Name of the Student:_____
Max. Marks : 22 Marks **Time : 22 Minutes**

Mark Schemes

Q1.

(a) (force of) gravity causes the satellite to accelerate (towards the Earth)

allow satellite is (constantly) accelerating

1

the acceleration causes a change in direction

acceleration causes a change in speed negates this mark point

1

velocity changes because direction changes

1

(b) length of orbit taken from graph = 42 100 (km)

1

42 100 = 7.73 × time
or
$\text{time} = \frac{42100}{7.73}$

allow
their distance = 7.73 × time

1

time (1 orbit) = 5446(s)

allow a value consistent with their distance

1

$\text{number of orbits} = \left(\frac{24 \times 3600}{5446}\right)$

= 15.86

allow $\left(\frac{24}{1.51}\right) = 15.86$

allow a value consistent with their distance

1

number of orbits = 15

allow a value consistent with their distance
*an answer of 16 scores **4** marks*

1

or

length of orbit taken from graph = 42 100 (km) (1)

$$7.73 = \frac{\text{distance}}{24 \times 3600} \quad (1)$$

distance = 667 872 (km) (1)

$$\text{number of orbits} = \left(\frac{667872}{42100}\right)$$

= 15.86 (1)

allow a value consistent with their two distances

number of orbits = 15 (1)

allow a value consistent with their two distances
up to full marks can be awarded for a method calculating velocity in km/h and time in hours
*an answer of 15 scores **5** marks*

(c) the predicted data is very close to the actual data

1

(d) supported the prediction (made by Bode)

allow predicted and actual values are very close

1

so provides evidence that the equation is true / correct / works / accurate

allow proves for provides evidence

1

[11]

Q2.

(a) gravity

1

(b) as the wire moves through the Earth's magnetic field

1

a potential difference is induced between the ends of the wire

1

the wire must be part of a complete circuit

1

(c) new trace shows:

twice the frequency

1

twice the amplitude

1

(d) dynamo

dc generator is insufficient

1

(e) the alternator pd changes polarity, the 2nd type of generator does not

1

(f) $\frac{230}{V_s} = \frac{690}{57}$

1

$V_s = \frac{230 \times 57}{690}$

1

V_s = 19 (V)

*an answer of 19 (V) scores **3** marks*

1

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