**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 | Salivary gland | 7 | starch/amylose/ glycogen; | maltose/short polysaccharides /disaccharides /dextrin; |
| Lipase | Pancreas; | *Allow any pH in range 7–9* | Lipids | Fatty acids and glycerol |

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]