P5.3 Summary questions

1 reflected, refracted, absorbed, transmitted
2 a A and C
   b A and B
   c It increases/speeds up.
   d Draw a normal to the boundary of surface 1 and surface 2 at the point where ray A hits it.
      Use an angle measurer to measure the angle between ray A and the normal to find the angle of incidence.
      Use an angle measurer to measure the angle between ray B and the normal to find the angle of refraction.
3 When light is specularly reflected from a surface, the angles of incidence equal the angle of reflection wherever the beam hits the surface.
   When light is diffusely scattered from a surface, the angles of incidence are not equal the angle of reflection wherever the beam hits the surface.
4 a A – A green leaf transmits green light and reflects all the rest of the colours of the visible spectrum. False
   B – Red light is absorbed by a blue filter. True
   C – A blue shirt looks purple in red light. False
   D – The sky looks blue because light from the sky is reflected by the retina of your eye. False
   b A green leaf reflects green light and absorbs all the rest of the colours of the visible spectrum.
      A blue shirt looks black in red light.
      The sky looks blue because light from the sky is absorbed by the retina of your eye.
5 a The wall is rough so the light from the torch is scattered (diffuse scattering) from the surface. So wherever you are in the room light from the torch will reflect from each part of the rough surface into your eye.
   b There is specular reflection from the mirror so all the light that hits it is reflected at equal angles. This means that an image of the car is produced by the mirror, but only when the angle between the light from the car and the normal to the mirror approximately equals the light from the mirror to the eyes of the driver.
   c i The white light is split into the colours of the visible spectrum because there is refraction at the surface of the drop. Different frequencies of white light are refracted by different amounts: red is refracted most, violet is refracted least.
      ii The light also reflects from the back of the raindrop into your eyes, so you cannot see it when the Sun is in front of you.
6 a A green object in white light absorbs all the frequencies of light except that of the colour that it appears, i.e. green. A red object absorbs all the frequencies except that of red.
   b i A – 2 – X, B – 1 – Y
   ii convex
   c i Draw a ray from the top of the object to the lens parallel to the principal axis, and from the lens through the focal point.
Draw a ray through the centre of the lens. Where these two rays cross or appear to come from is the top of the image.
The bottom of the image is below the top of the image on the principal axis.

iii The image is virtual if the top of the image is where the rays appear to come from.