

SMART EXAM RESOURCES
SUBJECT: COORDINATED SCIENCES [PHYSICS]
PAPER 4
F=ma
SET 1 QP-MS

- 1 A car of mass 1000 kg is travelling along a road. The driver applies the brakes which give a constant force of 4000 N.
- (i) Calculate the deceleration of the car.
- Show your working and state any formula that you use.

..... [2]

MARK SCHEME:

force = mass x acceleration/acceleration = $4000 \div 1000$;
 4m/s^2 ;

2

2

Another athlete in the race has a mass of 70 kg. Her initial forward acceleration was 1.5 m/s^2 .

Calculate the force needed to give this acceleration.

State the formula that you use and show your working.

formula

working

..... [2]

MARK SCHEME:

$$\begin{aligned} \text{force} &= \text{mass} \times \text{acceleration} ; \\ &= 70 \times 1.5 = 105\text{N} ; \end{aligned}$$

[2]

- 3 Fig. 4.1 shows a flying squirrel. A flying squirrel uses large flaps of skin as a form of parachute to enable it to fall, glide and land safely. The air trapped under these flaps, as the squirrel falls, provides an upward force called air resistance.

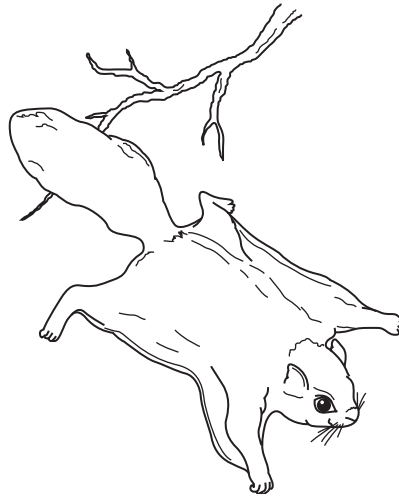


Fig. 4.1

- (a) (i) As the squirrel starts to fall, it is accelerating.

State the meaning of the term *accelerating*.

.....
..... [1]

- (ii) The squirrel weighs 20 N. Suggest a value for the air resistance while the squirrel is accelerating.

air resistance N

Explain your answer.

.....
..... [2]

- (iii) At one point as the squirrel falls, the resultant downward force on the squirrel is 10 N. Calculate the acceleration of the squirrel if its mass is 2 kg.

Show your working and state the formula that you use.

formula used

working

..... [2]

MARK SCHEME:

- (a) (i) increasing, velocity/speed ; [1]
- (ii) less than 20N ;
overall downward force ; [2]
- (iii) $F = m \times a$ $10 = 2 \times a$;
 $a = 5 \text{ m/s}^2$; [2]

4 (b) The mass of the train is 7×10^4 kg. The acceleration of the train is 3.6 m/s^2 .

(i) Calculate the accelerating force acting on the train.

State the formula you use, show your working and give the unit.

formula

working

force = unit = [3]

MARK SCHEME:

(force =) mass \times acceleration / $ma / 7 \times 10^4 \times 3.6$; 2.52×10^5 ; N ;	3
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5

A car is moving along a road. The mass of the car is 1200 kg and the resultant force acting on it is 1500 N.

Calculate the acceleration of the car.

State the formula that you use and show your working.

formula used

working

..... [2]

MARK SCHEME:

force = mass \times acceleration ;
acceleration = $1500 / 1200 = 1.25 \text{ m/s}^2$;

[2]