SMART EXAM RESOURCES
SUBJECT:COORDINATED SCIENCES [PHYSICS]
PAPER 4
ADDING FORCES
SET 2 QP-MS

1 **(d)** Fig. 9.2 shows the forces acting on the sprinter at various points during the race.

The lengths of the arrows represent the magnitude of the forces.

(i) Put a tick (✓) in the box which shows the horizontal forces acting on the sprinter 5.0 s after the race started.
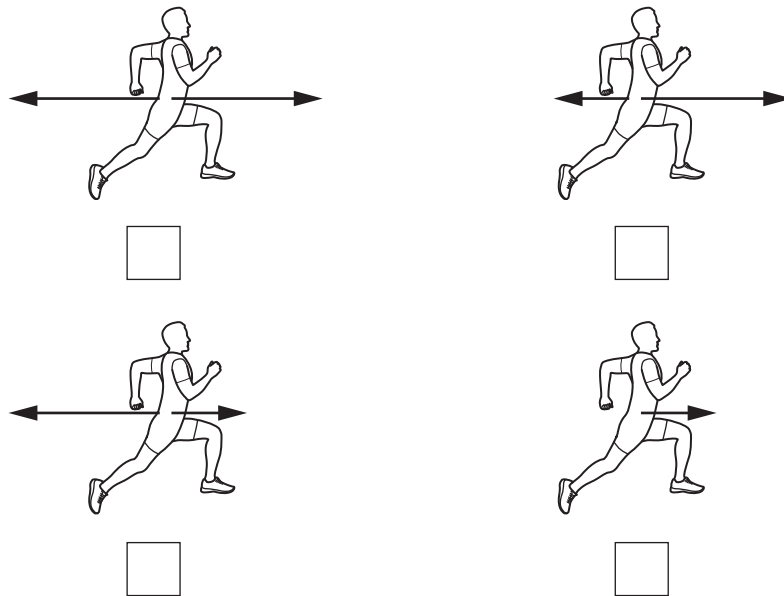

Fig. 9.2

[1]

(ii) Use the motion of the sprinter in Fig. 9.1 to explain your answer to **(d)(i)**.

....

....

.... [1]

MARK SCHEME:

9(d)(i)	first diagram ticked ;	1
9(d)(ii)	constant velocity / no acceleration, so forces must be balanced / no resultant force ;	1

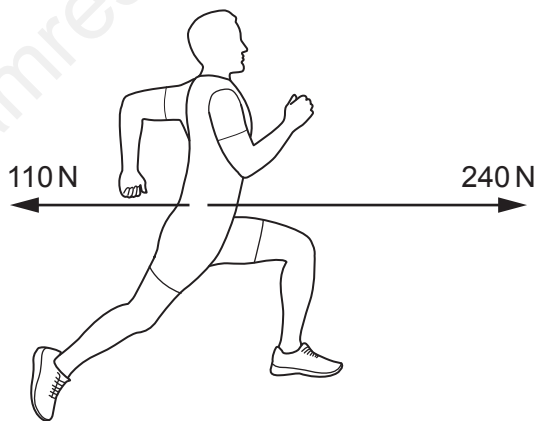**2** Fig. 6.1 shows the forces acting on the sprinter during the race.

Fig. 6.1

(i) Calculate the resultant force acting on the sprinter.

resultant force = ... N [1]

(ii) Describe how these forces would change the motion of the sprinter.

....

....

....

.... [2]

MARK SCHEME:

6(b)(i)	(240 – 110 =) 130 (N) ;	1
6(b)(ii)	resultant force forward ; sprinter will accelerate / speed up ;	2

3 Fig. 3.1 shows an insect called a pond skater.

Pond skaters spread their weight over their 6 legs so that they can move over the surface of water.
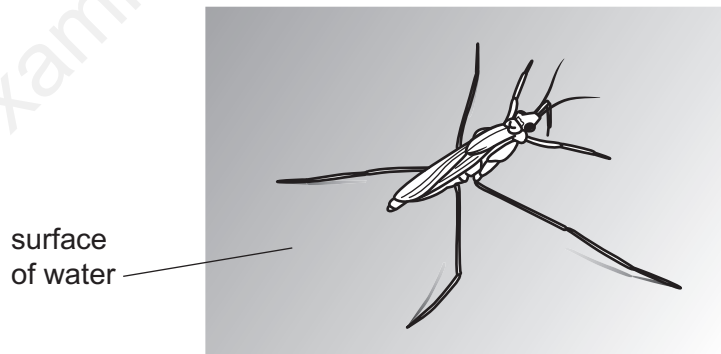
surface
of water

Fig. 3.1

(a) The pond skater has a mass of 0.25 g and is stationary on the surface of the water.

(i) Use the values in the list to complete the sentences about the pond skater.

The gravitational field strength, *g*, is 10 N/kg.

You can use each value once, more than once or not at all.

| **0 N** | **0.0025 kg** | **0.0025 N** | **0.25 g** | **0.25 kg** | **2.5 N** |

The weight of the pond skater is ....

The force acting upwards on the pond skater by the water is ....

The resultant force acting on the pond skater is ....

[2]

MARK SCHEME:

0.0025 N ; 0.0025 N **and** 0 (N) ;	**2**

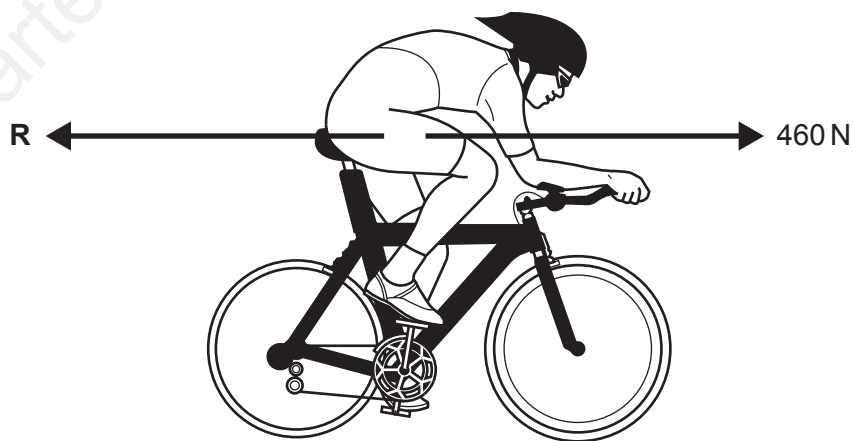**4** Fig. 12.3 shows the forces acting on the cyclist while he is travelling at constant speed.

Fig. 12.3

(i) State the size of force **R** on Fig. 12.3.

.... [1]

(ii) Suggest the cause of force **R** on Fig. 12.3.

....

.... [1]

MARK SCHEME:

(i)	460 (N) ;	1
(ii)	air resistance / friction / drag ;	1

5 A rocket is used to launch satellites into Earth's orbit.

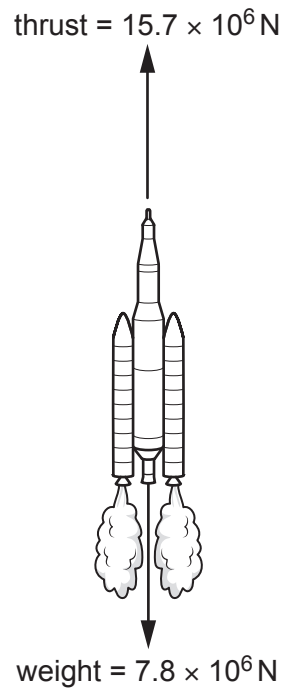**(a)** Fig. 12.1 shows the forces acting on a rocket as it is launched.

thrust = 15.7×10^6 N

weight = 7.8×10^6 N

Fig. 12.1

(i) Calculate the resultant force acting on the rocket as it is launched.

resultant force = ... N [1]

(ii) Describe the motion of the rocket as it is launched.

....

....

....

.... [2]

(iii) Suggest a reason why the weight decreases as the rocket travels further away from Earth.

....

.... [1]

MARK SCHEME:

Question	Answer	Marks
(a)(i)	7.9×10^6 (N) ;	1
(a)(ii)	accelerates ; upwards;	2
(a)(iii)	gravitational field strength decreases / rocket uses up fuel ;	1