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| **•3.** | A particle of charge http://edugen.wiley.com/edugen/courses/crs1650/art/math/halliday8019c21/math114.gifis 12.0 cm distant from a second particle of charge http://edugen.wiley.com/edugen/courses/crs1650/art/math/halliday8019c21/math115.gif. Calculate the magnitude of the electrostatic force between the particles. |
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| **54.** | In Fig. [21-42](http://edugen.wiley.com/edugen/courses/crs1650/reference/xlinks/halliday8019c21xlinks.xform?id=halliday8019c21-fig-0042), two tiny conducting balls of identical mass *m* and identical charge *q* hang from non conducting threads of length *L*. Assume that http://edugen.wiley.com/edugen/courses/crs1650/art/math/halliday8019c21/math043.gifis so small that http://edugen.wiley.com/edugen/courses/crs1650/art/math/halliday8019c21/math235.gifcan be replaced by its approximate equal, http://edugen.wiley.com/edugen/courses/crs1650/art/math/halliday8019c21/math236.gif. (a) Show that

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| http://edugen.wiley.com/edugen/courses/crs1650/art/common/pixel.gif |
| http://edugen.wiley.com/edugen/courses/crs1650/art/math/halliday8019c21/math237.gif |  |
| http://edugen.wiley.com/edugen/courses/crs1650/art/common/pixel.gif |

gives the equilibrium separation *x* of the balls. (b) If http://edugen.wiley.com/edugen/courses/crs1650/art/math/halliday8019c21/math238.gif, and http://edugen.wiley.com/edugen/courses/crs1650/art/math/halliday8019c21/math239.gif, what is http://edugen.wiley.com/edugen/courses/crs1650/art/math/halliday8019c21/math240.gif? |
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| ••9.   | In Fig. [21-23](http://edugen.wiley.com/edugen/courses/crs1650/reference/xlinks/halliday8019c21xlinks.xform?id=halliday8019c21-fig-0023), the particles have charges http://edugen.wiley.com/edugen/courses/crs1650/art/math/halliday8019c21/math125.gifand http://edugen.wiley.com/edugen/courses/crs1650/art/math/halliday8019c21/math126.gif, and distance http://edugen.wiley.com/edugen/courses/crs1650/art/math/halliday8019c21/math127.gif. What are the (a) *x* and (b) *y* components of the net electrostatic force on particle 3?  |
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