McRoberts Secondary

Energy Unit Test 2025-12-01

Personal Data

Family Name:

Given Name:

Signature:

checked

Registration Number

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In this section **no** changes or modifications must be made!

Scrambling 0 0

Type: 020

Exam ID(Physics 11): 25120100002

Please mark the boxes carefully: ☒ Not marked: ☐ or ■

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Only clearly marked and positionally accurate crosses will be processed!

Answers 1 - 15

	a	b	c	d
1	☐	☐	☐	☐
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13	☐	☐	☐	☐
14	☐	☐	☐	☐
15	☐	☐	☐	☐
	a	b	c	d

Answers 16 - 20

	a	b	c	d
16	☐	☐	☐	☐
17	☐	☐	☐	☐
18	☐	☐	☐	☐
19	☐	☐	☐	☐
20	☐	☐	☐	☐
	a	b	c	d

1. An object of mass 83.0 kg is moving with speed 8.00 m/s. What is its kinetic energy?

   a. 2130 J
   b. 3510 J
   c. 3050 J
   d. 2660 J

2. An object of mass 84.0 kg is 3.00 m above the ground. What is its gravitational potential energy relative to the ground?

   a. 2470 J
   b. 1580 J
   c. 3510 J
   d. 3070 J

3. Which of the following are units of energy? *Select all that apply.*

   a. $\mathrm{kg\,m\,s^{-2}}$
   b. J
   c. N m
   d. kg m s

4. Bob pushes against a brick wall for 13 seconds. Zoe pushes against the same wall for 26 seconds. The wall does not move. Compare the work done by each person.

   a. Zoe does 2 times as much work as Bob.
   b. Zoe does 13 seconds more work than Bob.
   c. The work done by each person depends on the force they applied.
   d. Both Bob and Zoe do no work.

5. A cyclist climbing up a hill wants to shift gears to increase his bicycle's mechanical advantage. This would make it so that a smaller effort force is needed to overcome the force of gravity on the bike. Which sprocket changes would result in a greater mechanical advantage? *Select all that apply.*

   a. increase front sprocket radius.
   b. increase rear sprocket radius.
   c. decrease front sprocket radius.
   d. decrease rear sprocket radius.

6. A pulley system lifts a 1575-N weight a distance of 1.57 m. Paul pulls the rope a distance of 8.26 m, exerting a force of 418 N. What is the efficiency of the system?

   a. 49.9 %
   b. 71.6 %
   c. 45.6 %
   d. 91.2 %

7. An elevator is moving upwards at a constant speed of 1.97 m/s. The total mass of the elevator and passengers is 1125 kg. How much power is developed by the elevator's motor?

   a. 19.1 kW
   b. 21.7 kW
   c. 14.3 kW
   d. 24.7 kW

8. A box is pushed up an inclined plane. The angle of incline is 70° from the ground. What is the ideal mechanical advantage of the inclined plane?

    a. 1.060
    b. 1.260
    c. 1.580
    d. 0.940

9. How much power is required to lift a box of mass 60 kg a distance of 13.0 m straight up in 11.0 s?

    a. 468 W
    b. 539 W
    c. 695 W
    d. 618 W

10. How much work is done (by you) if you raise a 6.0 N weight 3.0 m above the ground?

    a. 176.4 J
    b. 18.0 J
    c. 30.3 J
    d. 0.0 J

11. A rope is used to pull a box 16.0 m across the floor. The rope is held at an angle of 39.0° with the floor and a force of 233 N is used. The mass of the box is 13 kg and the coefficient of kinetic friction between the box and the ground is 0.96. How much work does the force on the rope do?

    a. 3730 J
    b. 2190 J
    c. 1620 J
    d. 2900 J

12. How much work does the force of gravity do when a 99.0-N object falls a distance of 2.5 m?

    a. 0 J
    b. 2390 J
    c. 1900 J
    d. 244 J

13. A simple machine with mechanical advantage less than 1

    a. increases friction.
    b. increases energy.
    c. increases effort force.
    d. decreases effort force.

14. A ball drops some distance and loses 10 J of gravitational potential energy. Do **NOT** ignore air resistance. How much kinetic energy did the ball gain?

    a. More than 10 J.
    b. Exactly 10 J.
    c. Less than 10 J.
    d. Cannot be determined.

15. The transfer of energy by mechanical means is

    a. momentum
    b. force
    c. work
    d. acceleration

16. A 1605-kg car is traveling at 19 m/s. The brakes are suddenly applied and the car slides to a stop. The average braking force between the tires and the road is 3139 N. How far will the car slide once the brakes are applied?

    a. 78.9 m
    b. 136.0 m
    c. 120.0 m
    d. 92.3 m

17. A car moving at 40 km/h comes to a stop in 85 m after the driver applies the brakes. How far would the same car take to stop if it were moving at 46 km/h? Assume identical road conditions and braking force.

    a. 139.1 m
    b. 126.2 m
    c. 112.4 m
    d. 151.2 m

18. The net work done on an object is equal to its

    a. change in kinetic energy.
    b. change in velocity.
    c. change in potential energy.
    d. change in total mechanical energy.

19. A test rocket of mass 58 kg is fired straight up. Its fuel gives it a kinetic energy of 9292 J by the time the rocket engine burns all the fuel. What additional height will the rocket rise?

    a. 18.5 m
    b. 16.3 m
    c. 21.1 m
    d. 23 m

20. Charles's mass is 24.0 kg. He climbs the 5.9-m ladder of a slide, and reaches a velocity of 5.4 m/s at the bottom. How much work was done by friction on Charles?

    a. 1510 J
    b. 1400 J
    c. 1260 J
    d. 1040 J