

Name of the Student: _____

Max. Marks : 23 Marks

Time : 23 Minutes

Mark Schemes

Q1.

(a) 20 000 Hz 1

(b) 400 (m)
allow 1 mark for correct substitution ie 1600×0.25
provided no subsequent steps shown
an answer of 200 (m) gains 1 mark 2

(c) twice 1

(d) From pulse 1 to pulse 3 the distance (to the sea floor) decreased
accept the sea got shallower
or
the submarine went deeper for the distance decreased 1

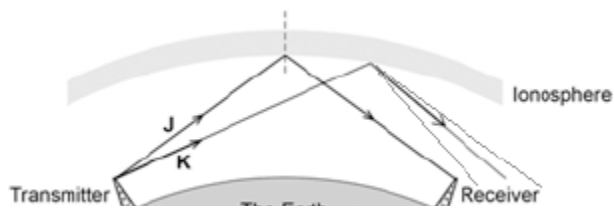
then (after pulse 3) the distance (to the sea floor) increased
accept the sea got deeper
or
the submarine rose for the distance increased
An answer of the distance decreased then increased gains 1 mark 1

[6]

Q2.

(a) (i) reflection of wave **K** at or within the ionosphere
allow dashed lines 1

angle i = angle r
'judge by eye'



tolerance for the reflected ray is between the first e and last r
ignore arrows

a reflected ray to the receiver doesn't score 2nd mark

additional rays shown don't score 2nd mark

1

(ii) normal

1

(b) (i) microwave

1

(ii) refraction

1

(c) All electromagnetic waves are transverse.

1

All electromagnetic waves have the same speed in a vacuum.

1

[7]

Q3.

(a) refraction

1

(b) towards the normal

1

(c) (i) convex

1

(ii) principal focus

accept focal point

1

(d) parallel on left

1

refracted towards the normal at first surface

1

refraction away from normal at second surface

1

passes through or heads towards principal focus

1

(e) refractive index

accept material from which it is made

1

(radius of) curvature (of the sides)

accept shape / radius
*do **not** accept power of lens*
ignore thickness / length

1

[10]