(Waste management (water, land, air pollution))

Q1.(2020)

fatty acid(s)

Q2.a)(2020)

any **one** from:
- universal indicator (paper / solution)
- pH meter

Q2.b)(2020)

any **two** from:
- volume of milk
- exposure to air / oxygen
- sterilise test tubes
- treatment of milk before investigation
- freshness / age of milk (at start)
- time of day pH was measured

Q2.c)(2020)

almond (milk)

Q2.d)(2020)

as temperature increases up to 15 °C the time taken (to reach pH 5) decreases

above 15 °C the time taken (to reach pH 5) stays the same

Q2.e)(2020)

any **one** from:
- bacteria / microbes / microorganisms / fungi dividing faster (when warmer)

- reactions (in the bacteria) are happening faster (to decay milk)

- (because there is) more (kinetic) energy

- enzyme activity is higher (at 10 °C than at 5 °C)

Q2.f)(2020)

any **two** from:
- different concentration / type of fat / lipid
- different concentration / type of proteins / carbohydrate / sugar
- different (amount / type of) bacteria present
- may have been pasteurised by a different process

- different starting pH

Q2.g)(2020)

determine the types of bacteria present in the milk

Q3.a)(2021)

(put beaker in a) water bath

Q3.b)(2021)

volume of the milk
or
type of milk

Q3.c)(2021)

correct scale and axis labelled

all points plotted correctly

suitable curved line of best fit

Q3.d)(2021)

similar shaped line drawn to left of 20 °C line on **Figure 4**

same start pH

Q4.(2022)

carbon dioxide **or** acidic gas(es)

Q5.(2022)

any **three** from:

- fertiliser
- sewage
- toxic chemicals
- herbicide
- fungicide

Q6.(2022)

air pollution:
(carbon dioxide **or** methane **or** greenhouse gases)
- global warming / climate change / traps heat
  - floods / fire / drought **or** ice caps melt **or** rise in sea level **or** extreme weather
  - loss of habitat / food
  - migration

(acidic gas / named – eg SO_2 / NO_x)
- damage to leaves so less photosynthesis
- damage to roots or alters ions in soil (/ e.g. phosphates / iron)
  - (so) less protein manufacture
- damage to lungs
  - breathing difficulties / bronchitis / asthma

(carbon monoxide)
- combines with haemoglobin
  - less oxygen carried (by haemoglobin / blood)

(particulates / 'soot')
- cover leaves **or** block light
  - less photosynthesis so less glucose made
- damage to lungs
  - breathing difficulties / bronchitis / asthma

water pollution:
(sewage)
- bacteria multiply
  - use oxygen in respiration
  - water animals cannot respire
  - pathogens in water

(fertiliser)
- algae multiply
  - (algae) block light so plants cannot photosynthesise
  - lack of oxygen for respiration – fish die

(toxic substances)
- damages / harms cells **o**r bioaccumulation
  - interferes with metabolism – e.g. respiration / protein synthesis

(plastics)
- entrap animals or causing internal damage if swallowed

(particles)
- block light
  - plants / algae cannot photosynthesise so less glucose made

(oil)
- damages birds' feathers
  - cannot fly so cannot find food **or** escape predators

(acid rain / acids)
- lowers pH of water
  - damages fish gills
  - bleaches coral

Q7.a)(2023)

any **one** from:

- use more temperatures
- measure pH at smaller time intervals
- use a data logger (for continuous monitoring)
- measure pH at same time of day
- same type of milk

- repeat (at each temperature) and calculate a mean **or** repeat (at each temperature) and eliminate anomalies
- cover / uncover all beakers

Q7.b)(2023)

points for days 1, 2 and 3 correctly plotted

correct curved line of best fit

Q7.c)(2023)

tangent drawn to the 15 °C curve at 2 days

$$\frac{6.5 - 4.5}{4}$$

0.5

$$\frac{0.5}{0.3} = 1.67$$

Q7.d)(2023)

enzymes more active
or more bacteria produced

lipids broken down more quickly

fatty acids produced more quickly (which changes pH)