

GCSE Physics

Worksheet: Visible light

TIME 30 min	TOTAL 27 marks	CALCULATOR Allowed	DIFFICULTY Easy, Medium
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Topics: Visible light

NAME	CLASS	DATE
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- Use black ink or black ball-point pen. Pencil should only be used for drawing.
- Answer all questions in the spaces provided.
- In all calculations, show clearly how you work out your answer.
- The marks for questions are shown in brackets.

0 1

Opaque objects look different colours in white light.

0 1 . 1

Why does a red apple look red in white light?

Tick (✓) **one** box.

It absorbs red light and reflects all other colours.

☐

It reflects red light and absorbs all other colours.

☐

It emits red light.

☐

It transmits red light only.

☐

[1 mark]

0 1 . 2

Explain why a sheet of paper looks white in white light.

.....

.....

[1 mark]

0 1 . 3

Explain why a piece of black card looks black.

.....

.....

[1 mark]

0 1 . 4

What name is given to the reflection of light from a smooth surface in a single direction?

Tick (✓) **one** box.

Diffuse reflection

☐

Refraction

☐

Specular reflection

☐

Transmission

☐

[1 mark]

0 2

0 2 . 1

Why does fresh snow look white in sunlight?

Tick (✓) **one** box.

It reflects all colours of light equally.

☐

It absorbs all colours of light equally.

☐

It emits white light.

☐

It transmits all colours of light.

☐

[1 mark]

0 2 . 2

Explain why a piece of coal looks black.

[1 mark]

0 3

0 3 . 1

Which colour of visible light has the longest wavelength?

Tick (✓) **one** box.

Blue

☐

Green

☐

Red

☐

Violet

☐

[1 mark]

0	3	.	2
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Light of several different colours falls on an opaque object. The object reflects some wavelengths of the light.

State what happens to the wavelengths of light that the object does not reflect.

.....

.....

.....

[1 mark]

0	4
---	---

A red apple is viewed first in white light, where it appears red.

0	4	.	1
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Explain why the apple appears red in white light, and explain what colour the apple would appear if viewed in only blue light, and why.

[illegible]

[6 marks]

0 5

A magician's stage is lit with red light only. A prop box on the stage is painted with red stars on a blue background.

0 5 . 1

Describe and explain what the audience sees.

[3 marks]

0 6

A performer on a stage wears a white shirt with green stripes and a pair of blue trousers. The stage is lit with green light only.

0 6 . 1

Describe what the audience sees when they look at the shirt. Explain your answer.

[3 marks]

0 6 . 2

What colour do the trousers appear? Explain your answer.

.....

.....

.....

.....

[2 marks]

0 6 . 3

Each colour of light has its own narrow band of wavelength and frequency. The green light has a wavelength of 5.3×10^{-7} m. The speed of light is 3.0×10^8 m/s.

Calculate the frequency of the green light.

.....

.....

.....

.....

Frequency = Hz

[2 marks]

0 7

A white flag has a red cross on it. The flag is lit by white light. A student looks at the flag through a blue filter.

0 7 . 1

State the colour that the white parts of the flag appear to the student.

.....

.....

.....

.....

[1 mark]

0 7 . 2

Explain why the red cross appears black to the student.

[2 marks]

END OF QUESTIONS

Original practice questions written to match the specification. Not produced by, affiliated with or endorsed by AQA.

Mark scheme

GCSE Physics · Worksheet: Visible light · 27 marks

Question 1 (4 marks)

01.1 [1 mark]

Correct: It reflects red light and absorbs all other colours.

01.2 [1 mark]

Answer: It reflects all colours of light equally.

- it reflects all wavelengths / colours of light (equally) (1)
-

01.3 [1 mark]

Answer: It absorbs all colours of light.

- it absorbs all wavelengths / colours of light (and reflects none) (1)
-

01.4 [1 mark]

Correct: Specular reflection

Question 2 (2 marks)

02.1 [1 mark]

Correct: It reflects all colours of light equally.

02.2 [1 mark]

Answer: It absorbs almost all the light and reflects hardly any.

- it absorbs all (or nearly all) colours/wavelengths of light and reflects very little (1)
-
-

Question 3 (2 marks)

03.1 [1 mark]

Correct: Red

03.2 [1 mark]

Answer: They are absorbed.

- they are absorbed (by the object) (1)
-

Question 4 (6 marks)

04.1 [6 marks]

Answer: Level-of-response answer: white light contains all colours; the apple's skin reflects red light and absorbs the rest, so only red light reaches the eye and it looks red. In only blue light, there is no red light to reflect, and since the skin absorbs blue light too, little or no light is reflected, so the apple looks black.

Levels of response

- **Level 3 (5–6)** A detailed, coherent answer. Relevant points are accurate, linked in a logical sequence and use correct scientific terms.
- **Level 2 (3–4)** Several relevant points with some linking, but the answer has gaps, errors or lacks detail.
- **Level 1 (1–2)** Simple statements making one or two relevant points, with little or no linking.
- **No marks (0)** Nothing relevant or worthy of credit.

Indicative content

- white light contains a mixture of all the colours (wavelengths) of visible light
- the apple's skin reflects (mainly) red light and absorbs the other colours of light that fall on it
- because only red light is reflected (and reaches the eye) in white light, the apple appears red
- in only blue light, there is no red light present to be reflected
- since the apple's skin absorbs blue light (as it absorbs all colours other than red), it does not reflect much of the blue light reaching it either
- with little or no light reflected back to the eye, the apple would appear black (very dark), not blue

Notes: Level 1 (1–2 marks): states that the apple reflects red light. Level 2 (3–4 marks): correctly explains why the apple looks red in white light, or makes some progress on the blue-light case, but not both fully. Level 3 (5–6 marks): a complete, correctly reasoned explanation of both the white-light and blue-light-only cases, correctly concluding that the apple would appear black (not blue) in blue light.

Question 5 (3 marks)

05.1 [3 marks]

Answer: The stars look red (they reflect the only light present); the background looks black (it absorbs red and has no other light to reflect).

- the stars look red (1)
 - because they reflect red light, which is the only light shining on them (1)
 - the background looks black, because it absorbs red light and there is no other colour of light for it to reflect (1)
-

Question 6 (7 marks)

06.1 [3 marks]

Answer: The whole shirt looks green, so the stripes cannot be seen.

- the white parts of the shirt look green (white reflects all colours, including green) (1)
 - the stripes also look green (they reflect green light) (1)
 - so the stripes cannot be seen (1)
-

06.2 [2 marks]

Answer: Black, because they absorb green light and there is no blue light to reflect.

- black (1)
 - blue trousers absorb green light / only reflect blue light, and there is no blue light (1)
-

06.3 [2 marks]

Answer: 5.7×10^{14} Hz

- $f = 3.0 \times 10^8 \div 5.3 \times 10^{-7}$ (1)
 - 5.7×10^{14} (Hz) (1)
-

Question 7 (3 marks)

07.1 [1 mark]

Answer: Blue

- blue (1)
-

07.2 [2 marks]

Answer: The cross reflects only red light, and the blue filter absorbs red light, so no light from the cross reaches the eye and it looks black.

- the red cross reflects only red light (it absorbs the other colours) (1)
 - the blue filter absorbs red light (it only transmits blue), so no light from the cross reaches the student's eye (1)
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