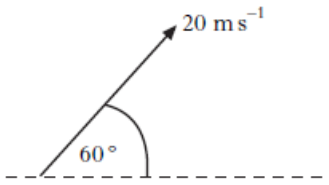
Unit 1 – Our Dynamic Universe
Section 4 - Gravitation

2008 2. A javelin is thrown at 60° to the horizontal with a speed of 20 m s^{-1}.



The javelin is in flight for 3·5 s.
Air resistance is negligible.
The horizontal distance the javelin travels is

A 35·0 m
B 60·6 m
C 70·0 m
D 121 m
E 140 m.

2012 Revised 4. A satellite orbits a planet at a distance of $5{\cdot}0 \times 10^7$ m from the centre of the planet.

The mass of the satellite is $2{\cdot}5 \times 10^4$ kg.

The mass of the planet is $4{\cdot}0 \times 10^{24}$ kg.

The gravitational force acting on the satellite due to the planet is

A $1{\cdot}7 \times 10^{-6}$ N
B $2{\cdot}7 \times 10^{3}$ N
C $1{\cdot}3 \times 10^{11}$ N
D $2{\cdot}7 \times 10^{14}$ N
E $2{\cdot}7 \times 10^{32}$ N.

2014 Revised 4. The distance between a spacecraft and a space station is 0·45 km.

The mass of the spacecraft is $1{\cdot}08 \times 10^5$ kg.

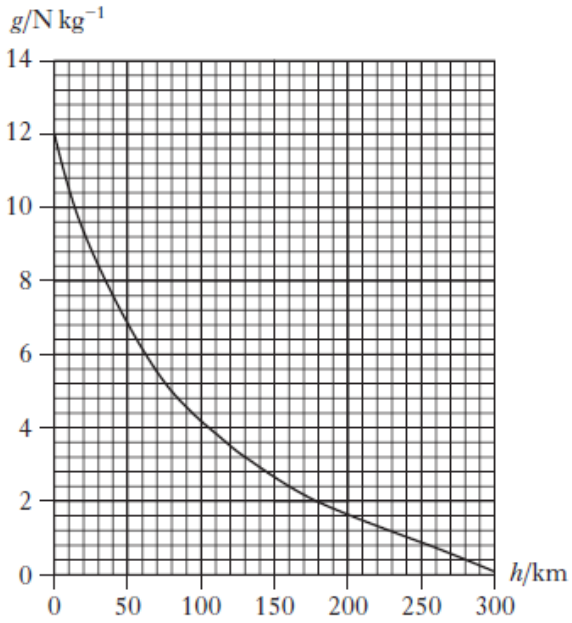
The mass of the space station is $3{\cdot}44 \times 10^5$ kg.

The gravitational force between the spacecraft and the space station is

A $1{\cdot}8 \times 10^6$ N
B 5·5 N
C $1{\cdot}2 \times 10^{-1}$ N
D $5{\cdot}5 \times 10^{-3}$ N
E $1{\cdot}2 \times 10^{-5}$ N.

2013 Revised 7. A rock of mass 0·80 kg falls towards the surface of a planet.

The graph shows how the gravitational field strength, g, of the planet varies with height, h, above the surface of the planet.



At one point during its fall the weight of the rock is 4·0 N. The height of this point above the surface of the planet is

A 15 km
B 80 km
C 105 km
D 130 km
E 255 km.

2016 **5.** A planet orbits a star at a distance of $3{\cdot}0 \times 10^{9}$ m.

The star exerts a gravitational force of $1{\cdot}6 \times 10^{27}$ N on the planet.

The mass of the star is $6{\cdot}0 \times 10^{30}$ kg.

The mass of the planet is

A $2{\cdot}4 \times 10^{14}$ kg

B $1{\cdot}2 \times 10^{16}$ kg

C $3{\cdot}6 \times 10^{25}$ kg

D $1{\cdot}6 \times 10^{26}$ kg

E $2{\cdot}4 \times 10^{37}$ kg.

2018 **5.** Enceladus is a moon of Saturn. The mass of Enceladus is $1{\cdot}08 \times 10^{20}$ kg.

The mass of Saturn is $5{\cdot}68 \times 10^{26}$ kg.

The gravitational force of attraction between Enceladus and Saturn is $7{\cdot}24 \times 10^{19}$ N.

The orbital radius of Enceladus around Saturn is

A $2{\cdot}38 \times 10^{8}$ m

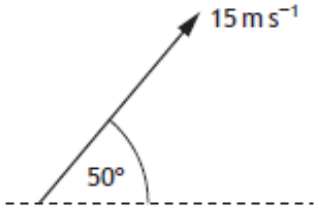
B $9{\cdot}11 \times 10^{13}$ m

C $5{\cdot}65 \times 10^{16}$ m

D $8{\cdot}30 \times 10^{27}$ m

E $3{\cdot}19 \times 10^{33}$ m.

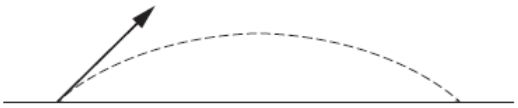
2019 **2.** A stone is thrown at 50° to the horizontal with a speed of 15 m s^{-1}.



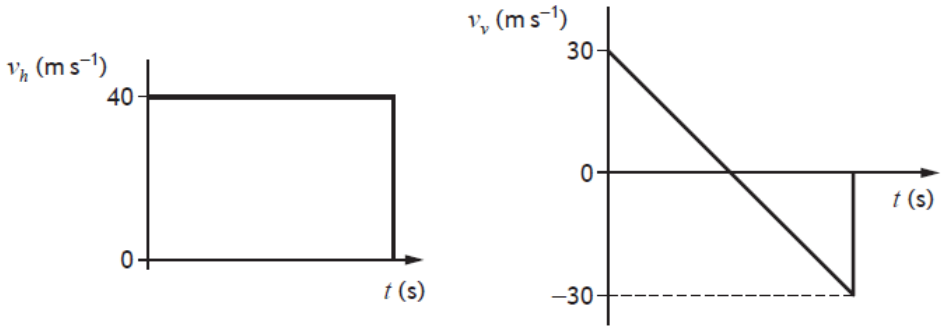
Which row in the table gives the horizontal component and the vertical component of the initial velocity of the stone?

	Horizontal component (m s^{-1})	Vertical component (m s^{-1})
A	15 sin 50	15 cos 50
B	15 cos 50	15 sin 50
C	15 cos 50	15 sin 40
D	15 cos 40	15 sin 50
E	15 sin 50	15 cos 40

2019 3. A golfer strikes a golf ball, which then moves off at an angle to the ground. The ball follows the path shown.



The graphs show how the horizontal component of the velocity v_h and the vertical component of the velocity v_v of the ball vary with time t.



The speed of the ball just before it hits the ground is

A 10 m s^{-1}

B 30 m s^{-1}

C 40 m s^{-1}

D 50 m s^{-1}

E 70 m s^{-1}.