

Core Science 221, Section 1**NAME:**

Homework 1: The Concept of Energy in Physics: Homeworks are due as posted on the course web site. Enter the answer to the multiple-choice questions on the answer table beside the number corresponding to the question. There may be gaps in the table when full-answer questions appear in the homework. You only need to hand in the table for the multiple-choice questions. Solutions will be posted eventually after the due date.

Answer Table					Name:						
	a	b	c	d	e		a	b	c	d	e
1.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	31.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	32.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	33.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	34.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	35.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	36.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	37.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	38.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	39.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
10.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	40.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
11.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	41.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
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14.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	44.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
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23.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	53.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
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25.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	55.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
26.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	56.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
27.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	57.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
28.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	58.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
29.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	59.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
30.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	60.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

1. “Let’s play *Jeopardy!* For \$100, the answer is: It is usefully, if inadequately defined, as the capacity for change or the quantified capacity for change.”

What is _____, Alex?

- a) momentum b) entropy c) enthalpy d) effigy e) energy

2. Pure energy (i.e., energy without any other characteristics than those ascribed to energy alone):

- a) is common. b) does not exist it seems. c) is rare. d) is medium. e) is well-done.

3. “Let’s play *Jeopardy!* For \$100, the answer is: The energy of motion with formula $KE = (1/2)mv^2$, where m is the object’s mass and v is the object’s speed.”

What is _____, Alex?

- a) joule b) force c) momentum d) kinetic energy e) potential energy

4. An object has kinetic energy 24 J and mass 3 kg. What is its speed?

- a) 4 m/s. b) 16 m/s. c) 256 m/s. d) 24 m/s. e) 0 m/s.

5. A vector is a physical quantity with:

- a) no direction. b) no magnitude. c) three directions. d) three and half directions.
e) a magnitude and a direction.

6. The conservation-of-energy law means that the total energy of a closed system will:

- a) be totally lost. b) change. c) not change. d) increase. e) decrease.

7. “Let’s play *Jeopardy!* For \$100, the answer is: A theoretical proof of the conservation of energy.”

What is _____, Alex?

- a) Pythagoras’s theorem b) Noether’s theorem c) Birkhoff’s theorem
d) Newton’s corollary e) Noether’s conjecture

8. One of the great boons of using the energy concept in the prediction of the behaviors of systems is that it (i.e., the energy concept) often gives you limited, but very useful information:

- a) with impossible difficulty. b) never. c) easily. d) with zero probability. e) not.

9. “Let’s play *Jeopardy!* For \$100, the answer is: This feature of an isolated physical system sets a limit to the amount of change that system can undergo.”

What is _____, Alex?

- a) nothing b) the total energy c) something d) the total kinetic energy
e) the total potential energy

10. The word energy was apparently coined by:

- a) Aristotle (384–322 BCE). b) Gottfried Wilhelm von Leibniz (1646–1716).
c) Thomas Young (1773–1829). d) Emmy Noether (1882–1935).
e) Richard Feynman (1918–1988).

11. “Let’s play *Jeopardy!* For \$100, the answer is: He was the discoverer of special relativity.”

Who was _____, Alex?

- a) Isaac Newton (1643–1727) b) James Clerk Maxwell (1831–1879)
c) Albert Einstein (1879–1955) d) Erwin Schrödinger (1887–1961)
e) Louis de Broglie (1892–1987)

12. According to special relativity, the vacuum speed of light is (with some qualifications we needn’t go into):

- a) dependent on the observer. b) 3 m/s. c) the highest possible physical speed. d) the lowest possible physical speed.
e) negligible.

13. “Let’s play *Jeopardy!* For \$100, the answer is: It is the mass-energy equivalence equation or the Einstein equation.”

What is _____, Alex?

a) $E = \frac{1}{2}mv^2$ b) $E = mv$ c) $E = mc^4$ d) $E = mc^3$ e) $E = mc^2$

14. What is the energy equivalent in joules of 1 kg. Recall the vacuum speed of light is approximately 3.00×10^8 m/s.

a) 9×10^8 J. b) 9×10^{16} J. c) 3×10^{16} J. d) 3×10^8 J. e) 1.

15. Since the early days of radioactivity, people have been (as Beatrix Potter [1866–1943] once said in another context) “’ticed by quantities” when contemplating the fact that the energy scale of nuclear reactions is of order _____ times the energy scale of chemical reactions.

a) 2 b) 6 c) 10 d) 10^{-6} e) 10^6