

Unit 2 Key Area 5 Metabolism & adverse conditions

1. During unexpected periods of drought the South American lungfish, *Lepidosiren paradoxa*, survives by burying into mud.

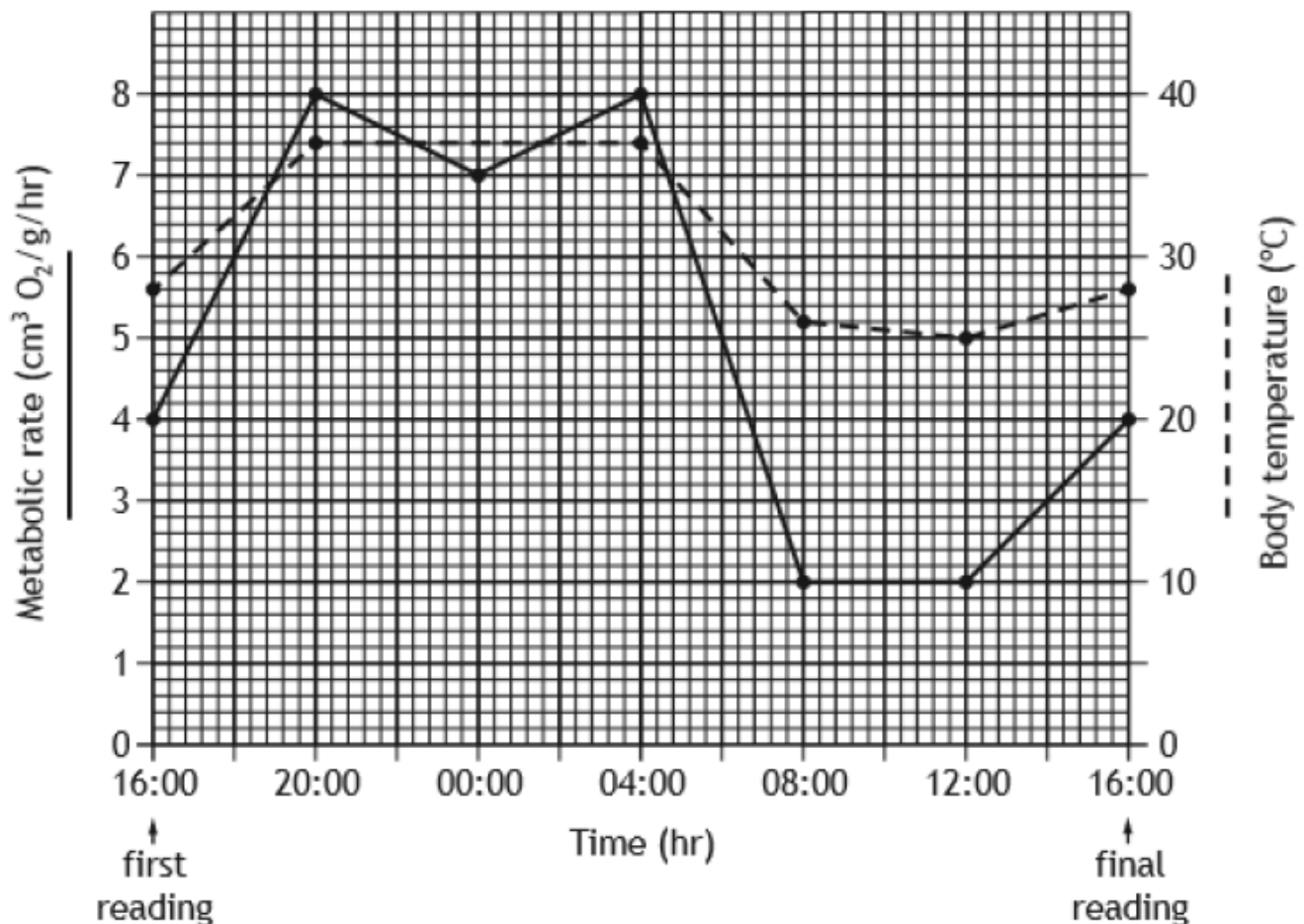
This type of behaviour is known as

- A predictive dormancy
- B daily torpor
- C aestivation
- D hibernation

1

2. The northern blossom bat *Macroglossus minimus* is an Asian species which has a high metabolic rate and a daily rhythm of torpor.

The metabolic rates and body temperatures of a group of these bats were recorded every four hours over a 24 hour cycle and the results are shown on the graph below.



(a) Calculate the oxygen consumption of a 16 g bat at 00:00 hours.

Space for calculation

_____ cm³ O₂ per hr **1**

(b) Cross (X) one box to identify the period when the bats were in full torpor and justify your answer.

16:00-20:00 20:00-00:00 04:00-08:00 08:00-12:00

--	--	--	--

Justification

_____ **2**

(c) Give one benefit to bats of their daily torpor.

_____ **1**

(d) Blossom bats are nocturnal.

Give **one other** behavioural adaptation of animals with high metabolic rates to allow survival in adverse conditions.

_____ **1**

3. An investigation was set up to monitor growth of bacteria in compost. The compost was added to a fermenter and the temperature of the compost was recorded over a 20 day period. Samples of the compost were cultured and the numbers of three bacterial species present were recorded.

The compost temperatures and the populations of the three species of bacteria are shown in the table below.

Time (days)	Compost Temperature (°C)	Population (millions per gram of compost)		
		Species A	Species B	Species C
0	21	396.0	0.4	123.0
2	40	4.2	10.2	14.6
4	72	0.1	195.0	0.1
6	53	0	8.5	0
20	32	0	0	0

- (a) Calculate how many times greater the population of Species A was compared to Species B at the start of the investigation.

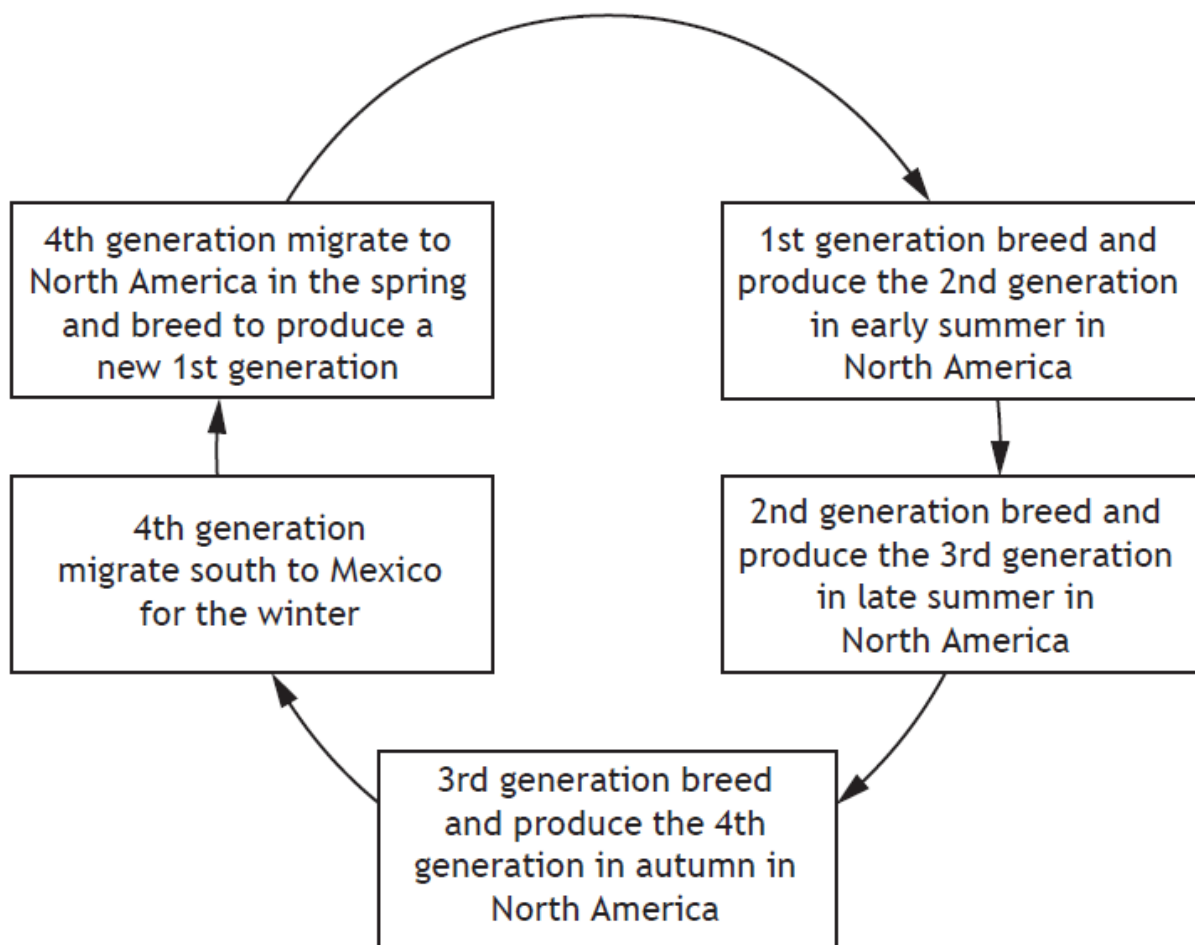
Space for calculation

_____ **1**

- (b) Describe the relationship between temperature of the compost and population of Species C over the first four days.

1

4. The diagram shows information on the breeding and migration of Monarch butterflies (*Danaus plexippus*). Each generation dies after laying eggs.



(a) State one advantage and one disadvantage to the Monarch butterfly of migration to Mexico.

2

Advantage _____

Disadvantage _____

(b) The migratory behaviour of the Monarch butterfly from North America to Mexico is innate.

Use the information given to justify this statement.

1

(c) Some species of hummingbird also migrate between North America and Mexico. They have high metabolic rates which they reduce while resting each night during the migration period.

Name this reduction in metabolic rate.

1

5.

Write notes on how animals survive and avoid adverse conditions.

7