

MARK SCHEME

GCSE

PHYSICS

AQA - COMBINED SCIENCE

P6 - TEST 2

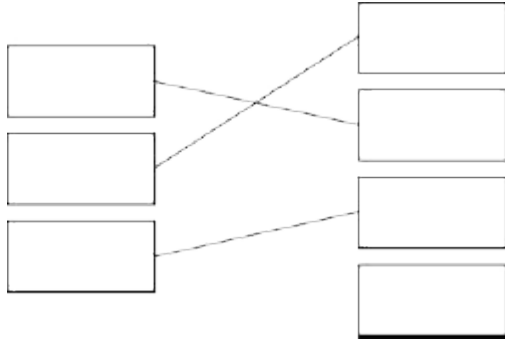
WAVES

Beginner

Mark schemes

- 1.** (a) ray shown refracted (to rhs or along normal)
gains 1 mark
- but**
ray shown refracted away from normal
gains 2 marks
- 2
- (b) *idea that*
travels at a different speed
gains 1 mark
- (allow refracted / travels slower in air / air is less dense) (do not allow bent)
- but**
travels more quickly in air
gains 2 marks
- 2
- [4]**
- 2.** (a) any **one** from:
- (visible) light
 - UV / ultra violet
 - X-ray
 - gamma / γ -ray
- 1
- (b) less than
- 1
- less than
- 1
- the same as
- 1
- [4]**
- 3.** (a) *correct order only*
- gamma (rays)
allow waves
- 1
- (visible) light
- 1

(b)



extra line from statement cancels the mark

1
1
1

[5]

4.

(a) 2.5(cm)

10 / 4 for 1 mark

2

(b) (i) 3 (m/s)

allow 0.5 × 6 for 1 mark

2

(ii) any **one** from:

- cheaper
- (easier) to make adjustments
- easier to handle
- external conditions can be controlled
- for safety
- fit for purpose

allow to see if it works / floats / has faults

1

[5]

5.	(a)	4		1	
	(b)	3		1	
	(c)	3			
			<i>correct answer with no working = 2</i>		
			<i>allow 1 mark for $f = \text{number} \div \text{time}$</i>		
			<i>or correct working i.e., $12 \div 4$</i>		
			<i>N.B. correct answer from incorrectly recalled relationship / substitution = 0</i>		
				2	
		Hz / hertz			
			<i>accept HZ, hz, hZ</i>		
			<i>allow waves / cycles per second</i>		
			<i>allow wps, w/s, cps, c/s</i>		
				1	
					[5]
6.	(a)	(i)	wavelength		
			<i>accept frequency</i>		
			<i>accept speed</i>		
				1	
		(ii)	amplitude		
			<i>accept energy</i>		
			<i>height is insufficient</i>		
				1	
		(iii)	sound		
				1	
	(b)	0.12			
			<i>allow 1 mark for correct substitution, ie 8×0.015 provided no subsequent step shown</i>		
				2	
		metre per second or m/s or metre/second			
			<i>do not accept mps</i>		
			<i>units must be consistent with numerical answers</i>		
				1	
					[6]

7. (a) transmits
correct order 1
- absorbs 1
- (b) light
allow ultra violet or UV or infrared or IR or gamma 1
- (c) 20
allow 1 mark for correct working, ie $\frac{60}{3}$ provided no subsequent step 2
- (d) Killing cancer cells 1
- [6]

8. (a) all three lines correct
-
- allow 1 mark for each correct line*
if more than one line goes from a device then all lines from that device are wrong 3
- (b) (i) skin cancer
do not accept cancer
do not accept sunburn
correct answer only 1
- (ii) other factors may be involved
accept may have been in the Sun too long
accept (over)-use of sunbeds and (over)- exposure to the Sun
(both) give the same symptoms
accept any other sensible factor that could lead to doubt
do not accept irrelevant answers eg may be run over by a car
do not accept killed by exposure to the Sun 1

(iii) can assess risk
answers should be in terms of assessing our own health risk

or

make your own decision

accept so you limit its use / don't use one

*do **not** accept so you don't get skin cancer*

*do **not** accept so you don't get sunburn*

1

[6]

9.

(a) R

1

(b) they have the same wave speed as visible light

1

they have a lower frequency than gamma rays

1

(c) any **two** from:

- ageing of the skin

allow sunburn

burn unqualified is insufficient

- skin cancer

cancer is insufficient

allow mutation of genes in skin cells

- eye damage

allow blindness

2

(d) any **two** from:

- gamma (rays)
- X-rays
- ultraviolet

2

[7]

10.

(a) 2 cm

1

(b) 5 (hertz)

ignore incorrect units

1

(c) $v = f \times \lambda$

10 (cm/s)

*allow correct substitution for 1 mark (20 × 0.5) **or** (2 × 5)*

2

- (d) (i) point at 6 cm on x-axis should be circled 1
- (ii) line of best fit drawn through points ignoring anomalous point at 6 cm
line should be a curve through every point (including 0) except anomalous point
tolerance ± 1 square at each cross
ignore line after 16 cm
*do **not** accept straight lines joining crosses* 1
- (iii) 3.5 (cm/s)
tolerance \pm half a square from students line
allow ecf from (d)(ii)
if no extrapolation accept 3.5 1

[7]

11.

- (a) **B** 1
- (b) **A** 1
- (c) $\frac{2.5 \text{ (waves)}}{0.5 \text{ (s)}}$ 1
- 5(.0)(Hz) 1
- (d) longitudinal 1
- (e) timing (from seeing the blocks bang together and hearing the sound)
or
 risk of cancelling the timer
ignore human error unqualified
*allow reaction time (of student **B**)* 1
- (f) student to stand further away (so there is a greater time lag to measure)
allow other correct methods, eg using echoes 1
- (g) both are transverse waves 1
- both can travel through a vacuum 1

[9]

12.

- (a) (i) X-ray(s) 1

- (ii) gamma rays 1
- (iii) infrared 1
- (b) the same speed as 1
- (c) (i) horizontal arrow drawn pointing to the right
judge by eye
accept drawn anywhere on diagram 1
- (ii) Y 1
- (iii) any **one** from:
- any type of electromagnetic wave
accept electromagnetic wave(s)
 - water (wave)
do not accept seismic waves
 - (earthquake / seismic) S waves
do not accept P waves
do not accept earthquakes 1
- (d) (i) 3 1
- (ii) 3.6
- or**
- their (d)(i) $\times 1.2$ correctly calculated
 $v = f \times \lambda$
allow 1 mark for correct substitution
ie 3 or their (d)(i) $\times 1.2$ provided that no subsequent step is shown 2

[10]