Geology 12 Minerals and Resources TEST EXTRA PRACTICE

Multiple Choice Answers:
1. C 2. B 3. C 4. B 5. C 6. B 7. B 8. D 9. B 10. C 11. B 12. D
13. B 14. B 15. C 16. C 17. B 18. D 19. A 20. B 21. D 22. A
23. D 24. B 25. A 26. D 27. C

Written Response Answers: included with question

PART A: MULTIPLE CHOICE

1. Which of the following mineral groups would have the most noticeable reaction when dilute hydrochloric (HCl) acid was applied?

   A. oxides
   B. silicates
   C. carbonates
   D. phosphates

Reference Data Pages in the Appendix	*For questions 2 and 3, refer to the following reference in the Appendix.* **Properties of Common and Important Minerals (green sheets)**

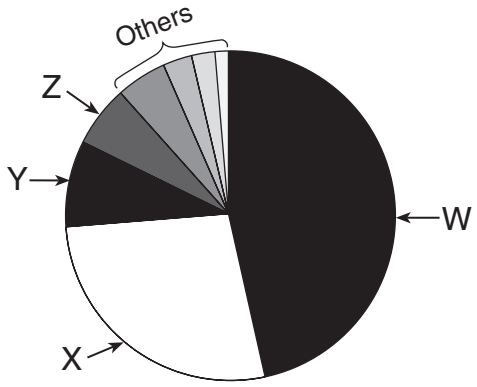
2. Which of the following mineral properties would **best** allow you to distinguish between potassium feldspar and pyroxene?

   A. form
   B. colour
   C. cleavage
   D. hardness

3. A gabbro containing olivine, pyroxene, magnetite and plagioclase feldspar is physically weathered into separate mineral grains of equal size. Which mineral would be hardest to transport in a river on the basis of its density?

   A. olivine
   B. pyroxene
   C. magnetite
   D. plagioclase feldspar

4. The pie chart below shows the relative proportions of the most abundant elements in Earth's crust. Which letter corresponds to **silicon?**

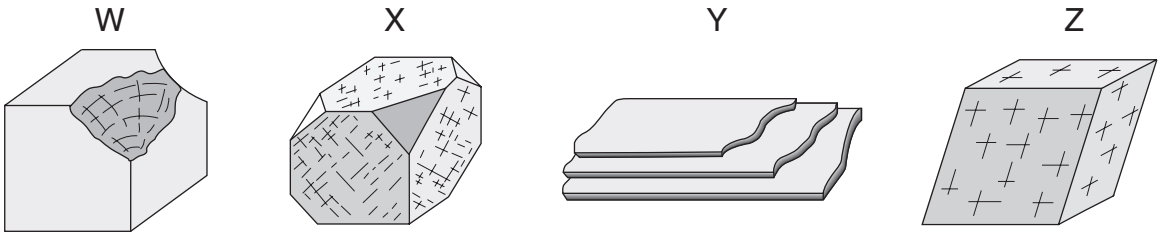


A. W
B. X
C. Y
D. Z

Reference Data Pages in the Appendix

For question 5, refer to the diagrams below and to the following reference in the Appendix.

Properties of Common and Important Minerals (green sheets)



5. Which diagram **best** illustrates mica?

A. W
B. X
C. Y
D. Z

6. A mountain experiences a constant rate of uplift of 1.5 metres per 1000 years. **At the same time**, the mountain's height is also changed by erosion at a rate of 2.6 metres per 1000 years. What will be the long-term effect on the height of the mountain?

   A. It will increase.
   B. It will decrease.
   C. It will increase and then decrease.
   D. It will decrease and then increase.

7. More than 2000 minerals are found in the Earth's crust. Ninety percent of the lithosphere, however, is made of the 12 minerals in the table below.

Rock-forming Minerals	
feldspar	augite
quartz	garnet
biotite	magnetite
calcite	olivine
hornblende	pyrite
muscovite	talc

   To which of the following mineral groups do most of these minerals belong?

   A. oxides
   B. silicates
   C. sulphides
   D. carbonates

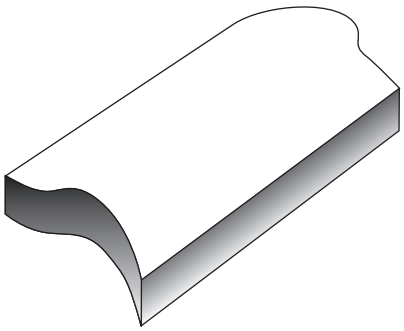
Reference Data Pages

For question 8, refer to the following reference in the Data Pages.
Properties of Common and Important Minerals (green sheets)

8. Which of the following properties can **best** be used to distinguish between calcite and halite?

   A. streak
   B. hardness
   C. magnetism
   D. reaction with acid

Use the following diagram of a mineral fragment to answer question 9.



9. How many directions of cleavage does the mineral fragment show?

   A. 1
   B. 2
   C. 3
   D. 4

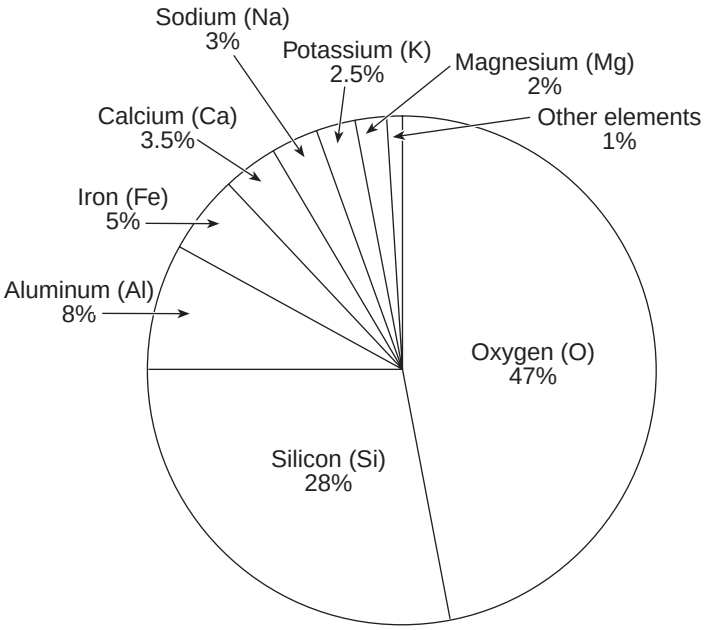
Reference Data Pages

For question 10, refer to the following references in the Data Pages.
Properties of Common and Important Minerals
Table of Hardness

10. Which of the following minerals can scratch a wire nail but not a steel knife?

    A. quartz
    B. calcite
    C. apatite
    D. fluorite

Use the following diagram of the abundance of major elements in the earth's crust and the table of mineral groups to answer question 11.

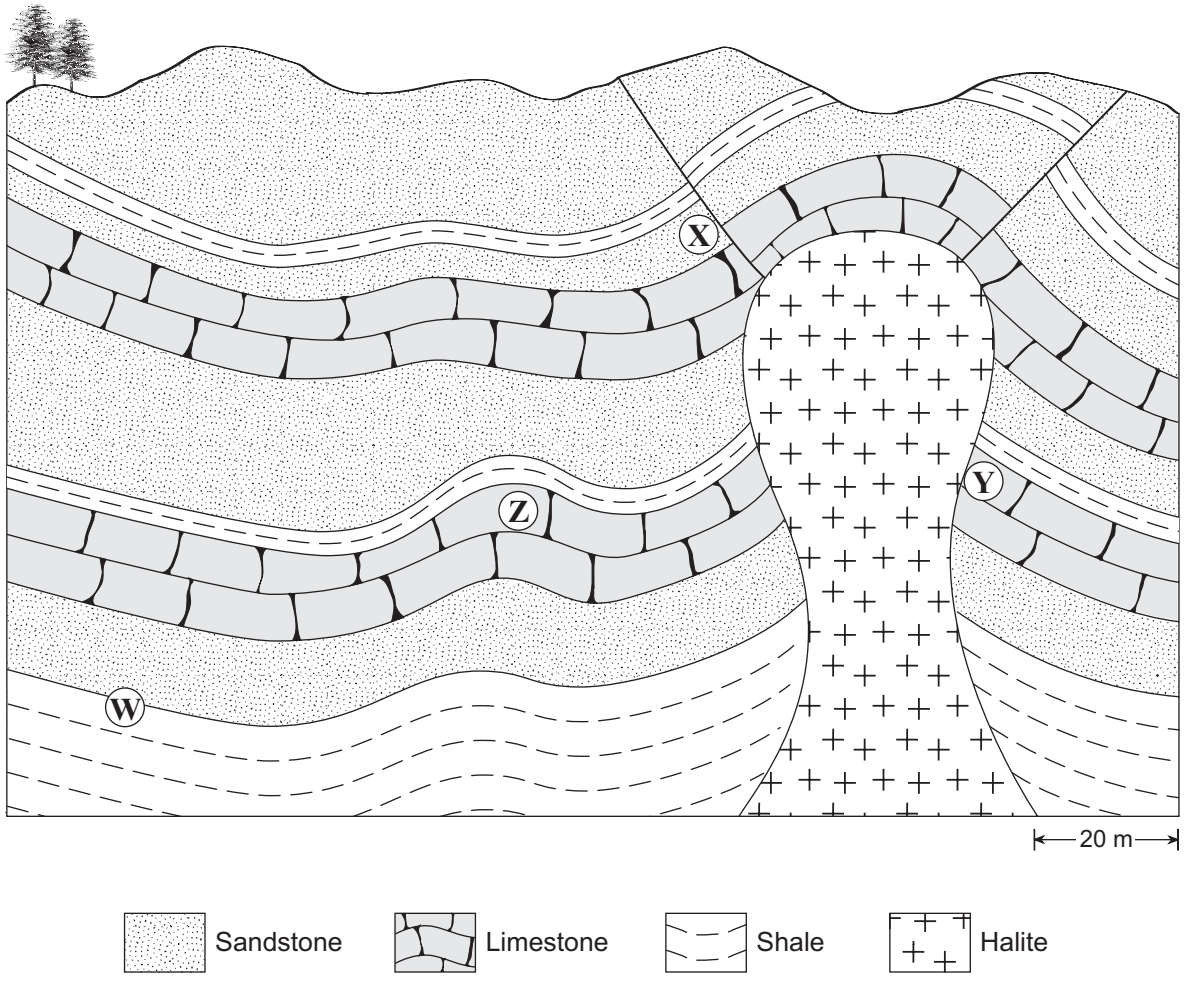


Mineral group	Typical mineral	Formula of typical mineral
silicates	potassium feldspar	$KAlSi_3O_8$
oxides	hematite	Fe_2O_3
carbonates	calcite	$CaCO_3$
sulphates	gypsum	$CaSO_4$
sulphides	pyrite	FeS_2

11. Which of the following mineral groups is most common in the earth's crust?

A. oxides
B. silicates
C. sulphates
D. carbonates

Use the following cross section to answer questions 12 and 13.



12. In the cross section above, at which locations might oil and gas accumulate?

    A. X and Y
    B. W and Z
    C. W and X
    D. Y and Z

13. What are the most important characteristics of oil reservoir rock?

    A. low porosity and high permeability
    B. high porosity and high permeability
    C. low permeability and low porosity
    D. low permeability and high porosity

14. Since the earth's formation,

A. the only remaining rock forming material is lava.
B. no rocks on the surface have remained unchanged.
C. sedimentary rock has been the only new rock produced.
D. the only remaining original material is metamorphic rock.

15. Which of the following elements is most common in the earth's crust?

A. silicon
B. carbon
C. oxygen
D. sulphur

REFERENCE DATA BOOKLET	*For questions 16 and 17, refer to the following in the Data Booklet.* **Photograph 1** **Table of Hardness** **Properties of Common and Important Minerals**

16. A key characteristic visible in photograph 1 is

A. streak.
B. density.
C. cleavage.
D. hardness.

17. The mineral in photograph 1 cannot easily be scratched by a fingernail. What is this mineral?

A. talc
B. mica
C. calcite
D. graphite

photograph 1

18. Concentrations of copper mineralization have been found in veins around the granite intrusion on the geological map. Which process is **most likely** responsible for the copper mineralization?

A. evaporation
B. assimilation
C. placer deposition
D. hydrothermal deposition

19. A mining exploration company has decided not to mine the copper. Which of the following is the **best** reason for leaving the copper mineral in the ground?

A. The value of the copper is too low.
B. The copper concentration is too high.
C. The copper is too close to the surface.
D. The copper market is too close to the resource.

20. If a beaker of seawater were left to evaporate and dry out, the minerals left present in the container would most likely be

A. biotite and quartz.
B. gypsum and halite.
C. fluorite and galena.
D. calcite and chalcopyrite.

21. Mineral deposits that form in ocean basins near ridge-related hot springs are called

A. evaporites.
B. magmatic.
C. pegmatites.
D. hydrothermal.

22. Which of the following is an example of a mineral deposit formed by weathering and erosion?

A. Placer gold.
B. Porphyry copper.
C. Magmatic tungsten.
D. Fossiliferous limestone.

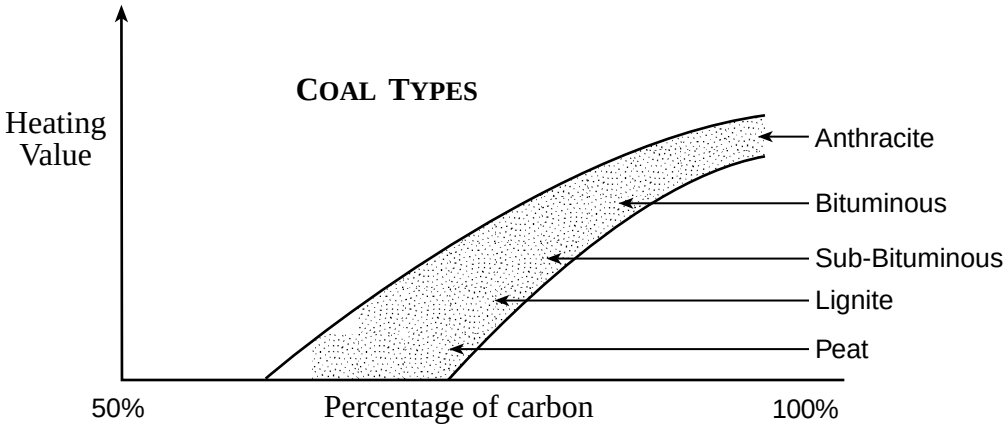
23. Deposits of asbestos, garnet and graphite form

A. when crystals settle out of a magma.
B. by deposition of minerals in streams.
C. as a result of circulating hydrothermal fluids.
D. when heat and pressure are applied to existing earth materials.

24. Economic minerals which commonly occur as evaporite deposits are

A. gold and silver.
B. calcite and gypsum.
C. galena and sphalerite.
D. chalcopyrite and bornite.

Use the following graph to answer question 53.



25. Generally, for types of coal, as the grade of metamorphism increases

A. heating value increases and carbon content increases.
B. heating value decreases and carbon content increases.
C. heating value increases and carbon content decreases.
D. heating value decreases and carbon content decreases.

---

26. In a structure which traps oil and gas, the cap rock would be

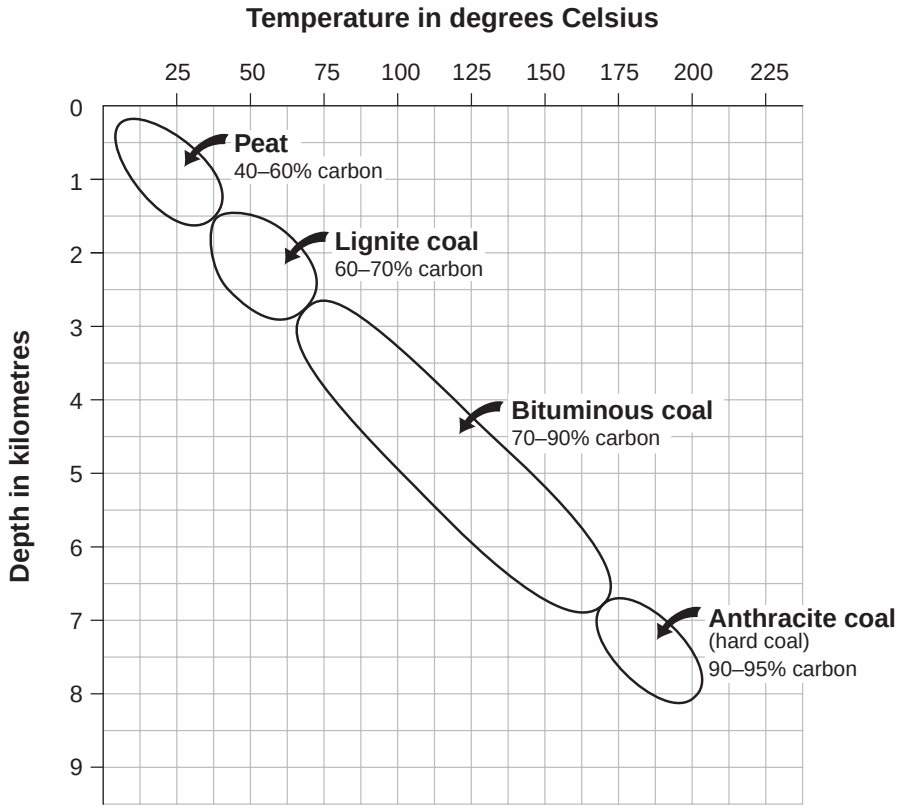
A. porous.
B. jointed.
C. permeable.
D. impermeable.

27. In the formation of oil deposits, after the burial of organic matter, the conversion to oil requires

A. 500 to 1 000°C and low pressure.
B. 500 to 1 000°C and high pressure.
C. 50 to 100°C and low pressure.
D. 50 to 100°C and high pressure.

WRITTEN RESPONSE

Use the following graph which shows relationships between temperature, depth, and types of coal, to answer question 4.



1. a) Describe a type of environment where a potential coal deposit could accumulate on the earth's surface and the type of material that would accumulate to eventually become coal. **(2 marks)**

b) According to the graph, at what temperature and depth would lignite change to bituminous coal? **(1 mark)**

c) Choose **one** type of coal and describe a use for it. **(1 mark)**

d) Why is anthracite (hard coal) often found in association with slate rather than shale or mudstone? **(1 mark)**

KEY

1. a) Describe a type of environment where a potential coal deposit could accumulate on the earth's surface and the type of material that would accumulate to eventually become coal. **(2 marks)**

Type of environment: **usually a swamp, marsh or delta where there is abundant plant growth and decomposition.** ← **1 mark**

Type of material: **plant material, vegetation** ← **1 mark**

organic ← **½ mark**

previously living material ← **½ mark**

b) According to the graph, at what temperature and depth would lignite change to bituminous coal? **(1 mark)**

Temperature: **approximately > 62° C** ← **½ mark**
< 75° C

Depth: **2.3 – 3.5 km** ← **½ mark**
> 2.5 km
< 3 km

c) Choose **one** type of coal and describe a use for it. **(1 mark)**

Any **one** for **1 mark:**

Peat: **used for heating, power generation, soil enhancer, absorbent for liquids**

Lignite: **used for heating, power generation, source for organic chemicals**

Bituminous: **used for heating, power generation, source for organic chemicals, coking in steel manufacture**

Anthracite: **heating, power generation**

d) Why is anthracite (hard coal) often found in association with slate rather than shale or mudstone? **(1 mark)**

Anthracite (hard coal) forms at the highest temperature and pressure of all the coals and is in fact metamorphic. At this temperature and pressure, the sedimentary rock shale or mudstone will have been metamorphosed to slate because of the higher temperature and pressure. ← **1 mark**

2. Complete the table below to show how the earth's resources of coal and gravel are formed and used. **(2 marks)**

Earth resource	How it formed	One use
Example: **Rock salt (halite)**	*evaporation of sea water*	*road salt*
Coal		
Gravel		

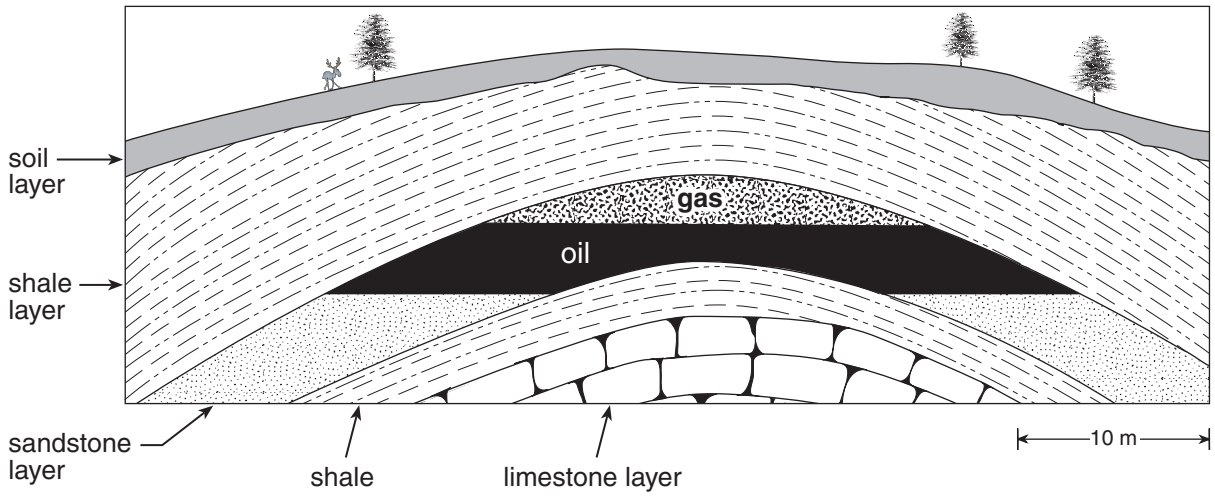
KEY

2. Complete the table below to show how the earth's resources of coal and gravel are formed and used. **(2 marks)**

$\frac{1}{2}$ mark for each correct answer. Total 2 marks

Earth resource	How it formed	One use
Example: **Rock salt (halite)**	*evaporation of sea water*	*road salt*
Coal	• **burial of woody material from swamps/forest**	• **generates electricity** • **petrochemicals** • **steel production**
Gravel	• **erosion, transport and deposition of sediments** • **glacial deposition**	• **construction** • **concrete**

Use the following diagram of an oil and gas deposit to answer question 3.



3. a) Describe how the oil and gas might have formed. **(2 marks)**

_____

_____

_____

b) Describe **two** characteristics of the rock materials that enable the oil and gas to accumulate in this particular location. **(2 marks)**

Characteristic 1: _____

Characteristic 2: _____

KEY

3. a) Any one for 2 marks:

- **marine microorganisms in oceans die**
- **marine microorganisms get buried**
- **chemical reactions cause creation of hydrocarbons**
- **hydrocarbons accumulate in traps**

3. b) Any two for 1 mark each:

- **the reservoir rock must be porous**
- **the cap rock must be impermeable**
- **the reservoir must be permeable**
- **appropriate structure (anticline)**

Use the following description of a mineral to answer question 4.

"A valuable mineral X forms mainly in hydrothermal veins, often associated with quartz and sulphide minerals. It is often found in placer deposits of unconsolidated sand, as well as sandstone and conglomerate. It may be confused with pyrite and chalcopyrite because of its similar appearance, but is easily distinguished on the basis of its higher density."

4. a) i) What is mineral **X**? **(1 mark)**

_____

ii) Describe another test and its results that would distinguish mineral X from pyrite and chalcopyrite. **(2 marks)**

Test	Result for Mineral X	Result for Pyrite	Result for Chalcopyrite

b) Describe how a placer deposit forms. **(2 marks)**

_____

_____

c) Chalcopyrite is mined so that copper can be extracted from it. Describe one use of copper. **(1 mark)**

_____

_____

KEY

gold ← 1 mark

Note: If gold is not chosen, marks can still be awarded for following questions.

$\frac{1}{2}$ mark for each box. Total 2 marks.

Test	Result for Mineral X	Result for Pyrite	Result for Chalcopyrite
1. Streak	yellow	greenish-black	black
2. Form	flakes, grain, massive	cubic dodecahedral	tetrahedral
3. Hardness	2.5 – 3.0	6.0 – 6.5	3.5 – 4.0

REFERENCE DATA BOOKLET

For question 5, refer to the following in the Data Booklet.
Properties of Common and Important Minerals

5. Describe **two** properties that would help distinguish between chalcopyrite and pyrite.
(2 marks)

Property	Description for chalcopyrite	Description for pyrite
Property 1:	_____ _____ _____	_____ _____ _____
Property 2:	_____ _____ _____	_____ _____ _____

6. Name a resource found in British Columbia that has resulted from glacier or river processes. Give a specific use for that resource. **(2 marks)**

Name of resource: _____

Description of use: _____

_____

KEY

5. Describe **two** properties that would help distinguish between chalcopyrite and pyrite. **(2 marks)**

Any **two** for **1 mark each:**

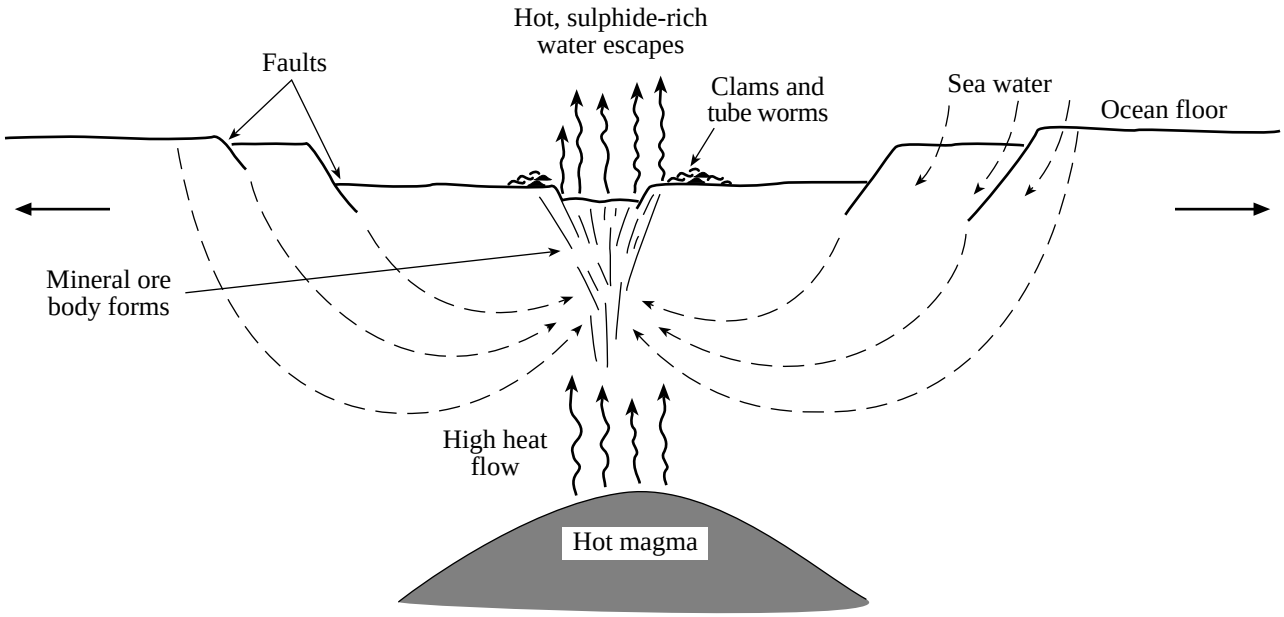
Property	Description for chalcopyrite	Description for pyrite
Property 1:	**hardness between 3.5–4**	**hardness between 6–6.5**
Property 2:	**has a golden-brassy yellow colour**	**has a brassy yellow colour**
Property 3:	**tetrahedral crystals**	**cubic crystals**
Property 4:	**has a specific gravity of 4.2**	**has a specific gravity of 5.0**
Property 5:	**black streak**	**greenish black streak**

6. Name a resource found in British Columbia that has resulted from glacier or river processes. Give a specific use for that resource. **(2 marks)**

Any **one** resource for **1 mark;** any **one** use for **1 mark:**

Resource	Use
sand	**• cement** **• road construction** **• pre-loading for foundations**
gravel	**• concrete** **• construction**
placer deposits **(Au, Pt, Cr, diamonds, etc)**	**• jewellery** **• electronics** **• art**
glacial till	**• earth fill** **• dam construction**
silt and clay	**• pottery** **• bricks** **• impermeable base for landfill sites or ponds**
water	**• agriculture** **• power** **• sanitation** **• drinking**

Use the following diagram of a submarine "black smoker" hydrothermal vent to answer question 7.

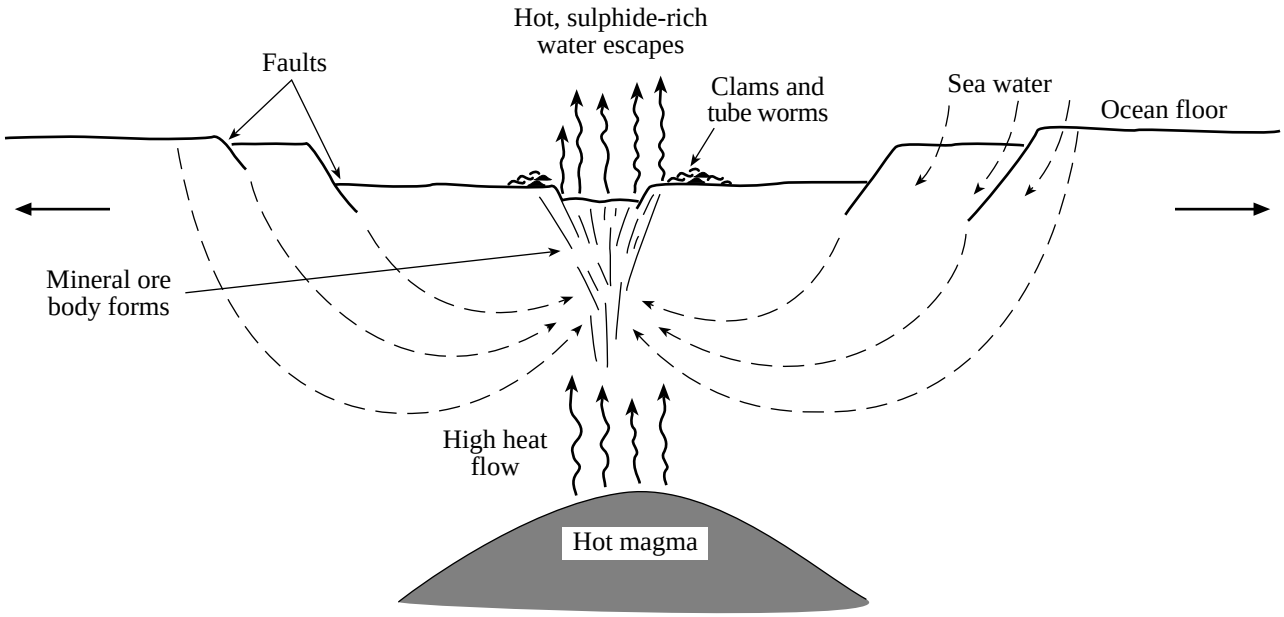


7. a) New, large mineral deposits of copper, zinc, silver, etc. are forming today on the sea floor at the sites of hydrothermal vents. Referring to the diagram above, describe why the vents are usually located in an oceanic rift valley. **(1 mark)**

b) Referring to the diagram above, describe a possible source for the metals in the hydrothermal solution. **(1 mark)**

c) Explain why the ore minerals are often deposited close to the hydrothermal vent. **(1 mark)**

KEY



7. a) New, large mineral deposits of copper, zinc, silver, etc. are forming today on the sea floor at the sites of hydrothermal vents. Referring to the diagram above, describe why the vents are usually located in an oceanic rift valley. **(1 mark)**

Sea floor spreading occurs at oceanic rift valleys. This is a volcanic area, and therefore there is an abundance of heat available to drive the water convection.

The rock here is heavily fractured and faulted, providing channel ways for the water.

Note: Students should mention heat and fracture.

b) Referring to the diagram above, describe a possible source for the metals in the hydrothermal solution. **(1 mark)**

Source: The rocks of the ocean crust through which the hot water travels. (1 mark)
From magma fluids. ($\frac{1}{2}$ mark)

c) Explain why the ore minerals are often deposited close to the hydrothermal vent. **(1 mark)**

Ore minerals in the hot solution precipitate quickly on contact with cool sea water. Solubility changes when they enter cold water.