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Your **Bridge** to International **Success**

Science Answer Review pack

Grade 9

Agenda

Speed (Longman Physics p94-96)

Speed/time graphs (Longman Physics p100-104)

Pressure (Longman physics p110-113)

Respiration (Longman Biology p10-13)

Please complete booklets and bring to your next science class

Additional resources:

http://www.educationquizzes.com/

http://www.scibermonkey.org/level-ks3.html

http://studyjams.scholastic.com/studyjams/jams/science/index.htm

https://www.neok12.com/

Speed records

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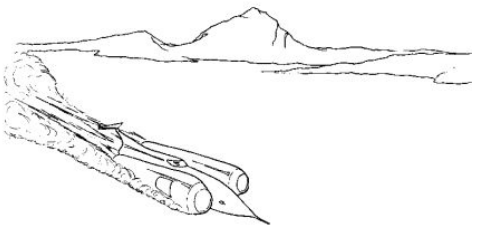
Throughout history, people have always tried to travel faster and faster, improving the design of existing means of transport and developing new methods on land, sea and in the air.

Land speed records

The earliest official land speed record is credited to a Frenchman, Gaston Chasseloup-Laubat, who averaged 39 mph over a measured mile in 1898 using an electrically powered vehicle. This speed was almost doubled in 1902 with the arrival of the internal combustion engine. William K Vanderbilt achieved a new record of 76 mph in the USA. This was gradually improved upon throughout the first half of the twentieth century. John Cobb of Great Britain reached the incredible speed of 394 mph in 1947 on the Bonneville Salt Flats in Utah, USA. The development of jet-propelled cars in the 1960s led to a rapid increase in the record to 600 mph by the end of 1965. In 1997, Andy Green from Great Britain achieved a new record of 767 mph in *ThrustSSC*.



ThrustSSC

1 How long did the following take to cover a measured mile when breaking the land speed record?

a Gaston Chasseloup-Laubat 92.3s

b John Cobb 9.14s

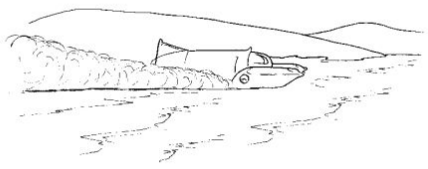
c Andy Green 4.69s

2 The recorded speed is the average of two measured miles in opposite directions. Why is this? To cancel the effect of any prevailing winds and any possible slope in the ground

3 The Bonneville Salt Flats have been used for many land speed record attempts. Why do you think this is a good site? They are flat and dry

Water speed records

The world water speed record for propeller-driven boats rose from 71 mph in 1919 to 178 mph in 1952. Between 1955 and 1964, Donald Campbell gradually increased the water speed record in his jet-speed boat *Bluebird* from 202 mph to 276 mph. He was killed while attempting yet another world record on Lake Coniston in Cumbria. In the last 20 years Ken Warby, an Australian, has increased the record to over 300 mph and is now building a new boat, 50% more powerful than his previous one.



Bluebird

4 Why is it possible to reach a higher speed in a car than in a boat?

There is greater friction on a boat from water

5 Ken Warby's new boat is said to be '50% more powerful than his previous one'. Explain why it will not be able to increase the world water speed record by 50%.

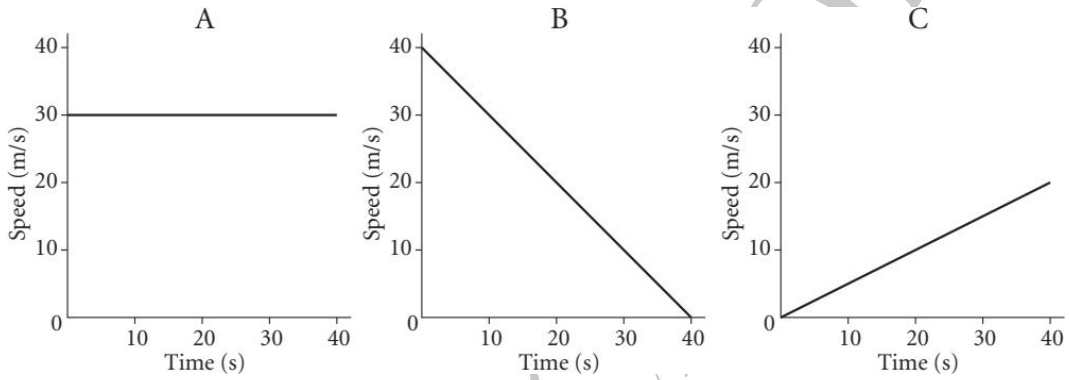
Increased speed leads to increased friction with water and air resistance. All the additional power of the engine will not go into increasing its speed; some of it will be used to overcome the increased resistance to motion

Interpreting speed-time graphs

A speed–time graph shows how the speed of an object varies with time. On the graph, an upward sloping line shows the car getting faster, and a horizontal line shows a constant speed.

1 The graphs below show the motion of a car on three different occasions.

a Describe what is happening in each graph

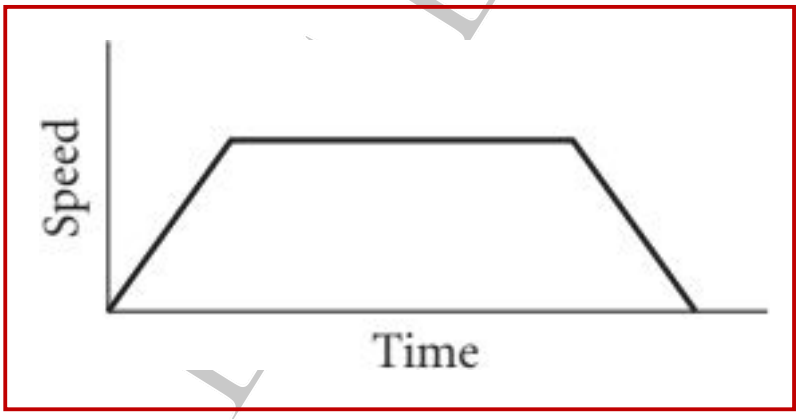


Graph A:constant speed of 30 m/s;
Graph B: speed decreases at a constant rate of 1 m/s2;
C speed increases at constant rate of 0.5 m/s2

b The distance travelled is equal to the area under a speed–time graph. Use the graphs to find the distance travelled by the car in each case.

A 1200 m; B 800 m; C 400 m

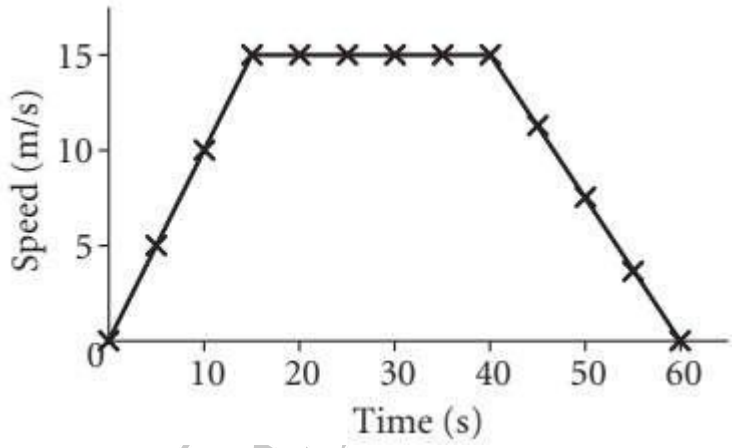
2 Sketch a speed–time graph for a train travelling between two stations.



3 a Use the values in the table to plot a graph showing how the speed of a car varies over a 60 s period.

Time (s)	Speed (m/s)
0	0
5	5
10	10
15	15
20	15
25	15
30	15
35	15
40	15
45	11
50	7.5
55	3.5
60	0

3 a



b Describe the motion of the car as fully as you can.

The car starts from a standing position. It accelerates at 1 m/s/s for the first 15 seconds.

It then travels at a constant speed of 15 m/s from 15 to 40 seconds.

It then begins to decelerate at 0.75 m/s^2 until it stops after 60 s.

c Use your graph to find the total distance travelled by the car during the 60 s period.

During the first 15 seconds the car travelled 112.5 m; between 15 and 40 seconds the car travelled 375 m; from 40 to 60 seconds the car travelled 150 m. The total journey was 637.5 m.

d What can you say about the forces acting on the car between 15 s and 40 s?

The forces on the car were balanced, as the car's speed was constant.

Using the pressure equation

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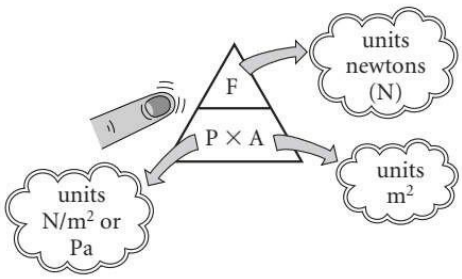
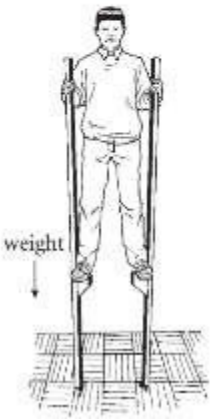
When you are working with pressure, you often know two measurements out of pressure, force and area, and you want to calculate the other one. The pressure triangle will help you work this out.

If you want to calculate pressure, put your finger over the 'P' and the triangle shows that pressure is equal to force divided by area. In the same way, you can put your finger over the 'F' and see that force is equal to pressure multiplied by area. When you put your finger over the 'A', you can see area is equal to force divided by pressure.



1 Copy the table. Calculate each missing quantity, using the pressure triangle to help you.

Force (N)	Area (m^2)	Pressure (N/m^2)
10	2	5
15	3	5
40	10	4
160	8	20
49	7	7
75	15	5



2 Jed is learning to walk on stilts, but his mum isn't keen on him practising on the wooden floor in the dining room. Jed doesn't think the floor will get damaged, but his mum doesn't agree.

Use the information below to work out who is right. Remember to give evidence to support your answer.

- Jed's weight = 600 N
- combined area of the bottom of the stilts = 20 cm^2
- combined area of Jed's trainers = 60 cm^2

The pressure on the floor is 600 N / 20 cm^2
30 N/cm^2 with stilts; and 600 N / 60 cm^2
10 N/cm^2 with trainers.
Jed's mum is right because the pressure is much greater when he uses stilts.

3 Cara weighs 65 kg. She is balancing on the tip of one ballet shoe. The tips of both shoes together have a total surface area of 10 cm^2.

What would be the total pressure:

a when Cara balances on one shoe tip?

b when Cara balances on both shoe tips?

a) 130 N/cm2
b) 65 N/cm2

4 It's been snowing and Georgina can't decide whether to use her snowshoes or skis.

- Georgina's weight = 750 N
- surface area of each snowshoe = 0.5 m^2
- surface area of each ski = 0.15 m^2

Which do you think she should wear in order to avoid sinking into the snowdrifts? Explain your answer.

The pressure with snowshoes is 750 N/ (2 x 0.5 m^2) = 750 N/m^2;
the pressure with skis is 750 N/(2 x 0.15 m^2) = 2500 N/m^2.
Georgina should therefore wear snowshoes to avoid sinking into the snowdrifts.

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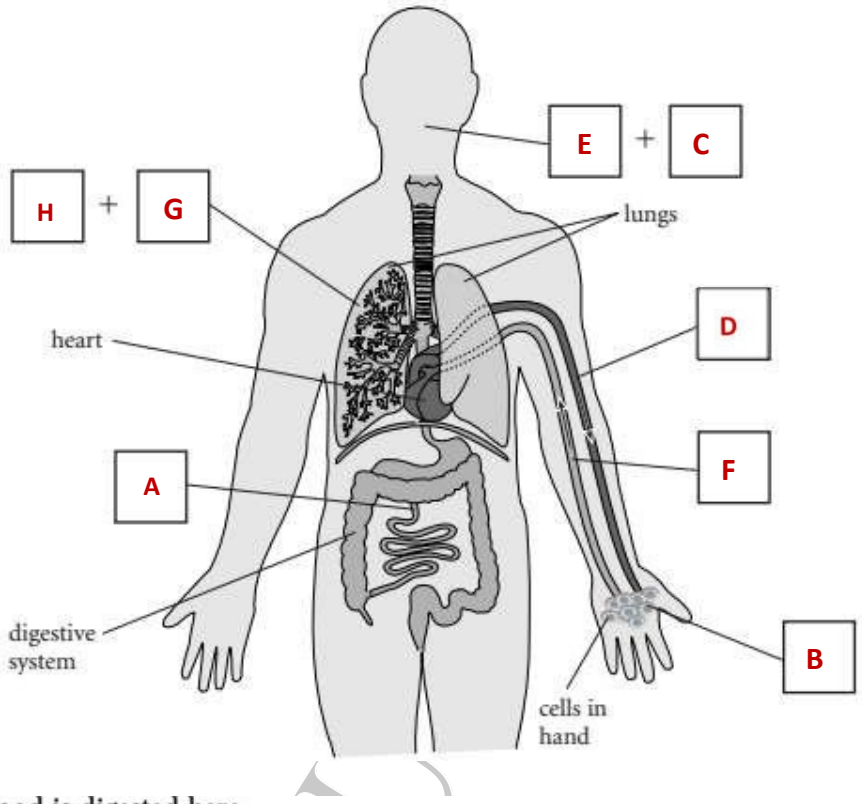
Respiration

a Write the letter for the correct label in each box.



A Food is digested here.
B Respiration happens here. In respiration, glucose and oxygen are turned into water and carbon dioxide.
C Carbon dioxide leaves the body here.
D Glucose and oxygen travel in the blood to the body cells.
E Food is taken into the body here.
F Carbon dioxide and water travel away in the blood.
G Carbon dioxide is taken in the blood to the lungs, where it leaves the blood.
H Oxygen is taken into the blood here.

b Write the letters A to G in order to show the stages in converting glucose in food into exhaled carbon dioxide.

E H A D B F G C ____ ____

Underline the following statements that are true about both plants and animals.

They respire in order to produce energy.
They use up oxygen in respiration.
They breathe using lungs.
They give out carbon dioxide.
They give out water vapour.
They give out heat as they respire.
They have blood to carry oxygen.