

**Lord Wandsworth College
Scholarship Assessment**

Physics SAMPLE PAPER

Name: _____

Class: _____

Date: _____

Time: **21 minutes**

Marks: **27 marks**

Comments:

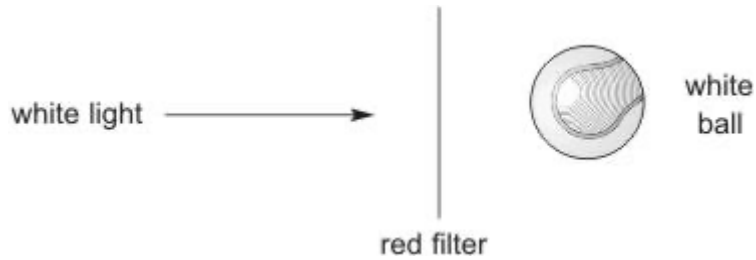
Q1.

(a) Peter had two different coloured tennis balls as shown below.



He shone white light through a red filter onto each ball.

(i) **experiment 1**

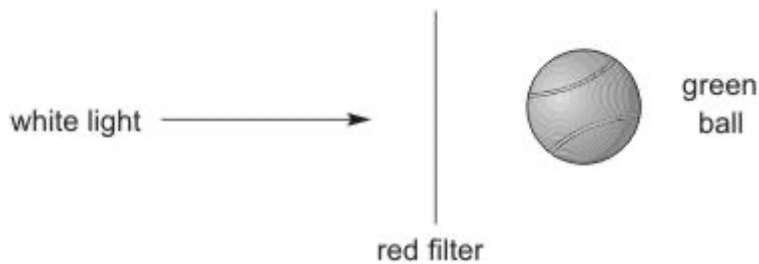


The white ball appeared red.
Explain why this ball appeared red.

.....
.....
.....
.....

2 marks

(ii) **experiment 2**



What colour did this ball appear?

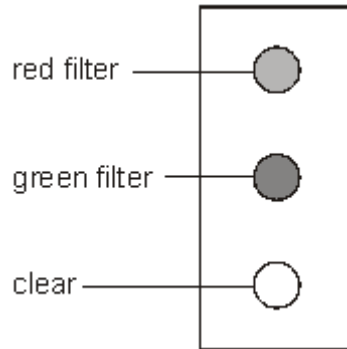
.....

Explain your answer.

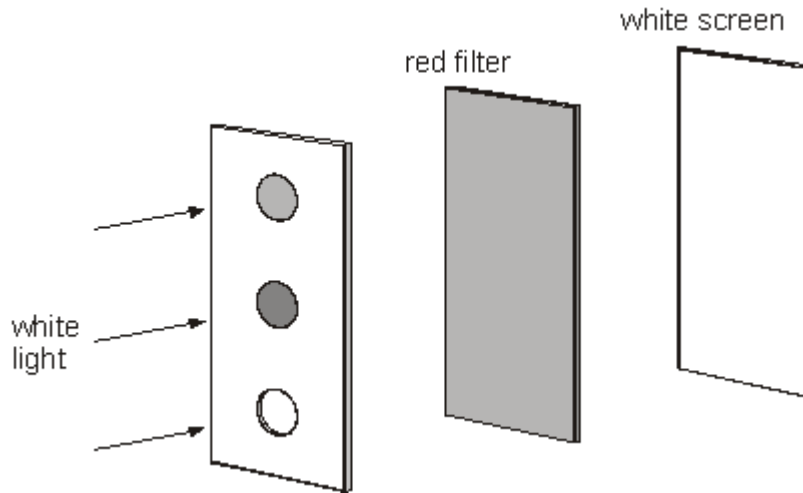
.....
.....

2 marks

- (b) Peter set up a different experiment.
He cut three holes in a piece of card.
Two of the holes were covered by coloured filters as shown below.



Peter placed a red filter between the piece of card and a white screen.
He shone white light at the piece of card with three holes in it.



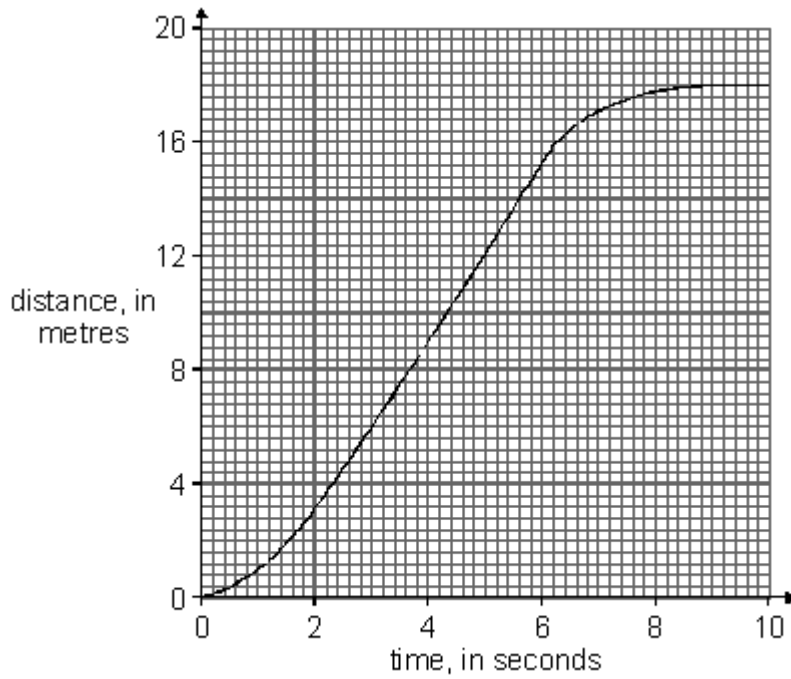
What would Peter see on the screen?

.....
.....

1 mark
maximum 5 marks

Q2.

A remote-controlled car was timed over a period of 10 seconds. A graph of **distance** against **time** is shown below.



(a) Describe the motion of the car between:

(i) 2 seconds and 6 seconds;

.....

1 mark

(ii) 9 seconds and 10 seconds.

.....

1 mark

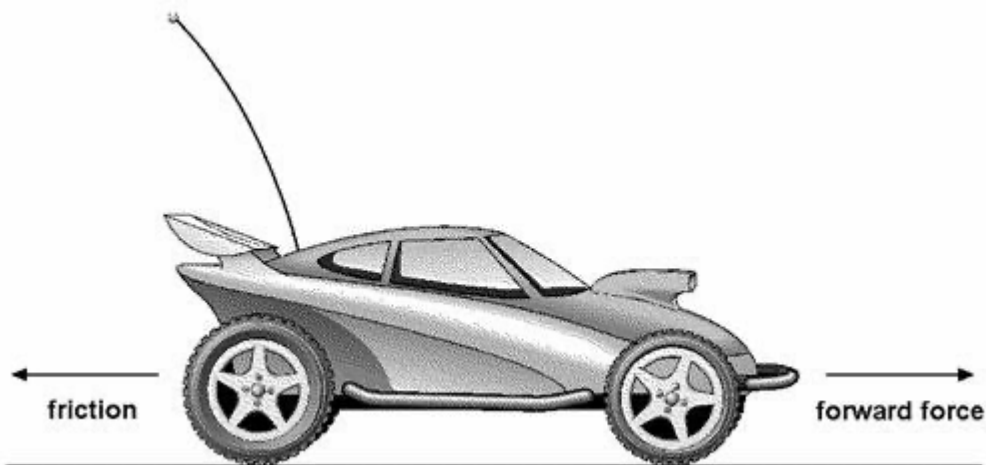
(b) Calculate the average speed of the car between 0 and 10 seconds. Give the unit.

.....

.....

2 marks

(c) The diagram below shows **two** of the forces acting on the car when it is moving.



(i) When the motor was switched off, the car slowed down and then stopped.

While the car was slowing down, which of the following was true? Tick the correct box.

Friction was zero and the forward force was greater than zero.

The forward force was zero and friction was greater than zero.

Friction was zero and the forward force was zero.

The forward force and friction were both greater than zero.

1 mark

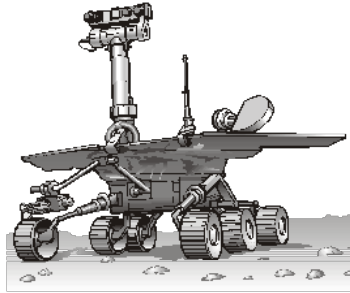
(ii) Use the graph to find the time when the car started to slow down.

The car started to slow down after s.

1 mark
Maximum 6 marks

Q3.

The drawing below shows a space buggy on the surface of Mars.



- (a) The distance between Earth and Mars is 192 000 000 km.

It took a spacecraft 200 days to take the buggy from Earth to Mars.

Calculate the speed at which the spacecraft travelled.

Give the unit.

.....
.....

2 marks

- (b) The weight of the buggy was 105 N on Earth and 40 N on Mars.

Why was the weight of the buggy less on Mars than on Earth?

.....
.....

1 mark

- (c) The buggy uses solar panels to generate electrical energy.

The solar panels generate less electrical energy on Mars than on Earth.

Give a reason why.

.....
.....

1 mark

- (d) The weight of the buggy was 40 N on Mars.
When the buggy landed on Mars it rested on an area of 0.025 m².

Calculate the pressure exerted by the buggy on the surface of Mars.

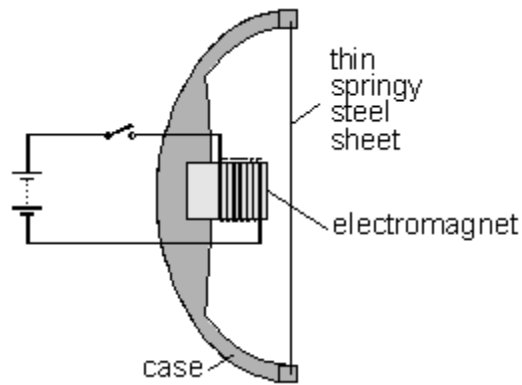
Give the unit.

.....
.....

2 marks

Q4.

A pupil fixes a small electromagnet close to a thin springy steel sheet. The device acts like a small speaker. She connects a battery and switch to the electromagnet as shown.



(a) (i) When the pupil closes the switch, what will happen to the steel sheet?

.....

1 mark

(ii) The pupil opens the switch again. What will happen to the steel sheet now?

.....

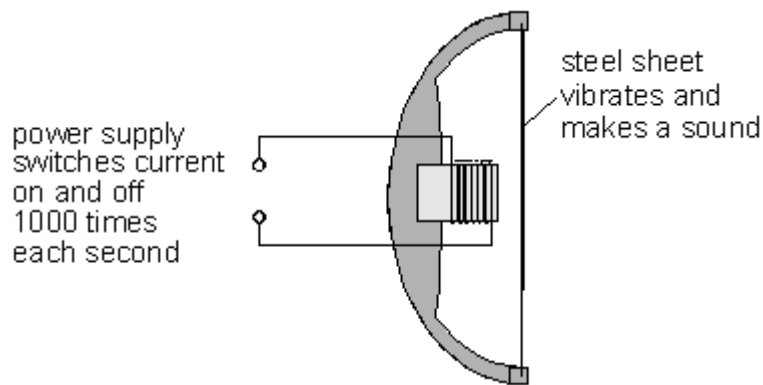
1 mark

(iii) If the pupil had connected the battery the other way round, what difference would this have made to your answer to part (i)?

.....

1 mark

- (b) The pupil removes the battery and switch. She connects the electromagnet to a power supply which switches the current on and off 1000 times each second. The steel sheet vibrates and makes a sound.



- (i) She then adjusts the power supply so that the current is switched on and off 3000 times each second.

What difference does this make to the pitch of the sound?

Give a reason for your answer.

.....

.....

.....

2 marks

- (ii) The pupil now adjusts the power supply so that the current is larger. Explain why this makes the sound louder.

.....

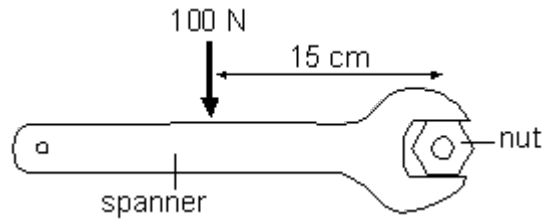
.....

1 mark

Maximum 6 marks

Q5.

Gareth is trying to release a nut with a spanner. The diagram shows the size of the force he is exerting and where this force acts on the handle.



- (a) The spanner applies a moment, or turning effect, to the nut. Calculate the size of this moment or turning effect. Give the units.

.....
.....

2 marks

- (b) Give **two** ways in which Gareth could increase the moment he applies using this spanner.

1
.....
2
.....

2 marks
Maximum 4 marks

Mark schemes

Q1.

- (a) (i) • only red light passes through the filter
*accept 'the other colours are filtered out
or absorbed'*
'red light passes through' is insufficient
*a mark for this answer may be awarded **in either a i
or a ii** provided there is no contradiction* 1 (L7)
- the ball reflects red light
accept 'white objects reflect all colours' 1 (L7)
- (ii) black
accept 'you cannot see it' 1 (L7)
- any **one** from
- the green ball does not reflect red light or the light that passes through the filter
- the ball absorbs red light
accept 'no green light reaches the ball' 1 (L7)
- (b) two red spots
accept 'red black red'
'two spots' is insufficient
'red spots' is insufficient
*do **not** accept 'only red light'* 1 (L7)

[5]

Q2.

- (a) (i) constant speed **or** steady speed
accept not accelerating 1 (L7)
- (ii) stationary **or** not moving **or** stopped
accept 'steady speed of zero'
*do **not** accept 'it has a steady speed'* 1 (L7)
- (b) 1.8
 $\frac{18}{10}$
accept 1 (L7)
- m/s

accept 'metres per second' or 'ms⁻¹'
do **not** accept 'mps'

1 (L7)

- (c) (i) The forward force was zero and friction was greater than zero. ✓
if more than one box is ticked, award no mark

1 (L7)

- (ii) 6

accept answers from 5.8 to 6.2

1 (L7)

[6]

Q3.

- (a) • 960.000

accept $\frac{192.000.000}{200}$

1 (L7)

- km/day or kilometres per day or km day⁻¹
accept '40.000 km/hr' for two marks
accept '11.1 km/s' for two marks
accept '11.111 m/s' for two marks
accept 'd' for 'day' and 'h' for 'hour'
do not accept 'km pday'

1

- (b) • gravity on Mars is less
accept 'gravity is greater on Earth'

1 (L6)

- (c) any **one** from

- Mars is further from the Sun
accept 'the Sun is closer to the earth'
- less light reaches Mars
accept 'the light rays have spread out more'
'Mars is further away' is insufficient
do not accept 'less heat reaches Mars'

1 (L7)

- (d) • 1600
accept '40/0.025'

1 (L7)

- N/m² or Pa or Nm⁻²
accept 'pascals'
do not accept lower case 'n'

1

[6]

Q4.

(a) (i) any **one** from

- attracted to the electromagnet
accept 'attracted' or 'sticks to the electromagnet'
- bends towards the electromagnet
accept 'moves left' or 'bends in' or 'bends'
do not accept 'vibrates' or 'makes a noise'
or 'becomes magnetised' without qualification

1 (L7)

(ii) any **one** From

- goes back to where it was
accept 'not attracted any more'
or returns to normal'
- springs back
- bends back
- it straightens
do not accept 'nothing' or 'it stops vibrating'

1 (L7)

(iii) any **one** from

- none **or** no difference
- it would still attract
do not accept 'bends the other way'

1 (L7)

(b) (i) higher pitch

accept 'higher' if both higher and louder
given award no mark

1 (L7)

because the frequency of the vibration increases

accept 'because the steel sheet vibrates
faster or moves faster'

do not accept 'it vibrates more'

1 (L7)

(ii) any **one** from

- larger amplitude vibrations
accept 'bigger vibrations' or 'larger amplitude'
or 'more energy'
do not accept 'it vibrates more'
- sheet would bend more **or** further

1 (L7)

[6]

Q5.

- (a) **one mark is for the correct value and the other mark is for the corresponding unit**

either

- 1500

accept '100 × 15'

1 (L7)

- N cm **or** newton cm

1 (L7)

or

- 15

accept '100 × 0.15'

- N m **or** newton metre

- (b) exert a larger force

answers may be in either order

*accept 'use a bigger force' **or** 'push harder'*

*do **not** accept 'exert a larger pressure'*

1 (L7)

exert the force further away from the nut

accept 'push down further from the nut'

***or** 'exert the force further along the spanner'*

*do **not** accept 'use of a longer spanner'*

1 (L7)

[4]