the far side takes the same sign; earthing then drains away the far-side charge. **(3)** Field direction is the direction of force on a *positive* charge, so the force on a negative charge is *opposite* to the field. For the charge-flow item use $Q = It$. Watch the diagram questions carefully — near side, far side and earth symbol decide the answer.

Laws & Principles of Electrostatics · Applications

Q #	Exam reference	Answer	Brief working / reason
1	M/J 16 P11	D	Uncharged metal ball, positive rod held to the right . By induction, electrons are pulled to the near side, so the side facing the rod (right) becomes negative and the far side (left) becomes positive → far +, near – → diagram D .
2	M/J 16 P12	A	Friction only moves electrons. The cloth ends up positive , so the cloth <i>lost</i> electrons to the polythene → negative charges (electrons) transferred from the cloth to the polythene .
3	M/J 17 P11	B	A charged ball has charge (→ electric field) and mass (→ gravitational field). It is at rest, so no moving charge → no magnetic field . Fields present: electric and gravitational only .
4	M/J 17 P11	A	The shoe becomes positive , so it <i>lost</i> electrons. Those electrons go to the carpet → negative electrons are transferred to the carpet . (Protons never move.)
5	M/J 17 P11	A	$Q = It$. Charge per minute = 3 flashes × 20 C = 60 C in 60 s. $I = Q/t = 60 / 60 = \mathbf{1.0\ A}$.
6	M/J 19 P11	B	Shaking rubs the beads against the box (friction). The beads gain electrons and stick to the oppositely-charged box; by conservation the box loses electrons . Row: box loses electrons, beads gain electrons → B .
7	M/J 20 P11	D	Positive rod held near X while X and Y touch: electrons are drawn toward the rod (toward X). When the spheres are separated, X keeps the extra electrons (negative) and Y is left short of electrons (positive), equal in size. Y is positive and the same size as that on X .
8	M/J 20 P11	A	

Q #	Exam reference	Answer	Brief working / reason
			Field direction = direction of force on a <i>positive</i> charge. The force on this negative charge points right, so the field points the opposite way → to the left .
9	M/J 20 P12	B	Only electrons are free to move in a metal. The positively-charged cloud (its base is +) pulls electrons off the earthed conductor, so the top is left positive. Only electrons move in the conductor.
10	O/N 16 P11	B	Positive sphere midway between an isolated rod (left) and an earthed rod (right). Isolated rod: induction gives far end +, near end – ("+ ... –"). Earthed rod: the near side is induced – while the far-side + drains to earth, so it shows – on the near side only . Both features match diagram B .
11	O/N 17 P11	A	Rubbing makes the polythene rod negative , so it <i>gained</i> electrons. Therefore electrons move from the cloth to the rod .
12	O/N 17 P12	B	The block becomes negative , so it <i>gained</i> electrons from the silk handkerchief → negative electrons flow from the handkerchief to the block . (Positive charges / protons do not flow.)
13	O/N 17 P12	A	A negative rod near an uncharged sphere induces charge: the side facing the rod becomes positive (attraction) and the far side becomes negative. Diagram A shows + on the near side, – on the far side.
14	O/N 18 P11	A	Field lines of an isolated positive point charge are straight and point radially outwards (away from the charge) → diagram A .
15	O/N 18 P11	D	P(+) and Q(–). At Y (on the line, midpoint) both charges drive the field the <i>same</i> way — from + toward – — giving a strong field pointing toward Q. At X (off-axis, farther out) the vertical components cancel and only a smaller component remains, still toward Q. So the field is weaker at X than at Y and in the same direction .
16	O/N 18 P11	C	Positive rod near the sphere, then sphere earthed → electrons flow up from earth and the sphere gains a net negative charge. Remove the earth, then remove the rod: the trapped electrons spread out, leaving the sphere negative all over → diagram C .
17	O/N 19 P11	C	The cloud base is negative ; it repels electrons in the earthed mast downwards, so the top of the mast is left positive . Charge "at the top" is positive, produced by electrons moving to the bottom of the mast .
18	O/N 19 P11	B	Rubbing of the moving aircraft against the air transfers electrons → it charges up by friction of the aircraft with the air .
19	O/N 19 P12	B	Plate X is positive. As earthed plate Y is brought closer, X attracts electrons onto Y's facing surface, so electrons flow to Y from earth only . (Protons never flow.)
20	O/N 19 P12	C	

Q #	Exam reference	Answer	Brief working / reason
			Copper is chosen because it is a good conductor: it has a low electrical resistance , so charge from the cloud/strike flows safely to earth.
21	O/N 20 P11	B	The rubbed polythene rod is charged ; it induces opposite charge on the near surface of the earthed water stream, which is attracted. The water, being earthed, stays neutral overall → rod charged, water uncharged .
22	O/N 20 P11	B	The field points vertically up ; force on a negative charge is <i>opposite</i> to the field → vertically downwards .

Note from Megalecture. Every diagram item was decided by tracking electrons only (protons are fixed in the nuclei) and by remembering that the *near* side of an induced conductor takes the *opposite* sign, while earthing drains the far-side charge. These are original Megalecture worked solutions prepared for revision use.