Waves

1.

At which location would you be most concerned about the danger of a tsunami?

Student Response	Value	Correct Answer	Feedback
A. the Florida coast			
B. Cape of Good Hope			
C. White Rock, B.C.			
D. Hilo Bay, Hawaii	100%	✓	
E. Bowen Island			

Score: 1/1

2.

A wave with a period of 10 seconds per cycle has a frequency of _____ cycles per second.

Student Response	Value	Correct Answer	Feedback
A. 0.01			
B. 0.06			
C. 0.1	100%	✓	
D. 1			
E. 6			

Score: 1/1

3.

During a storm surge, most deaths occur _____.

	Student Response	Value	Correct Answer	Feedback
A.	from injuries from the high winds			
B.	from lightning			
C.	from rapid spread of diseases			
D.	by drowning	100%	✓	
E.	due to starvation			

Score: 1/1

4.

Historical tsunami have been generated by these events EXCEPT _____.

	Student Response	Value	Correct Answer	Feedback
A.	the Frank Slide, a massive landslide near the Alberta/BC	100%	✓	

border.

B. a subduction zone earthquake in Cascadia in 1700

C. one of the largest earthquakes ever recorded (M9.5), off the coast of Chile

D. an earthquake offshore of Newfoundland in 1921

E. the largest earthquake ever recorded in North America, the "Good Friday Earthquake"

Score: 1/1

5.

Maximum wave heights are highest in the Antarctic Ocean because _____.

Student Response	Value	Correct Answer	Feedback
A. wind duration is typically days to weeks			
B. waves travel			

	faster in colder waters			
C.	winds are strongest in the Antarctic Ocean			
D.	all waves are deep water waves			
E.	the fetch is very long	100%	☑	

Score: 1/1

6.

The one place in British Columbia to have experienced a tsunami in the last century is_____.

	Student Response	Value	Correct Answer	Feedback
A.	Victoria			
B.	Tofino			
C.	Port Alberni	100%	☑	
D.	Nanaimo			
E.	Lituya Bay			

Score: 1/1

7.

The International Tsunami Warning System located in Honolulu, Hawaii _____.

Student Response	Value	Correct Answer	Feedback
A. warns ships in the middle of the Pacific Ocean of impending tsunami			
B. uses data from seismic stations in BC to predict the height of a tsunami as it arrives in Tofino			
C. uses data from seismic and tide stations to predict the arrival of a tsunami in Indonesia	100%	✓	
D. publishes maps of areas in Japan that are at risk in the event of a tsunami			
E. manages the evacuation of people			

living along the coast of Vancouver Island after a tsunami alert

Score: 1/1

8.

The next time a big tsunami strikes the coast of Vancouver Island, what is it likely to leave behind that will record the event for future geologists?

Student Response	Value	Correct Answer	Feedback
A. pieces of shocked quartz and breccia			
B. the remains of deep sea creatures carried far inland			
C. a thin layer of sand	100%	☑	
D. a thin layer of clay enriched in iridium			
E. a thick layer of			

salt

Score: 1/1

9.

The predicted 30 cm sea level rise in BC over the next 50 years will NOT cause _____

Student Response	Value	Correct Answer	Feedback
A. drowning of tidal marshes and loss of habitat for waterfowl			
B. the shoreline to move inland by about 300 meters in Richmond			
C. bigger surf at Long Beach in Tofino	100%	☑	
D. flooding of coastal areas in Delta and Langley			
E. increased erosion at Point Grey			

Score: 1/1

10.

All these factors determine the size of wind-generated waves EXCEPT _____.

Student Response	Value	Correct Answer	Feedback
A. wind duration			
B. wind speed			
C. water depth	100%	☑	
D. fetch			

Score: 1/1

11.

When a wave with L=200 meters passes over water with d=10 meters, the motion of the water particles at a depth of 8 meters _____.

Student Response	Value	Correct Answer	Feedback
A. will be minimal or cease entirely			
B. causes water to move rapidly towards the shore			
C. tends to form ripples on			

	the seafloor		
D.	traces circular orbits		
E.	will be in flattened ellipses	100%	✓

Score: 1/1

12.

Which of the following does NOT explain why the surf at Tofino Beach varies on a daily basis?

	Student Response	Value	Correct Answer	Feedback
A.	swells generated by storms in the North Pacific Ocean			
B.	high and low tides	100%	✓	
C.	variable local winds			
D.	destructive interference from waves			
E.	constructive interference from waves			

Score: 1/1

13.

In order to predict the wave heights of incoming surf, forecasters require information on all of the following EXCEPT _____.

	Student Response	Value	Correct Answer	Feedback
A.	local wind conditions			
B.	waves that could interfere destructively			
C.	air and sea surface temperatures	100%	✓	
D.	waves that could interfere constructively			
E.	swells from distant storms			

Score: 1/1

14.

Scientists have estimated that if all the ice on Greenland were to melt, global sea level would rise by about 8 meters. Which of the following locations is most at risk?

	Student Response	Value	Correct Answer	Feedback
A.	UBC			
B.	Abbotsford			
C.	all are equally at risk			
D.	Whistler			
E.	Richmond	100%	✓	

Score: 1/1

15.

If you were floating in the middle of the ocean (where it is very deep), what motion would you undergo as a wave passes by? Assume that there is no current.

Student Response	Value	Correct Answer	Feedback
A. You would bob straight up and down.			
B. You would move along with the wave in the same direction as the wave is traveling.			
C. You would move parallel to land.			
D. You would describe a circular orbital motion.	100%	✓	
E. You would move back and forth horizontally.			

Score: 1/1

16.

Following a tsunami warning after an earthquake off the coast of Alaska, one of the worst places to be is _____.

Student Response	Value	Correct Answer	Feedback
A. on the 5th floor (or higher) of a reinforced concrete building on a beach in Japan			
B. on a sailboat off the coast of Halifax, NS			
C. lying on a beach in Hilo Bay, Hawaii	100%	✓	
D. on a submarine on the surface of the Pacific Ocean, where the water is at least 3500 meters deep			
E. in a park located beyond the tsunami inundation zone			

Score: 1/1

17.

Which statement is FALSE?

Student Response	Value	Correct Answer	Feedback
A. Tsunami with longer wavelengths travel faster.		☑	
B. The speed of a tsunami decreases as it approaches shore.			
C. In the open ocean, tsunami crests are rounded and stable with typical wave heights of 0.5 – 1m.			
D. Restricted bays and harbours intensify the effects of a tsunami.			
E. The arrival of a tsunami can be predicted.	0%		

Score: 0/1

18.

Larger wind-driven waves can develop in the North Atlantic Ocean than in the Strait of Georgia. Why? Choose the BEST reason.

Student Response	Value	Correct Answer	Feedback
A. The wind blows constantly over the North Atlantic Ocean but only rarely blows hard over the Strait of Georgia.			
B. The fetch is smaller in the Strait of Georgia than in the North Atlantic Ocean.	100%	✓	
C. Wind speed is faster over the North Atlantic Ocean than over the Strait of Georgia.			
D. The Strait of Georgia is affected by daily wind			

reversals due to the proximity of land on all sides.

E. Low atmospheric pressure over the North Atlantic Ocean tends to amplify large wind-driven waves.

Score: 1/1

19.

In the northern hemisphere, storm surge from a hurricane is typically the MOST disastrous for the coastline _____.

Student Response	Value	Correct Answer	Feedback
A. on the left side of the hurricane (if you're facing in the direction the hurricane is traveling)			
B. on the right side	100%	✓	

of the hurricane (if you're facing in the direction the hurricane is traveling)

C. directly under the eye of the hurricane

D. to the west of the eye of the hurricane

E. to the north of the eye of the hurricane

Score: 1/1

20.

If a wave with a wavelength of 100 m travels in a body of water 1 km deep, water particles at a depth of 55 m will _____.

	Student Response	Value	Correct Answer	Feedback
A.	move rapidly toward the shore			
B.	move in orbits	0%		

that are 1/23rd of the orbits of water particles in the surface

C. move back and forth

D. not be affected by the passing wave ☑

E. move in flattened ellipses

Score: 0/1

1.

The San Andreas Fault extends offshore under water in some sections to the north of San Francisco. Imagine that a magnitude 8.5 earthquake occurs along an underwater section of the fault. Is it likely or unlikely to generate a large tsunami?

	Student Response	Value
A.	It is unlikely because the fault is still too close to shore.	
B.	It is unlikely because the movement along the fault is horizontal.	
☑ C.	It is likely because earthquakes along the San Andreas fault are typically shallow.	0%
D.	It is likely because the magnitude of the earthquake is large.	
E.	It is likely because most underwater earthquakes generate tsunami.	

Score: 0/1

2.

The distance measured from trough to trough of a wave is the _____.

Student Response	Value
A. orbital	
B. wave height	
C. wavelength	100%
D. wave period	
E. amplitude	

Score: 1/1

3.

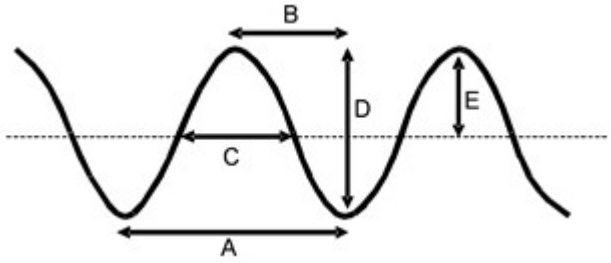
The speed of a shallow water wave depends only on one variable, which is _____.

Student Response	Value
A. slope of the bottom	
B. wavelength	0%
C. wave period	
D. water depth	
E. wave freqency	

Score: 0/1

4.

Based on the diagram above, the wave height is represented by line _____.



Student Response	Value
A. A	
B. B	0%
C. C	
D. D	
E. E	

Score: 0/1

5.

Imagine four waves with different wave periods: wave A has a period of 2 seconds, wave B has a period of 5 seconds, wave C has a period of 7 seconds, and wave D has a period of 10 seconds. Knowing that the water is 4000 meters deep, arrange the waves according to their wave speed.

Student Response	Value
A. A < B < C=D	
B. D < C < B < A	
C. A < B < C < D	100%
D. A=B < C < D	
E. A=B=C=D	

Score: 1/1

1.

The modern Beaufort scale is based on _____.

Student Response	Value
A. effects of wind on trees and buildings	
B. wind speed	
C. wavelength	
D. wave period	
E. visibility	0%

Score: 0/1

2.

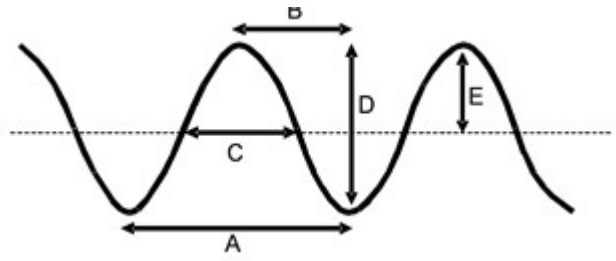
Tsunami can be generated by all of the following EXCEPT _____.

	Student Response	Value
☑ A.	hurricanes	100%
B.	meteor impacts	
C.	rock falls	
D.	earthquakes	
E.	calving icebergs	

Score: 1/1

3.

Based on the diagram above, the wave steepness is _____.



	Student Response	Value
A.	A/E	
☑ B.	D/A	100%
C.	C/E	
D.	D/B	
E.	E/A	

Score: 1/1

4.

For an earthquake-generated tsunami, which factor of prediction can we be MOST confident about (before the tsunami arrives)?

	Student Response	Value
A.	wave height	
B.	arrival time	
C.	wave energy	0%
D.	destruction potential	
E.	number of large waves	

Score: 0/1

5.

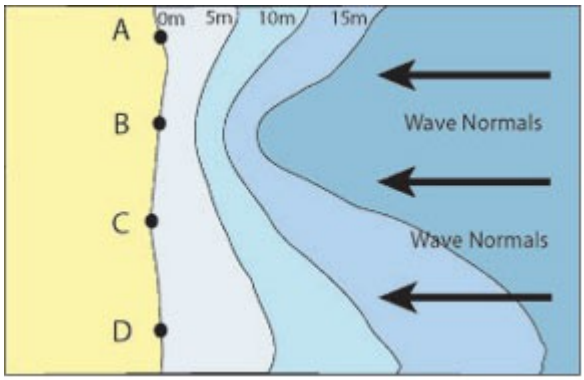
Which of the following statements is FALSE?

	Student Response	Value
A.	Most of Canada's coastline will be at risk with increasing global sea level rise.	
B.	Global sea level rises when the volume of seawater expands due to an increase in global air temperature.	0%
C.	A global air temperature increase of 5 °C/century will likely cause a global sea level increase of 120 m.	
D.	In geological time scales, the advance and retreat of glacial ice is the primary cause for global sea level change.	
E.	Global sea level has increased by 120 m since the last glacial maximum 18,000 years ago.	

Score: 0/1

1.

The figure below shows a beach and ocean bathymetry (contours showing ocean depth) just offshore. Depth contours are labeled. At which point would you expect to see the most plunging breakers?



	Student Response	Value	Feedback
1.	A		
2.	B		
3.	C	100%	
4.	D		
5.	E		

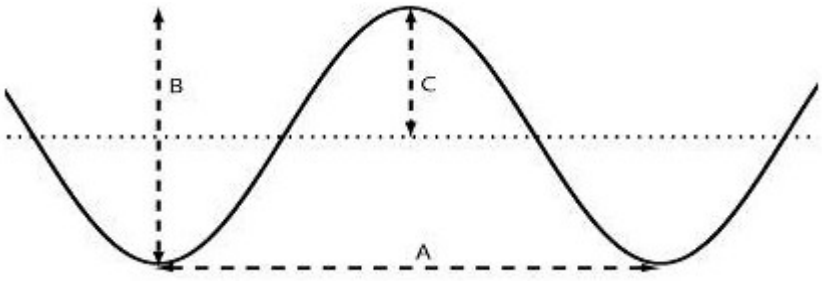
General Feedback: in a bathymetric map, the slope is STEEPEST where the contours are most closely spaced

Score: 1/1

2.

Label the elements of the wave anatomy illustrated below. (use words NOT symbols)

A 1.-----
B 2.-----
C 3.-----



Student Response	Value

1.	Wavelength	30%
2.	Wave height	30%
3.	Amplitude	40%

Score: 1/1

3.

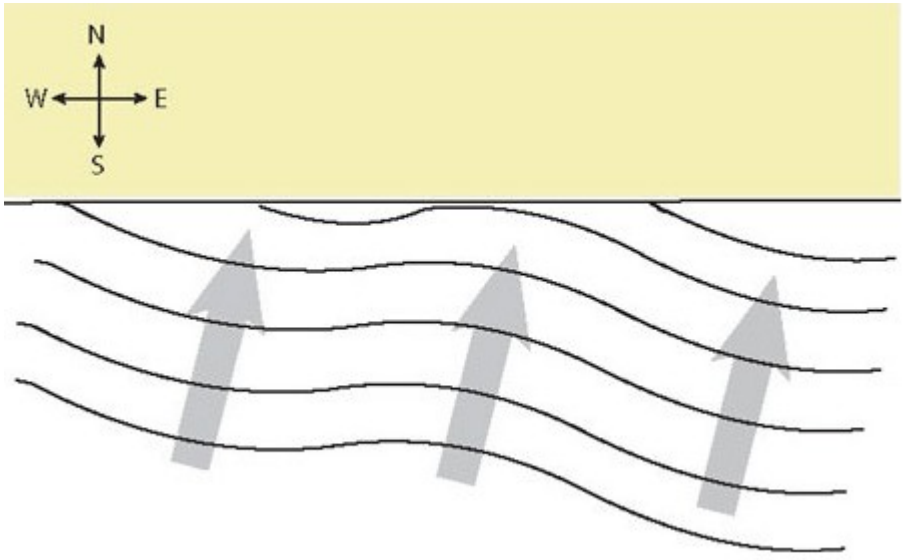
As surface waves travel across an ocean, they carry _____.

Student Response	Value	Feedback
A. matter		
B. energy	100%	
C. both matter and energy		
D. neither energy or matter		

Score: 1/1

4.

The figure below shows a beach and approaching waves (wave normals are grey arrows). In which direction will **littoral drift** occur?



Student Response	Value	Feedback
1. East to West		
2. West to East		
3. North to South		
4. South to North	0%	
5. Southwest to Northeast		

Score: 0/1

5.

Although the period of a wave changes as waves approach the shore, the speed of the wave remains constant.

Student Response	Value
True	0%

Score: 0/1

6.

Current changes in sea level are attributed to _____.

Student Response	Value	Feedback
A. the melting of glaciers		
B. the warming, and subsequent expansion, of ocean water		
C. the slow readjustment of land following the melt of the Laurentide ice sheet (10 000 years ago).		
D. all of the above	100%	
E. none of the above; there is no evidence that sea level is changing.		

Score: 1/1

7.

A tsunami can be triggered by _____.

Student Response	Value	Feedback
A. an earthquake		
B. a volcanic eruption		
C. underwater landslides		
D. all of the above	100%	
E. none of the above		

Score: 1/1

8.

Which of the following waves has the most energy?

Student Response	Value	Feedback
1. L=10m, T=10s, H=2m		
2. L=20m, T=50s, H=1m		
3. L=30m, T=50s, H=2m	0%	
4. L=10m, T=50s, H=3m		
5. L=30m, T=1 minute, H=2m		

Score: 0/1