

TABLE 6.3 Idealized Melting Temperatures of Granite (with water) and Basalt at Various Depths Within Earth

GRANITE (WITH WATER)		BASALT (DRY)	
DEPTH (KM)	MELTING TEMP. (CELSIUS)	DEPTH (KM)	MELTING TEMP. (CELSIUS)
0	950°	0	1100°
10	700°	25	1160°
20	660°	50	1250°
30	625°	100	1400°
40	630°	150	1600°

ACTIVITY 6.6

Melting Temperatures of Rocks

1. Plot the melting temperatures for wet granite and dry basalt from Table 6.3 on the graph in Figure 6.10. Draw a different colored line for each set of points and label them *melting curve for wet granite* and *melting curve for basalt*.

Refer to the plots on the graph you completed in Figure 6.10 to complete the following.

2. At approximately what depth does wet granite reach its melting temperature and generate magma?
_____ km
3. Oceanic crust and the underlying rocks to a depth of about 100 kilometers have a basaltic composition. Does the melting curve for basalt indicate that the lithosphere above approximately 100 kilometers has or has not reached the melting temperature for basalt? Therefore, at those depths, should basalt be solid or molten?
The melting temperature _____ been reached.
Basalt should be _____.
4. Referring to Figure 6.10, at approximately what depth does basalt reach its melting temperature?
At a depth of approximately _____ km.
5. Referring to Figure 6.9, what is the name of the layer that begins at a depth of about 100 kilometers and extends to approximately 600 kilometers?

6. Does the graph you constructed support or refute the concept of a weak asthenosphere that is capable of "flowing"?

MasteringGeology™

Looking for additional review and lab prep materials? Go to www.masteringgeology.com for Pre-Lab Videos, Geoscience Animations, RSS Feeds, Key Term Study Tools, The Math You Need, an optional Pearson eText, and more.

6.5 Earth's Internal Temperature

Measurements of temperatures in deep wells and mines indicate that Earth's temperatures increase with depth. The rate of temperature increase is called the **geothermal gradient**. Although the geothermal gradient varies from place to place, an average rate for a particular region can be calculated.

ACTIVITY 6.5

Earth's Internal Temperature

Use **TABLE 6.2**, which shows idealized internal temperatures at various depths, to complete the following.

TABLE 6.2 Idealized Internal Temperatures of Earth

DEPTH (KM)	TEMPERATURE (CELSIUS)
0	20°
25	600°
50	1000°
75	1250°
100	1400°
125	1525°
150	1600°

- Plot the temperature values from Table 6.2 on the graph in **FIGURE 6.10**. Then draw a line to connect the points. Label the line *geothermal gradient*.
- Referring to the graph, does the Earth's internal temperature increase at a constant or changing rate with increasing depth?

Earth's internal temperature increases at a _____ rate with increasing depth.

- Is the rate of temperature increase from the surface to 100 kilometers greater or less than the rate of increase below 100 kilometers?

The rate of temperature increase is _____.

- Is the temperature at the base of the lithosphere, about 100 kilometers below the surface, approximately 600°C, 1400°C, or 1800°C?

The temperature is approximately _____.

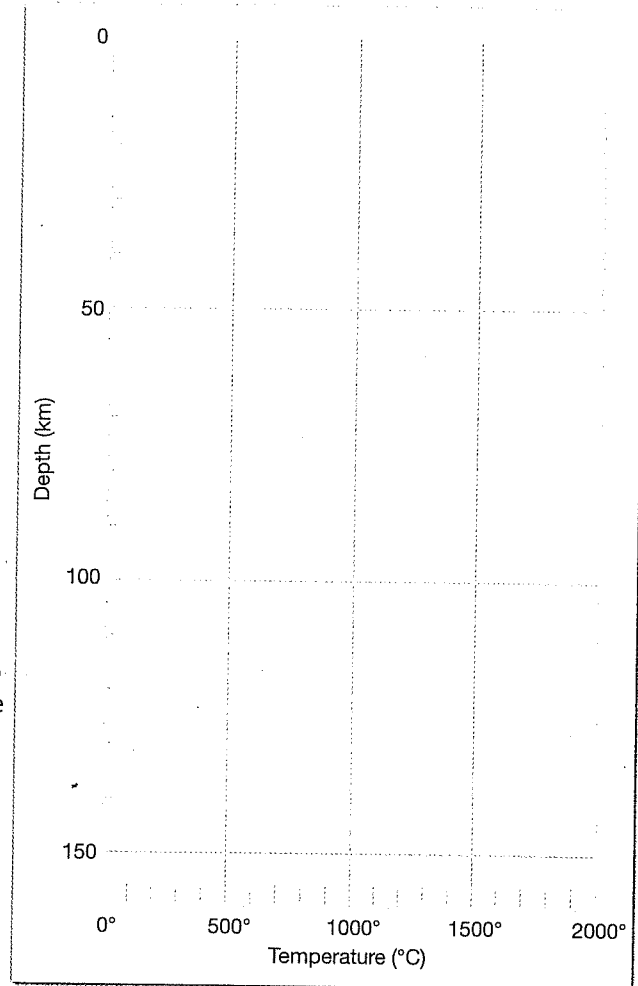


FIGURE 6.10 Graph for plotting temperature and melting point curves.

6.6 Melting Temperatures of Rocks

The approximate melting points of the igneous rocks granite and basalt, under various pressures (depths), have been determined in the laboratory and are shown in **TABLE 6.3**. Granite that contains water and basalt were selected because they are common materials in Earth's crust.