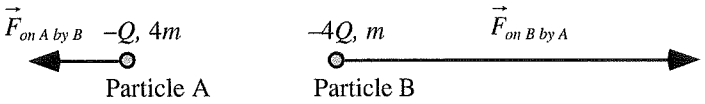
AP Physics 1: Unit 11 Electrostatics Name:_____

D1-WWT11: TWO NEGATIVELY CHARGED PARTICLES—FORCE

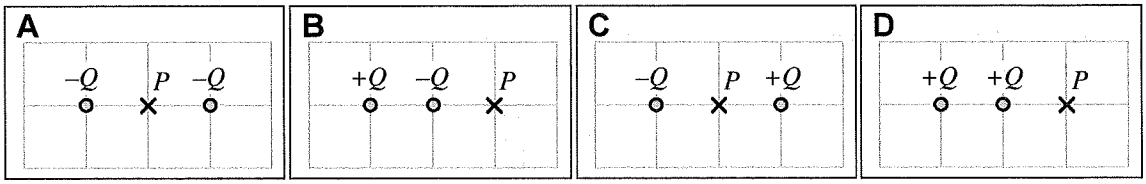
A student's diagram for the electric forces acting on two negatively charged ($-Q$ and $-4Q$) particles is shown. Particle A has four times the mass of particle B.



What, if anything, is wrong with this diagram? If something is wrong, explain the error and how to correct it. If the diagram is valid, explain why.

D1-RT12: TWO ELECTRIC CHARGES—ELECTRIC FORCE

In each figure, two charges are fixed in place on a grid, and a point near those particles is labeled P. All of the charges are the same size, Q, but they can be either positive or negative.



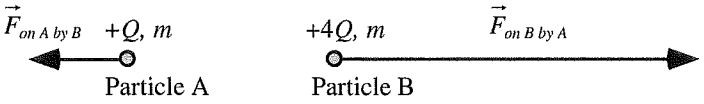
Rank the strength (magnitude) of the electric force on a charge $+q$ that is placed at point P.

				OR			
1	2	3	4		All	All	Cannot
Greatest			Least		the same	zero	determine

Explain your reasoning.

D1-TT15: TWO CHARGED PARTICLES—FORCE

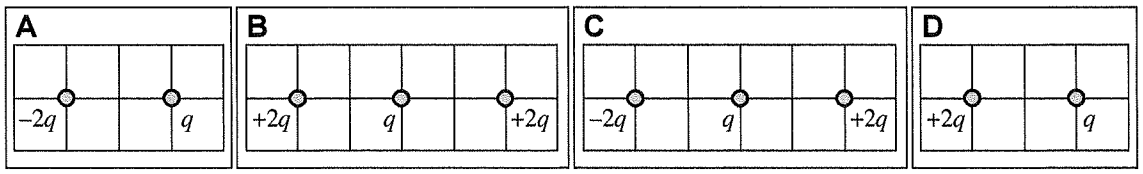
Shown below is a student's drawing of the electric forces acting on Particle A (with charge $+Q$ and mass m) and Particle B (with charge $+4Q$ and mass m).



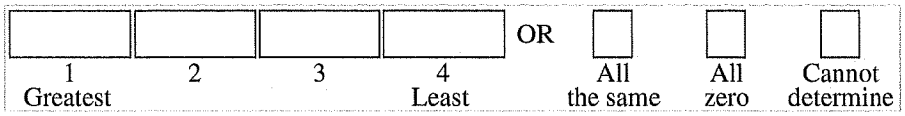
There is something wrong with this diagram. Explain what is wrong and how to correct it.

D1-RT16: TWO AND THREE CHARGES IN A LINE—FORCE

In each case, small charged particles are fixed on grids having the same spacing. Each charge q is identical, and all other charges have a magnitude that is an integer multiple of q.



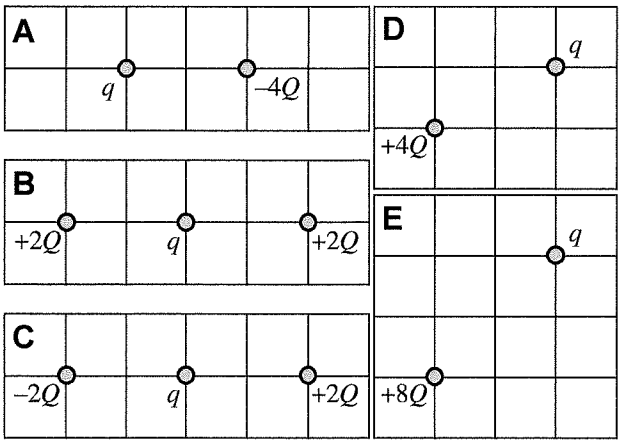
Rank the magnitude of the electric force on the charge labeled q due to the other charges.



Explain your reasoning.

D1-RT17: Charged Particles in a Plane—Force

In each case, small charged particles are fixed on grids having the same spacing. Each charge q is identical, and all other charges have a magnitude that is an integer multiple of Q.



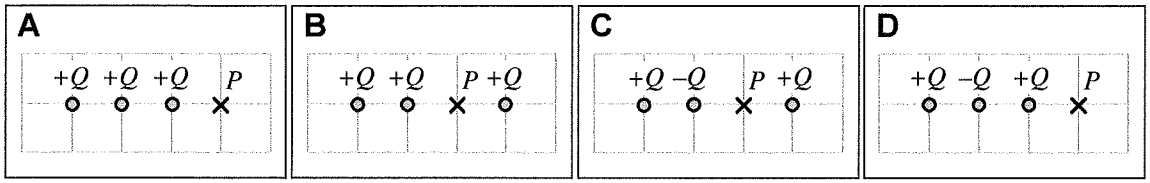
Rank the magnitude of the net electric force on the charge labeled q due to the other charges.

1	2	3	4	5	OR			
Greatest				Least		All the same	All zero	Cannot determine

Explain your reasoning.

D1-RT18: Three Linear Electric Charges—Electric Force

In each figure, three charges are fixed in place on a grid, and a point near those particles is labeled P. All of the charges are the same size, Q, but they can be either positive or negative.



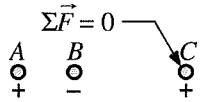
Rank the magnitude of the net electric force on a charge $+q$ that is placed at point P.

1	2	3	4	OR			
Greatest			Least		All the same	All zero	Cannot determine

Explain your reasoning.

D1-QRT22: Three Charges in a Line III—Force

Three charged particles are fixed in place in a line. Charge C is twice as far from charge B as charge A is. It is known that there is no net force on charge C due to charges A and B.

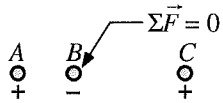


Indicate whether each of the following statements is *true*, *false*, or *cannot be determined.*

	Statement	True	False	Cannot be determined
(a)	Charge A has a greater magnitude than charge C.			
(b)	Charge A has a greater magnitude than charge B.			
(c)	Charge C has a greater magnitude than charge B.			
(d)	Charge A has the same magnitude as charge C.			
(e)	Charge A has the same magnitude as charge B.			
(f)	Charge C has the same magnitude as charge B.			

Explain your reasoning.

Three charged particles, A, B, and C, are fixed in place in a line. Charge C is twice as far from charge B as charge A is. It is known that there is no net force on charge B due to charges A and C.



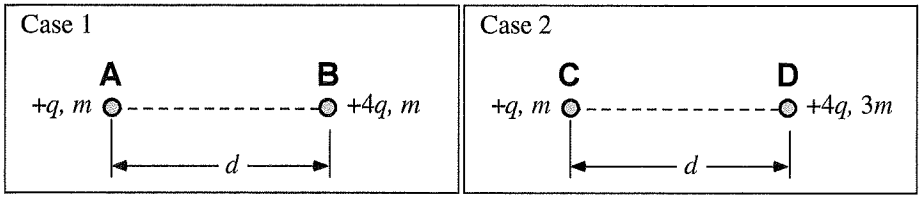
Indicate whether each of the following statements is *true*, *false*, or *cannot be determined.*

	Statement	True	False	Cannot be determined
(g)	Charge A has a greater magnitude than charge C.			
(h)	Charge A has a greater magnitude than charge B.			
(i)	Charge C has a greater magnitude than charge B.			
(j)	Charge A has the same magnitude as charge C.			
(k)	Charge A has the same magnitude as charge B.			
(l)	Charge C has the same magnitude as charge B.			

Explain your reasoning.

D1-RT31: Two Charged Particles—Acceleration

In each case shown, a particle of charge $+q$ is placed a distance d from a particle of charge $+4q$. The particles are then released simultaneously. The masses of the particles are indicated in the diagram.



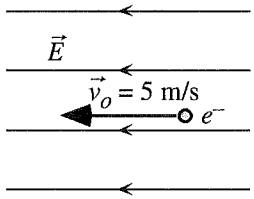
Rank the magnitude of the acceleration of each particle just after it is released.

1	2	3	4	OR			
Greatest			Least		All the same	All zero	Cannot determine

Explain your reasoning.

D1-WWT32: Electron in a Uniform Electric Field—Velocity

An electron is placed in a uniform electric field with an initial velocity of 5 m/s as shown. A student makes the following statement:



"The electron will continue to move in the same direction at a constant velocity because it is moving in the same direction as the electric force on it; since the electric field is constant, the force on the electron is constant."

What, if anything, is wrong with this statement? If something is wrong, explain the error and how to correct it. If the statement is valid, explain why.