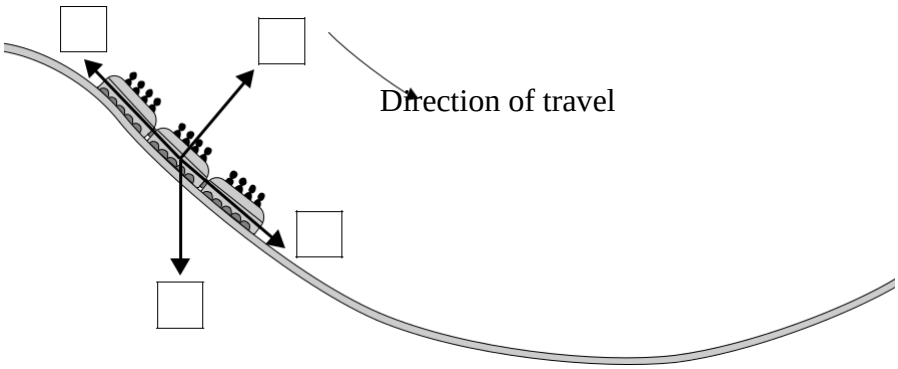
POTENTIAL AND KINETIC ENERGY

Q:1 The diagram shows the passenger train on part of a rollercoaster ride.

(a) Which arrow shows the direction of the resultant force acting on the passenger train?

Put a tick (☐) in the box next to your choice.



(1 mark)

(b) At the bottom of the slope, the passengers in the train all have the same speed but they each have a different kinetic energy.

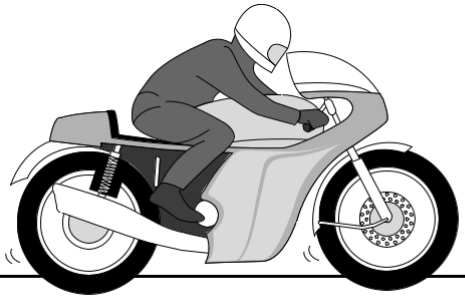
Why is the kinetic energy of each passenger different?

_____

_____

(1 mark)

2. The diagram shows a motorbike of mass 300 kg being ridden along a straight road.



_____

_____

The rider sees a traffic queue .He applies the brakes and reduces the speed of the motorbike from 18 m/s to 3 m/s.

(a) Use the equation in the box to calculate the kinetic energy lost by the motorbike.

$$\text{kinetic energy} = \frac{1}{2} \times \text{mass} \times \text{speed}^2$$

Show clearly how you work out your answer.

_____.

_____..

_____J

(2 marks)

(b) (i) How much work is done on the motorbike by the braking force?

_____

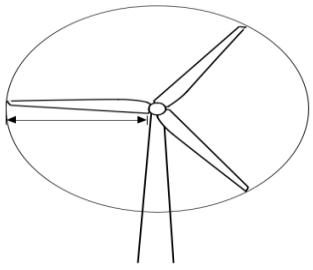
(1 mark)

(ii) What happens to the kinetic energy lost by the motorbike?

_____..

(1 mark)

Q:3 The diagram shows a wind turbine.



a)The blades of the turbine are 20 metres long. On average, 15 000 kg of air, moving at a speed of 12 m/s, hit the blades every second.

Use the equation in the box to calculate the kinetic energy of the air hitting the blades every second.

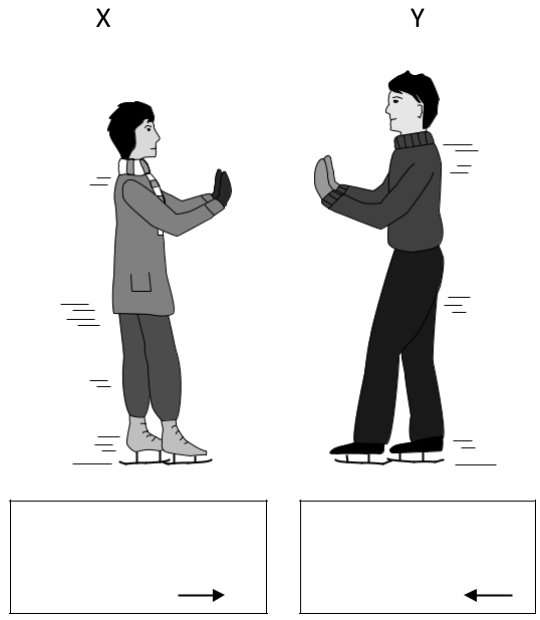
kinetic energy $= \frac{1}{2} \times \text{mass} \times \text{speed}^2$

Show clearly how you work out your answer.

Kinetic energy = _____

(1 marks)

Q: 4 The picture shows two children, X and Y, skating towards each other at an ice rink. The children collide with each other, fall over and stop.



Mass = 40 kg

Velocity = 2.5

Mass = 50 kg

Velocity = 2 m/s

(a) Before the collision the children had different amounts of kinetic energy.

What are the two factors that determine the kinetic energy of the children?

1. _____

2. _____

(2 marks)

b) What was the total kinetic energy of the children after they had fallen over and stopped?

_____

(1 mark)

Q:5 The diagram shows a skier who is accelerating down a steep ski slope.

a) Draw an arrow on the diagram to show the direction of the resultant force acting on the skier.

(1 mark)

b) How and why does the kinetic energy of the skier change?

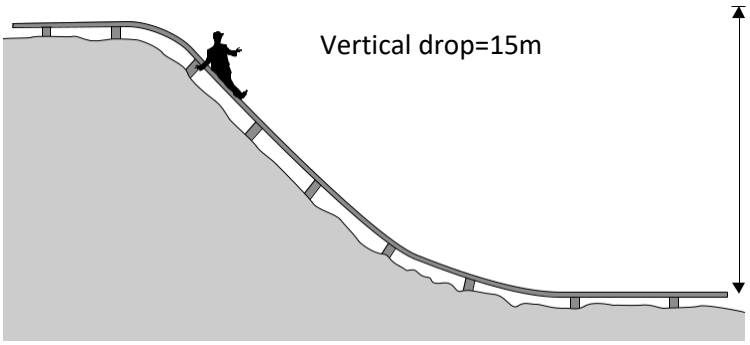
_____

_____

_____

(2 marks)

Q:6 The miners working in a salt mine use smooth wooden slides to move quickly from one level to another.



(a) A miner of mass 90 kg travels down the slide.

Do not write outside the box

Calculate the change in gravitational potential energy of the miner when he moves 15 m vertically downwards.

Gravitational field strength = 10 N/kg

Use the correct equation from the Physics Equations Sheet.

Show clearly how you work out your answer.

Change in Gravitational potential energy= _____

(2 marks)

(b) Calculate the maximum possible speed that the miner could reach at the bottom of the slide.

Use the correct equation from the Physics Equations Sheet.

Show clearly how you work out your answer.

Give your answer to an appropriate number of significant figures.

Maximum possible speed = _____ m/s

(3 marks)

(c) The speed of the miner at the bottom of the slide is much less than the calculated maximum possible speed.

Explain why.

(3 marks)