

**Answers for extension worksheet – Option E**

**1 a** a reflex action (1)

**b** (6)

	Stimulation by parasympathetic nerves	Stimulation by sympathetic nerves
<b>Radial muscles of the iris</b>	relax	contract
<b>Circular muscles of the iris</b>	contract	relax
<b>Pupil diameter</b>	decreases (constricts)	increases (dilates)

**c** (4)

Effect	Stimulation by sympathetic nerves
increase in output of the heart	yes
increase in sweat production	yes
increase in blood flow to the gut	no
vasoconstriction of arterioles in the skin	yes

**d** When a person is afraid or in danger – the effect of the sympathetic nerves is to prepare for ‘fight or flight’ so the heart rate increases and blood is diverted to vital organs. (2)

**2 a i** balance and movement

**ii** automatic functions such as swallowing, breathing and heart rate (2)

**b** The cerebellum is responsible for balance and movement. Birds and fish carry out complex, coordinated movements as they fly and swim at speed. Reptiles have less complex movements and tend to move more slowly so their cerebellum is relatively smaller. (3)

**c** the sensory region of the cerebral cortex (1)

**d** impulses to prevent the person walking on the damaged ankle;  
increase in breathing rate or heart rate;  
release of endorphins to subdue the pain (3)

**e** Endorphins are the body’s natural painkillers. They are neurotransmitters that block the transmission of impulses at synapses involved in the perception of pain. (2)

3 a

(6 – 1 mark for each correct row)

Behaviour	Innate	Learned
emerging dragonfly nymphs climbing upwards	✓	
male birds singing to attract mates	✓	✓
flatworms moving towards a source of food	✓	
a herd of cows avoiding touching an electric fence		✓
alarm calls of vervet monkeys	✓	✓
woodlice avoiding dry conditions	✓	

- b** Behaviour can be used immediately; short-lived organisms that don't have time to learn must avoid danger from an early age. (2)
- c** by watching and imitating the behaviour of others; by being told (humans) or taught by adult animals (1)
- d** Reflex actions are very fast and can be vital if an animal is to survive a life-threatening situation. (1)
- e** in fast-moving, dangerous situations requiring a very rapid response, such as an attack by a competitor or predator (1)