

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!

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| 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 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 ms^{-1} . It speeds up at a steady rate over 20 seconds to 9 ms^{-1} . Calculate the average acceleration of the bike. | | 0.2 ms^{-2} |
| 6. A bike travels down a steep hill for 117m in 9s. Calculate its average speed. | | 13 ms^{-1} |
| 7. A box is dragged across a slippery floor with a force of 45 N, and accelerates at 0.08 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 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 ms^{-1} and its final speed is 10 ms^{-1} . The ride takes 60 seconds. Calculate its acceleration. | | 0.13 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 ms^{-2} . Calculate the force their racket exerts. | | 12 N |
| 13. A truck slows from 18 ms^{-1} to 0 ms^{-1} in 6 seconds. Calculate its acceleration. | | -3 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 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 ms^{-2} $(2 \times 3)/2$ |
| 17. Calculate the average speed: a dolphin swims 720 m in 60s | | 12 ms^{-1} |

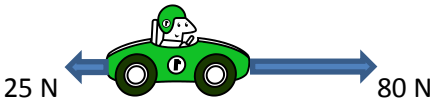

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| 18. Calculate the work done when a person lifts a brick of mass 5 kg from the floor to a wall 2 m high. | | 100 J (5 x 10 x 2) |
| 19. Calculated by the formula distance travelled / time taken | | average speed |
| 20. Common units for distance, kilometres, ____ and centimetres | | metres |
| 21. Falling objects drop with an acceleration of __ ms ⁻² | | 9.8 or 10 |
| 22. $F_{\text{net}} = ma$. What is F_{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)

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| 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 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 Δ 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 ms^{-2} |
| 19. What is another word for an object that is "at rest"? | | stationary / stopped |

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| 20. What is the approximate value of g in N kg^{-1} ? | | 10 N kg^{-1} |
| 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^{-2} | | 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 |