Movements of Ocean Water

Standard difficulty · 20 questions · 40 marks · Time: 37 minutes

Name: _____ Date: _____ Score: ____ / 40

Write full answers in Sections B and C. Answers are on the last page — try every question first!

Section A — Choose the correct answer 8 × 1 = 8 marks

1. Most ocean waves are caused by:
   (a) earthquakes **(b)** ocean currents **(c)** the moon **(d)** wind

2. What is meant by the trough?
   (a) the lowest point of a wave
   (b) the horizontal distance between two crests
   (c) the number of waves passing a point in one second
   (d) the time between two crests passing a point

3. What is a diurnal tide?
   (a) the falling water between high and low tide
   (b) the rising water between low and high tide
   (c) two high and two low tides each day
   (d) one high and one low tide each day

4. What is the effect of the Coriolis force on ocean currents?
   (a) friction pushes surface water along
   (b) water expands, standing about 8 cm higher at the equator
   (c) turns water right in the north, left in the south
   (d) pulls water down the slope of the pile

5. A wave is 10 m from the bottom of its trough to the top of its crest. What is its amplitude?
   (a) 5 m **(b)** 6 m **(c)** 10 m **(d)** 20 m

6. Waves with a wavelength of 270 m pass a point every 15 seconds. What is their speed in metres per second?
   (a) 36 m/s **(b)** 270 m/s **(c)** 33 m/s **(d)** 18 m/s

7. A tide rises through a range of 2.4 m in about six hours. On average, how many cm does it rise each hour?
   (a) 40 cm **(b)** 20 cm **(c)** 240 cm **(d)** 50 cm

8. A wave crest passes a pier every 4 seconds. How many waves pass in 6 minutes?
   (a) 98 waves **(b)** 91 waves **(c)** 25 waves **(d)** 90 waves

Section B — Short answer 8 × 2 = 16 marks

9. What actually moves across the ocean in a wave?

10. What is meant by each? (a) wave height (b) amplitude

11. Describe each: (a) a spring tide (b) a semi-diurnal tide

12. What is the effect of each on ocean currents? (a) the Coriolis force (b) differences in density

13. Is each a warm or a cold current? (a) the North Atlantic Drift (b) the California Current

14. A wave is 14 m high, with crests 72 m apart passing every 12 seconds. What are its amplitude and its speed?

15. At a place with semi-diurnal tides, high tide is at 13:15. Roughly when will the next low tide and the next high tide be?

16. Spring tide or neap tide? (a) about seven days after a spring tide (b) sun, moon and earth in a straight line

Section C — Longer answers — 4 × 4 = 16 marks

17. Describe the characteristics of waves.

18. Match each with its meaning: (a) wave period (b) crest (c) wave frequency. Choose from: the time between two crests passing a point; the highest point of a wave; the number of waves passing a point in one second.

19. A wave train has waves 16 m high with crests 45 m apart, and a crest passes every 5 seconds. (a) What is the amplitude? (b) What is the wave speed? (c) How many waves pass in one minute? (d) What moves across the ocean: the water or the energy?

20. A bay has a tidal range of 7.2 m and high tide at 03:45. (a) About how many cm does the water fall each hour until low tide? (b) Roughly when is low tide? (c) Why can tides be predicted well in advance?

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Answer key

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Q	Answer	Working
1	**(d) wind**	—
2	**(a) the lowest point of a wave**	—
3	**(d) one high and one low tide each day**	—
4	**(c) turns water right in the north, left in the south**	—
5	**(a) 5 m**	10 ÷ 2
6	**(d) 18 m/s**	270 ÷ 15
7	**(a) 40 cm**	240 cm ÷ 6
8	**(d) 90 waves**	60 ÷ 4 × 6
9	**Energy; the water particles only move in small circles.**	—
10	**(a) the vertical distance from trough to crest (b) one-half of the wave height**	—
11	**(a) a higher tide with sun, moon and earth in a line (b) two high and two low tides each day**	—
12	**(a) turns water right in the north, left in the south (b) dense, cold or salty water sinks**	—
13	**(a) warm (b) cold**	—
14	**amplitude 7 m; speed 6 m/s**	14 ÷ 2; 72 ÷ 12
15	**low tide about 19:15, high tide about 01:15**	about 6 hours to low tide, 12 hours to the next high tide
16	**(a) neap tide (b) spring tide**	—
17	**Crest and trough (highest and lowest points), wave height, amplitude (half the height), period, wavelength, speed (in knots) and frequency (waves per second).**	—
18	**(a) the time between two crests passing a point (b) the highest point of a wave (c) the number of waves passing a point in one second**	—
19	**(a) 8 m (b) 9 m/s (c) 12 (d) The energy; water particles only move in small circles.**	16 ÷ 2; 45 ÷ 5; 60 ÷ 5

Q	Answer	Working
20	**(a) about 120 cm an hour (b) about 09:45 (c) They depend on the positions of the earth, moon and sun, which are known accurately.**	720 cm ÷ 6; + 6 hours