

6.2 Newton's Law of Gravitation

Question Paper

Course	DPIB Physics
Section	6. Circular Motion & Gravitation
Topic	6.2 Newton's Law of Gravitation
Difficulty	Easy

Time allowed: 20
Score: /10
Percentage: /100

Question 1

What is the correct relationship between the gravitational force and the distance between two point masses?

A. $F \propto \frac{1}{G}$

B. $F \propto \frac{1}{m}$

C. $F \propto \frac{1}{r^2}$

D. $F \propto r^2$

[1 mark]

Question 2

The force, F between two point masses is 10 N. The distance, r between the two masses is doubled.

What is the new force between the two masses?

A. 2.5 N

B. 5 N

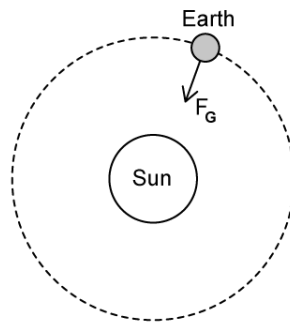
C. 20 N

D. 100 N

[1 mark]

Question 3

The gravitational force, F_G as shown on the diagram, keeps the Earth orbiting the Sun in a circular orbit.



What type of force is F_G ?

- A. Electrostatic force
- B. Centripetal force
- C. Centrifugal force
- D. Contact force

[1 mark]

Question 4

Which expression best describes the relationship between the orbital time period, T and the orbital radius, r ?

- A. $T^3 \propto r^2$
- B. $T^2 = r^3$
- C. $T^2 \propto \frac{1}{r^3}$
- D. $T^2 \propto r^3$

[1 mark]

Question 5

Which of the following is **not** an equation which can be used to calculate g , the gravitational field strength?

A. $g = \frac{F}{m}$

B. $g = \frac{GM}{r^2}$

C. $g = Fm$

D. $g = \frac{\textit{weight}}{\textit{mass}}$

[1 mark]

Question 6

Which of the following statements about gravitational force is true?

- A. Gravitational force has a finite range
- B. A greater gravitational force is exerted on objects with larger mass
- C. On planets with a large value of g , the gravitational force per unit mass is smaller than on planets with a smaller value of g
- D. An object's mass changes depending on the gravitational field strength at that point

[1 mark]

Question 7

An alien of mass 100 kg lives on a planet with a gravitational field strength of 50 N kg^{-1} .

What is the weight of the alien on this planet?

- A. 5000 N
- B. 1000 N
- C. 0.05 N
- D. 100 N

[1 mark]

Question 8

A commercial low-orbit space flight carries a passenger of mass 70 kg.

What is the approximate gravitational force of attraction between the Earth and the passenger?

- A. 0 N
- B. 7 N
- C. 700 N
- D. 7000 N

[1 mark]

Question 9

A planet has twice the radius of the Earth and 4 times the mass. Assume the planet is spherical and of uniform density.

If the magnitude of the gravitational field strength on Earth is g , what is the magnitude of the gravitational field strength on the surface of the planet?

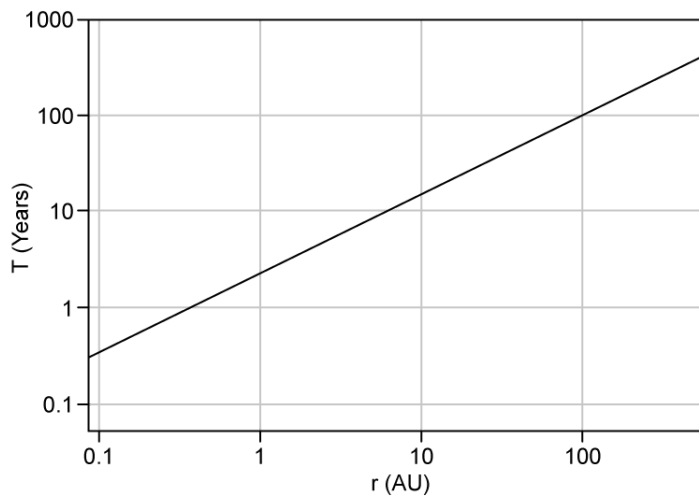
- A. $4g$
- B. $8g$
- C. $2g$
- D. g

[1 mark]

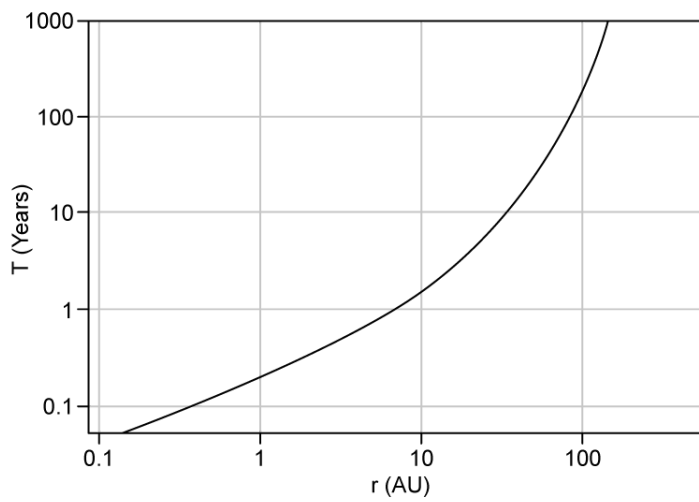
Question 10

Which graph, plotted on logarithmic axes, shows Kepler's Third Law for the planets in our Solar System?

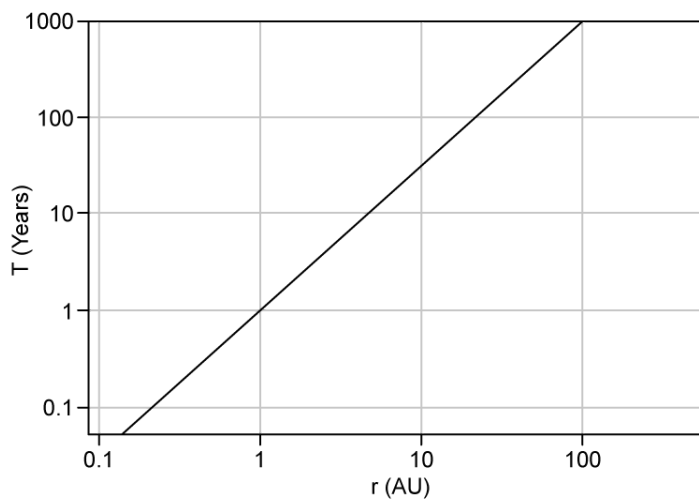
A.



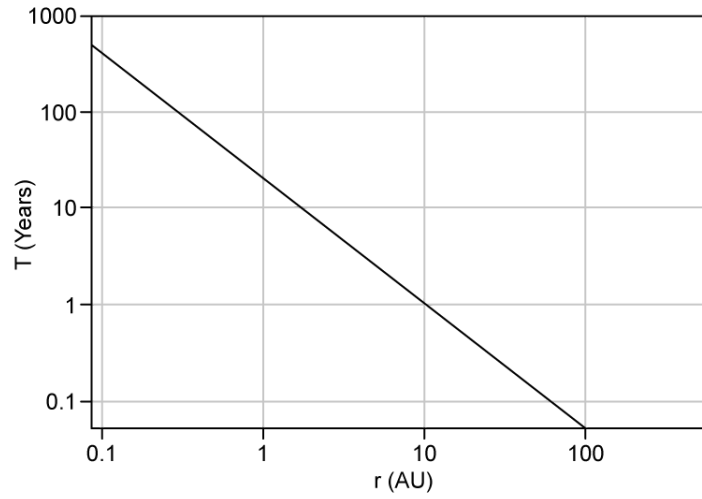
B.



C.



D.



[1 mark]