1.3 Satellites & Projectiles Past Paper Questions

Q1. The purpose of the curved reflector on a satellite television aerial is to

A   Make the transmitted signal stronger

B   Make the received signal stronger

C   Reflect light on to the receiver

D   Absorb transmitted signals

E   Absorb received signals   (1)

Q2.How long does a geostationary satellite take to orbit the Earth?

A   1 hour
B   1 day
C   1 week
D   1 month   (1)
E   1 year

Q3. The weather information satellite NOAA-15 has a period of 99 minutes and an orbital height of 833km.

The geostationary weather information satellite Meteosat has a period of 1 440 minutes and an orbital height of 35, 000 km. Which of the following gives the period of a satellite with an orbital height of 20 000 km?

A   83 minutes
B   99 minutes
C   720 minutes
D   1440 minutes   (1)
E   1750 minutes

Q4. A signal is transmitted using a curved reflector as shown.
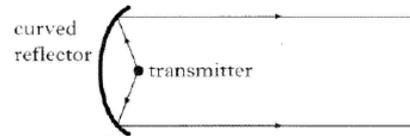
Which of the following statements is/are correct?

I.   The signal meets the curved reflector at an angle called the critical angle.
II.   The transmitter is placed at the focus of the reflector.

III.   At the curved reflector, the angle of reflection of the signal is equal to the angle of incidence.   (1)

A   I only

B   I and II only

C   I and III only

D   II and III only

E   I, II and III

Q5 A football match is being broadcast live from Dundee. Signals from the football stadium are transmitted to a television studio in Glasgow via a relay station on top of a nearby hill.
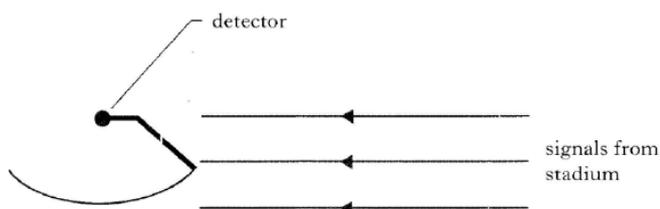
At the relay station a curved reflector is placed behind a detector of the television signals.

       a) State the purpose of the curved reflector. (1)

       b) Copy and complete the diagram below to show the effect of the curved reflector on the signal at the relay station. (2)
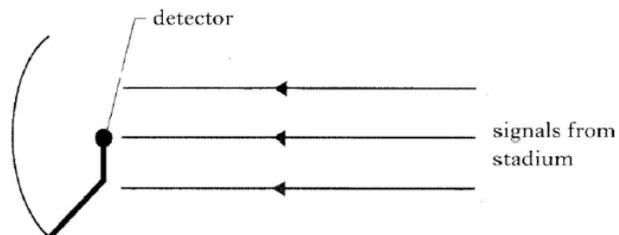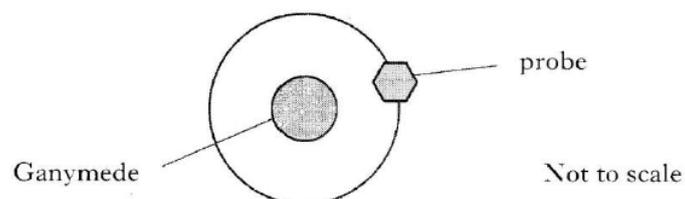

      c) During the match strong winds cause the reflector to move to a new position as shown.

      State the effect this has on the signal received at the detector. (1)

Q6 A space probe goes into orbit around Ganymede, one of Jupiter's moons.

   Explain why the probe follows a circular path while in orbit. (2)

Q7 A mountain climber carries a device which receives radio signals from satellites to determine the climber's position.

The device can also be used to send the climber's position to the emergency services in the event of an accident.

One satellite sends a radio signal that is received by the device 0.068s after transmission.

       a) State the speed of the radio signal.   (1)

       b) Calculate the distance between this satellite and the climber.   (3)

Q8 A package is released from a helicopter flying horizontally at a constant speed of 40 ms^{-1}.

40 m/s

path of package
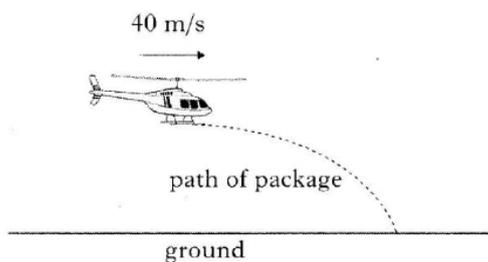
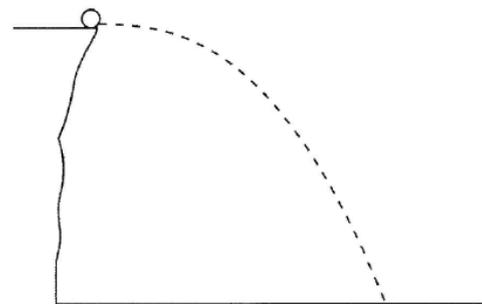ground

The package takes 3.0s to reach the ground.

The effects of air resistance can be ignored.

Which row in the table shows the horizontal speed and vertical speed of the package just before it hits the ground?

	Horizontal speed (ms^{-1})	Vertical speed (ms^{-1})
A	0	30
B	30	30
C	30	40
D	40	30
E	40	40

(1)

Q9 A ball is projected horizontally from a cliff as shown below.

The effect of air resistance is negligible.

A student makes the following statements about the ball.

     I.   The vertical speed of the ball increases as it falls.

     II.   The vertical acceleration of the ball increases as it falls.

     III.   The vertical force on the ball increases as it falls.

Which of the statements is/are correct?

     A   I only
     B   II only
     C   I and II only   (1)
     D   II and III only
     E   I, II and III

Q10 . A ball rolls down a runway and leaves it at point R.
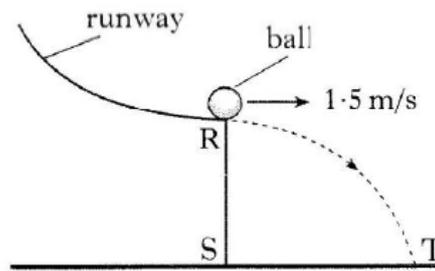
The horizontal speed of the ball at R is 1.5 ms^{-1}.

The ball takes 0.6 s to travel from R to T.

The distance ST is

A   0.40m
B   0.90m
C   2.5m
D   9.0m
E   15m

(1)

11 The Mars Lander released a rover exploration vehicle on to the surface of Mars. To collect data from the bottom of a large crater, the rover launched a projectile horizontally at 30ms^{-1}. The probe took 6s to reach the bottom of the crater.
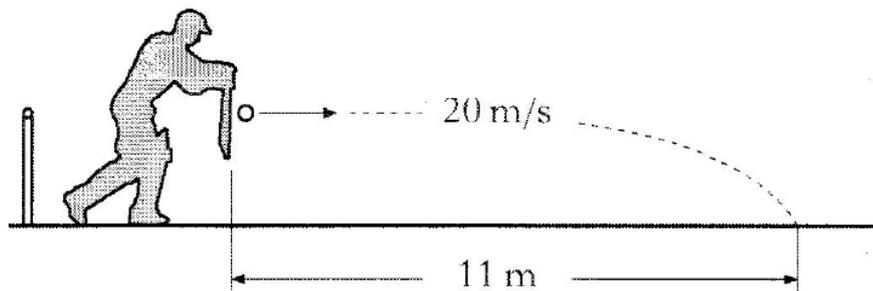
a) Calculate the horizontal distance travelled by the probe.

(3)

b) Calculate the vertical speed of the probe as it reached the bottom of the crater.

(3)

12 A cricketer strikes a ball. The ball leaves the bat horizontally at 20ms^{-1}. It hits the ground at a distance of 11m from the point where it was struck.

Assume that air resistance is negligible.

a) Calculate the time of flight of the ball.   (3)
b) Calculate the vertical speed of the ball as it reaches the ground.   (3)
c) Sketch a graph of vertical speed against time for the ball. Numerical values are required on both axes.   (3)
d) Calculate the vertical distance travelled by the ball during its flight.   (3)

Total Marks 35