**1.** D

[1]

**2.** A

[1]

**3.** A

[1]

**4.** C

[1]

**5.** D

[1]

**6.** C

[1]

**7.** (a) *Award* ***[1]*** *for every two correct.*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ***Enzyme*** | ***Source*** | ***Optimum pH*** | ***Substrate*** | ***Products*** |
| Amylase | Salivarygland | 7 | starch/amylose/glycogen; | maltose/shortpolysaccharides/disaccharides/dextrin; |
| Lipase | Pancreas; | *Allow any pH in range 7–9* | Lipids | Fatty acids andglycerol |

 2 max

(b) rate of digestion at body temperature would be too slow / enzymes
increase the rate of digestion;
enzymes break large molecules down into small/soluble molecules;
for absorption/diffusion into blood; 2 max

(c) labelled sac-shaped gall bladder with a duct;
tubule/(bile) duct shown connecting gall bladder directly to small
intestine/duodenum / tubule/(bile) duct merging with the pancreatic
duct before entering small intestine; *Alternative answers are
accepted because of variations in human anatomy.*pancreas drawn with pancreatic duct connected to small intestine
and pancreas labelled; 3*A duct is preferred to a line, but since this is a diagram, both are acceptable.*

[7]

**8.** (a) sodium/Na 1

(b) unclear correlation between V and T;
depends on the nature of the substrate and its concentration;
sometimes high V with low T (*e.g.* experiment 1 for sucrose) /
sometimes high V with high T (*e.g.* experiment 2 for NaCl); 2 max

(c) higher salt/NaCl concentrations increase T and V;
increase in puddling with increase in salt/NaCl;
no clear relationship between the number of visits and the
concentration of salt/NaCl; 2 max

(d) (i) sodium/Na 1

(ii) retention of sodium/Na from laboratory solutions and natural
puddles;
definite loss of potassium from laboratory solutions but loss/gain
uncertain from natural puddles;
slight loss of magnesium from laboratory solutions and uncertain
gain/loss from natural puddles;
calcium uncertain in both cases / variation in data for calcium;
more conclusive results in laboratory solutions / conditions
more reliable in laboratory solutions / greater variation in
natural puddles;
*Accept reference to error bars/ranges in data in place of
uncertainty.* 3 max

(e) males have longer/wider digestive tracts for greater absorption of fluid;
ileum of males has greater surface area;
which allows faster/more absorption in males than in females; 2 max

(f) puddling provides needed sodium/Na because their (larval) food does not
supply enough sodium/Na;
sodium/Na needed for neural activity;
greater flight/neural activity in males than in females;
*Accept other reasonable suggestions.* 1 max

[12]

**9.** (a) *Award* ***[1]*** *for each structure clearly drawn and correctly labelled.
Schematic diagrams are acceptable.*right and left ventricles—not connected shown larger than atria;
right and left atrium—not connected, thinner walls than ventricles;
right ventricle has thinner walls than left ventricle / *vice versa*;
atrio-ventricular valves / tricuspid and bicuspid valves — shown between
atria and ventricles;
aorta and pulmonary artery—shown leaving the appropriate ventricle
with semilunar valves shown;
pulmonary vein and vena cava — shown entering appropriate atrium;
*Vessels must join unambiguously to correct chamber.* 4 max

(b) arteries carry blood under high pressure;
they have a thicker elastic wall/narrower lumen;
they have muscles that control pressure / help move the blood;
veins carry blood under lower pressure;
they have thin walls with less elastic tissue/muscle/wider lumen;
have valves to prevent back flow;
capillaries have walls which are one cell thick;
to allow easy diffusion across their wall / ultrafiltration;
(some) capillaries have pores/clefts;
*Award* ***[5 max]*** *if capillaries are not referred to.* 6 max

(c) external intercostal muscles contract;
internal intercostal muscles relax;
pulling the rib cage upwards;
diaphragm contracts and flattens;
increase in volume of thoracic cavity;
this reduces pressure;
so air enters the lungs;
internal intercostal muscles contract / external intercostal muscles relax;
diaphragm relaxes;
abdominal muscles/organs/liver push diaphragm upwards;
decrease in volume of thoracic cavity;
increases the pressure;
so air leaves the lungs;
*Award any of the above points if clearly drawn in a diagram.* 8 max

 *(Plus up to* ***[2]*** *for quality)*

[20]