Light Waves MS

Q1 (1 mark)
Electromagnetic wave

Q2 (1 mark)
Nothing / empty space

Q3 (1 mark)
3×10^8 m/s

Q4 (1 mark)
Light energy is converted to heat or other energy

Q5 (1 mark)
Reflection from a smooth surface

Q6 (1 mark)
Scattering from a rough surface

Q7 (1 mark)
Pinhole camera

Q8 (1 mark)
To focus light / bring rays together

Q9 (1 mark)
Retina

Q10 (1 mark)
All colours of visible light

Q11 (2 marks)
Any two:
Light is a wave (1)
Light travels in straight lines (1)
Light does not need a medium (1)
Light travels very fast (1)

Q12 (2 marks)
Light does not need particles (1)
So it can travel through empty space (1)

Q13 (2 marks)
Absorption takes in light energy (1)
Reflection bounces light off surface (1)

Q14 (3 marks)
Specular reflection is from smooth surfaces (1)

Diffuse scattering is from rough surfaces (1)
Specular gives clear image, diffuse does not (1)

Q15 (3 marks)
Light passes through small hole (1)
Rays cross to form inverted image (1)
Image appears on screen (1)

Q16 (3 marks)
Light is refracted by lens (1)
Rays are focused to a point (1)
Image forms on retina/screen (1)

Q17 (3 marks)
Light hits retina (1)
Signals sent via optic nerve (1)
Brain interprets image (1)

Q18 (2 marks)
Two from:

Black surfaces absorb more light (1)
White surfaces reflect more light (1)
More absorbed light means more energy transferred/heating

Q19 (3 marks)
Mirror is smooth so reflection is clear (1)
Wall is rough so light is scattered (1)
No clear image forms (1)

Q20 (3 marks)
Light changes speed entering water (1)
This causes refraction (1)
Light bends direction (1)

Q21 (4 marks)
White light contains many colours (1)
Prism separates colours by frequency (1)
Different colours refract differently (1)
Spectrum is formed (1)

Q22 (4 marks)
Light enters camera lens (1)
Lens focuses light (1)
Image forms on sensor (1)
Sensor converts light to electrical signal (1)

Light Waves MS

Q23 (4 marks)
Filter absorbs some colours (1)
Only certain wavelengths pass through (1)
Object appears filtered colour (1)
Other colours are removed (1)

Q24 (3 marks)
Plant absorbs most colours except green (1)
Green light is reflected (1)
Green light enters eye (1)

Q25
Law of reflection stated: angle of incidence equals angle of reflection (1)
Angle of reflection identified as 35 (1)
Correct unit = ° / degrees (1)

Q26
Light changes speed entering glass (1)
Light slows down in glass (1)
Ray bends towards the normal / smaller angle of refraction (1)

Q27

Normal drawn at 90° to surface (1)
Angle of incidence labelled between incident ray and normal (1)
Angle of refraction labelled between refracted ray and normal (1)
Refracted ray bends towards normal in glass / correctly drawn ray (1)

Q28 (6 marks)

Level 1 (1–2 marks)
Basic statements about light entering the eye
Simple mention of lens or retina
Limited explanation of the process

Level 2 (3–4 marks)
Light is focused by the lens
Retina is mentioned with a function
Some reference to electrical signals to the brain
Partial explanation of sequence

Level 3 (5–6 marks)
Light reflected from objects enters the eye
Convex lens focuses light onto retina

Retina converts light into electrical signals
Signals travel via optic nerve to brain
Clear, fully linked explanation of vision process

Mark points:
Light enters eye (1)
Light reflected from objects (1)
Lens focuses light (1)
Image forms on retina (1)
Retina detects light (1)
Electrical signals produced (1)
Signals travel to brain (1)
Brain interprets image (1)

Model Answer:
Light reflected from objects enters the eye and is focused by the convex lens onto the retina. The retina contains light-sensitive cells that convert the light into electrical signals. These signals travel along the optic nerve to the brain, which processes them to form the image that we see.

Q29 (6 marks)

Level 1 (1–2 marks)
Basic statements about light entering a camera
Simple mention of lens or image formation
Limited explanation of process

Level 2 (3–4 marks)
Light is focused by a lens
Sensor or film is mentioned
Some explanation of how an image is formed
Mostly correct sequence

Level 3 (5–6 marks)
Light enters camera through lens
Lens focuses light to form an image
Image forms on sensor or film
Sensor converts light into electrical signals / film records chemically
Clear, linked explanation of full process

Mark points:
Light enters camera (1)
Light is refracted by lens (1)
Lens focuses light (1)
Image forms on sensor/film (1)
Sensor converts light to electrical signals (1)

Light Waves MS

Film records image chemically (1)
Image is stored (1)

Model Answer:
Light enters the camera through the lens and is refracted so that it is focused onto a small area. This forms an image on the sensor or film. The sensor converts the light into electrical signals, or the film records the image chemically. The image is then stored and can be viewed or saved.