

AS 90940

Mechanics Test Yourself Part 1 (Motion & Energy)

Print and then fold the sheet on the dotted line to hide the answers. Then answer the questions and open it up to mark your work. You will need a calculator. Good luck!

1. _____ is the force when 2 surfaces move or try to move across each other.		friction
2. 1 joule per second equals 1 _____		watt, W
3. A _____ is a push or a pull.		force
4. A 50 g golf ball is hit and accelerates at $20 \text{ ms}^{-2}$ . What force was acting on the ball? (Hint $50 \text{ g} = ? \text{ kg}$ )		$(0.05 \text{ kg}) 1 \text{ N}$
5. A bike is moving at $5 \text{ ms}^{-1}$ . It speeds up at a steady rate over 20 seconds to $9 \text{ ms}^{-1}$ . Calculate the average acceleration of the bike.		$0.2 \text{ ms}^{-2}$
6. A bike travels down a steep hill for 117m in 9s. Calculate its average speed.		$13 \text{ ms}^{-1}$
7. A box is dragged across a slippery floor with a force of 45 N, and accelerates at $0.08 \text{ ms}^{-2}$ . Calculate the mass of the box.		562.5 kg
8. A crane lifts a 5000 N crate to a height of 7 m in 10 seconds. What is its power? (Hint: calculate work done first)		3500 W or $3500 \text{ Js}^{-1}$
9. A parachute increases _____ so that terminal velocity is _____ enough for someone to land safely.		air resistance / drag , small
10. A roller coaster's original speed is $2 \text{ ms}^{-1}$ and its final speed is $10 \text{ ms}^{-1}$ . The ride takes 60 seconds. Calculate its acceleration.		$0.13 \text{ ms}^{-2}$
11. A sky diver falls at constant speed when their weight equals the friction force (drag); they are at _____ velocity		terminal
12. A tennis player hits a ball (0.06 kg) so that it accelerates at $200 \text{ ms}^{-2}$ . Calculate the force their racket exerts.		12 N
13. A truck slows from $18 \text{ ms}^{-1}$ to $0 \text{ ms}^{-1}$ in 6 seconds. Calculate its acceleration.		$-3 \text{ ms}^{-2}$
14. A weightlifter lifts a 220 kg barbell from the floor to a height of 2 m. Calculate the gain in potential energy.		4400 J
15. An object of mass 45 kg on Earth will have a weight force of..		450 N
16. A 1 kg object on a smooth surface is accelerating at $2 \text{ ms}^{-2}$ . If the net force on the object is tripled and the mass of the object is doubled, calculate the new acceleration of the object.		$3 \text{ ms}^{-2}$ $(2 \times 3)/2$
17. Calculate the average speed: a dolphin swims 720 m in 60s		$12 \text{ ms}^{-1}$

18. Calculate the work done when a person lifts a brick of mass 5 kg from the floor to a wall 2 m high.		100 J (5 x 10 x 2)
19. Calculated by the formula distance travelled / time taken		average speed
20. Common units for distance, kilometres, ____ and centimetres		metres
21. Falling objects drop with an acceleration of __ ms <sup>-2</sup>		9.8 or 10
22. $F_{\text{net}} = ma$ . What is $F_{\text{net}}$ ?		net force
23. Friction can be _____; brakes slowing or stopping your bike or spikes on a running shoe		useful
24. Friction commonly acts in the ____ direction to movement		opposite
25. Friction slows things down, makes things h__ and w____ things away		hot wears
26. $F_w = mg$ . What is $F_w$ ?		weight force
27. If 24 J of work are done pushing a box using a 3N force, how far is it pushed?		8 m
28. If the forces acting on an object are unbalanced, the object will accelerate, _____ or change direction		decelerate
29. In a distance-time graph a line going back down to distance 0 means: slowing down / going down a hill / returning to start		returning to start
30. In a distance-time graph, the steeper the line, the greater the .....		speed
31. In a distance-time graph, what does a horizontal line mean?		stationary / stopped/at rest
32. In a distance-time graph, what does a straight (sloping) line mean?		constant speed
33. In a speed-time graph, what does a horizontal line mean?		constant speed
34. In a speed-time graph, what does a steeper straight (sloping) line mean?		greater acceleration
35. In a speed-time graph, what does a straight (sloping) line mean?		constant acceleration
36. In the equation $E_p = mgh$ , what is h and what are its units?		Height metres (m)
37. In the formula $W = Fd$ , W is the		Work done

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Mechanics Test Yourself Part 2 (Motion & Energy)

Print and then fold the sheet on the dotted line to hide the answers. Then answer the questions and open it up to mark your work. You will need a calculator. Good luck!

1. Is any work done when a crane tries to lift a container using a force of 12000 N but can't move it?		no
2. Is work done when a boy climbs a ladder?		yes
3. Jack wants to know how fast he can swim. What 2 measurements must he make to calculate his swimming speed?		distance & time
4. Kinetic energy $E_k$ is _____ energy		movement
5. Tom has a mass of 80 kg and is accelerating towards a wall on a skate board which he hits with a force of 400N. Calculate his acceleration.		$-5 \text{ ms}^{-2}$
6. On objects of the same mass, acceleration is directly proportional to the force applied; doubling the forces ____ the acceleration		doubles
7. Power = work / time, so what do you calculate to find out work?		power x time
8. Running at the same speed a bull would have more kinetic energy than a sheep because it has more		mass
9. Speed you see when you look down at a speedometer is called _____ speed.		instantaneous
10. Steady speed means speed that is not ...		changing
11. The _____ is the amount of material in something, measured in kg or g		mass
12. The mass / weight of an object does not change, no matter where the object is.		mass
13. The rate at which work is done is called the _____		power
14. The symbol $\Delta$ means " _____ "		change in
15. The unit for work and energy is the ...		J / joule
16. Thomas takes 5 seconds to run upstairs, a vertical height of 4.5 m, lifting his own weight of 700 N. Calculate his power output.		630 W
17. W____ requires movement against an opposing force.		work
18. What 3 units must you only use when using $F=ma$ ?		N, kg and $\text{ms}^{-2}$
19. What is another word for an object that is "at rest"?		stationary / stopped

20. What is the approximate value of g in N kg <sup>-1</sup> ?		10 N kg <sup>-1</sup>
21. What is the formula for calculating distance when average speed and distance are known		distance = speed x time
22. What is the formula for calculating speed when time taken and distance are known		speed = distance/time
23. What is the mass of a 80 kg person sitting on a Wanganui park bench?		80 kg
24. What is the net force on this car? 		55 N towards the right
25. What is the net force on this car? 		0 N / zero forces / balanced forces
26. What is the weight of a 60 kg person sitting on a Wanganui park bench?		600 N
27. What type of motion has the units ms <sup>-2</sup>		acceleration
28. What word is often used for “negative acceleration”		deceleration
29. What word means the change in speed of an object		acceleration
30. What work is done when 2.5 N force moves a toy 4 m?		10 J
31. Wheels reduce friction by _____ the areas in contact with the ground.		reducing
32. When a distance-time graph is curved, the object is		accelerating /decelerating/ changing speed
33. When a person jumps from a plane their weight remains constant but as they accelerate _____ increases		air resistance / drag
34. When an object is stationary or travelling at constant speed then the forces acting on the object are...		balanced / equal
35. When the same force is applied to a smaller mass, the smaller mass has _____ acceleration; halving the mass _____ the acceleration		greater doubles
36. Whenever work is done _____ is changed from one form to another.		energy
37. Who is more powerful, Jessica who does 60 J of work for 3 seconds or Hannah who does 125 J of work for 5 seconds?		Hannah
38. Word that describes the way something is moving is its m_____		motion
39. Work (done) and _____ have the same units, which are _ .		Energy, J