

INTD255, Safe Return Doubtful: Midterm 1

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1 Early Antarctic and Oceanographic Exploration

1. Who was Captain James Cook? List several notable achievements of his three main expeditions.

James Cook was a British explorer. His notable achievements are the voyage to observe the transit of Venus, became the first European to sail past the Arctic Circle, and reaching 300 miles beyond the Arctic Circle on his next voyage.

2. What was the significance of the *Venus Transit* on one of the Cook expeditions? What other, more secret, mission did Capt. Cook have in the Southern Ocean?

The significance of the Venus Transit was that astronomers wanted to observe its transit across the Sun which would improve navigation. The other secret mission Cook had was to find the supposed secret southern continent.

3. **Kepler's Laws:** If the units of orbital radius r are AU, and the units of orbital period T are years, then $T^2 = r^3$. (a) If the orbital radius of Uranus is 19.22 AU, what is its orbital period in years? (b) If the orbital period of Mars is 1.88 years, what is its orbital radius? (c) What parameter in orbital mechanics was fixed by the observations of the Venus Transit in the late 18th Century by scientists who accompanied the Cook expedition?

A. $(19.22)^3 = 84.01y$

B. $(1.88)^2 = 1.52$

C. The observations helped refine the astronomical unit (AU), a key parameter in celestial mechanics.

4. List some of the achievements in early polar exploration attained on the following expeditions:

- *The Belgica* - First expedition to endure an Antarctic winter.
- *The Fram*, with Nansen - Attempted to reach the North Pole via drifting ice.
- *The Gjoa* - First successful navigation of the Northwest Passage.
- *The Discovery*, with Scott - Conducted scientific research in Antarctica.

6. Who are the Chinook? Where did Capt. Cook approach their territory?

The Chinook lived in the Pacific Northwest. Cook approached their territory during his third voyage while exploring the Oregon coast.

7. Discuss the risks and rewards of cultural exchange, in light of the writings of Barry Lopez in *Horizon*. As examples, consider the stories of Ranald MacDonald, Captain James Cook, Captain Amundsen and the Netsilik.

Cultural exchanges could lead to valuable knowledge sharing but also to conflict and exploitation

2 Survival Skills: Work, Energy, Food, and Physics

1. How many kcal of energy is stored in 2 kg of pemmi can? (Treat this as a fatty food, not a protein).

18000kcal

1

5. Who were the *Dorset* and the *Thule*? How did they survive in their environment?

The Dorset and Thule were Arctic Indigenous groups. The Dorset relied on seal hunting and rudimentary tools, while the Thule used advanced sleds and harpoons.

2. How many kg of wheat biscuits are required for 500 kcal of energy? (Treat this as mostly carbohydrates).

$$500/4 = 125\text{g}$$

3. How many Joules of energy are required to pull 1000 kg across 5 km of snowy tundra, if the relevant coefficient of friction is 0.1?

$$.1 * (1000\text{kg} * 9.8\text{m/s}^2) = 980\text{N} \quad 980\text{N} * 5000\text{M} =$$

4900000J

4. Take your result from the previous exercise, and divide the energy among 10 sled dogs. How much energy is required of each dog? Now feed each dog that much pemmican. How many kg of food, per dog, is required?

Each dog needs 490000J

$490000/4184=117.1\text{kcal per dog}$

$117.1/900 = .13$

$.13*100= 13\text{g}$

5. What food related health risk is associated with spending long durations at sea and in polar regions?

Scurvy, due to vitamin C deficiency.

3. What was the primary role of the Royal Geographic Society in British Antarctic exploration?

Funded and planned British expeditions, emphasizing scientific research

3 Navigation: Distance, Time, Speed, Longitude and Latitude

1. How many nautical miles correspond to travelling 2.5 degrees directly South?

$2.5*60= 150\text{nm}$

2. If we travel due North by 400 km, what is our change in latitude?

$400/111= 3.6 \text{ degrees}$

4 The British, The Norwegians, and Cultural Exchanges

1. Having read the first part of the story of the race for the South Pole, describe the differences in style between the Norwegian/Scandinavian expeditions and the British ones. **Bonus:** Connect your ideas to indigenous cultural exchange, or our reading in *Deep Survival*.

Norwegians relied on skis and dog sleds while the British used man pulling and horses when possible.

2. List five technologies for polar survival that the Norwegians learned from the *Netsilik*.

Dog sleds, fur clothing, igloos, seal hunting, and diet

3. If we are travelling due West at a latitude of 60 degrees North, what distance corresponds to a change of 1.5 degrees longitude?

$1.5 * 60\text{km} = 83.7\text{km}$

4. If a ship sails East at 10 knots, how many nautical miles are travelled in 48 hours?

$10*48=480 \text{ nautical M}$

6. When American ambassadors first arrived in Japan, after a period of intense isolationism in Japan, they found the Imperial court already knew how to speak English? How did this happen? Who helped them to learn English, and of the desire of Western nations to trade?

Learned from shipwrecked sailors like Randal MacDonald and Dutch traders.

7. Consider the following quote "Whether the change facing a people comes on swiftly ... or slowly ... the responsibility of the wisdom keeper is to recognize the early signs of significant change, to look into the past, and locate, again, a through line to the future." Apply this idea to a story we have encountered in the course, or a problem facing our community today.

Climate change in the arctic has reduced ice levels. This has disrupted the wildlife and indigenous people. Now animals like polar bears are migrating and adapting to warmer climates. This is the opposite of what polar explorers had to do when they adapted to the polar regions using the knowledge from indigenous people.

2

4. (a) How did the British travel and move gear in the polar regions, before motorized craft were developed?
(b) How did this differ from the Norwegians?

British used manual labor and horses while the Norwegians used dog sleds

5. In your view, what are the major risks to ships and explorers when exploring the polar regions in this period?

The major risk to explorers are scurvy, hypothermia, and getting lost. The major risk to ships are ice, storms, and also getting lost

5 Exploration Achievements

1. Discuss the cultural significance of Nansen's first crossing of Greenland to the nation of Norway.

It was a symbol of Norway's patriotism

2. Was Roald Amundsen the first leader to cross the

North-West Passage? On whose progress did he build?

He build on Franklin's work

Reflections 1- It demonstrates the inter connection of Arctic cultures

3. What were the highlights of Robert Falcon Scott's "furthest South" on the *Discovery* expedition?

He reached 82 degrees south and set up supply depots

4. Scientifically, why was important for explorers in the early 20th century to locate the magnetic North and South poles?

For better understanding of Earth's geomagnetic field

6 Survival and Psychology

1. Using the terminology found in *Deep Survival*, what is the difference between a *primary emotion*, and a *secondary emotion*?

Primary is more instinctual while secondary is a learned emotion.

2. Using the terminology of emotional bookmarks, how are secondary emotions formed, and how do they protect you?

3

They are formed from past experiences and they influence your future response to protect you.

2. While reflecting on the Pacific Ocean in Cape Foul weather, Lopez notices that you can never see the entire Pacific, because the Southern Ocean covers more than one hemisphere of area of our planet. What an area of life or academic topic that you wish you understood, but might not ever fully understand?

I wish I understood the financial markets. There are lots of variables influencing global markets and then global markets affect domestic ones and it's hard to understand all the variables.

7 Reflections

1. While on Skraeling Island, the writer Barry Lopez interacts with a research team responsible for finding artifacts from Dorset, Thule, and Norse cultures in Northern Canada. What is the significance of these diverse finds, in your view?