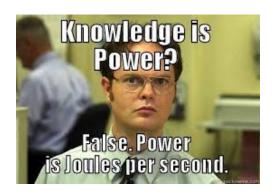
Grade 12 Physics Energy Test Energy Unit Test



First Name:	
Last Name:	

Directions:

- Show all work for full marks
- Test duration: 75 minutes
- For calculations, round final answers to 2 decimal places

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Page:	2	3	4	5	Total		
Points:	6	7	31	30	74		
Score:							

Multiple Choice (10 marks)

A. 5 JB. 25 JC. 50 JD. 10 J

1. (1 point) What is the kinetic energy of a 2 kg object moving at 5 m/s?

2.	(1 point)	How much gravitational potential energy does a 5 kg object have at 10 m height?
	A.	50 J
	В.	$490~\mathrm{J}$
	С.	980 J
	D.	$245~\mathrm{J}$
3.	(1 point)	Which energy transformation occurs in a photovoltaic cell?
	A.	Thermal to electrical
	В.	Light to electrical
	С.	Chemical to electrical
	D.	Mechanical to electrical
4.	(1 point)	What is the work done by a 20 N force pushing an object 5 m?
	A.	4 J
	В.	100 J
	С.	25 J
	D.	200 J
5.	(1 point)	What power is developed by doing 600 J of work in 10 seconds?
	Α.	$6~\mathrm{W}$
	В.	$60~\mathrm{W}$
	С.	$6000~\mathrm{W}$
	D.	$10~\mathrm{W}$
6.	(1 point)	Which statement best describes energy conservation?
		Energy can be destroyed
		Energy changes form but total remains constant
		Energy becomes less useful over time
		Energy creation is possible in closed systems

7	(1 point)	What is the efficiency of a device that outputs 150 J from 200 J input?
١.	` - /	what is the emeloney of a device that outputs 100 g from 200 g input.
	A.	133%
	В.	50%
	С.	75%
	D.	25%
8.	(1 point)	How much energy is stored in a spring (k=400 N/m) compressed 0.2 m?
		8 J
	В.	8 J
		16 J
	D.	80 J
	,	
9.	` - /	A 5 kg object has a kinetic energy of 50 J. What is its speed?
		2 m/s
		4.47 m/s
		10 m/s
	D.	$20 \mathrm{m/s}$
l0.	,	A spring with a spring constant of 150 N/m is stretched by 0.2 m. What is the elastic potentia ored in the spring?
	A.	1 J
	В.	3 J
	С.	3 J
	D.	$6~\mathrm{J}$
l 1 .	(1 point) bottom?	A 2 kg block slides down a frictionless ramp from a height of 10 m. What is its speed at the
	A.	$10 \mathrm{\ m/s}$
	В.	14.14 m/s
	С.	$20 \mathrm{\ m/s}$
	D.	$30~\mathrm{m/s}$
2.	(1 point)	A car of mass 800 kg is moving at 20 m/s. What is its kinetic energy?
	A.	80,000 J
	В.	$160,000 \; \mathrm{J}$
	С.	$240,000 \; \mathrm{J}$
	D.	320,000 J
13.	(1 point)	Work is defined as:
	A.	Force divided by distance
	В.	Force times distance times the cosine of the angle between them
	С.	Change in momentum

- D. Change in kinetic energy
- 14. (1 point) A pendulum's potential energy is maximum at:
 - A. Its lowest point
 - B. Its highest point
 - C. The midpoint of its swing
 - D. None of the above

Long Answer (40 marks)

- 15. A 50 kg roller coaster car starts from rest at 60 m height.
 - (a) (4 points) Calculate initial potential energy
 - (b) (6 points) Find speed at 20 m height (no friction)
 - (c) (6 points) Calculate actual speed at 20 m height if 10% energy is lost to friction
 - (d) (4 points) Determine average frictional force

- 16. A spring with a spring constant of 200 N/m is compressed by $0.3~\mathrm{m}$ and used to launch a 2 kg block horizontally on a frictionless surface.
 - (a) (5 points) Calculate the elastic potential energy stored in the spring.
 - (b) (5 points) Determine the speed of the block as it leaves the spring.

- 17. A 15.0 kg branch falls from a tree onto a trampoline 8.0 m below.
 - (a) (5 points) Calculate the total mechanical energy of the branch at the top of the tree just before it falls, assuming it starts from rest and air resistance is negligible.
 - (b) (5 points) Determine the velocity of the branch just before it hits the trampoline.
 - (c) (5 points) If the trampoline compresses by 0.25 m to bring the branch to a stop, calculate the spring constant of the trampoline.

- 18. A 0.020 kg bullet is fired at a wooden target with an initial velocity of 250 m/s. Upon hitting the target, the bullet becomes embedded and stops after penetrating 0.12 m into the wood.
 - (a) (5 points) Calculate the initial kinetic energy of the bullet.
 - (b) (5 points) Determine the average force exerted by the target to stop the bullet.
 - (c) (5 points) If 20% of the bullet's kinetic energy is converted into heat, how much energy is absorbed as heat?