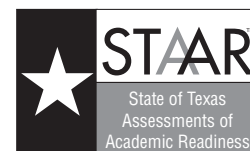


# STAAR PHYSICS REFERENCE MATERIALS



## FORCE AND MOTION

$$\text{Average velocity} = \frac{\text{displacement}}{\text{change in time}}$$

$$v_{\text{avg}} = \frac{\Delta d}{\Delta t}$$

$$\text{Acceleration} = \frac{\text{final velocity} - \text{initial velocity}}{\text{change in time}}$$

$$a = \frac{v_f - v_i}{\Delta t}$$

$$\text{Acceleration} = \frac{(\text{final velocity})^2 - (\text{initial velocity})^2}{2(\text{displacement})}$$

$$a = \frac{v_f^2 - v_i^2}{2\Delta d}$$

$$\text{Displacement} = \left( \text{initial velocity} \right) \left( \text{change in time} \right) + \frac{1}{2} (\text{acceleration}) \left( \text{change in time} \right)^2$$

$$\Delta d = v_i \Delta t + \frac{1}{2} a \Delta t^2$$

$$\text{Centripetal acceleration} = \frac{(\text{tangential velocity})^2}{\text{radius}}$$

$$a_c = \frac{v_t^2}{r}$$

$$\text{Net force} = (\text{mass})(\text{acceleration})$$

$$F_{\text{net}} = ma$$

$$\text{Work} = (\text{force})(\text{distance})$$

$$W = Fd$$

$$\text{Torque} = (\text{force})(\text{lever arm})$$

$$\tau = Fr$$

$$\text{Power} = \frac{\text{work}}{\text{time}}$$

$$P = \frac{W}{t}$$

$$\text{Pythagorean theorem}$$

$$a^2 + b^2 = c^2$$

## GRAVITATIONAL, ELECTRIC, AND MAGNETIC

$$\text{Force of gravitational attraction between 2 objects} = G \left( \frac{m_1 m_2}{d^2} \right)$$

$$F_g = G \left( \frac{m_1 m_2}{d^2} \right)$$

$$\text{Force between 2 charged particles} = \left( \text{Coulomb constant} \right) \left( \frac{q_1 q_2}{d^2} \right)$$

$$F_{\text{electric}} = k_c \left( \frac{q_1 q_2}{d^2} \right)$$

$$\text{Electrical power} = (\text{voltage})(\text{current})$$

$$P = VI$$

$$\text{Current} = \frac{\text{voltage}}{\text{resistance}}$$

$$I = \frac{V}{R}$$

$$\text{Equivalent resistance for resistors in series}$$

$$R = R_1 + R_2 + R_3 + \dots$$

$$\text{Equivalent resistance for resistors in parallel}$$

$$\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + \dots$$

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To download a free, complete version of the STAAR Physics Reference Materials, visit [www.tea.state.tx.us/student.assessment/staar/](http://www.tea.state.tx.us/student.assessment/staar/).

Provide students with a durable reference chart for year-round use, so that they can fully understand what material is provided on the charts and how to use it to solve problems.

#### \*Teacher's Tip\*

Give your students a little extra motivation to hang on to their reference charts during the school year. Tell your students, "If you have your reference chart on class test days, then you may use it during my tests. If you do not have your reference chart ... (too bad)."