P3.1 Pre-Unit Quiz Mark scheme

Qu	Answer	Marks	Supporting information for fix-it tasks
1	B	1	Answering A is a common misconception that resultant force is always 0 because of forces cancelling each other out. Answering C is the misconception that resultant force is the largest force acting on an object. *Task: Practising calculating resultant force from diagrams and drawing free-body force diagrams to show directions of different forces.*
2	B	1	Answering A shows that pupils have correctly calculated the magnitude of the resultant force but incorrectly identified the direction. *Task: Practising calculations of resultant force with direction from free-body force diagrams.* Answering C shows that pupils have incorrectly added together forces acting in opposite directions. *Task: Practising calculations of resultant force with forces in the same direction and forces in opposite directions.*
3	C	1	Answering A or B shows a lack of understanding of the effects of unbalanced forces. Unbalanced forces can change the speed, direction or shape of an object so in this case the car's speed must be changing, meaning that it cannot be stationary or moving at a constant speed. *Task: Completing a summary to explain the effects of unbalanced forces on stationary objects and objects that are already in motion.*
4	A	1	Answering B or C shows a lack of understanding of the effects of balanced forces. An object will continue in its state of motion unless it is acted upon by an unbalanced force, so the car will continue moving at a constant speed as it was already in motion.

			Task: Completing a summary to explain the effects of balanced forces on stationary objects and objects that are already in motion. Alternatively pupils could identify the motion from free-body force diagrams and explain in terms of balanced and unbalanced forces.
5	B	1	Answering A shows an understanding of the equation but a lack of understanding about converting to SI units. Task: Practise converting quantities to SI units in calculations. Answering C shows an ability to convert into SI units but a lack of understanding of the speed – distance/time equation. Task: Model how to lay out a speed = distance/time calculation for students to practice calculations, including rearranging for different unknown quantities.
6	A	1	Answering B or C show a misconception of the meaning of a horizontal line on a distance-time graph and that pupils may have confused a positive gradient with a horizontal line. Task: Pupils can be presented with different examples of distance-time graphs and asked to describe the motion at different stages. It may be useful to convert the graph into a table to show that no distance is being covered when there is a horizontal line.
7	A	1	Answering B shows that pupils have confused a horizontal line with the steepest positive gradient. Answering C shows that pupils have understood that gradient represents speed but incorrectly interpreted the meaning of the steepness of the gradient. Task: Pupils can compare the speeds of different sections of a distance-time graph and calculate the speed using the gradient to confirm their comparison.
8	B	1	Answering A shows that pupils have extrapolated the maximum value from the y axis and taken this as the total distance.

			Answering C shows that pupils have added together the separate distance travelled at each point, rather than reading it as a cumulative value.

Task: Pupils can work backwards to make a table of a distance-time graph or describe the journey shown by a distance-time graph in words. |
| 9 | A | 1 | Answering B or C shows that pupils have confused everyday units for speed with the SI unit.

Task: Pupils should revisit the SI units for distance and time and the equation that links speed, distance and time to show how the SI unit is derived. |
| 10 | B | 1 | Answering A shows that pupils have calculated her speed for the first section of the run only, but correctly divided distance by time.

Answering C shows that pupils have correctly identified that average speed is calculated from total distance divided by total time but they have neglected to include the time spent resting. This is a common misconception as some pupils will assume that this period of rest is not included in the calculation as her speed is 0 during this time.

Task: Pupils can be presented with other written scenarios to calculate average speed or they can calculate average speed for a whole journey from a distance-time graph. |