Name of the Student:_____

Max. Marks : 20 Marks   **Time : 20 Minutes**

Q1.

Explain how unwanted energy transfers may be reduced in mechanical systems.

(2)

....

....

....

....

(Total for question = 2 marks)

Q2.

Figure 6 shows a book resting on a table with some forces involved.

force exerted by the
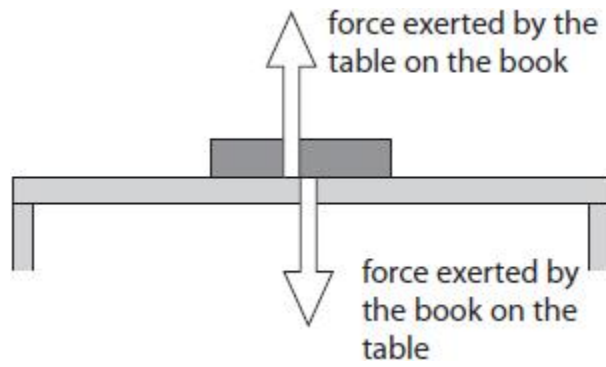table on the book

force exerted by
the book on the
table

Figure 6

State why this diagram is **NOT** a free body force diagram.

(1)

....

....

(Total for question = 1 mark)

Q3.

In which of the following situations is a non-zero resultant force acting?

(1)

- ☒ **A**   a book rests on a table
- ☒ **B**   a car travels along a road at a constant speed
- ☒ **C**   a javelin moves through the air after leaving an athlete's hand
- ☒ **D**   a steel ball bearing descends through some car oil at a constant velocity

(Total for question = 1 mark)

Q4.

Answer the question with a cross in the box you think is correct ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

The magnitude and direction of a force can be represented by a vector.
Figure 22 shows the forces acting on four identical trolleys. The arrows show the magnitude and direction of the forces.

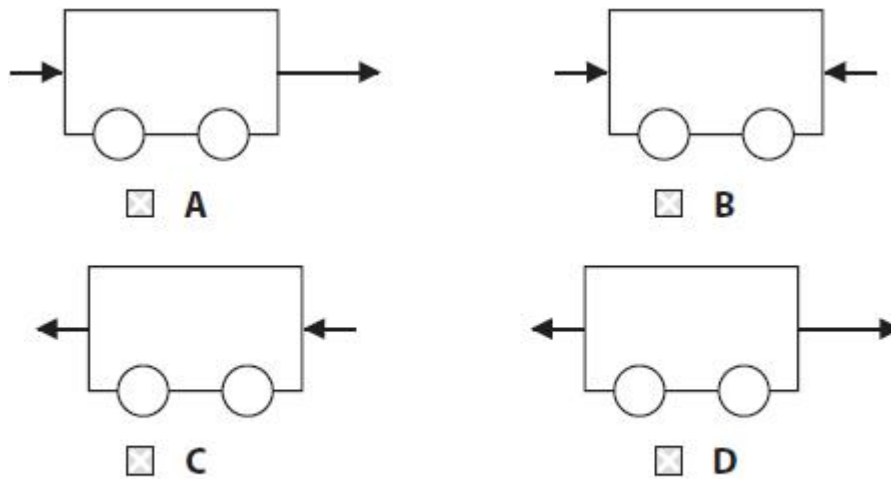Which diagram shows a pair of forces that will produce zero acceleration?

(1)

Figure 22

(Total for question = 1 mark)

Q5.

Figure 18 shows a different spring hanging from a hook fixed to the ceiling.

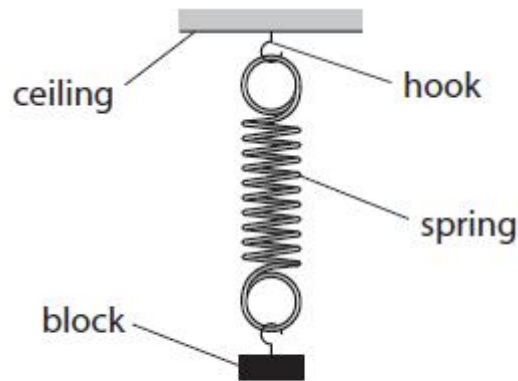A block hangs from the other end of the spring.

Figure 18

The weight of the spring is 1 N.
The weight of the block is 5 N.

The force exerted on the top of the spring by the hook is

(1)

☒ **A**   4 N down
☒ **B**   4 N up
☒ **C**   6 N down
☒ **D**   6 N up

(Total for question = 1 mark)

Q6.

Answer the question with a cross in the box you think is correct ⊠. If you change your mind about an answer, put a line through the box ⊠ and then mark your new answer with a cross ⊠.

Figure 6 shows four forces, P, Q, R and S, acting on a rod.
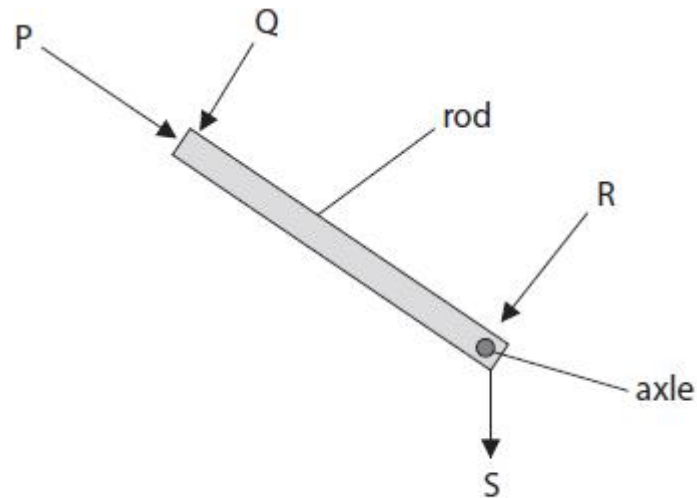
The rod can rotate around an axle.

Figure 6

Which force will make the rod rotate about the axle?

(1)

- ⊠ **A** P
- ⊠ **B** Q
- ⊠ **C** R
- ⊠ **D** S

(Total for question = 1 mark)

Q7.

Answer the question with a cross in the box you think is correct ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

Figure 11 shows a person doing a push-up exercise.

Figure 11

An upward force is used to cause rotation about a pivot.

Which row of the table is correct for this rotation?

(1)

		provide the upward force	act as a pivot
☒	A	arms	hands
☒	B	arms	feet
☒	C	legs	hands
☒	D	legs	feet

(Total for question = 1 mark)

Q8.

Answer the question with a cross in the box you think is correct ⊠. If you change your mind about an answer, put a line through the box ⊠ and then mark your new answer with a cross ⊠.

Figure 1 shows some forces acting on a seesaw.

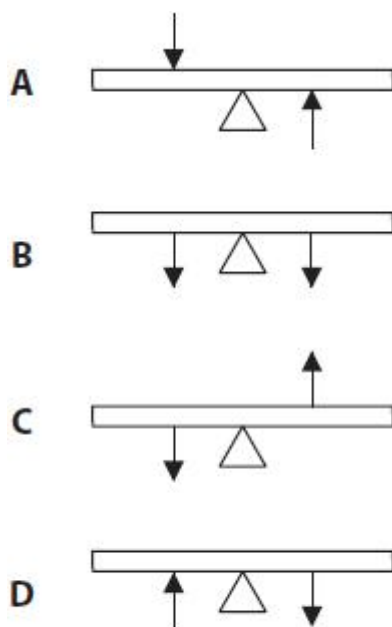The forces shown have the same magnitude but act in different directions.

Figure 1

In which of these could the forces acting on a seesaw be in equilibrium?

(1)

☒ A
☒ B
☒ C
☒ D

(Total for question = 1 mark)

Q9.

A student investigates the relationship between the magnetic flux density and the electromagnetic force on a current-carrying wire.

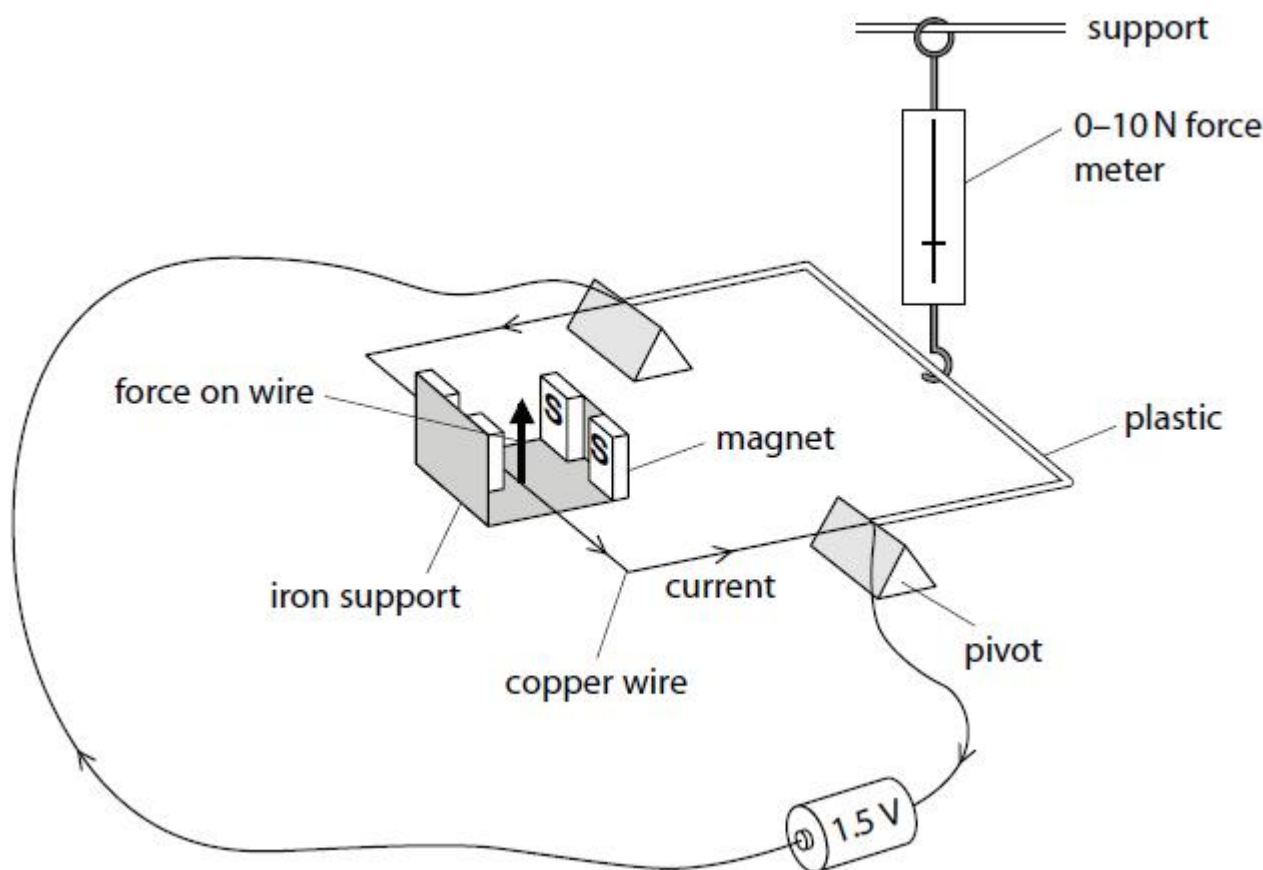The student has the equipment shown in Figure 19.

Figure 19

The student varies the number of magnets and measures the force on the wire using the force meter.

The results are shown in Figure 20.

number of pairs of magnets	reading on force meter (N)
1	0.0
2	0.0
3	0.1

Figure 20

The student decides that his equipment is not sufficiently sensitive.

Give **three** ways the student should develop his investigation to improve the quality of his results.

(3)

1 ....

....

2 ....

....

3 ....

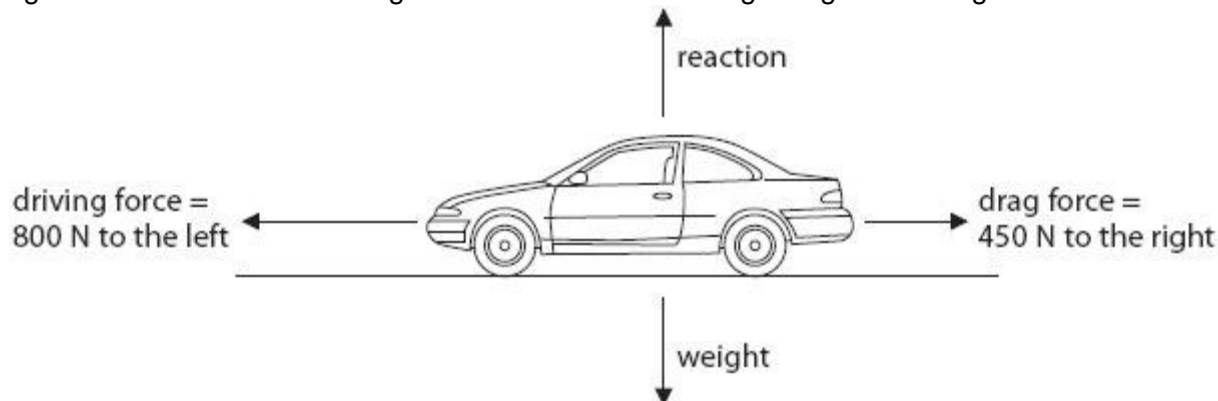...

(Total for question = 3 marks)

Q10.

The diagram shows the forces acting on a car which is travelling along a flat straight road.

(a) (i) The size of the resultant force on the car is 350 N.
In which direction is the resultant force acting?
Put a cross (■) in the box next to your answer.

(1)

☒ **A** down ↓

☒ **B** to the left ←

☒ **C** to the right →

☒ **D** up ↑

(ii) Complete the sentence by putting a cross (■) in the box next to your answer.

The car is

(1)

☒ **A** accelerating

☒ **B** decelerating

☒ **C** moving at a constant speed

☒ **D** not moving

(2)

(iii) The mass of the car is 625 kg.
Calculate the weight of the car.
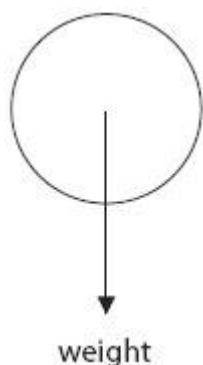gravitational field strength = 10N/kg

(2)

....

(b) Forces also act on objects when they fall through the air.
There are two forces acting on this ball as it falls through the air.
The weight is shown on the diagram.

weight

(i) Draw and label an arrow on the diagram to show the other force acting on the ball.

(2)

(ii) Use words from the box to complete the sentences.

(2)

| balanced | changing | greater | smaller | zero |

After a short time the ball falls at a steady speed.

The forces acting on the ball are now ....

The acceleration of the ball is now ....

(Total for Question is 8 marks)