

Worksheet: Kinetic Energy & Work-Energy Theorem

KINETIC ENERGY

1. What is the formula for the kinetic energy of an object? Is KE a vector or a scalar? What are the units for KE?

$$\frac{1}{2}mv^2$$

Scalar

Joules (Nm)

2. A car has 20,000 J of KE. How much kinetic energy would it need to gain to be going twice as fast?

A) 40,000 J B) 20,000 J C) 60,000 J D) 80,000 J

$$\frac{1}{2}m(2v)^2$$

3. An elevator moves from the 5th floor to the 15th floor at a constant velocity. By what factor does its KE change?

0

constant velocity

4. If you triple the mass of an object and halve the velocity of an object, by what factor does the KE change?

$$\frac{1}{2}(3m)(\frac{1}{2}v)^2$$

$\frac{3}{4}$ less velocity

5. What is the work done by gravity if an 800 kg elevator is lifted from a height of 25 meters up to a height of 75 meters?

$$W_g = -mg\Delta h$$

$$= -800(10)(50)$$

$$W_g = -400,000 \text{ J}$$

6. A 75-kg skateboarder starts at the top of a slope that is at an angle of 25°. If the length of the diagonal part of the hill was 34 meters, what was the work done by gravity as they go from the top of the hill to the bottom of the hill.



$$\sin 25 = \frac{h}{34}$$

$$h = 14.4 \text{ m}$$

$$W_g = -mg\Delta h$$

$$= -75(10)(14.4 - 0)$$

$$W_g = -10,777 \text{ J}$$

WORK-ENERGY THEOREM

7. A 340-kg motorcycle accelerates from rest to 25 m/s.

a. What was the change in the kinetic energy of the motorcycle?

$$\Delta KE = \frac{1}{2}mv_f^2 - \frac{1}{2}mv_i^2$$

$$= \frac{1}{2}(340)(25)^2 - 0$$

$$\Delta KE = 106,250$$

b. What was the net work done on the motorcycle? Be sure to indicate if it was positive or negative.

$$\Sigma W = \Delta KE$$

$$\Sigma W = 106,250 \text{ J (positive)}$$

c. The motorcycle makes this change over a distance of 100 meters. What was the net force acting on the motorcycle?

$$\Sigma W = Fx$$

$$106,250 = F_{\text{net}}(100)$$

$$F_{\text{net}} = 1,062.5 \text{ N}$$

d. What was the acceleration of the motorcycle.

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

$$1,062.5 = 340a$$

$$a = 3.125 \text{ m/s}^2$$

e. So far, none of the questions so far have required the use of kinematics. Velocity, force and distance are all related now by net work and kinetic energy. Time cannot be found however by using these principles. Use kinematics to find how long it took the motorcycle to travel the 100 meters.

$$V_f = 25$$

$$V_f = V_i + at$$

$$a = 3.125$$

$$25 = (3.125)t$$

$$V_i = 0$$

$$t = 8 \text{ seconds}$$

8. A 0.68 kg rock is dropped from the top of a 45 meter tall tower.

a. Draw a free-body diagram for the rock on the way down.



b. What is the work done by gravity on the rock while it is on the way down?

$$\Sigma W = \Sigma Fx \cos \theta$$

$$= (-mg)\Delta h \cos \theta$$

$$(-0.68(10))(-45)$$

$$\Sigma W = 306 \text{ J}$$

Answers Pgil Work Power And Kinetic Energy

United States Naval Academy

A red circular graphic with a gradient, appearing as a semi-circle or a partial circle, located to the right of the United States Naval Academy text.

Answers Pgil Work Power And Kinetic Energy:

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Making Sense of Secondary Science ,1994 ***Examination Papers of Admission to the United States Naval Academy ...*** United States Naval Academy,1899 *Making Sense of Secondary Science* Rosalind Driver,Ann Squires,Peter Rushworth,Valerie Wood-Robinson,2014-09-19 What ideas do children hold about the natural world How do these ideas affect their learning of science Young learners bring to the classroom knowledge and ideas about many aspects of the natural world constructed from their experiences of education and from outside school These ideas contribute to subsequent learning and research has shown that teaching of science is unlikely to be effective unless it takes learners perspectives into account *Making Sense of Secondary Science* provides a concise accessible summary of international research into learners ideas about science presenting evidence based insight into the conceptions that learners hold before and even despite teaching With expert summaries from across the science domains it covers research findings from life and living processes materials and their properties and physical processes This classic text is essential reading for all trainee secondary elementary and primary school science teachers as well as those researching the science curriculum and science methods who want to deepen their understanding of how learners think and to use these insights to inform teaching strategies It also provides a baseline for researchers wishing to investigate contemporary influences on children s ideas and to study the persistence of these conceptions Both components of *Making Sense of Secondary Science* this book and the accompanying teacher s resource file *Making Sense of Secondary Science* Support materials for teachers were developed as a result of a collaborative project between Leeds City Council Department of Education and the Children s Learning in Science Research Group at the University of Leeds UK *Examination Papers for Admission to the U.S. Naval Academy* United States Naval Academy,1918

E-science i (science and Technology)' 2003 Ed. , *Homework Helpers: Earth Science* Phil Medina,2025-09-12 *Homework Helpers Earth Science* covers all of the topics typically included in a high school or undergraduate course including How to understand the language of rocks The events that we see in the sky and how they affect us Earthquakes and

what they can tell us about the inside workings of our world How to understand the weather and what the weatherman is saying Homework Helpers Earth Science is loaded with practical examples using everyday experiences Every topic includes a number of simple tricks to make even the toughest ideas understandable and memorable Each chapter ends with practice questions and explanations of answers As a reference tool Homework Helpers Earth Science can be used as a preview of tomorrow s class or a reinforcement of today s It will leave students with a firm grasp of the material and the confidence that will inspire a deeper understanding

A World on Paper Enrico Bellone,1980 This profound philosophical argument analyzes the mental processes and opinions of such physicists as Maxwell Kelvin Tait etc who between 1750 and 1900 considered the relationship between mathematics and experience causing a revolution which questioned the universal applicability of Newtonian mechanism

Secondary Science Catrin Green,2016-07-21 Part of Phil Beadle s How to Teach Series So you have passion for your subject and you get to work with some of the funniest most surprising and exceptional students But teaching science isn t always a walk in the park How do you get students to think scientifically remember all of those key words and not get acid in their eyes Secondary Science is chockfull of workable ideas for the secondary science classroom Ditch the stereotypical view of a science teacher white coat slides teaching the limewater test to the same class for the fifth year in a row and discover new and creative ways to inspire the next generation to use science Areas covered include the big ideas in science scientific skills and knowledge curriculum practical work difficult topics differentiation assessment feedback and the science of memory and learning including the spacing effect and interleaving The book is packed with advice about teacher talk fun science games ideas for developing scientific literacy ideas for embedding mathematical skill in science advice for extended writing in science advice to make practical work safe meaningful and worthwhile and top tips for teaching the difficult topics that students tend to dislike Catrin offers tips for teaching areas of the science curriculum including electricity evolution and balancing equations Suitable for all teachers including NQTs and experienced teachers who are looking for new ideas If you are looking for quick and easy ideas to make science fun and relevant while ensuring that all students are successful and confident in your lessons and not overloaded with facts then this book is for you

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