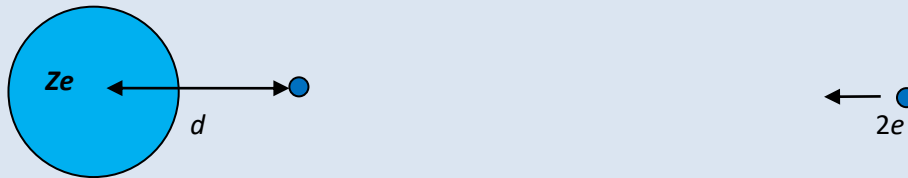**Quiz D18.2**

Electric field and potential

1. A particle of charge $2e$ is projected with initial kinetic energy K towards a nucleus of electric charge Ze. The particle is initially very far away from the nucleus.

The particle stops a distance d from the centre of the nucleus. What is d?

A $\dfrac{kZe^2}{K}$ B $\dfrac{2kZe^2}{K}$ C $\sqrt{\dfrac{kZe^2}{K}}$ D $\sqrt{\dfrac{2kZe^2}{K}}$

2. The diagram shows three equipotential surfaces.

$-28\ \text{J C}^{-1}$ $-23\ \text{J C}^{-1}$ $-18\ \text{J C}^{-1}$
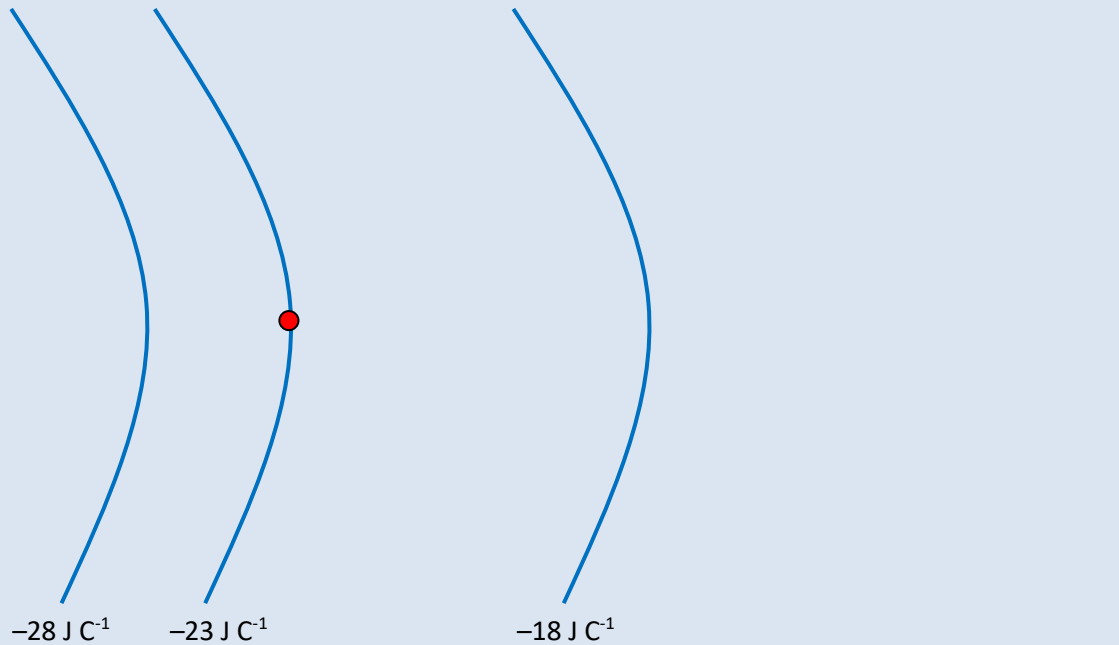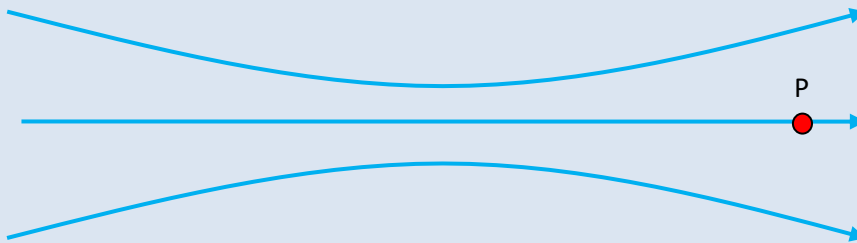
A negative charge of -3.0 nC is placed on the middle equipotential and released.
What is the direction of motion of the charge and what is the change in its potential energy when it reaches one of the other two equipotentials?

	Direction of motion	Change in potential energy
A	Left	15 nJ
B	Left	−15 nJ
C	Right	15 nJ
D	Right	−15 nJ

**3.** The diagram shows three electric field lines.

An electron is placed at P and released.

What is correct about the magnitude of the acceleration and the speed of the electron?

|	Magnitude of acceleration	Speed
A	Increases and then decreases	Increases and then decreases
B	Increases and then decreases	Increases
C	Decreases and then increases	Increases and then decreases
D	Decreases and then increases	Increases

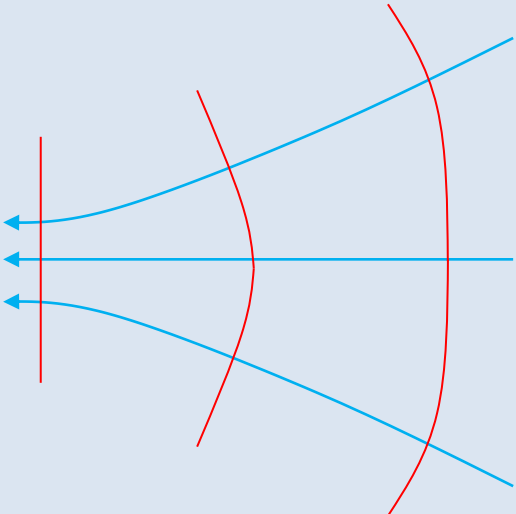**4.** The diagram shows three electric field lines.
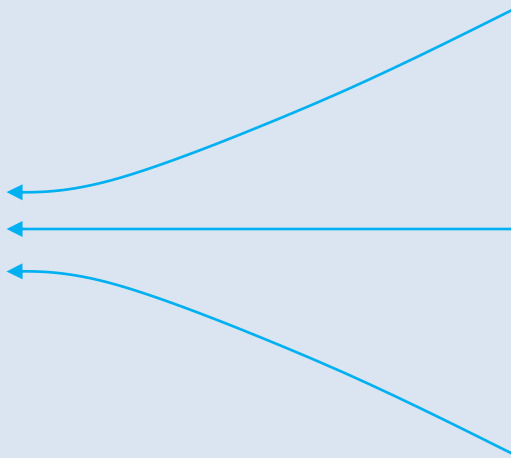
Which diagram correctly shows three equipotentials separated by the same potential difference
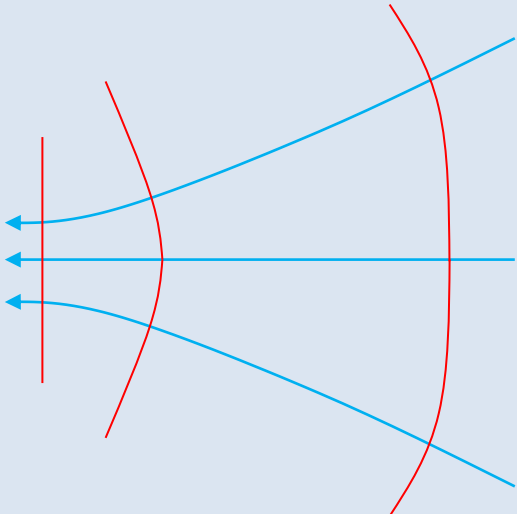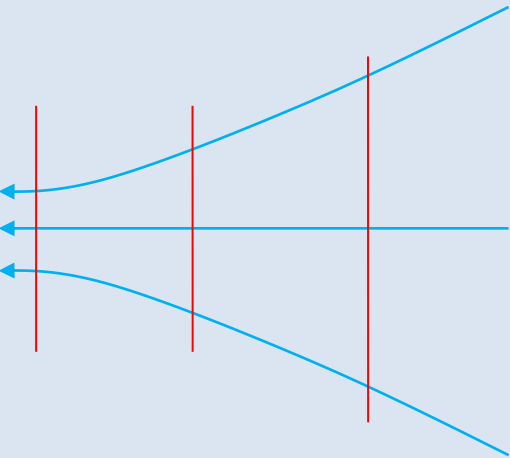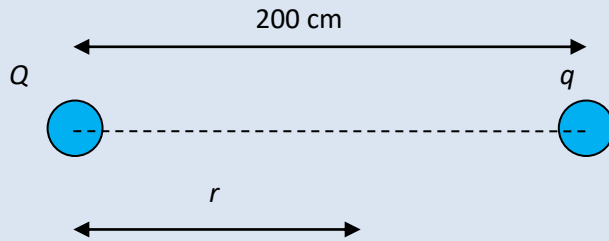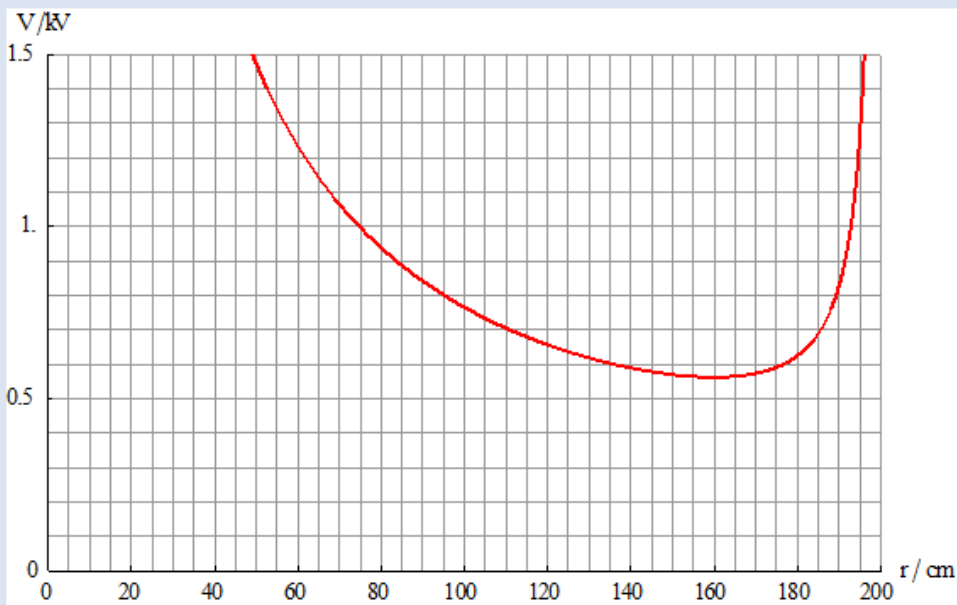
A
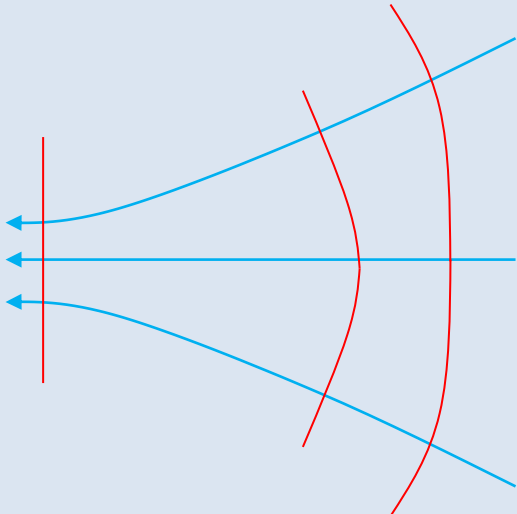
B

C

D

5. The centres of two charged spheres are separated by a distance of 200 cm.


The graph shows the variation, with distance r from the centre of the left sphere, of the electric potential V due to the two spheres along a line joining the spheres.

What is the ratio $\dfrac{Q}{q}$, of the charge on the left sphere to that on the right?

A 4   **B** 8   **C** 16   **D** 32

6. Four charges of equal magnitude are placed at the vertices of a square. The top charges are negative and the lower charges positive.
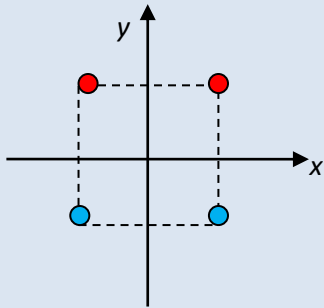

Where is the electric potential zero?

    A At the origin only.

    B Along the *x*-axis.

    C Along the *y*-axis.

    D Along both axes.

7. A charged particle of mass *m* and charge +*q* is placed on the surface of a charged sphere and then released. The radius of the sphere is *R* and its charge is +*Q*. What is the speed of the particle when it is very far from the sphere?

  A $\sqrt{\dfrac{kQq}{mR^2}}$ **B** $\sqrt{\dfrac{2kQq}{mR^2}}$ **C** $\sqrt{\dfrac{kQq}{mR}}$ **D** $\sqrt{\dfrac{2kQq}{mR}}$

8. Light incident on the left plate causes electrons to be emitted with kinetic energy 3.0 eV. The electrons reach the right plate. The left plate has potential 2.0 V and the right plate potential −1.0 V.
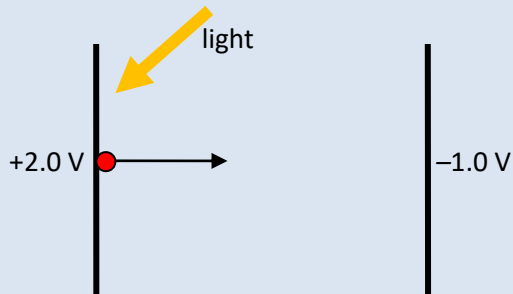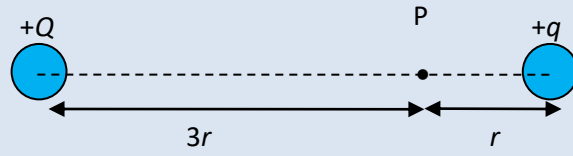

What is the kinetic energy of an electron when it reaches the right plate?

A 0 **B** 2.0 eV **C** 3.0 eV **D** 4.0 eV

9. The diagram shows three electric field lines. In which direction should the negative charge be moved in order to increase its potential energy?
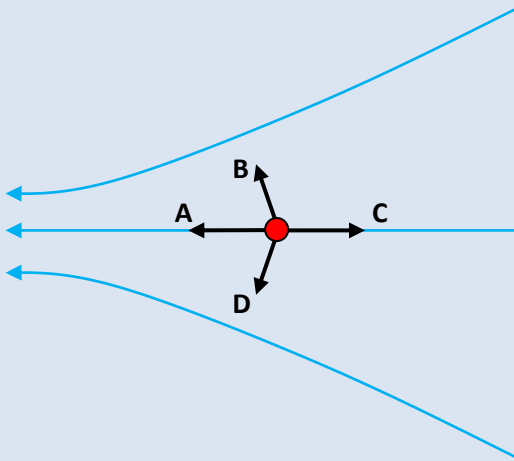
10. The electric potential at P due to the charge on the left alone is V. The net electric field at P is zero.

What is the total potential at P due to both charges?

A 0   **B** $\dfrac{4V}{3}$ **C** $2V$ **D** $4V$

Quiz D18.2 Answers	
1	B
2	D
3	B
4	A
5	C
6	B
7	D
8	A
9	A
10	B