Worksheet I: Newton’s third law – multiple choice
questions

For each question below, choose an answer and then give a clear reason why, making sure you use appropriate mathematical language.

1. When you step on a toy, the toy applies an equal and opposite force on your foot as your foot applies to the toy.

|  |  |
| --- | --- |
|  | True |
|  |  |
|  | False |

1. If you are an astronaut slowly drifting away from the space station, you might be able to drift back to the station by throwing a 5kg tool rapidly in the direction that you are travelling (away from the station).

|  |  |
| --- | --- |
|  | True |
|  |  |
|  | False |

1. Gravity is pulling on you downwards with a force which we call your weight. The reason why you aren't accelerating downwards is that there is an equal and opposite force of the floor (let's assume you are standing up) pushing you upwards that nets out against the force of gravity. This is the ‘equal and opposite’ force described by Newton's third law of motion.

|  |  |
| --- | --- |
|  | True |
|  |  |
|  | False |

1. Which best explains why we are able to accelerate forward when starting to run?

|  |  |
| --- | --- |
|  | The striking foot pushes backward against the ground. The friction with the ground provides an equal and opposite force forward. |
|  |  |
|  | The foot not touching the ground propels the entire body as it swings forward. |
|  |  |
|  | No acceleration takes place. Runners are always at a fixed velocity. |
|  |  |
|  | As one leg moves backward, it provides an equal and opposite force for the other foot to move forward. |
|  |  |
|  | The runner’s upper body quickly leans forward, causing the entire body to begin accelerating forward. |

1. You and a friend are pulling on a rope in opposite directions as hard as you can. What is the ‘equal and opposite force’ to the force of your hand pulling on the rope described by Newton's third law?

|  |  |
| --- | --- |
|  | The force of friction between the ground and your shoes |
|  |  |
|  | The force of the rope pulling your friend’s hand |
|  |  |
|  | The force of your arm pulling back on your hand |
|  |  |
|  | The force of your arm pulling back on your hand |
|  |  |
|  | The force of the rope pulling on your hand in the opposite direction |