Are you GCSE ready?

Test 1: Forces 1 – Speed and Gravity

KNOW

[Each question = 1 mark]

01. If the various forces acting on an object add up to zero, which one of the following statements could be true?

A. It is travelling in a circular path at a steady speed.
B. It is accelerating.
C. It is travelling in a straight line at a steady speed.
D. It is slowing down and will shortly be at rest.

02. Complete this sentence: Speed can be calculated by…

A. …dividing distance by time
B. …dividing time by distance
C. …multiplying distance by time
D. …adding distance to time

03. Which of these best describes *average speed*?

A. The overall distance travelled divided by the time taken.
B. The reading on the speedometer of a car travelling at top speed.
C. The speed an object travels at when not accelerating.
D. The time taken to travel the total journey divided by the total distance.

04. Which one of these endings to this sentence is correct?

The greater the speed of an object…

A. …the less time it will take to cover a set distance.
B. …the longer it will take to cover a set distance.
C. …the smaller the distance it will cover in a set time.
D. …the greater the mass of an object.

05. Which one of these is **not** an example of acceleration?

A. An object falling from rest due to gravity.
B. An object whose speed is increasing.
C. An object which is slowing down.
D. An object whose motion on a distance-time graph is shown by a straight line.

06. Which of these enables us to calculate the weight of an object?

A. mass ÷ gravitational field strength

B. mass × gravitational field strength
C. gravitational field strength ÷ mass
D. gravitational field strength + mass

07. Which of these is completely correct?

A. Mass is measured in N; Weight is measured in N
B. Mass is measured in N; Weight is measured in kg
C. Mass is measured in kg; Weight is measured in N
D. Mass is measured in kg; Weight is measured in kg

08. Complete this sentence: Gravitational field strength is greater if the mass of the objects…

A. …is greater and the distance between them is greater.
B. …is less and the distance between them is greater.
C. …is greater and the distance between them is less.
D. …is less and the distance between them is less.

09. How does the force of gravity on the Moon compare with the force of gravity on Earth?

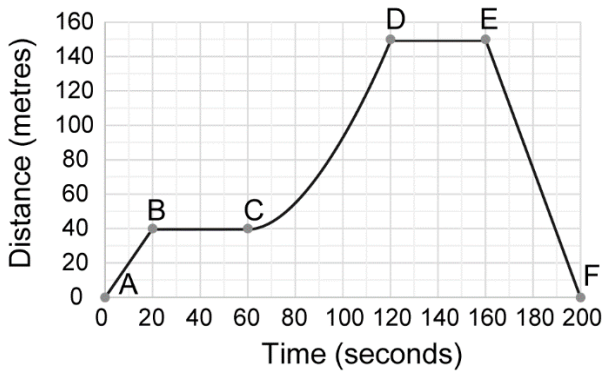
A. It is less, because the mass of the moon is less.
B. It is the same, because gravity is a constant.
C. It is more, because the moon is further away.
D. It is non-existent, because the moon has no atmosphere.

10. What is *mass*?

A. The amount of ‘stuff’ in an object.
B. A measure of how hard gravity pulls on an object.
C. Another word for weight.
D. A value dependent upon the gravitational field strength in an area.

APPLY

11. Look at this graph of a journey. It has five sections, A–B, B–C, C–D, D–E and E–F:



a. During which section was the object accelerating? **[1]**

b. Name a section in which the object was stationary. **[1]**

c. How fast was the object travelling in section E–F? **[2]**

d. Carl's mother is driving him to a football match. They are travelling along the road at 25 m/s and they are overtaken by a van travelling at 30 m/s. What is the speed of the van relative to Carl's car? **[1]**

12. The gravitational field strength on Mars is around 4 N/kg. The gravitational field strength on Earth is around 10 N/kg.

a. Carl weighs 400 N on Earth; what would he weigh on Mars? **[1]**

b. Carl weighs 24 N on Pluto; calculate Pluto's gravitational field strength. **[1]**

13. Edith and her group are measuring the speed at which they can cycle between two marks, 10 m apart, in the school playing field. They are comparing different students in the group; they are all using the same bike. This is the data they have gathered:

Amy	Beth	Cath	Danielle	Edith	Fran
2.0 s	1.8 s	1.9 s	2.2 s	2.0 s	1.7 s

a. Are there any anomalies in this data? **[1]**

b. Are there any *real differences* between the results for different students? **[1]**

c. Suggest a reason why the results are different for different students. **[1]**

EXTEND

15. Emily says that gravity is like any other force, because it pulls on objects.

Jo says it is different, because it doesn't physically touch an object.

Explain who is right. **[3]**

16. A track cyclist is travelling in an upright position at a constant speed of 8 m/s. Describe what would happen to her speed if:

a. the friction between the tyres and track was increased **[1]**;

b. she adopted a crouching position. **[1]**