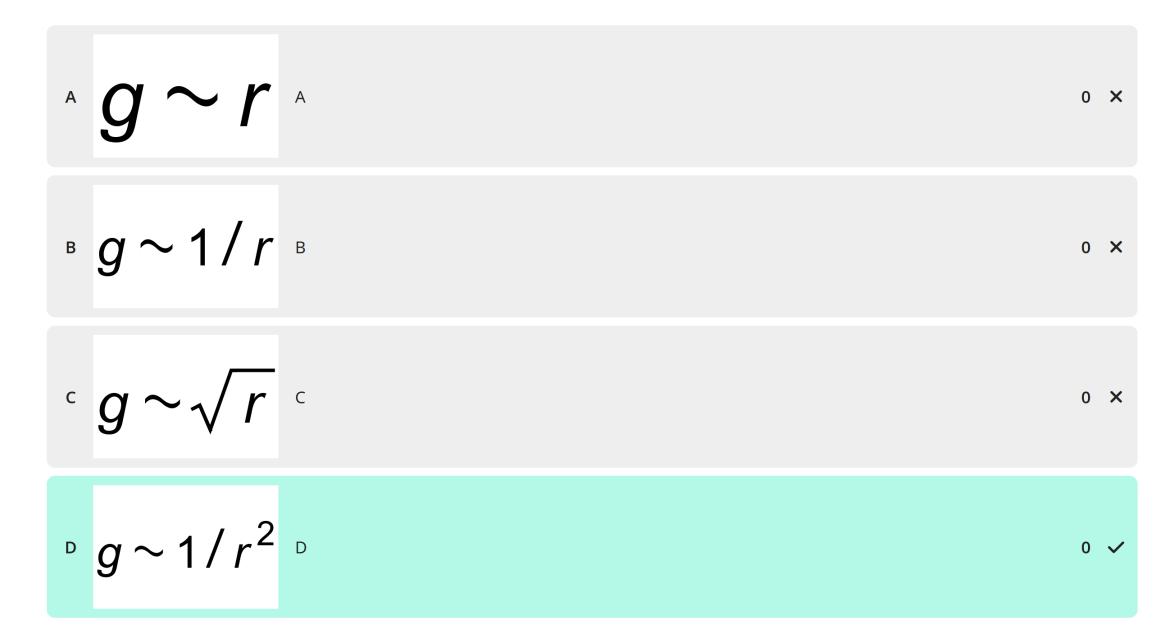
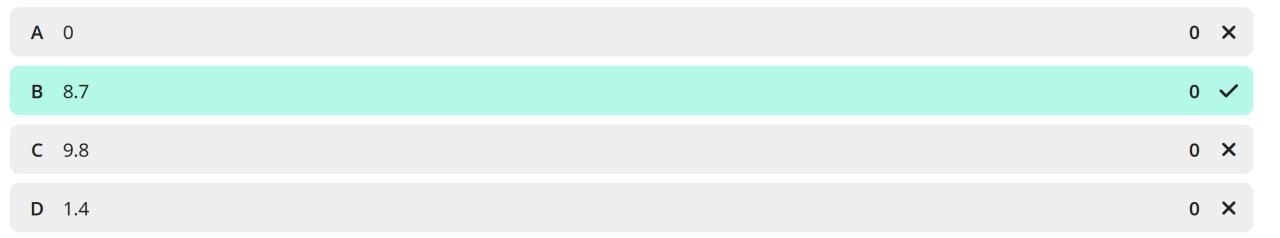
How does the gravitational acceleration changes outside the Earth as a function of distance to the center of the Earth (r>rE)?



# What is the gravitational acceleration at the altitude of the ISS (~400 km)? (In m/s2)



### What is the escape velocity?

A The velocity at distance r from the centre of mass needed to reach infinity at zero speed

**B** The minimum velocity of a rocket to reach orbit

0 X

$$V_{esc} = \sqrt{\frac{2\mu}{r}}$$

**/** 

**D** the velocity needed to reach the Sun

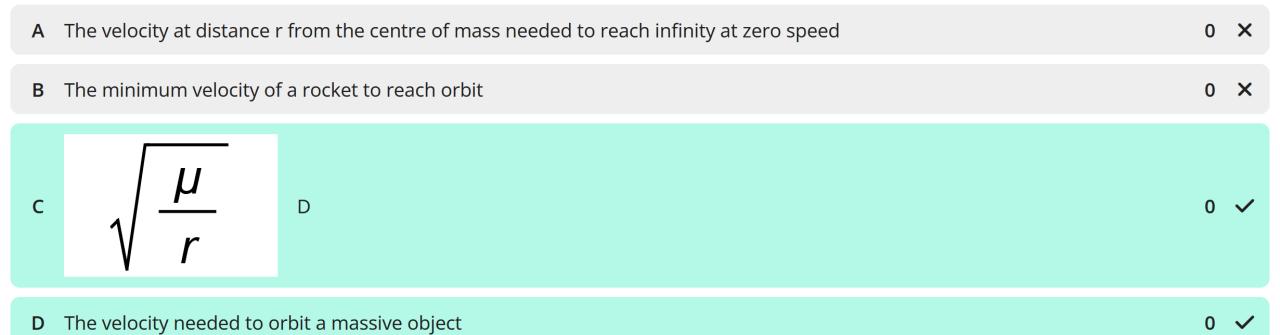
0 X

$$\sqrt{\frac{\mu}{r}}$$

E

0 X

# What is the circular velocity?



# What is the typical velocity and orbital period in LEO?

A 7.5 m/s   60 min	0 X
<b>B</b> 7.7 km/s   90 min	0 🗸
C 7.7 km/h   90 s	0 ×
<b>D</b> 9.0 km/s   77 min	0 ×

#### The mean solar time...

A Varies only on timescales of millennia	0 <b>X</b>
B varies because of the eccentricity and axial tilt of Earth's orbit	0 🗸
C is constant	0 X

# A sidereal day is...

A the same as the solar day	0 <b>X</b>
B is the time for a full rotation wrt the stars	0 🗸
C is the time for a full rotation wrt the Sun	0 <b>X</b>
D is 4 min longer than the mean solar day	0 ×

#### The gravitational force depends on...

$$F \sim r$$

$$F \sim 1/r$$

$$F \sim 1/r^2$$

$$F \sim 1/r^3$$

$$0 \times 1/r^3$$

# Kepler's 1st law says...

A The orbits are conics and the massive object is at one of the foci	0 🗸
B a satellite cannot escape the gravitational well of an object	0 ×
C the orbital period does not depend on the mass of the massive object	0 ×

# Kepler 2nd law says...

A the gravitational force depends on the distance	0 ×
B two equal areas of an orbit are swept in equal time	0 🗸
C the rate of change of the true anomaly is always constant	0 ×

# Kepler 3rd law says...

**C** the orbital period does not depend on the mass of the massive object

A 
$$T = 2\pi\sqrt{\frac{a^3}{\mu}}$$
 A

B the gravitational force depends on the distance

0 ×

# Which text about the specific energy is wrong?

A 
$$\varepsilon = -\frac{\mu}{2a}$$
 A

B the energy is <0 for bounded orbits

0 ×

C The energy is positive for elliptical orbits

0  $\checkmark$ 

D the energy only depends on the semi-major axis