**2021 Year 10 Physical Sciences Topic Test**

**Time allowed: 1 hour**

**Total marks: 30 marks**

**SECTION A – MULTIPLE CHOICE (10 questions, 1 mark each)**

**Question 1**

Which of the following best describes the term ‘velocity’?

**A.** position with direction

**B.** speed with direction

**C.** speed without acceleration

**D.** another name for speed

**E.** displacement without direction

**Question 2**

Which of the following best describes a scalar quantity?

**A.** a quantity with magnitude and no direction

**B.** a quantity with direction and no magnitude

**C.** a quantity that measures change in direction

**D.** a quantity with magnitude and direction

**E.** a quantity that measures change in velocity

**Question 3**

Which of the following is an example of a motion with zero displacement?

**A.** a puppy running towards its owner

**B.** a puppy returning to the same spot on its bed after feeding

**C.** a puppy walking around inside a stationary bus

**D.** a puppy running towards a toy in a straight line without change in direction

**E.** a puppy running across the lawn without acceleration or deceleration

**Question 4**

What is momentum?

**A.** the force acting in the opposite direction

**B.** the sum of all the forces acting on an object

**C.** the tendency of an object to resist changes in its motion

**D.** the product of an object’s mass and velocity

**E.** the sole influence of gravity on an object

**Question 5**



Which statement best describes a soccer ball slowing down on a level ground?

**A.** a positive acceleration is acting on the ball

**B.** no net force is acting on the ball

**C.** the ball is experiencing a net force acting upwards on the ball

**D.** the force of friction is changing the ball’s speed

**E.** a large downwards force is decelerating the ball

**Question 6**

Which of the following can be best explained by Newton’s second law?

**A.** a bicycle will slow down on a level road when the rider stops pedalling

**B.** a passenger without a seatbelt will be thrown forward when the car halts suddenly

**C.** the speed of a rocket is only related to the mass of the rocket

**D.** a moving toy car will bounce backwards upon colliding with a stationary toy train

**E.** a big cat weighs more than a small cat

**Question 7**

What does the term ‘work’ mean in physics?

**A.** the distance travelled per unit of time

**B.** the amount of force required to accelerate an object

**C.** a measure of the energy transferred when moving an object

**D.** the product of the mass and velocity of an object

**E.** any force acting on an object other than gravity

**Question 8**

What is the force of gravity acting on an object called?

**A.** weight

**B.** mass

**C.** inertia

**D.** reaction force

**E.** momentum

**Question 9**

What is the SI unit of weight?

**A.** Joule

**B.** Kilogram

**C.** Ampere

**D.** Pascal

**E.** Newton

**Question 10**

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?

**A.** thermal energy → gravitational potential energy → elastic potential energy

**B.** elastic potential energy → gravitational potential energy → kinetic energy

**C.** gravitational potential energy → kinetic energy → elastic potential energy

**D.** kinetic energy → gravitational potential energy → elastic potential energy

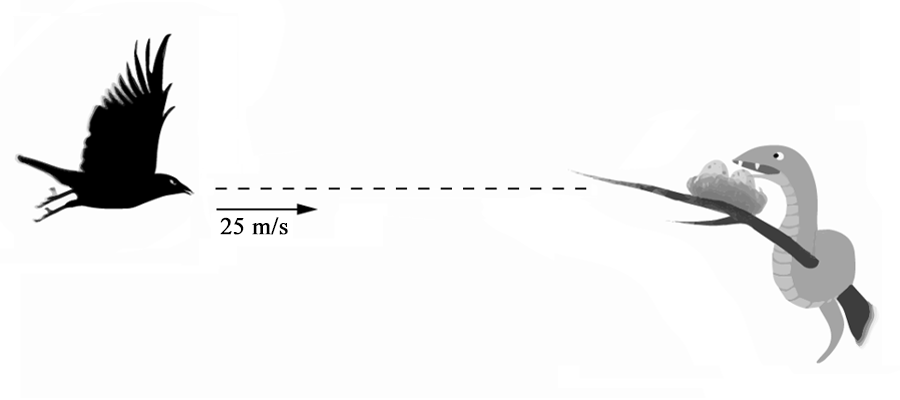
**E.** elastic potential energy → thermal energy → kinetic energy

**SECTION B – SHORT ANSWERS (3 questions, total 20 marks)**

*You may use the attached formula sheet for this section.*

**Question 1** (4 marks)

A mother bird spots an egg thief and flies towards it in a straight line at a constant speed of 25 m/s.



(a) What distance has the bird travelled after 3 seconds? 2 marks

Show all your working.

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(b) The mother bird is experiences no net force during her flight. 2 marks

Is the mother bird’s movement an example of Newton’s first law of motion?

Explain your answer.

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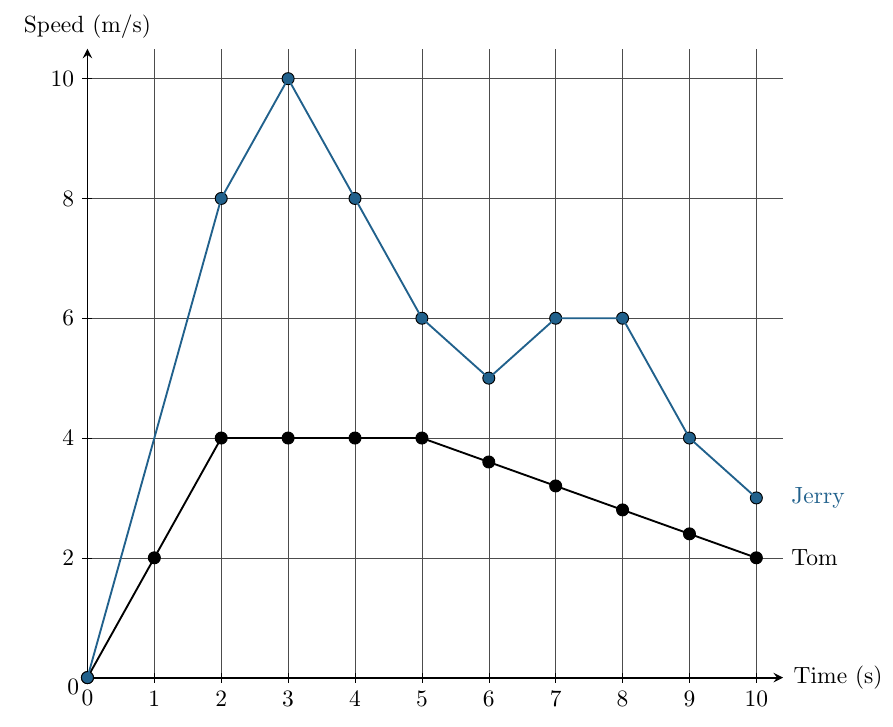
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**Question 2** (8 marks)

Below is a speed-time graph showing the motions of Tom chasing Jerry.



(a) What does the area under a speed-time graph represent? 1 mark

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(b) What does the gradient of a speed-time graph indicate? 1 mark

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(c) Who ran faster during the first two seconds? 1 mark

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(d) What is Jerry’s maximum speed shown on the graph? 1 mark

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(e) Based on the graph, describe Tom’s motion in the first 5 seconds. 2 marks

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(f) Using the graph, calculate the total distance travelled by Tom in the first 5 seconds. 2 marks

Show all your working.

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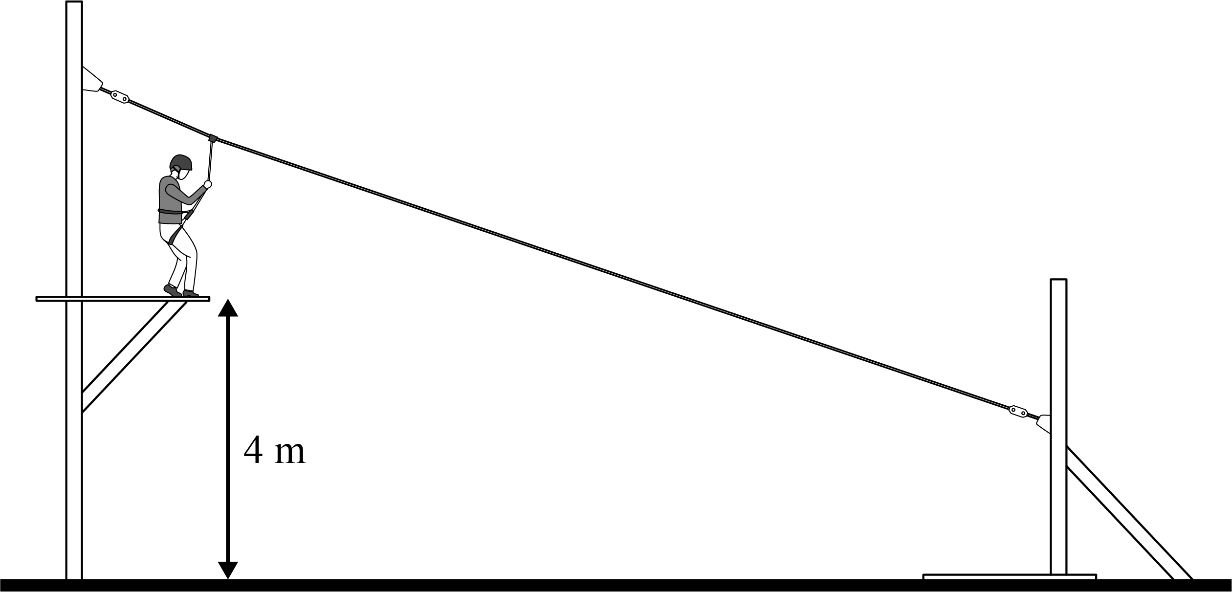
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**Question 3** (8 marks)

Koa is about to ride a flying fox. Koa has a mass of 55 kg and he is 4 m above the ground.



(a) What is Koa’s gravitational potential energy just before riding the flying fox? 2 marks

Show all your working.

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(b) Complete the following sentence by writing down the appropriate words or numbers below. 3 marks

According to the law of conservation of energy, \_\_\_\_\_\_\_\_\_\_ cannot be created or \_\_\_\_\_\_\_\_\_\_,

but only \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

(c) Determine Koa’s kinetic energy when he reaches the bottom of the ride. 1 mark

You may assume that friction is negligible in this question.

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(d) Calculate Koa’s speed when he reaches the bottom of the ride, rounded to two decimal places. 2 marks

Show all your working.

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