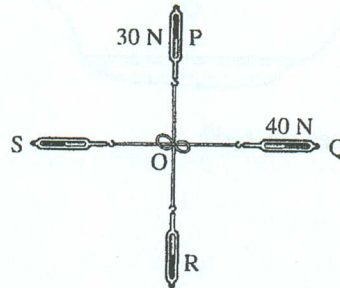# Topic 3   Dynamics

PAPER 1

MULTIPLE-CHOICE QUESTIONS

For each question, there are four possible answers. Choose the one you consider correct and record your choice (A, B, C or D) in the brackets provided.

1. The diagram shows four force-meters (spring balances) joined together by pieces of string with a knot at **O**. The strings are at 90° to each other.

The knot at **O** does not move when the readings on **P** and **Q** are as shown.

What are the readings on **R** and **S**?

(2011/P1/Q3)

	reading on **R**/N	reading on **S**/N
A	0	70
B	30	40
C	40	30
D	70	0

(   )

2. A cheetah runs very quickly to catch its prey.

The friction between the cheetah and the air, and between the cheetah and the ground, varies with the conditions.

Under which conditions of friction will the cheetah reach its greatest maximum speed?
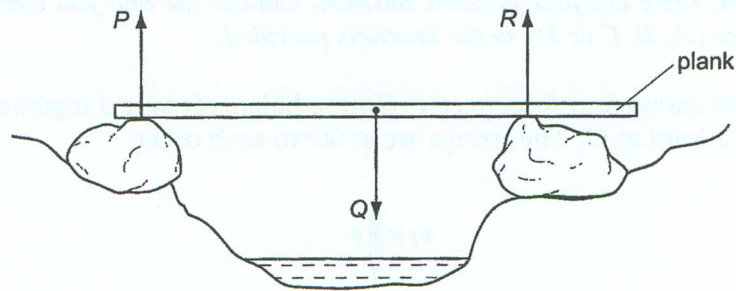
(2012/P1/Q3)

	friction with air	friction with ground
A	high	high
B	high	low
C	low	high
D	low	low

(   )

3. A wooden plank rests in equilibrium on two rocks on opposite sides of a narrow stream.

    Three forces of size P, Q and R act on the plank.

    How are the sizes of the forces related?   (2012/P1/Q11)

    A $P + Q = R$
    B $P + R = Q$
    C $P = Q = R$
    D $P = Q + R$ (   )
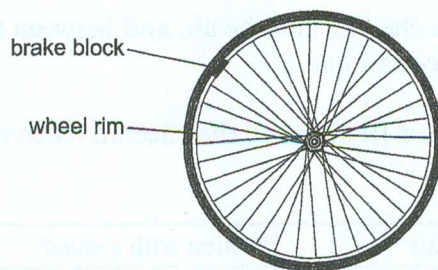
4. A body has three forces acting on it.

    What is the resultant force on the body?   (2014/P1/Q3)

    A   5.0 N to the left
    B   5.0 N to the right
    C   7.5 N to the left
    D   7.5 N to the right   (   )

5. Margaret cleans her bicycle wheel.

    Which action makes the brakes work efficiently?   (2015/P1/Q4)

    A   drying the wheel rim   **B**   oiling the wheel rim
    C   polishing the wheel rim   **D**   wetting the wheel rim   (   )

6. Two forces act on an object.

    In which situation is it **not** possible for the object to be in equilibrium?   (2015/P1/Q6)

    A   The two forces are of the same type.
    B   The two forces are the same size.
    C   The two forces act in the same direction.
    D   The two forces act through the same point.   (   )

7. Which force opposes the motion of an object sliding over a surface?   (2016/P1/Q3)

    A   acceleration   B   friction
    C   gravity   D   inertia   (   )
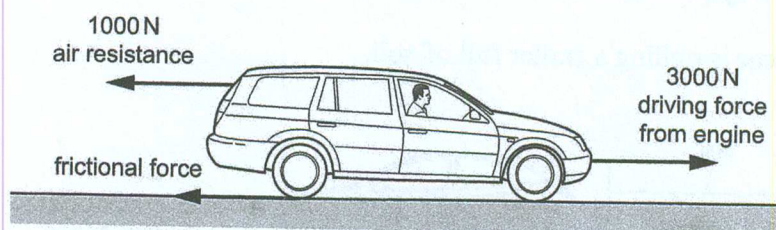
8. A resultant force of 10 N accelerates an object at 5 m/s^2.

    Which resultant force would accelerate the object at 1 m/s^2?   (2017/P1/Q3)

    A   1 N   B   2 N
    C   5 N   D   50 N   (   )

9. A car travels forwards along a flat road.

    All the horizontal forces that act on the car are shown.

    The car is slowing down.

    What is the value of the frictional force?   (2019/P1/Q3)

    A   smaller than 1000 N
    B   between 1000 N and 2000 N
    C   2000 N
    D   larger than 2000 N   (   )

10. An object is moving at a constant speed.

    Why must a force be applied to change its motion?   (2019/P1/Q4)

    A   The object has energy.   B   The object has inertia.
    C   The object has weight.   D   The object is moving.   (   )

PAPER 2

STRUCTURED QUESTIONS

Section A
Answer the following questions.

1. The diagram shows a helicopter hovering stationary in the air.

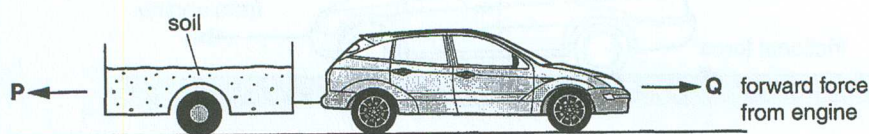   (a) Draw and label **two** arrows to show the main forces acting on the helicopter when it is hovering.   [1]

    (b) State what you can conclude about the size of each of these forces when the helicopter is hovering.   [1]
    (2015/P2/A5)

Section B
Answer the following questions.

1. A moving car is pulling a trailer full of soil.

    (a) Name force P.   [1]

    (b) Describe the movement of the car and trailer when force P equals force Q. [1]

    (c) The car has a mass of 1000 kg. The trailer and soil have a total mass of 180 kg.

        The car and trailer stop and then accelerate uniformly along a straight road for 6 s.

        The resultant force forwards is 2360 N.

        (i) Calculate the acceleration of the car and trailer during this period. [2]

        (ii) Calculate the speed of the car and trailer after 6 seconds.   [1]
        (2014/P2/B7a, b, c)