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| outhern River College | **Year 11 Integrated Science**  **Task 10: Energy, Forces, and Motion** |

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| **Name:**  **Date:** | **Teacher:** | **Score: /** |

1. Which statement best describes a soccer ball slowing down while rolling along the grass?
2. a positive acceleration is acting on the ball
3. no net force is acting on the ball
4. the force of friction is changing the ball’s speed
5. a large downwards force is decelerating the ball
6. What is the force of gravity acting on an object called?
7. weight
8. mass
9. inertia
10. momentum
11. Alinta is jumping straight up and down on a trampoline. Which of the following best describes the energy changes occurring when she falls onto the trampoline from maximum height?
12. elastic potential energy → gravitational potential energy → kinetic energy
13. gravitational potential energy → kinetic energy → elastic potential energy
14. kinetic energy → gravitational potential energy → elastic potential energy
15. elastic potential energy → thermal energy → kinetic energy
16. Which one of the following statements about friction is INCORRECT?
17. friction occurs in the same direction as a moving object
18. friction is a contact force
19. friction between two moving objects generates heat
20. without friction you could not grip an object or walk
21. Which of the following is best explained by Newton’s **first** law?
22. unbelted passengers will be thrown forward when a car stops suddenly
23. a gun recoils when a shot is fired
24. the acceleration of an object when a force is applied depends on the mass of the object
25. the weight of an object varies from planet to planet
26. Which of the following is best explained by Newton’s **second** law?
27. unbelted passengers will be thrown forward when a car stops suddenly
28. a gun recoils when a shot is fired
29. the acceleration of an object when a force is applied depends on the mass of the object
30. the weight of an object varies from planet to planet
31. Which of the following is best explained by Newton’s **third** law?
32. unbelted passengers will be thrown forward when a car stops suddenly
33. a gun recoils when a shot is fired
34. the acceleration of an object when a force is applied depends on the mass of the object
35. the weight of an object varies from planet to planet
36. An object is acted upon by a thrust force of 50 N and a total frictional force of 40 N. The net force will be:
37. 90 N backwards.
38. 90 N forwards.
39. 10 N forwards.
40. 10 N backwards.
41. Which of the following forces produces a change in motion?
42. unbalanced force
43. balanced force
44. gravitational force
45. frictional force
46. If you double the mass of an object but apply the same force, the acceleration will?
47. Double
48. Zero
49. Cut in half
50. Be the same
51. Describe each of Newton’s three laws in your own words, use an appropriate example for each law to help your description. (9 marks)
52. Newton’s 1st Law

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1. Newton’s 2nd Law

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1. Newton’s 3rd Law

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1. Describe what is meant by Inertia. (2 marks)

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1. Which object would have the largest inertia? A car or a Bicycle? Explain your answer (2 marks)

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1. Two students, Sam and Katie are at the skate park. Sam is 50 kg and Katie is 60 kg. Sam is riding on his scooter when he accidentally collides with Katie, also on her scooter. Sam applied a force of 100 N to Katie during the collision but they both manage to stay on their scooters.

What size force does Katie apply to Sam? (1 mark)

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Identify which student experiences the largest acceleration as a result of their collision and explain why. (2 marks)

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14. Draw vector forces on the diagram below to represent the main forces acting on the skydiver as they are falling at terminal velocity (maximum speed). Label the forces and draw them to represent their relative sizes. (2 marks) 

f) Calculate the force due to gravity acting on the parachutist. Assume g = 9.8m/s2. (2 marks)

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g) Determine the force of air resistance in Section C. (1 mark)

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An aircraft is being simultaneously affected by 4 forces:

• “Lift”, acting vertically upwards

• “Weight”, acting vertically downwards

• “Thrust”, acting horizontally forwards

• “Drag”, acting horizontally backwards

Sketch the vector diagram of these forces to show any “resultant” net force acting when:

1. the plane is in level flight at constant velocity. (4 marks)
2. the aircraft is speeding up AND gaining height. (4 marks)

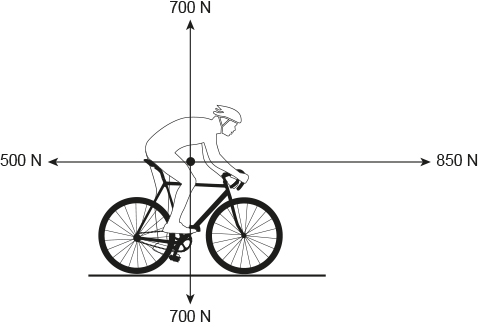
A 60kg cyclist exerts a net force of 100N pedalling his 15kg bike for 10.0 seconds. Ignoring any friction;

1. what acceleration will be produced? (3 marks)

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In the diagram below, will the cyclist be travelling in a state of constant motion? Explain your answer. (3 marks)

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