Coulomb's Law Practice Name:_____

**Reflection and Self-Assessment**

**Completion:** Circle the statement that best describes the completion of this practice.

- I completed every question on the practice.
- I did not complete some questions on the practice because:

_____

**Answer Checking**: Circle the statement that best describes how you checked your answers

- I checked all my answers against the key at the back and corrected any that were incorrect.
- I did not check all my answers and correct any mistakes because:

_____

**Online Worked Solution**: Circle the statement that best describes how you used the online worked solutions.

- I did not use the online worked solution at all.
- I used the online solution to understand some questions I got incorrect.
- I used the online solution to help me learn how to answer some questions.

**Confidence:** Circle the statement that best describes your confidence in answering questions of this type in the future.

- I am confident I can answer nearly any question of this type correctly without using notes or other assistance.
- I am confident I can answer **MOST** questions of this type correctly without using notes or other assistance.
- I am **NOT** confident I can answer most questions of this type correctly without using notes or other assistance.

**Time:** Circle the statement below that best describes the total amount of time you spent actively working on this practice:

| | | | | |
|---|---|---|---|---|
| Less than an hour | Between one and two hours | Between two and three hours | Between three and four hours | More than four hours |

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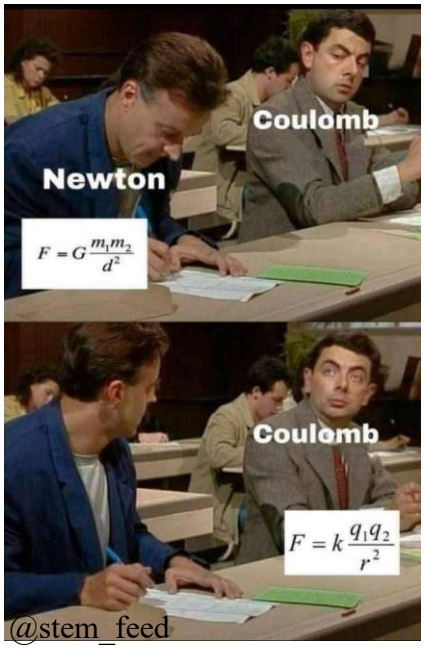
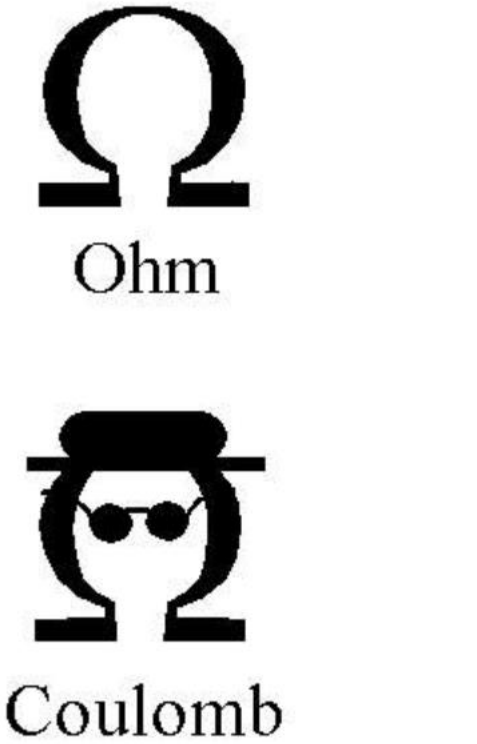
1. Explain each of the following jokes.
   a.




   b.



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2. A balloon is rubbed on someone's hair, electrons from the hair are transferred to the balloon.
    a. Will the balloon have a negative or positive charge?

    b. Will the person's hair have a negative or positive charge?

3. A negatively charge object is placed near a positively charged object. Will they be attracted to or repelled by each other?

4. Two negatively charged objects are placed near each other. Will they be attracted or repelled by each other?

5. What is 562 $\mu C$ in coulombs?

6. What is 0.00022 C in $\mu C$?

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7. A +5.9 $\mu C$ object is 0.56 m from a +11.6 $\mu C$ object.
    a. Will the objects attract each other or repel each other?

    b. What is the magnitude of the force acting on each object?

8. A -4.6 $\mu C$ object is 1.9 m from a +4.9 $\mu C$ object.
    a. Will the objects attract each other or repel each other?

    b. What is the magnitude of the force acting on each object?

9. A 462 $\mu C$ object is attracted to another object 1.23 metres away from it with a force of 0.258 N. What is the charge of the second object?

10. A -45.6 $\mu C$ object is repelled by another object 5.23 metres away from it with a force of 56.3 N. What is the charge of the second object?

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11. Two 5.3 $\mu C$ objects repel each other with a force of 5.2 N. How far apart are the objects?

12. A 113 $\mu C$ object is attracted to a -245 $\mu C$ object with a force of 7.2 N. How far apart are the objects?

13. About how many times more powerful is the attraction of a 1 C object to a -1 C object due to electric force, compared to the attraction of 1 kg object to a 1 kg object due to gravity?

    A: 20 times more

    B: 100 times more

    C: 5000 times more

    D: 100 000 000 000 000 000 000 times more

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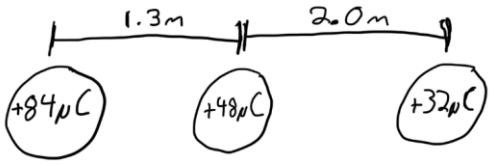
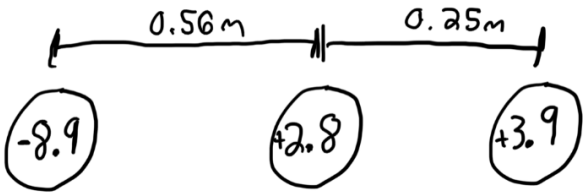
14. A +48 $\mu C$ charge is located 1.3 metres to the right of a +84 $\mu C$ charge and 2.0 m to the left of a +32$\mu C$ charge. What is the net force (magnitude and direction) acting on the 48 $\mu C$ charge.




15. A +2.8 $\mu C$ charge is located 0.56 metres to the right of a $-8.9\mu C$ charge and 0.25 metres to the left of a $+3.9\ \mu C$ charge. What is the net force (magnitude and direction) acting on the +2.8 $\mu C$ charge?



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16. Two charges are a certain distance apart and are attracted to each other by an electric force of 400.0 N. How will the strength of their attraction change if

    a. The distance between them is doubled?

    b. The strength of one of the charges is doubled?

    c. The strength of both charges is doubled?

    d. The distance between them is tripled?

    e. The strength of one of the charges is doubled and the distance between them increases by a factor of 5?

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17. A 0.22 kg Styrofoam ball is charged so that it has a $+26\ \mu C$ charge. A rod which has a charge of $-24.5\ \mu C$ is used to levitate the ball so that it floats in the air.

    a. What is the force of gravity acting on the ball?

    b. If it is levitating (not moving up or down) what must the net vertical force on the ball be?

    c. What is the electric force from the rod acting on the ball?

    d. How far from the ball must the rod be placed and should it be placed above or below the ball?

    e. If the rod had a positive charge how would your answer for d change?

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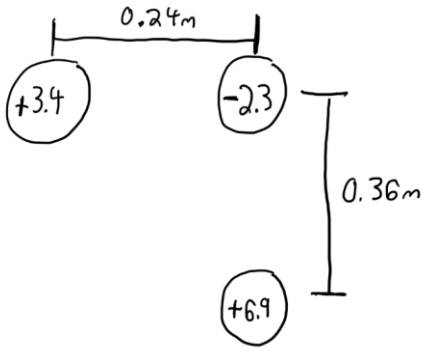
18. A particle with a $-2.3\mu C$ charge is located 0.24 m to the East of a $+3.4\mu C$ charge and 0.36m to the North of a $+6.9\mu C$ charge.




    a. What is the force (magnitude and direction) acting on the $-2.3\mu C$ charge from the $+3.4\mu C$ charge?

    b. What is the force (magnitude and direction) acting on the $-2.3\mu C$ charge from the $+6.9\mu C$ charge?

    c. What is the net force acting on the $-2.3\mu C$ charge? (magnitude and direction)

    d. If the mass of the particle is 0.025 kg. What will its acceleration be the moment it is released?

    e. If the particle is allowed to move freely why will its acceleration not stay at the value found in d.

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19. A 0.25 kg plastic puck is given a charge of +$8.3\ \mu C$. It sits on a surface with coefficient of static friction between the puck and the surface of 0.26. A rod with a charge of $+6.4\mu C$ is brought near the puck, how close must it get until the puck moves?

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| **Answers** | | | | |
|---|---|---|---|---|
| 1a) Newton's law of universal gravitation is nearly identical to Coulomb's Law. Almost as if Coulomb copied it. | 1b) Coulomb sounds like cool-ohm | 2a) Negative | 2b) Positive | 3) Attracted |
| 4) Repelled | 5) 0.000562 C | 6) 220 $\mu C$ | 7a) Repel | 7b) 2.0 N |
| 8a) Attract | 8b) 0.056 N | 9) $-9.40 \times 10^{-8} C$ or $-0.0940 \mu C$ | 10) $-0.00376\ C$ or $-3760\ \mu C$ | 11) 0.22 m |
| 12) 5.9 m | 13) D | 14) 18 N right | 15) 2.3 N left | 16a) 100.0 N |
| 16b) 800.0 N | 16c) 1600 N $\approx 1.6 \times 10^3 N$ | 16d) 44.44 N | 16e) 32.00 N | 17a) 2.2 N downwards |
| 17b) 0 | 17c) 2.2 N upwards | 17d) 1.6 m above | 17e) Rod would be BELOW the ball | 18a) 1.2 N West |
| 18b) 1.1 N South | 18c) 1.6 N, 42° South of West | 18d) 66$\frac{m}{s^2}$, 42° South of West | 18e) As it gets closer the electric force and thus acceleration will increase | 19) 0.87 m |