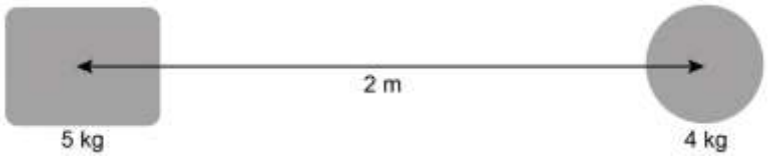
# Curriculum Aligned Competency Based Test Items
# Science
# Class 9 – Chapter 10
# Gravitation

The force of gravity acting between two objects is:
- directly proportional to the product of their masses.
- inversely proportional to the square of the distance between them.

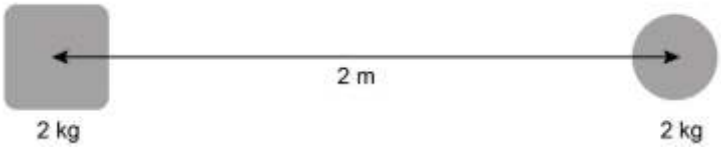
SAS21S091001

**1** Which pair of objects will have the strongest force of gravity between them?

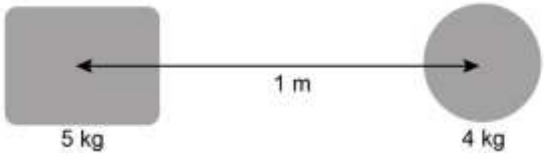
A.




B.




C.




D.

SAS21S091002

2 The formula for calculating the force of gravity between two objects is as follows:

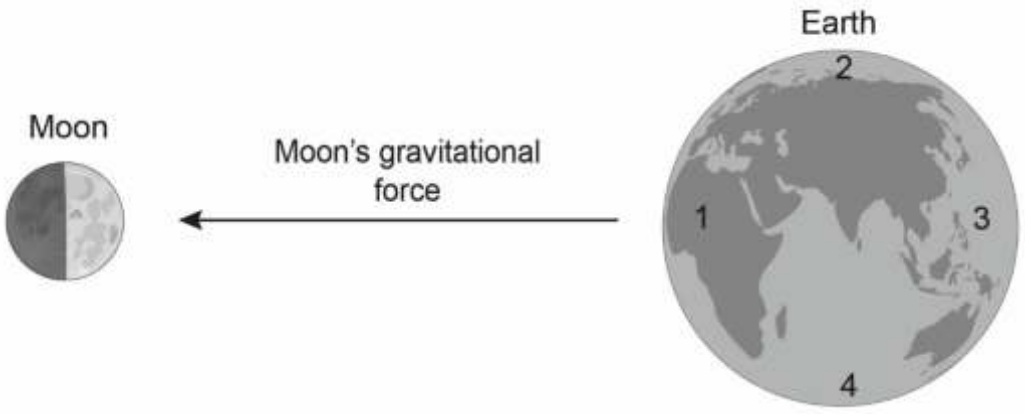
$$F = G \frac{M \times m}{d^2}$$

What does G stand for in the formula?

_____

_____

The picture shows the moon's gravitational force acting on the earth's surface.
The arrow represents the direction of the force.
1, 2, 3 and 4 are four different locations on the earth's surface.




SAS21S091003

3 Which locations will experience low tide as shown in the picture?

A. Location 1 and Location 2
B. Location 2 and Location 4
C. Location 1 and Location 3
D. Location 3 and Location 4

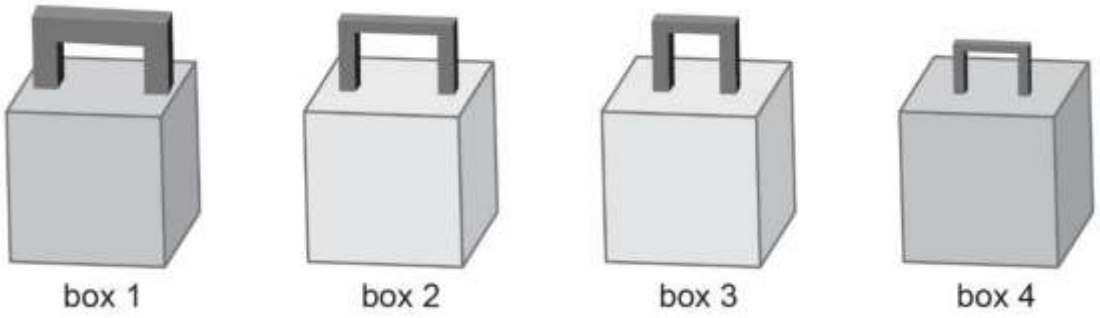
SAS21S091004

4 The moon moves around the earth in a fixed orbit.
What makes the moon move in the fixed orbit?

_____

_____

Ayesha has four solid boxes.
The handles of the boxes are of different thickness and size.
All the boxes along with their handles have the same mass.




SAS21S091005

**5** Ayesha tries to lift the four boxes one by one.
Which box will be the most difficult to lift?

A. Box 1
B. Box 2
C. Box 3
D. Box 4

SAS21S091006

**6** Which box has the most weight?
Explain your answer.

_____

_____

SAS21S091007

**7** Which box has the most weight?
Explain your answer.

$$\textit{Relative density of an object} = \frac{\textit{Density of the object}}{\textit{Density of water}}$$

An object floats on water.
What should be the relative density of the object?

_____

_____

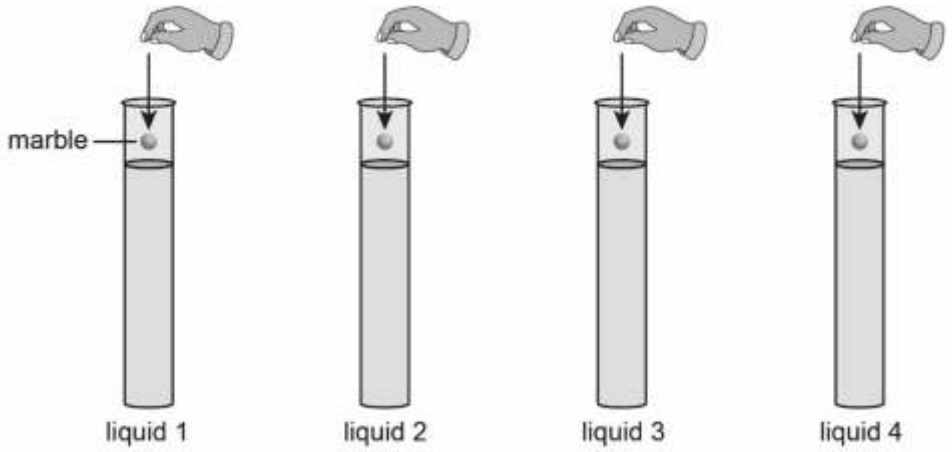
SAS21S091008

8 Why is it essential for deep-sea diving vessels to be built of thick sheets of steel?

_____

_____

Peter pours the same amount of four different liquids in separate cylinders.
The cylinders are of the same size.
He then drops a glass marble in each of the four cylinders.




Peter notes the time the marble takes to reach the bottom of each cylinder.
The table shows the results.

| Liquid | Time taken by the marble to reach the bottom of the cylinder (in seconds) |
|---|---|
| Liquid 1 | 1.8 sec |
| Liquid 2 | 1.5 sec |
| Liquid 3 | 0.8 sec |
| Liquid 4 | 1.0 sec |

SAS21S091009

9 Which liquid exerted the most upward force on the marble?

A. Liquid 1
B. Liquid 2
C. Liquid 3
D. Liquid 4

SAS21S091010

10 Four different objects are placed in a tumbler of water.
Which object will displace more water than its own weight?

A. 

Steel spoon

B. 

Steel bowl

C. 


Steel coin

D. 

Steel ball

# Answers



| | |
|---|---|
| **Item Number** | Question 1 |
| **Question Code** | SAS21S091001 |
| **Grade & Chapter Name** | Grade 9 \| Gravitation |
| **Concept \| Sub-concept** | Physical Science \| Universal Law of Gravitation |
| **Competency** | Interpreting Data and Evidence Scientifically |
| **Item Type** | Multiple Choice Question |
| **Full Credit (Full Score)** | C. Image |
| **No Credit (No Score)** | Any other response or missing response |

| | |
|---|---|
| **Item Number** | Question 2 |
| **Question Code** | SAS21S091002 |
| **Grade & Chapter Name** | Grade 9 \| Gravitation |
| **Concept \| Sub-concept** | Physical Science \| Universal Law of Gravitation |
| **Competency** | Explaining Phenomena Scientifically |
| **Item Type** | Constructed Response |
| **Full Credit (Full Score)** | Mentions that G stands for universal gravitation constant |
| **No Credit (No Score)** | Any other response or missing response |

| | |
|---|---|
| **Item Number** | Question 3 |
| **Question Code** | SAS21S091003 |
| **Grade & Chapter Name** | Grade 9 \| Gravitation |
| **Concept \| Sub-concept** | Physical Science \| Motion of Objects Under The Influence Gravitational Force the Earth |
| **Competency** | Interpreting Data & Evidence Scientifically |
| **Item Type** | Multiple Choice Question |
| **Full Credit (Full Score)** | B. Location 2 and Location 4 |
| **No Credit (No Score)** | Any other response or missing response |

| | |
|---|---|
| **Item Number** | Question 4 |
| **Question Code** | SAS21S091004 |
| **Grade & Chapter Name** | Grade 9 \| Gravitation |
| **Concept \| Sub-concept** | Physical Science \| Motion of Objects Under The Influence Gravitational Force the Earth |
| **Competency** | Explaining Phenomena Scientifically |
| **Item Type** | Constructed Response |
| **Full Credit (Full Score)** | Mentions that the gravitational pull of the earth keeps the moon in its orbit<br><br>For example:<br>• Gravitational force/pull of the earth makes the moon move in a fixed orbit. |
| **No Credit (No Score)** | Any other response or missing response |

| | |
|---|---|
| **Item Number** | Question 5 |
| **Question Code** | SAS21S091005 |
| **Grade & Chapter Name** | Grade 9 \| Gravitation |
| **Concept \| Sub-concept** | Physical Science \| Thrust and Pressure |
| **Competency** | Interpreting Data & Evidence Scientifically |
| **Item Type** | Multiple Choice Question |
| **Full Credit (Full Score)** | D. Box 4 |
| **No Credit (No Score)** | Any other response or missing response |

| | |
|---|---|
| **Item Number** | Question 6 |
| **Question Code** | SAS21S091006 |
| **Grade & Chapter Name** | Grade 9 \| Gravitation |
| **Concept \| Sub-concept** | Physical Science \| Thrust and Pressure |
| **Competency** | Explaining Phenomena Scientifically |
| **Item Type** | Constructed Response |
| **Full Credit (Full Score)** | Mentions that all four boxes have the same weight as their mass is the same<br><br>For example:<br>• All four boxes have the same weight as their mass is the same. |
| **No Credit (No Score)** | Any other response or missing response |

| | |
|---|---|
| **Item Number** | Question 7 |
| **Question Code** | SAS21S091007 |
| **Grade & Chapter Name** | Grade 9 \| Gravitation |
| **Concept \| Sub-concept** | Physical Science \| Relative Density |
| **Competency** | Explaining Phenomena Scientifically |
| **Item Type** | Constructed Response |
| **Full Credit (Full Score)** | Mentions that the relative density of the object should be less than 1 |
| **No Credit (No Score)** | Any other response or missing response |

| | |
|---|---|
| **Item Number** | Question 8 |
| **Question Code** | SAS21S091008 |
| **Grade & Chapter Name** | Grade 9 \| Gravitation |
| **Concept \| Sub-concept** | Physical Science \| Pressure in Fluids |
| **Competency** | Explaining Phenomena Scientifically |
| **Item Type** | Constructed Response |
| **Full Credit (Full Score)** | Mentions that deep sea has very high water pressure. Thick sheet of steel can resist high water pressures<br><br>For example:<br>• Deep sea has very high water pressure.<br>• Thick sheet of steel can resist high water pressures. |
| **No Credit (No Score)** | Any other response or missing response |

| | |
|---|---|
| **Item Number** | Question 9 |
| **Question Code** | SAS21S091009 |
| **Grade & Chapter Name** | Grade 9 \| Gravitation |
| **Concept \| Sub-concept** | Physical Science \| Buoyancy |
| **Competency** | Interpreting Data and Evidence Scientifically |
| **Item Type** | Multiple Choice Question |
| **Full Credit (Full Score)** | A. Liquid 1 |
| **No Credit (No Score)** | Any other response or missing response |

| | |
|---|---|
| **Item Number** | Question 10 |
| **Question Code** | SAS21S091010 |
| **Grade & Chapter Name** | Grade 9 \| Gravitation |
| **Concept \| Sub-concept** | Physical Science \| Archimedes' Principle |
| **Competency** | Explaining Phenomena Scientifically |
| **Item Type** | Multiple Choice Question |
| **Full Credit (Full Score)** | B. Steel bowl |
| **No Credit (No Score)** | Any other response or missing response |