ELECTROSTATICS 1

1. (a) (i) electron/negatively charged particle; 1

(ii) An explanation to include:

1. causing explosion/fire/ignition;
2. sparking; 2

[Ignore references to electrical shock/current]

(iii) pipe could be earthed/charge conducted away safely;
[Accept 'rubber' conductivity strip] 1

(b) An explanation to include:

1. granules have like charges;
2. like charges repel; 2

[6]

2. (a) friction;
electrostatic;
electrons;
attract; 4

(b) (i) correct direction of movement shown (towards metal plates); 1

(ii) An explanation to include:

- repelled from positive grid;
- attracted to negative plates; 2

[Allow like charges repel/unlike charges attract for 1 mark]

(iii) to make dust particles fall off/
in order to collect dust particles/to clean the plates; 1

[8]

3. (a) An explanation to include two from:

1. movement of fuel through pipes;
2. friction with surface of pipe causing charges to be produced;
3. electrons transferred between the fuel and the pipe; 2

(b) spark could ignite the fuel/cause explosion; 1

(c) An explanation to include:

1. copper wire acts as an earth;
2. which neutralises any charged object placed in contact with it; 2

[5]

4. (a) copper;
silver; 2

(b) (i) two forces pushing outwards;
horizontal; 2
[Reject curved lines for force]

(ii) An explanation to include:
1. positive;
2. like (charges) repel; 2
[Ignore poles]

(iii) An explanation to include:
1. aluminium is a conductor / OWTTE;
2. charge / current would flow to earth / OWTTE; 2

(c) (i) Any two correct suggestions, for example, Vander graaf / lightning conductor / Plasma ball / photocopiers / spray painter / precipitator (smoke cleaning) / insecticide sprays / particle accelerators / inkjet printers; 2

(ii) Any two correct suggestions, for example, shocks / dust / electronic circuit damage / hair standing on end / explosions (fuel) / could turn pace maker off / tumble dryer / lighting; 2

[12]

5. (a) (i) A description to include two of:
1. attracted / picked up by rod;
2. stick to rod;
3. paper (becomes charged) and is repelled from rod; 2

(ii) plastic charged, copper and steel not
[All three correct for 2 marks, 2 correct for 1 mark] 2

(b) An explanation to include two from:
1. lightning strikes poles (not the person) / poles attract the lightning;
2. charge / electrons / current travels along the poles;
3. to earth / (spike in) ground;
4. poles are good conductors (of electricity);
[Ignore conduct / absorb lightning] 2

[6]

6. (a) An explanation to include:
electrons / negative charge / negative particles;
transferred / moved from the ruler (to the cloth); 2
[reject for both marks positives move]

(b) An explanation to include three of:
(movement of petrol / lorry / tyres) can build up / transfer a charge / static electricity builds up;
tyres are (good electrical) insulators ;
they do not allow / stop charge / (static) electricity escaping / transferring to earth;
spark;
could cause an explosion / fire; 3
electricity / charge escapes / transferred from / through strip / lorry is earthed / charge goes to earth;

[5]

7. (a) A suggestion to include:
electrons;
pass through tyres to earth; 2
[Allow aircraft is earthed for 1 mark]

(b) $Q = I \times t \; / \; I = \frac{Q}{t}$

$= \frac{2.0 \times 10^{-4} C;}{0.5s}$

$= 4 \times 10^{-4}$ A; 4

[5]

8. (a) arrow drawn to the left; 1

(b) the sizes are equal; 1

(c) the strips have the same type of charge;
similar charges repel 2

(d) (i) electrons ; 1

(ii) positive, there are more positive charges than negative 1

[6]

9. (a) (i) arrow drawn from right to left close to horizontal;
(if at angle the path extended must intersect duster) 1

(ii) they (the balloon and duster) have opposite/different charges;
opposite/positive & negative (charges) attract;
Reject magnetic poles for 2(both marks)
Reject positive electrons for the 1st mark
Reject poles for either mark 2

(b) (i) the spark/lightning that passed to the ground; 1

(ii) the cloud;
Ignore thunder/lightning/kite/string 1

(iii) by movement/flow/conduction of charge/ions/electrons;
Ignore key 1

[6]

10. (a) by movement of electrons/negative charge;
from earth/switch to the man;
Reject positive electrons (for both marks) 2

(b) movement/conduction of ions/charged particles;
in the string by movement of positive & negative ions/charges;
in the key by movement of (free) electrons; 3

[5]