The skeleton, muscles and movement - answers

1 *Humerus* - upper arm bone, *femur* - thigh bone, *sternum* - breast bone, *tibia* - shin bone, *clavicle* - collar bone, *scapula* - shoulder blade, *pelvis* - hip girdle.

2 (a) The skull protects the brain, (b) the rib cage protects the heart, lungs, liver and spleen, (c) the vertebrae protect the spinal cord.

3 The ribs help to change the volume of the thorax during breathing movements.

4 (a) The bones of the skull, the junction of pelvic girdle and vertebral column are fixed joints.
(b) Shoulder and hip are examples of ball and socket joints.
(c) Knee and elbow are examples of hinge joints.

5 Cartilage may be found covering the surface of bones where they meet in a movable joint. Cartilage reduces friction between the bones and, to some extent, acts as a shock absorber.

6 Calcium phosphate is an inorganic component of bone.

7 (a) Smooth muscle is found in the wall of the alimentary canal, in arterioles and in the uterus.
(b) Contraction of smooth (circular) muscle of the alimentary canal produces peristalsis. In the arterioles it causes vaso-constriction. In the uterus it helps to expel the fetus.

8 Skeletal muscle produces voluntary movements.

9 Because muscles can only contract and relax, each skeletal muscle needs an antagonistic partner to extend it after contraction.

10 (a) The pelvic girdle provides the non-moving attachment for the leg muscles at the hip.
(b) The scapula provides the non-moving attachment for the arm muscles at the shoulder.
(c) The tibia provides the non-moving attachment for the muscles which move the foot at the ankle.

11 (a) When muscle P contracts it will raise bone Y (flex the joint), (ii) extend muscle Q.
(b) (i) Example A will give greater movement at F because the muscle attachment is closer to the joint. (ii) Example B will produce the greater force because the muscle attachment is further from the joint.

12 Respiration is the process which provides the energy for muscle contraction.

13 (a) Exercise increases the heart rate and the volume of blood expelled at each contraction (stroke volume); the rate and depth of breathing increase; the liver converts more glycogen to glucose.
(b) These changes supply the extra oxygen and glucose that the active muscles need for their increased respiration. The extra carbon dioxide from respiration is removed as fast as it accumulates.

14 The long-term benefits of exercise are: increase in size of the muscles used, reduction of heart rate and increase in stroke volume, more enzymes made in the muscles, stronger ligaments and tendons, more flexibility at the joints, possibly loss of excess body fat, possibly reduced chance of premature heart attack (any four).

15 (d) Playing squash three times a week is probably the best form of exercise to contribute to good health.

(a) The benefits of exercise at school do not persist unless the exercise is continued after leaving school.

(b) If the distance is long enough and the pace fast enough to raise the heart beat and breathing rate for 30 minutes or more, this form of daily exercise may be as good as (d).