**1.** (a) $C_6H_{12}O_6$

**1**

(b) atmospheric air contains less carbon dioxide than exhaled air

*allow converse*

**1**

(flask B goes more cloudy because) carbon dioxide is produced in (aerobic) respiration (by woodlice)

*do **not** accept anaerobic respiration*

**1**

(c) for comparison / to compare

*allow answers in the context of the investigation e.g.*

**or**
to check that no other factor / variable is influencing the results

*to prove that the results obtained were due to the woodlice respiring and nothing else*

***or***

*to prove that the woodlice produced the carbon dioxide and nothing else*

**1**

(d) (flask **A**) would remain colourless

*ignore references to clear*

*allow not cloudy*

**1**

(flask **B**) would remain colourless

**1**

(e) lactic acid

**1**

(f) alcohol / ethanol

**1**

**[8]**

**2.** (a) no oxygen (is used)

**1**

(b) muscles become fatigued / stop contracting

**1**

because not enough energy is transferred

**1**

(c) carbon dioxide

**1**

(d) count the bubbles
**or**
measure volume of gas

**1**

in a given time

**1**

(e) brewing / bread making
*allow other suitable use of fermentation in food industry*

**1**

**[7]**

**3.** (a) LHS – glucose

**1**

RHS – water
*allow $H_2O$ / H2O*

**1**

(b) so the earthworms' body temperature would change to 20°C

**1**

(c) (i) 56 or 55 or 54
*if incorrect answer given accept 60 - 5 for **1** mark*
*or 60 – 6 for **1** mark*
*or 60 – 4 for **1** mark*

**2**

(ii) one-tenth of answer to (c)(i) eg 5.5

**1**

(at 10°C / lower temperature):

lower rate of respiration
*allow chemical reactions slower or enzymes less active*
*ignore breathing*
*do not allow anaerobic*

**1**

worms less active / worms release less energy / worms use less energy

**1**

(d) (i) anomalous result / not in line with other data / does not fit the pattern

**1**

(ii) more representative / more reliable / can check 'repeatability' / see if get similar values / identify anomalies

*ignore valid / more fair*

*ignore reproducible*

*ignore 'to remove' anomalies*

*do not accept more accurate or more precise*

1

**[10]**

**4.** (a) (i) mitochondrion / mitochondria

*must be phonetically correct*

1

(ii) carbon dioxide / $CO_2$

1

water / $H_2O$

1

*in either order*

*accept CO2 but **not** $CO^2$*

*accept H2O **or** HOH but not $H^2O$*

(iii) diffusion

1

high to low concentration

*allow down a concentration gradient*

1

through (cell) membrane **or** through cytoplasm

*do **not** accept cell wall*

1

(b) ribosomes make proteins / enzymes

1

using amino acids

1

part A / mitochondria provide the energy for the process

*allow ATP*

*do **not** accept produce or make energy*

1

**[9]**

**5.** (a) (i) 19 800

*for correct answer ignore working or lack of working*

*165 × 120 but no answer / wrong answer = **1** mark (ignore extras)*

**2**

(ii) any **two** from:

- for respiration
  *ignore oxygen debt*
- energy released
  *allow energy produced*
- prevents anaerobic respiration
- prevents build-up of lactic acid

**2**

(b) any **two** from:

- increased breathing rate(*)
- increased depth of breathing **or** deep breathing(*)
  *(*)more breathing is max **1** mark*
  *ignore increase in heart rate*
  *allow heavier breathing*
  *do **not** allow harder breathing*
- dilation of arteries / vasodilation
  *allow blood vessels dilate*
  *do **not** allow veins / capillaries dilate*
- blood diverted from elsewhere
  *ignore name of organ*

**2**

**[6]**