

MARK SCHEME

GCSE

PHYSICS

AQA - COMBINED SCIENCE

P6 - TEST 1

WAVES

Beginner

Mark schemes

1.

- (a) *straight line continued through glass block to meet edge of the block*
do not allow dotted / dashed lines
judge by eye

1

straight line drawn through crosses to meet the edge of block
judge by eye
ignore reflection within the block
ignore 'normal' line

1

- (b) any **one** from

- safety / dark glasses
ignore goggles / glasses
unqualified
- safety / dark goggles
ignore special goggles / glasses
ignore sunglasses / eye protection
- don't look at laser (directly)
allow don't shine laser into someone's eyes

1

- (c) (i) any **one** from:

- too many points above line
allow line of best fit only goes through 2 points
allow line doesn't go through most points
allow line should go through more / most points
allow 3 points have been ignored
- no points below the line
- line should be curved
allow there should be equal numbers of points on both sides of line

1

- (ii) any **two** from:

- use smaller interval between readings
eg allow go up in 10's
- take readings at more angles
allow take readings at different angles / named angles
- repeat the experiment / readings *and calculate a mean*
allow repeat the experiment to identify anomalies
- use a narrower ray of light
ignore take more readings
ignore compare results (with other students)

2

[6]

- 2.** (a) stop
accept any indication
 cannot travel 2
- (b) middle box ticked
accept a tick next to the statement even if not in the box
*do **not** accept two ticks* 1
- (c) (i) B
 highest frequency
accept most waves (in box)
accept 'squashed together'
*do **not** accept 'squashed'*
accept 'close (together)'
accept shortest wavelength 2
- (ii) D
 largest amplitude
*accept tallest **or** highest wave*
*do **not** accept biggest wave*
*do **not** accept 'high' wave* 2

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- 3.** (a) convection 1
- (b) any **two** from:
- easier / clearer to read **or** reading error less likely / takes readings for you
 - greater resolution / temperature displayed to two decimal places
ignore precision / accurate / reliable / sensitivity
 - more frequent readings
ignore readings every second / plots graph / quicker
 - more data
 - live graphical representation
allow references to safety
allow no need to open lid (thus preventing cooling)
- 2

- (c) (i) black is a better emitter / radiator of energy / infrared radiation
allow heat
for full marks there must be a comparison in terms of emission / radiation
allow 1 mark for: temperature of black can decreases faster / more
or
water in black can has reached room / constant temperature whilst water in white can is still cooling
or
correct description of temperature drop in both cans after 14 minutes

2

- (ii) (any) line drawn between the white can and black can lines on graph
starting at 100 (°C)

1

line shows the same trend as white can line **or** black can line
second mark only scores if first marking point correct
*do **not** award this mark if line shows intentional rise at any point*

1

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4.

- (a) (i) (visible) light
accept visible

1

- (ii) microwaves

1

- (b) J

1

- (c) (i) B

1

- (ii) shorter than

1

- (d) (i) To find out if using a mobile phone is harmful to health

1

(ii) any **two** from:

- (X has a) low(er) SAR value
“it” refers to mobile phone
accept has a low(er) rate
- (maximum) energy absorbed (by the head) is less
accept energy emitted (by phone) is less
accept radiation for energy
- (if mobiles are harmful) less likely to cause harm
accept will not cause harm
accept it is safer

2

[8]

5.

(a) (i) oscillation

1

direction

1

correct order only

(ii) sound

1

(b) 1.6

allow 1 mark for correct substitution into correct equation ie 2×0.8

2

m/s

1

(c) as the wavelength increases so does the wave speed

1

extra information, eg wave speed increases faster
between 0-40 m than between 100-140 m

1

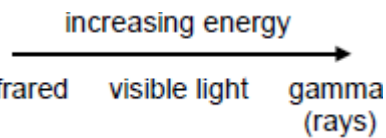
or

not in proportion

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6.

(a)



3 correct = 2 marks
1 or 2 correct = 1 mark
allow IR for infrared
allow visible or light for visible light

2

(b) (i) frequency

1

(ii) vacuum

1

(c) IR - remote control / fibre optic

ignore phones and cables unless qualified

1

microwave - mobile phone / satellite (TV)

1

radio – (terrestrial) TV / radio transmissions

allow walkie talkies

1

visible light – photography / fibre optic

allow valid examples of communication using visible light e.g. traffic lights, sign language

1

[8]

7.

(a) (i) absorb

1

(ii) more

1

(b) (i) conduction

1

(ii) colour (of cube)

allow colour (of box)

1

- (iii) Cube Y
all three in correct order for 2 marks

Cube X

Cube Z

one or two correct for 1 mark

allow grey for X

allow white for Y

allow black for Z

2

- (iv) results can be compared
accept start temperature affects rate of energy transfer
or
start temperature affects how quickly the cube cools down
ignore fair test / reliability / accuracy / control variable / valid

1

- (v) control (variable)
allow controls / controlled

1

[8]

8.

- (a) electromagnetic
accept e.m.

1

- (b) (i) 2.2 (arbitrary units)
allow an answer between 2.1 and 2.3

1

- (ii) the thicker the tissue the lower the intensity
accept more intensity is needed to pass through thicker tissue

1

the relationship is not linear

accept the line is not straight

allow for 1 mark

it still goes through with thicker tissue

or

intensity does not reach zero

or

at 5 cm X rays still pass through

1

- (iii) Both variables are continuous

1

- (c) (they are) absorbed
accept (they are) stopped 1
- (d) With a charge-coupled device (CCD). 1
- (e) (i) X-rays are ionising 1
- (ii) stand behind a (protective) screen
accept leave the room
accept wear a lead apron 1

[9]

9.

- (a) pitch 1
- loudness 1
- (b) (i) as length (of prongs) decreases frequency / pitch increases
accept converse
accept negative correlation
ignore inversely proportional 1
- (ii) 8.3 (cm)
accept 8.3 ± 0.1 cm 1
- (iii) (8.3 cm is) between 7.8 (cm) and 8.7 (cm)
ecf from part (ii) 1
- (so f must be) between 384 (Hz) and 480 (Hz) 1
- $410 \text{ (Hz)} \leq f \leq 450 \text{ (Hz)}$
if only the estimated frequency given, accept for 1 mark an answer within the range 1
- (c) (i) electronic 1
- (ii) frequency is (very) high
accept frequency above
20 000 (Hz) or audible range 1
- so tuning fork **or** length of prongs would be very small (1.2 mm) 1

(d) 285.7 (Hz)

accept any correct rounding 286, 290, 300

allow 2 marks for 285

allow 2 marks for correct substitution $0.0035 = 1 / f$

allow 1 mark for $T = 0.0035$ s

allow 1 mark for an answer of 2000

3

[13]