Tides on a Grid

Read tide patterns, then graph their links to moon phases.

MAQ.2.2 "Survey predictable patterns of tides (i.e., tidal period and range, diurnal, semidiurnal, mixed, spring, and neap tides) to correlate with moon phases in graphical form."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline the definitions of tidal range and tidal period, and circle the three daily tide patterns. In the last paragraph, draw arrows from spring tides and neap tides to their matching moon phases.

Watching the Harbor Rise

1. At a harbor, the waterline rises and falls against a marked pier. The tidal range is the height of a high tide minus the height of a low tide. The tidal period is the time from one high tide to the next. Measure both to describe a repeating pattern, not just one water level.

2. A diurnal pattern has one high tide and one low tide each lunar day, about 24 hours and 50 minutes. A semidiurnal pattern has two nearly equal highs and two nearly equal lows in that time. A mixed pattern also has two highs and two lows, but their heights differ noticeably. Local coastline shape helps determine which pattern occurs.

3. The table tracks the largest daily range at one harbor near four moon phases: new moon, first quarter, full moon, and third quarter. Spring tides, near new and full moons, usually have larger ranges. Neap tides, near the quarter moons, usually have smaller ranges. These phase links describe range, not whether a harbor has diurnal, semidiurnal, or mixed tides.

SAMPLE HARBOR: DAILY EXTREME HEIGHTS NEAR FOUR MOON PHASES

Moon phase	Highest high (m)	Lowest low (m)	Tidal range (m)
New moon	3.2	0.3	2.9
First quarter	2.1	0.9	1.2
Full moon	3.4	0.2	3.2
Third quarter	2.2	0.8	1.4

2 ANSWER WITH EVIDENCE

Use the passage

1. Compare the ranges near new moon and first quarter. Which is larger, by how much, and which tide type occurs near that phase?

2. Compare the ranges near full moon and third quarter. Which phase has the smaller range, and which tide type occurs near that phase?

3. A harbor has two nearly equal high tides and two nearly equal low tides in one lunar day. Which pattern does this match, and what separates it from a mixed pattern?

4. A harbor has one high tide per lunar day. What is its daily pattern, and about how long is its tidal period?

3 YOUR TURN

Your own words

On the grid, graph the table's tidal ranges in moon-phase order. Label both axes, mark which plotted phases are near spring tides and which are near neap tides, then write one sentence describing the pattern you graphed.



ANSWER KEY

Tides on a Grid

PART 1 · READ AND MARK

Underline the definitions of tidal range and tidal period, and circle the three daily tide patterns. In the last paragraph, draw arrows from spring tides and neap tides to their matching moon phases. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	Compare the ranges near new moon and first quarter. Which is larger, by how much, and which tide type occurs near that phase?	**The new moon range is larger by 1.7 m (2.9 m versus 1.2 m). Spring tides occur near new moon.**
2	Compare the ranges near full moon and third quarter. Which phase has the smaller range, and which tide type occurs near that phase?	**Third quarter has the smaller range, 1.4 m versus 3.2 m. Neap tides occur near third quarter.**
3	A harbor has two nearly equal high tides and two nearly equal low tides in one lunar day. Which pattern does this match, and what separates it from a mixed pattern?	**It matches a semidiurnal pattern. In a mixed pattern, the two highs and two lows differ noticeably in height.**
4	A harbor has one high tide per lunar day. What is its daily pattern, and about how long is its tidal period?	**It has a diurnal pattern and a tidal period of about 24 hours and 50 minutes.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

Horizontal axis: moon phase, in the order new moon, first quarter, full moon, third quarter. Vertical axis: tidal range (m), scaled from 0 to at least 3.2. Plotted values: 2.9, 1.2, 3.2, and 1.4 m, respectively. New moon and full moon are marked spring; both quarter moons are marked neap. The range is larger near new and full moons than near the quarter moons.

Accept a point graph or bar graph with an appropriate scale and accurately plotted values. Spring and neap labels should identify phases near those tide types, not a harbor's daily tide pattern.