Geology · Biology and Earth Sciences

# Physical Properties of Minerals

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## Multiple choice questions — 66 questions

**1** One mineral turns violet when it contains an iron compound and another turns brown when it contains the element iron. These two minerals, respectively, are .....

(A) quartz / sphalerite
(B) hematite / quartz
(C) malachite / rock crystal
(D) malachite / diamond

**2** By studying the minerals plagioclase, gypsum and mica, it becomes clear that they have .....

(A) similar chemical composition and physical properties
(B) similar chemical composition and different physical properties
(C) different chemical composition and similar physical properties
(D) different chemical composition and physical properties

**3** The change in the wavelength of light reflected from a mineral when it is moved in front of the eye is known as .....

(A) play of colours (B) luster (C) cleavage (D) streak

**4** Most minerals are characterized by all of the following except that they are .....

(A) compound minerals
(B) multicoloured
(C) of monoclinic crystals
(D) of cubic crystals

**5** The gemstone in the opposite figure is characterized by the property of .....



(A) metallic luster (B) cleavage (C) streak (D) play of colours

**6** The main reason the opposite mineral has this colour is a compound made of two elements, which are .....

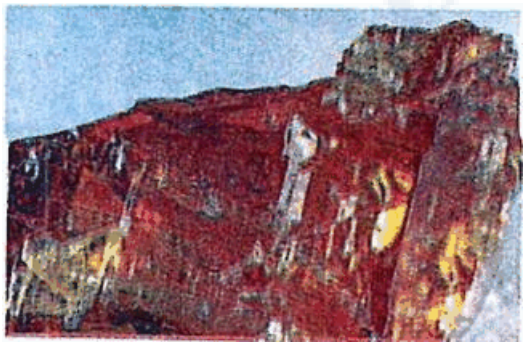


(A) oxygen and iron
(B) manganese and iron
(C) zinc and iron
(D) iron and carbon

**7** The colour of rock crystal changes to pink because of .....

(A) a change in the crystal system
(B) the presence of many gas bubbles
(C) the presence of manganese impurities
(D) the presence of iron oxide impurities

**8** Which of the following may represent the opposite compound mineral?

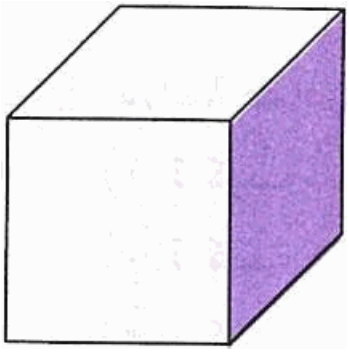


(A) Rock crystal
(B) Sphalerite
(C) Malachite
(D) Sulphur

**9** The mineral that is prospected for as a source of the element zinc (Zn) is .....

(A) hematite
(B) calcite
(C) sphalerite
(D) malachite

**10** The opposite figure represents the crystal system of the mineral halite, which determines .....



(A) the age of the mineral's formation

(B) the mineral's permeability coefficient

(C) the temperature of the mineral's formation

(D) the physical properties of the mineral

---

**11** The correct descending order of minerals according to the degree of luster is .....

(A) anhydrite then galena then olivine

(B) kaolinite then quartz then gold

(C) pyrite then feldspar then kaolinite

(D) mica then copper then gypsum

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**12** When the two opposite quartz samples are scratched, the colour of their streak is .....





(A) white

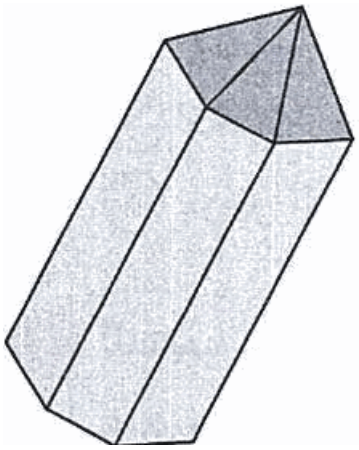
(B) milky

(C) pink

(D) grey

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**13** In front of you is a crystal of the mineral quartz. The mineral appears in this crystal form because of the regular arrangement of the atoms of .....

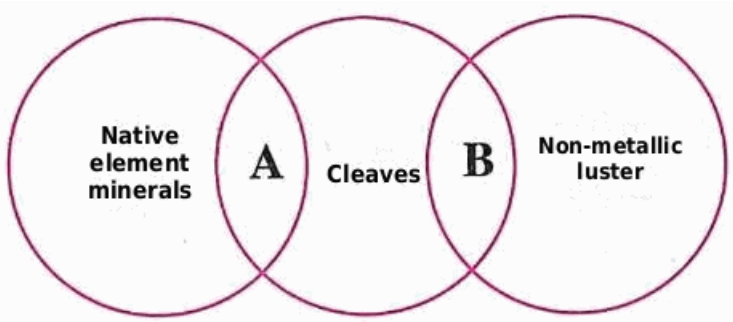


(A) silicon and iron
(B) silicon and manganese
(C) silicon and oxygen
(D) silicon and iron oxide

**14** The physical property that appears in a sample of the mineral pyrite without using any tools is .....

(A) the change of the yellow colour to green
(B) metallic luster
(C) cubic cleavage
(D) ductility and malleability

**15** From the opposite figure, minerals (A) and (B), respectively, may be .....




(A) (A) galena / (B) calcite
(B) (A) graphite / (B) calcite
(C) (A) graphite / (B) quartz
(D) (A) gold / (B) quartz

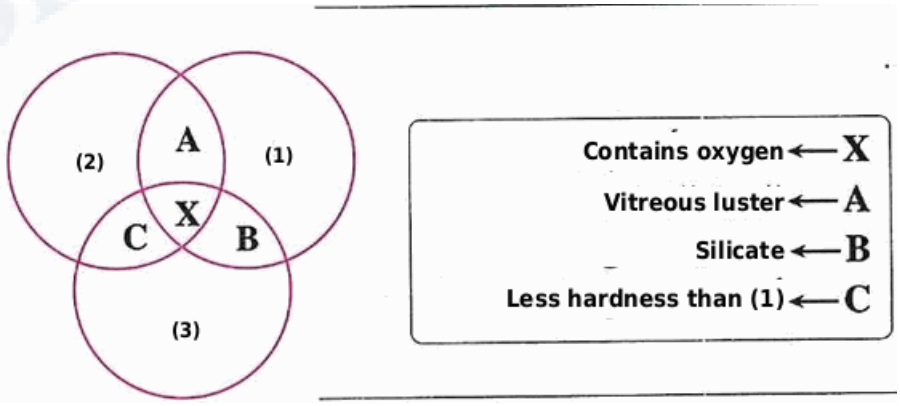
**16** Hammering a mineral enables us to identify all of the following except .....

(A) hardness
(B) malleability
(C) fracture
(D) cleavage

**17** The number of directions of weakly bonded planes in the mineral quartz is .....

(A) zero (B) 1 (C) 2 (D) 3

**18** Minerals (1), (2), (3) in the opposite figure may be .....




(A) (1) quartz - (2) galena - (3) calcite

(B) (1) calcite - (2) orthoclase - (3) galena

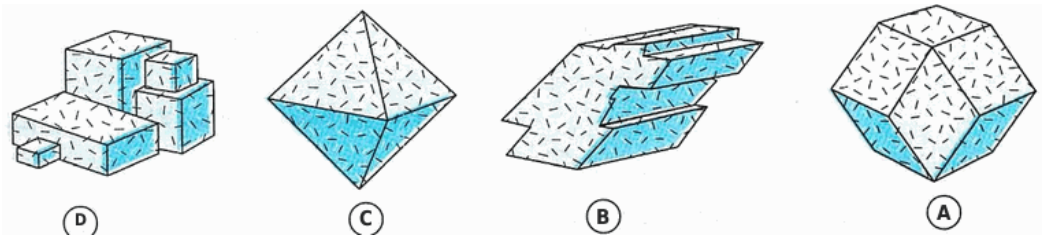
(C) (1) quartz - (2) calcite - (3) galena

(D) (1) quartz - (2) calcite - (3) orthoclase

**19** Which of the following minerals is the hardest?

(A) Talc (B) Orthoclase (C) Quartz (D) Fluorite

**20** Which of the following shapes results from the cracking of one of the sulphide minerals that is characterized by metallic luster?




**21** A native element mineral that has cleavage in one plane is the mineral .....

(A) mica (B) graphite (C) sulphur (D) diamond

**22** An experiment was carried out to determine the hardness of a mineral: it was scratched by a piece of glass and was also scratched by a copper coin. The hardness of the mineral is .....

(A) less than «3.5»
(B) exactly «5.5»
(C) greater than «3.5»
(D) greater than «5.5»

**23** How many minerals of the Mohs scale are scratched by the porcelain streak plate and cannot be scratched by a piece of glass?

(A) 1 (B) 2 (C) 3 (D) 6

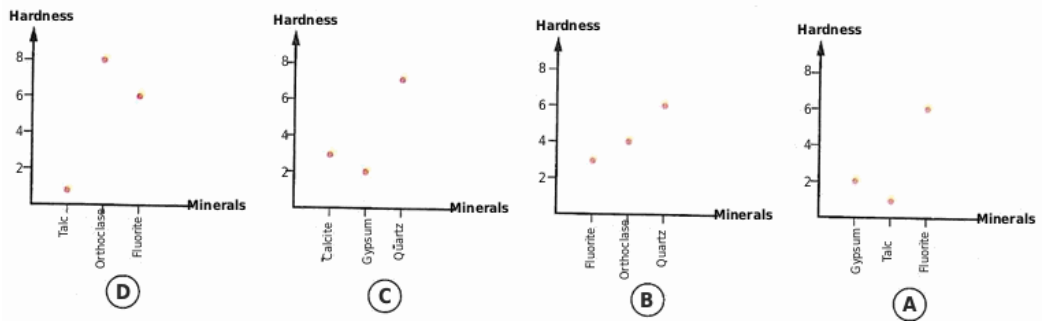
**24** The hardness of the human fingernail lies between the hardness of .....

(A) topaz and corundum
(B) talc and gypsum
(C) quartz and topaz
(D) gypsum and calcite

**25** Which of the following minerals scratches gypsum and is scratched by feldspar on the Mohs scale of hardness?

(A) A mineral that splits light into red and violet
(B) A mineral that scratches quartz
(C) A mineral used in the cement industry
(D) A mineral with conchoidal fracture

**26** Which of the following graphs is correct according to the Mohs scale of hardness?




**27** Which of the following statements is correct?

(A) Fluorite scratches gypsum
(B) Calcite scratches fluorite
(C) Talc scratches calcite
(D) Talc scratches fluorite

**28** The type of cleavage in minerals is known from .....

(A) hardness and streak

(B) the number of weakly bonded planes and the angles between them

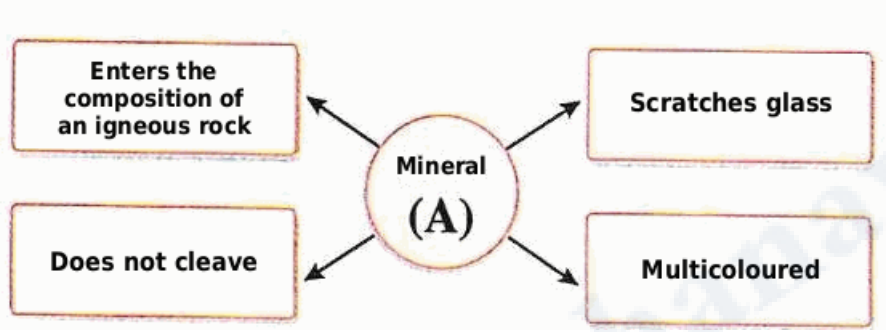
(C) the number of angles and the fracture of the mineral

(D) the lengths of the crystal axes and the angles between them

**29** Which of the following is a silicate mineral with conchoidal fracture?

(A) Orthoclase (B) Flint (C) Galena (D) Limonite

**30** From the opposite chart, which of the following minerals may letter (A) represent?




(A) Galena (B) Mica (C) Diamond (D) Quartz

**31** The mineral formed by the combination of sodium ions with chlorine has ..... cleavage.

(A) cubic (B) rhombic (C) sheet (platy) (D) basal

**32** The opposite mineral, whose specific gravity is 19.3, belongs to the group of .....



(A) silicates (B) sulphates (C) oxides (D) native elements

**33** Which of the following is the correct descending order of the hardness of these minerals?

(A) Diamond then topaz then quartz then corundum

(B) Diamond then corundum then orthoclase then quartz

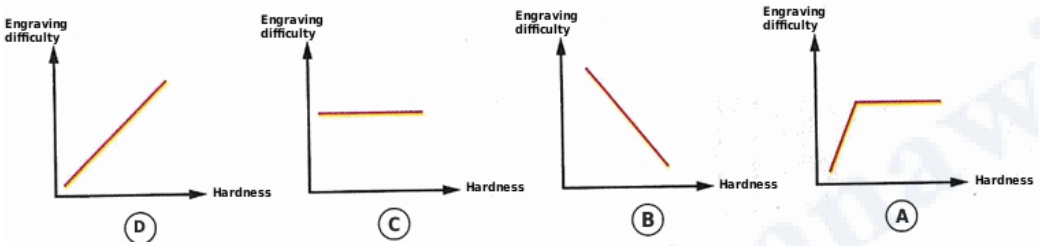
(C) Talc then calcite then fluorite then apatite

(D) Orthoclase then fluorite then calcite then talc

**34** The mineral that can scratch apatite and cannot scratch topaz is .....

(A) calcite (B) orthoclase (C) talc (D) fluorite

**35** The most suitable graph representing the relation between hardness and the difficulty of engraving on the mineral is graph .....

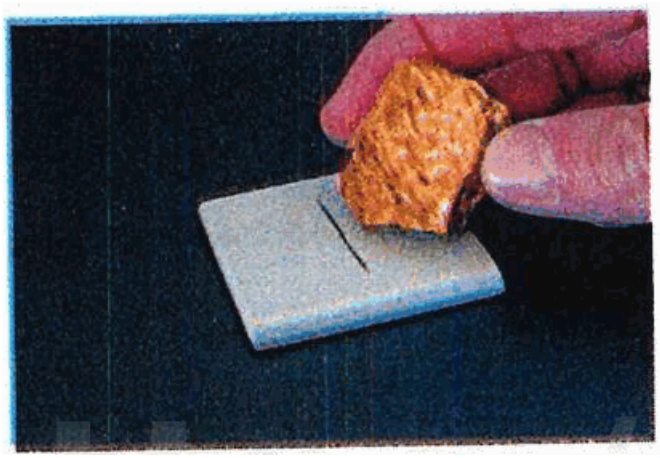



**36** The unglazed porcelain plate is used to find .....

(A) colour and streak (B) luster and streak

(C) hardness and luster (D) streak and hardness

**37** The mineral shown in the opposite picture may be the mineral .....



(A) pyrite (B) quartz (C) hematite (D) amethyst

**38** The mineral that is scratched by the porcelain streak plate may have a hardness of .....

(A) «5.5» (B) «7» (C) «7.5» (D) «8»

**39** From your study of the property of hardness, the most correct statement is that .....

(A) the human fingernail scratches calcite and does not scratch gypsum

(B) calcite can be scratched by a copper coin

(C) the mineral apatite can scratch topaz

(D) the hardness of the streak plate is about «7.5»

**40** Which of the following properties does not characterize the mineral of heavy specific gravity shown in the opposite figure?



(A) It has metallic luster (B) Its specific gravity is 19.3

(C) It has cubic cleavage (D) It belongs to the sulphide group

**41** Which of the following statements is the most accurate definition of cleavage?

(A) The splitting of a mineral along smooth surfaces

(B) The ability of a mineral to be shaped into sheets

(C) The breaking of a mineral along irregular broken surfaces

(D) The resistance of a mineral to scratching

**42** The cleavage shown in the opposite picture belongs to the mineral .....



(A) sphalerite (B) halite (C) quartz (D) calcite

**43** The mineral that does not contain weakly bonded planes among the following is .....

(A) mica (B) quartz (C) graphite (D) halite

**44** When a mineral sample was examined, it was noticed that it did not split even though pressure was applied to it. This indicates .....

(A) the degree of hardness of the mineral

(B) the strength of the bonds between the mineral's molecules

(C) the waviness of its luster

(D) the increase in the specific gravity of the mineral

**45** The property shared by gold and galena among the following is .....

(A) heavy specific gravity (B) non-metallic luster

(C) native element minerals (D) rhombic cleavage

**46** To which mineral group does the mineral that cleaves in three perpendicular directions and has a heavy specific gravity belong?

(A) Carbonates (B) Sulphides (C) Oxides (D) Silicates

**47** The mineral that cleaves as in the opposite figure may be .....



(A) mica (B) halite (C) amethyst (D) graphite

**48** From the opposite picture, which cohesive property can be deduced from the picture?



(A) Luster (B) Colour (C) Cleavage (D) Hardness

**49** The number of directions of the weakly bonded planes in the mineral mica is .....

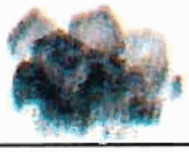
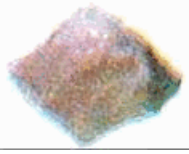
(A) zero (B) 1 (C) 2 (D) 3

**50** The data in the opposite table show the properties of one mineral. Which of the following minerals do the properties in the table represent?

| Properties of the mineral | |
|---|---|
| Vitreous | Luster |
| Scratches the copper coin | Hardness |
| None | Cleavage |
| Silicates | Mineral group |

(A) Calcite (B) Orthoclase (C) Amethyst (D) Apatite

**51** The opposite table shows information about 3 different minerals (A), (B), (C). What are these minerals, respectively?

| | | |
|---|---|---|
| Silicate |  | **A** |
| Its crystals are cubic |  | **B** |
| Its luster is vitreous |  | **C** |

(A) (A) mica / (B) halite / (C) calcite

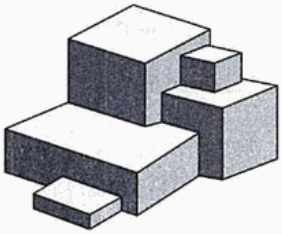
(B) (A) barite / (B) dolomite / (C) diamond

(C) (A) graphite / (B) halite / (C) quartz

(D) (A) mica / (B) calcite / (C) feldspar

**52** The following table gives information about four minerals (A), (B), (C), (D):

The opposite figure represents a sample of mineral (A), which is .....



| Colour | Luster | Hardness | Mineral |
|---|---|---|---|
| Silver | Metallic | «2.5» | **A** |
| Black | Non-metallic | «2.5» | **B** |
| Transparent | Non-metallic | «3» | **C** |
| Green | Non-metallic | «6.5» | **D** |

(A) hematite (B) calcite (C) pyrite (D) galena

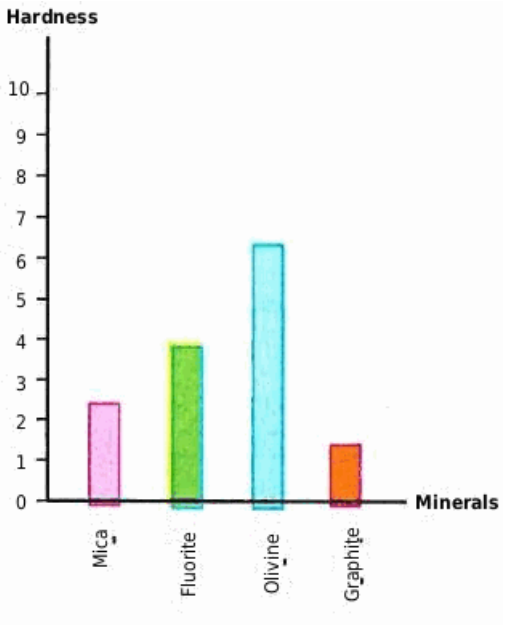
**53** The following table gives information about four minerals (A), (B), (C), (D):

The mineral that can scratch minerals (A), (B), (C) and cannot scratch mineral (D) among the following is .....

| Colour | Luster | Hardness | Mineral |
|---|---|---|---|
| Silver | Metallic | «2.5» | **A** |
| Black | Non-metallic | «2.5» | **B** |
| Transparent | Non-metallic | «3» | **C** |
| Green | Non-metallic | «6.5» | **D** |

(A) fluorite (B) talc (C) quartz (D) gypsum

**54** From the opposite graph, which shows the hardness of four different minerals, which of the following minerals scratches gypsum and cannot scratch calcite?




(A) Mica (B) Fluorite (C) Olivine (D) Graphite

**55** When a piece of amethyst is scratched with a piece of rock crystal, .....

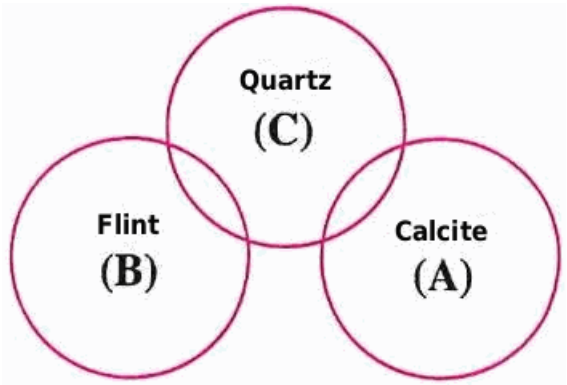
(A) the amethyst scratches the rock crystal and gives a pink powder

(B) the rock crystal scratches the amethyst and gives a violet powder

(C) each of them scratches the other and gives a white powder

(D) neither of them scratches the other

**56** Which of the following choices represents one similarity between minerals (A) and (C) and another similarity between minerals (B) and (C) in the opposite chart, respectively?




(A) Fracture / mineral group (B) Luster / fracture

(C) Cleavage / mineral group (D) Hardness / cleavage

**57** A large piece of mineral, light pink in colour, that scratches glass and is used in making ceramic ware is .....

(A) hematite (B) feldspar (C) quartz (D) diamond

**58** The following table records some physical properties of five minerals:
The mineral that can scratch fluorite and cannot scratch orthoclase among the following is .....

| Streak | Hardness | Common colours | Mineral name |
|---|---|---|---|
| White | «2.5» - «3» | White | Brucite |
| White | «2.5» | White | Carnallite |
| White | «3.5» - «4» | Pink | Dolomite |
| White | «4» - «4.5» | White | Magnesite |
| White | «6.5» | Green | Olivine |

(A) brucite (B) magnesite (C) carnallite (D) olivine

**59** The ornamental stone that contains the two most abundant elements in the Earth's crust is .....

(A) amethyst (B) calcite (C) malachite (D) sphalerite

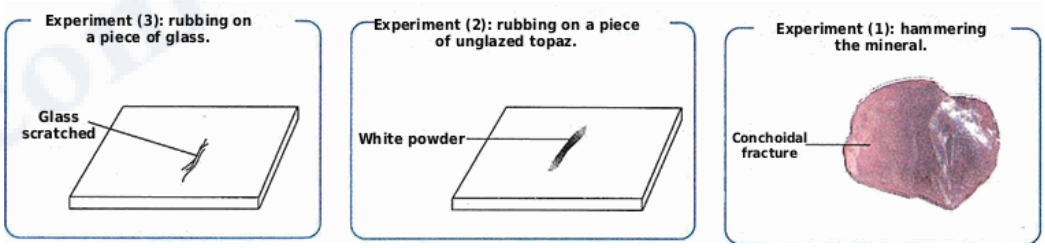
**60** The following table shows some physical properties of a mineral:
The chemical elements forming this mineral are .....

| Observation | Physical properties |
|---|---|
| White | Colour |
| Can be scratched by orthoclase | Hardness |
| Non-metallic vitreous luster | Luster |
| Smooth surfaces appear in more than one direction | Cleavage |

(A) oxygen and silicon (B) sulphur and zinc
(C) oxygen, carbon and calcium (D) oxygen and iron

**61** The following figures show three different physical experiments carried out on a mineral and their results. Observe them well, then answer:

The mineral tested is .....

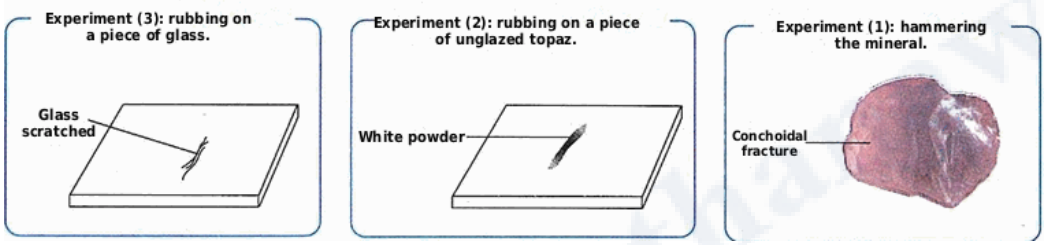



(A) galena (B) calcite (C) halite (D) quartz

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**62** The following figures show three different physical experiments carried out on a mineral and their results. Observe them well, then answer:

The luster of this mineral can be tested by .....




(A) using a piece of magnet

(B) observing the degree of light reflection on the mineral's surface

(C) using unglazed porcelain

(D) observing the wavelength reflected from the mineral

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**63** We have four minerals: (1) quartz, (2) calcite, (3) flint, (4) mica.

From your study of the distinguishing properties of these minerals, answer the following:

The minerals characterized by non-metallic vitreous luster are .....

(A) (1), (2) (B) (1), (3) (C) (1), (4) (D) (2), (3)

---

**64** We have four minerals: (1) quartz, (2) calcite, (3) flint, (4) mica.

From your study of the distinguishing properties of these minerals, answer the following:

The minerals that have cleavage are .....

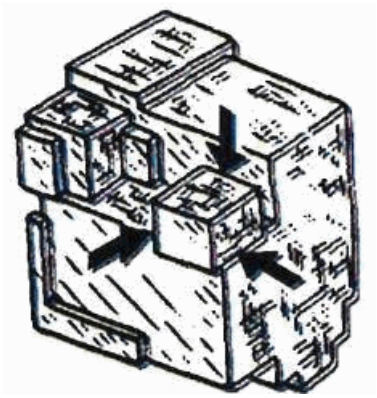
(A) (1), (4) (B) (1), (2) (C) (2), (4) (D) (2), (3)

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**65** We have four minerals: (1) quartz, (2) calcite, (3) flint, (4) mica.
From your study of the distinguishing properties of these minerals, answer the following:
The minerals characterized by conchoidal fracture are .....

(A) (3), (4) (B) (1), (4) (C) (2), (4) (D) (1), (3)

**66** By studying the specific gravity of the mineral in the opposite figure, it was found to be 2.1.
The mineral is probably .....



(A) galena (B) quartz (C) mica (D) halite

## Essay questions — 10 questions

1 The colours of minerals differ according to the impurities and the chemical composition. Through this, state:

(1) What is the reason for the change of the colour of sphalerite to brown?

(2) What is the colour of the powder produced by rubbing amethyst with rock crystal?

(3) What is the shape of the surface produced by breaking rose quartz?

---

2 State the following properties of the Mohs scale mineral that is scratched by the porcelain streak plate, is not affected when rubbed against glass, and is one of the feldspar minerals:

(1) Luster.

(2) Mineral group.

(3) Use.

(4) Degree of hardness.

---

3 Minerals differ in their ability to split along weakly bonded planes. In the light of this:

(1) What is the result of applying pressure on each of mineral (A), whose chemical composition is silicon dioxide, and mineral (B), whose chemical composition is sodium chloride?

(2) What happens when hammering mineral (C), whose specific gravity is 19.3, and mineral (D), whose specific gravity is 7.5?

---

4 Some minerals may be similar in colour but differ in other properties. In the light of this:

(1) What is the luster of the mineral that has a colour like the colour of gold? And what is the colour of its powder?

(2) Quartz and its streak may have the same colour under certain conditions. Explain this.

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5 State the mineral group of each of the following:

(1) The hardest mineral on the Mohs scale.

(2) A mineral whose specific gravity is 7.5

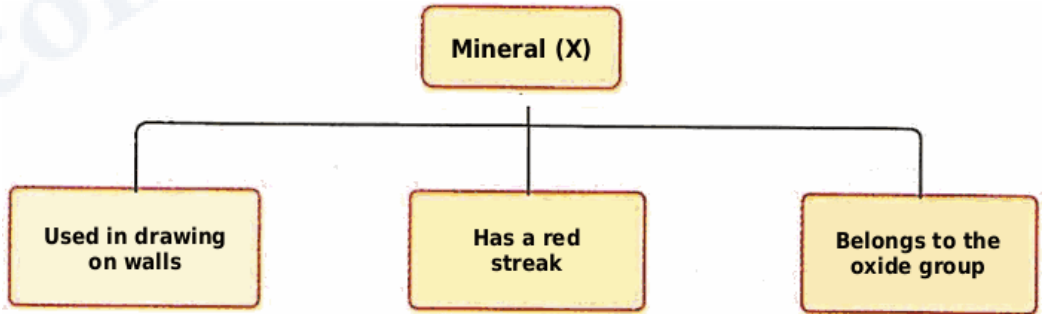
(3) A mineral on the Mohs scale that is scratched by a copper coin and is not scratched by the human fingernail.

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**6** The opposite chart shows some information about mineral (X):

(1) What is mineral (X)? And what is its colour?

(2) What is the sum of the percentages of the elements forming it out of the volume of the Earth's rocks?




**7** State one similarity and one difference between each of:

(1) Amethyst and rose quartz.

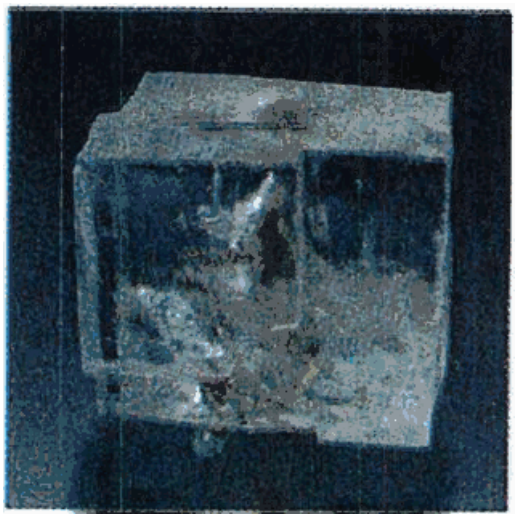
(2) Hardness and cleavage.

**8** The opposite picture shows a sample of a mineral whose chemical composition is sodium chloride. Study the picture well, then answer:

(1) State a cohesive property that can easily be described from the picture.

(2) What is the mineral shown in the picture?

(3) What is the crystal system of the mineral shown?



**9** The data in the following table show the properties of a mineral: luster: vitreous, chemical composition: calcium carbonate. Study them, then answer:

(1) What is the cleavage of the mineral shown in the table?

(2) To which mineral group does the mineral that comes directly before it on the Mohs scale of hardness belong?

(3) What silicate mineral is similar to the mineral shown in the table in luster?

**10** The following table shows the properties of two different minerals. Study it well, then answer:

Mineral (X): luster vitreous, cleavage A, ore for making glass, mineral group silicates.

Mineral (Z): luster vitreous, cleavage in more than one direction, ore for making cement, mineral group B

(1) What are minerals (X) and (Z)?

(2) What do letters (A) and (B) indicate?

## Past exam questions — 33 questions

**1** Which of the following minerals is a compound and reflects light to a greater degree? (Trial exam / June 2021)

(A) Calcite (B) Pyrite (C) Gold (D) Feldspar

**2** Which of the following is a native element mineral and reflects light to a greater degree? (1st session 2021, Sample exam 2025)

(A) Quartz (B) Gold (C) Galena (D) Feldspar

**3** Study the following table, then deduce: (2nd session 2022)

Group (1): galena, pyrite, gold.

Group (2): feldspar, calcite, quartz.

What is the classification criterion used to distinguish between the two groups?

(A) The degree of light reflection (B) Magnetic properties

(C) The colour of the mineral's powder (D) Ductility and malleability

**4** What is expected to happen when a limited number of atoms of one element are replaced by atoms of another element in the crystal of a mineral? (Trial exam 2023)

(A) A difference in the colour of the mineral's powder

(B) A difference in the crystal system of the mineral

(C) A difference in the mineral's resistance to scratching

(D) A difference in the wavelength of the light reflected from it

**5** The carbonate mineral used in the past as ornamental stones can be identified in the field by its ..... (1st session 2023)

(A) specific gravity (B) luster (C) colour (D) crystal system

**6** All of the following minerals need their streak to be known to identify them except ..... (1st session 2023)

(A) hematite (B) sulphur (C) quartz (D) pyrite

**7** When a slice of a mineral is placed on the pages of a book and the words are seen clearly, the mineral is probably ..... (1st session 2024)

(A) yellow sphalerite (B) galena (C) yellow sulphur (D) hematite

**8** We have three minerals:

(X): a sulphide mineral with a black streak.

(Y): a carbonate mineral.

(Z): an oxide mineral whose streak is red.

Their colours, respectively, are ..... (Sample exam 2025)

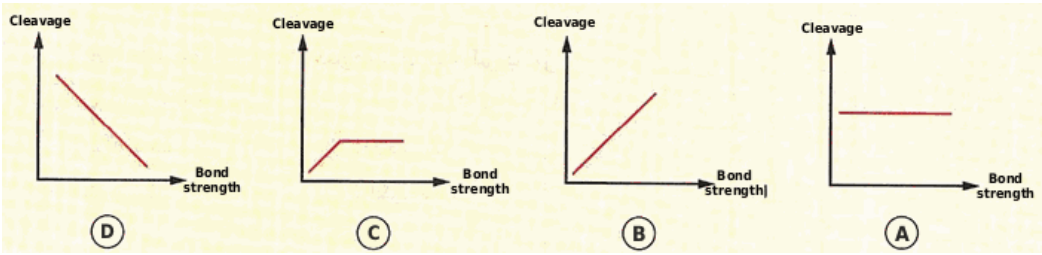
(A) golden / green / red (B) green / white / red

(C) golden / white / lemon (D) black / white / golden

**9** The mineral that is not scratched by the porcelain streak plate is ..... (Trial exam / May 2021)

(A) orthoclase (B) calcite (C) amethyst (D) apatite

**10** Which of the following graphs represents the correct relation between the property of cleavage and the strength of chemical bonds in minerals? (Trial exam / May 2021)




**11** Which of the following minerals has metallic luster and splits in more than one direction when hammered? (Trial exam / May 2021)

(A) Graphite (B) Quartz (C) Galena (D) Calcite

**12** Which native element mineral is characterized by weak chemical bonds and splits in one direction only? (Trial exam / June 2021, Sample exam 2025)

(A) Halite (B) Biotite (C) Muscovite (D) Graphite

**13** What is the similarity between the mineral halite and the mineral calcite? (1st session 2021)

(A) The number of cleavage planes
(B) The number of their chemical elements
(C) The mineral group
(D) The degree of solubility in water

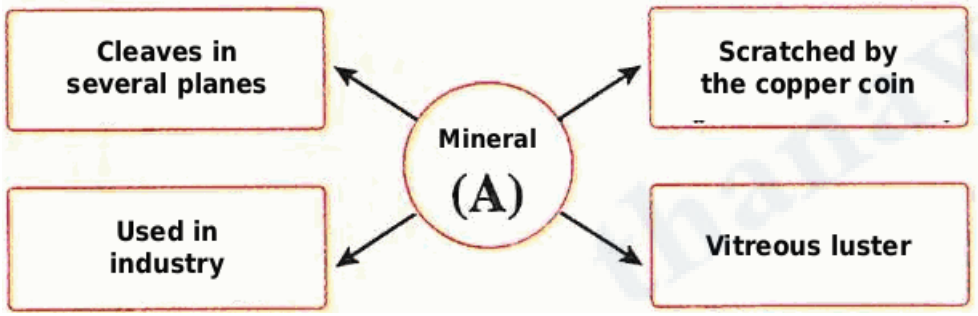
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**14** What are the similarity and the difference, respectively, between the minerals quartz and calcite? (2nd session 2021)

(A) They are similar in cleavage / they differ in fracture
(B) They are similar in being compound minerals / they differ in non-metallic luster
(C) They are similar in vitreous luster / they differ in cleavage
(D) They are similar in colour / they differ in ductility and malleability

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**15** By studying the chart in front of you, mineral (A) is ..... (2nd session 2021)




(A) quartz
(B) calcite
(C) orthoclase
(D) galena

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**16** Although diamond and graphite have the same chemical composition, they differ in hardness: diamond scratches all minerals, including graphite, because of ..... (2nd session 2021)

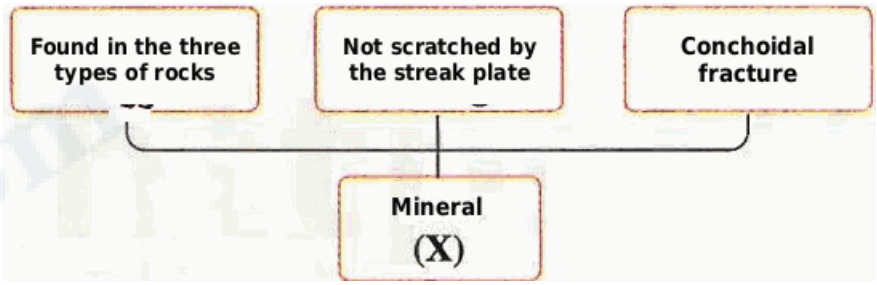
(A) the different type of impurities in each of them
(B) the different amount of impurities in each of them
(C) each of them having a specific chemical composition
(D) the different crystal system of each of them

---

**17** You have two samples of two different minerals:
The first sample: a silicate mineral that scratches orthoclase and does not scratch topaz.
The second sample: a carbonate mineral whose cleavage is rhombic.
What is the similarity between the two samples? (1st session 2022)

(A) The degree of light reflection
(B) The degree of resistance to abrasion
(C) The type of splitting
(D) The type of fracture

**18** From the opposite chart, to which mineral group does mineral (X) belong? (2nd session 2022)




(A) Silicates (B) Oxides (C) Sulphates (D) Carbonates

---

**19** From studying the following table:

Mineral (1): golden in colour, its streak is black.

Mineral (2): malleable and ductile, its luster is metallic.

Mineral (3): its colour is violet, its streak is white.

The mineral groups of minerals (1), (2), (3), respectively, are ..... (1st session 2023, Sample exam 2025)

(A) (1) native elements / (2) silicates / (3) sulphides

(B) (1) sulphates / (2) native elements / (3) silicates

(C) (1) silicates / (2) sulphides / (3) native elements

(D) (1) sulphides / (2) native elements / (3) silicates

---

**20** (X) and (Y) are two minerals that reflect a large amount of the light falling on them. If you know that they are compound minerals and belong to the same mineral group, state two physical properties to distinguish between them ..... (2nd session 2023)

(A) (X) its cleavage is rhombic - (Y) its streak is white

(B) (X) its streak is black - (Y) its colour is transparent yellow

(C) (X) its specific gravity is light - (Y) its cleavage is cubic

(D) (X) its cleavage is cubic - (Y) its colour is golden yellow

---

**21** A mineral has the same chemical composition as a mineral that splits parallel to the base of the crystal. This mineral is characterized by ..... (2nd session 2023)

(A) not being scratched by any mineral

(B) scratching quartz and not scratching corundum

(C) splitting the light falling on it into red and green

(D) its texture rippling when it is moved

**22** From the following table, to which mineral group do minerals (1) and (2) belong? (1st session 2024)

Mineral (1): its colour is white, its cleavage is rhombic.

Mineral (2): its colour is constant green.

(A) Sulphides (B) Silicates (C) Sulphates (D) Carbonates

**23** A mineral has metallic luster, good cleavage in several perpendicular planes and a high specific gravity. It belongs to the group of ..... (2nd session 2024)

(A) silicates (B) sulphides (C) carbonates (D) native elements

**24** By studying the minerals in the following table: (1) calcite, (2) quartz, (3) sphalerite, (4) pyrite.

Which of the following choices is correct? (2nd session 2024)

(A) (1), (2) have vitreous luster; (3), (4) are from the same mineral group

(B) (1), (2) are from the same mineral group; (3), (4) have vitreous luster

(C) (1), (2) have rhombic cleavage; (3), (4) have a black streak

(D) (1), (2) have the same hardness; (3), (4) have rhombic cleavage

**25** The similarity between galena and calcite is ..... (Sample exam 2025)

(A) the values of the angles between the cleavage planes

(B) the degree of reflection of the light falling on them

(C) the mineral group they belong to

(D) the number of directions of the cleavage planes

**26** Which mineral cleaves in more than one direction and has non-metallic luster? (1st session 2025)

(A) Pyrite (B) Galena (C) Calcite (D) Graphite

**27** Which compound mineral has cleavage in one plane? (2nd session 2025)

(A) Galena (B) Graphite (C) Mica (D) Calcite

**28** A shiny mineral sample with metallic luster shows perfect cubic cleavage and has a heavy specific gravity. Which mineral best matches these properties? (Sample exam 2026)

(A) Graphite (B) Mica (C) Calcite (D) Galena

**29** Mineral (X) scratches the mineral forming limestone rock and cannot scratch the mineral amethyst. What is its approximate hardness on the «Mohs» scale? (Sample exam 2026)

(A) 1 (B) 2 (C) 5 (D) 7

**30** The mineral whose chemical composition is silicon dioxide ($SiO_2$) is characterized by ..... (Sample exam 2026)

(A) a constant colour
(B) belonging to the oxides
(C) metallic luster
(D) having no weakly bonded planes

**31** A mineral sample has non-metallic vitreous luster and cleaves in three non-perpendicular directions to form a rhombus. What is this mineral? (Sample exam 2026)

(A) Calcite
(B) Pyrite
(C) Potassium feldspar
(D) Gypsum

**32** Flint and quartz are similar in all of the following except ..... (Sample exam 2026)

(A) the mineral group
(B) being found in igneous rocks
(C) conchoidal fracture
(D) having no cleavage

**33** A mineral made of two elements is used in making spectacle lenses: (Trial exam 2023)

(1) What is the mineral?
(2) What is the mineral group?
(3) What is the shape of its surface when broken?
(4) What is the colour of the powder produced when it is scratched with diamond?

# Answer key and solutions

## Multiple choice questions

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 A | 2 D | 3 A | 4 D | 5 D | 6 A | 7 C | 8 B | 9 C | 10 D |
| 11 C | 12 A | 13 C | 14 B | 15 B | 16 A | 17 A | 18 D | 19 C | 20 D |
| 21 B | 22 A | 23 A | 24 D | 25 C | 26 C | 27 A | 28 B | 29 B | 30 D |
| 31 A | 32 D | 33 D | 34 B | 35 D | 36 D | 37 A | 38 A | 39 B | 40 B |
| 41 A | 42 D | 43 B | 44 B | 45 A | 46 B | 47 B | 48 C | 49 B | 50 C |
| 51 A | 52 D | 53 A | 54 A | 55 C | 56 B | 57 B | 58 B | 59 A | 60 C |
| 61 D | 62 B | 63 A | 64 C | 65 D | 66 D | | | | |

**1** **Answer (A)**

Quartz becomes violet when iron compounds are present.

Sphalerite becomes brown when the element iron is present.

**2** **Answer (D)**

These are different minerals, so they differ in chemical composition and in physical properties.

**3** **Answer (A)**

This is the property of play of colours.

**4** **Answer (D)**

The crystals of most minerals are monoclinic, not cubic.

**5** **Answer (D)**

Diamond gives many colours when it is moved in front of the eye: play of colours.

**6** **Answer (A)**

The violet colour of amethyst is caused by iron oxide, that is, oxygen and iron.

**7** **Answer (C)**

The presence of manganese impurities is the reason for the pink colour of rock crystal.

**8** **Answer (B)**

Sphalerite is a compound mineral of zinc and sulphur.

**9** **Answer (C)**

Sphalerite is zinc sulphide, and it is the source of the element zinc.

**10** **Answer (D)**

The crystal form determines the physical properties of the mineral.

**11** **Answer (C)**

Metallic luster (pyrite) then vitreous (feldspar) then earthy (kaolinite).

**12** **Answer (A)**

The streak colour is constant for a mineral, and the streak of quartz is white whatever its colour is.

**13** **Answer (C)**

Quartz is silica, so it is made of a regular arrangement of silicon and oxygen atoms.

**14** **Answer (B)**

Pyrite has a metallic luster that is seen with the naked eye.

**15** **Answer (B)**

(A) is a native element mineral that has cleavage: graphite.

(B) has cleavage and a non-metallic luster: calcite.

**16** **Answer (A)**

Hammering reveals malleability, fracture and cleavage.

Hardness is found by scratching.

**17** **Answer (A)**

Quartz has no cleavage, so it has no weakly bonded planes.

**18** **Answer (D)**

**19** **Answer (C)**

The hardness of quartz is 7, orthoclase 6, fluorite 4 and talc 1.

**20** **Answer (D)**

Galena is a sulphide with metallic luster, and it cleaves into small cubes, which is shape (D).

**21** **Answer (B)**

Graphite is a native element mineral that cleaves in one plane.

**22** **Answer (A)**

The copper coin (hardness 3.5) scratched the mineral, so its hardness is less than 3.5.

**23** **Answer (A)**

The hardness of the streak plate is 6.5 and of glass 5.5, so the only mineral between them is orthoclase (6).

**24** **Answer (D)**

The hardness of the human fingernail is 2.5, so it is between the hardness of gypsum (2) and calcite (3).

**25** **Answer (C)**

The mineral is between gypsum (2) and feldspar (6), and calcite (3) is the one used in the cement industry.

**26** **Answer (C)**

The hardness of gypsum is 2, calcite 3 and quartz 7.

**27** **Answer (A)**

Fluorite (4) is harder than gypsum (2), so it scratches it.

**28** **Answer (B)**

The type of cleavage is known from the number of weakly bonded planes and the angles between them.

**29** **Answer (B)**

Flint is a silicate and its fracture is conchoidal.

**30** **Answer (D)**

Quartz scratches glass, is multicoloured, has no cleavage and enters the composition of igneous rocks.

**31** **Answer (A)**

Halite (sodium chloride) has cubic cleavage.

**32** **Answer (D)**

Gold has a specific gravity of 19.3 and is one of the native elements.

**33** **Answer (D)**

The hardness of orthoclase is 6, then fluorite 4, then calcite 3, then talc 1.

**34** **Answer (B)**

The mineral is between apatite (5) and topaz (8), and orthoclase (6) is the only suitable one.

**35** **Answer (D)**

The greater the hardness, the more difficult engraving on the mineral becomes, so the relation is direct.

**36** **Answer (D)**

It is used to find the streak colour and estimate hardness (its hardness is 6.5).

**37** **Answer (A)**

**38** **Answer (A)**

The hardness of the streak plate is 6.5, so the mineral it scratches is softer than it: 5.5.

**39** **Answer (B)**

The hardness of calcite is 3 and of the copper coin 3.5, so the coin scratches it.

**40** **Answer (B)**

The specific gravity of galena is about 7.5, while 19.3 is the specific gravity of gold.

**41** **Answer (A)**

Cleavage is the splitting of a mineral along smooth surfaces.

**42** **Answer (D)**

Calcite cleaves into rhombic shapes.

**43** **Answer (B)**

Quartz has no cleavage, so it has no weakly bonded planes.

**44** **Answer (B)**

The strength of the bonds between the mineral's molecules makes it resist cleavage.

**45** **Answer (A)**

Gold (19.3) and galena (7.5) both have a heavy specific gravity.

**46** **Answer (B)**

Galena is a sulphide; it cleaves into cubes in three perpendicular directions and its specific gravity is heavy.

**47** **Answer (B)**

Halite cleaves into cubes.

**48** **Answer (C)**

Mica cleaves into thin sheets, which is the property of cleavage.

**49** **Answer (B)**

Mica has cleavage in one direction.

**50** **Answer (C)**

The mineral is a silicate without cleavage: amethyst (quartz), and its hardness is 7, so it scratches the copper coin.

Calcite and orthoclase have cleavage, and apatite is not a silicate.

**51** **Answer (A)**

(A) is a silicate: mica.

(B) has cubic crystals: halite.

(C) has vitreous luster: calcite.

**52** **Answer (D)**

The hardness of (A) is 2.5, its luster is metallic, its colour is silver and its crystals are cubic: galena.

**53** **Answer (A)**

The hardness of (D) is 6.5 and the others are less than 3, so the mineral whose hardness is between them is fluorite (4).

**54** **Answer (A)**

The hardness of mica is about 2.5, so it scratches gypsum (2) and does not scratch calcite (3).

**55** **Answer (C)**

Amethyst and rock crystal are quartz and have the same hardness, so each of them scratches the other.

Their powder is white.

**56** **Answer (B)**

(A) calcite and (C) quartz: their luster is vitreous.

(B) flint and (C) quartz: their fracture is conchoidal.

**57** **Answer (B)**

**58** **Answer (B)**

The mineral that scratches fluorite (4) and does not scratch orthoclase (6) has a hardness between 4 and 6: magnesite (4 to 4.5).

**59** **Answer (A)**

The two most abundant elements are oxygen and silicon, and amethyst is silica (SiO2).

**60** **Answer (C)**

Its hardness is less than orthoclase, it has cleavage, its luster is vitreous and it is a carbonate: calcite (Ca, C, O).

**61** **Answer (D)**

The mineral has conchoidal fracture, scratches glass, and on unglazed porcelain gives a white powder: quartz.

**62** **Answer (B)**

Luster is the degree of light reflection on the mineral's surface.

**63** **Answer (A)**

**64** **Answer (C)**

Calcite and mica have cleavage, while quartz and flint have conchoidal fracture.

**65** **Answer (D)**

Quartz and flint have conchoidal fracture.

**66** **Answer (D)**

Halite has a specific gravity of about 2.1 and its cleavage is cubic.

## Essay questions

**1** **Model answer**

(1) Because a small proportion of iron atoms replace some of the zinc atoms.

(2) White.

(3) Conchoidal fracture.

**2** **Model answer**

(1) Non-metallic, pearly.

(2) Silicates.

(3) Making ceramics.

(4) «6».

**3** **Model answer**

(1) Mineral (A): does not cleave and gives conchoidal fracture. Mineral (B): gives cubic cleavage.

(2) Mineral (C): is shaped. Mineral (D): gives cubic cleavage.

**4** **Model answer**

(1) The luster of pyrite is metallic, and the colour of the powder produced by scratching pyrite is black.

(2) When quartz contains impurities of many gas bubbles, its colour becomes white like the colour of its streak.

**5** **Model answer**

(1) Native element minerals.

(2) Sulphides.

(3) Carbonates.

**6** **Model answer**

(1) Hematite; its colour is red or dark grey.

(2) 51.6%

**7** **Model answer**

(1) Similarities: hardness «7», no cleavage, white streak, non-metallic vitreous luster, conchoidal fracture (one is enough).

Differences: amethyst contains iron oxide impurities and its colour is violet, while rose quartz contains manganese impurities and its colour is pink.

(2) Similarity: both are cohesive (physical) properties.

Difference: hardness is the degree of the mineral's resistance to scratching or abrasion, while cleavage is the ability of the mineral to split along weakly bonded planes.

**8** **Model answer**

(1) Its cleavage is cubic.

(2) Halite.

(3) The cubic system.

**9** **Model answer**

(1) Rhombic cleavage.

(2) The sulphate group.

(3) Quartz.

**10** **Model answer**

(1) (X): quartz, (Z): calcite.

(2) (A): no cleavage, (B): carbonates.

## Past exam questions

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|
| B | B | A | D | C | B | A | A | C | D |
| 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| C | D | A | C | B | D | A | A | D | D |
| 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
| A | D | B | A | D | C | C | D | C | D |
| 31 | 32 | 33 | | | | | | | |
| A | B | — | | | | | | | |

**1** **Answer (B)**

Pyrite ($FeS_2$) is a compound mineral with metallic luster that reflects light to a great degree.

Gold is metallic but a native element, and calcite and feldspar have non-metallic luster.

**2** **Answer (B)**

Gold is a native element mineral with metallic luster.

Galena is a compound, and quartz and feldspar have non-metallic luster.

**3** **Answer (A)**

Group (1) are minerals with metallic luster (they reflect light to a great degree).

Group (2) are minerals with non-metallic luster.

**4** **Answer (D)**

Limited replacement of atoms (impurities) changes the colour of the mineral, that is, it changes the wavelength of the light reflected from it.

**5** **Answer (C)**

Malachite is a carbonate mineral used for ornament, and it is characterized by its constant green colour.

**6** **Answer (B)**

Sulphur has a constant yellow colour, so it is known by its colour.

Hematite, pyrite and quartz have variable colours, so their streak must be known.

**7** **Answer (A)**

Seeing the words clearly through the slice means that the mineral is transparent.

Yellow sphalerite may be transparent, while galena and hematite are opaque.

**8** **Answer (A)**

(X) pyrite is golden, (Y) malachite is green and (Z) hematite is red.

**9** **Answer (C)**

The hardness of the streak plate is about 5.5 to 6

Amethyst (quartz) has a hardness of 7, so it is not scratched by the plate.

**10** **Answer (D)**

The weaker the chemical bonds, the greater the cleavage, so the relation is inverse (D).

**11** **Answer (C)**

Galena has metallic luster and cleaves in three perpendicular directions (cubic cleavage).

**12** **Answer (D)**

Graphite is a native element mineral (carbon) with weak bonds between its layers, so it cleaves in one direction.

**13** **Answer (A)**

Halite has cubic cleavage and calcite has rhombic cleavage, and both are in three planes.

**14** **Answer (C)**

Quartz and calcite have vitreous luster.

Quartz does not cleave, while calcite has rhombic cleavage.

**15** **Answer (B)**

It is scratched by the copper coin (hardness 3), its luster is vitreous and it cleaves in several planes: calcite.

**16** **Answer (D)**

The difference in hardness between diamond and graphite is due to the different internal arrangement of carbon atoms (the crystal system).

**17** **Answer (A)**

The first sample is quartz and the second is calcite, and both have vitreous luster (the same degree of light reflection).

**18** **Answer (A)**

Conchoidal fracture, not scratched by the streak plate and found in the three types of rocks: quartz, which is a silicate.

**19** **Answer (D)**

(1) Pyrite is a sulphide, (2) gold or copper is a native element mineral and (3) amethyst is a silicate.

**20** **Answer (D)**

Two compound minerals with metallic luster from the same group (sulphides): galena and pyrite. Galena has cubic cleavage, and pyrite is golden yellow.

**21** **Answer (A)**

The mineral that splits parallel to the base is graphite, and the mineral with the same composition is diamond.

Diamond is the hardest mineral, so it is not scratched by any mineral.

**22** **Answer (D)**

(1) Calcite: white with rhombic cleavage, and (2) malachite: constant green.

Both are carbonates.

**23** **Answer (B)**

Metallic luster, cubic cleavage and high specific gravity: galena, which is a sulphide.

**24** **Answer (A)**

Calcite and quartz have vitreous luster.

Sphalerite and pyrite are sulphides.

**25** **Answer (D)**

Galena (cubic cleavage) and calcite (rhombic cleavage) both cleave in three directions.

**26** **Answer (C)**

Calcite has non-metallic luster and cleaves in three directions.

Pyrite, galena and graphite have metallic luster.

**27** **Answer (C)**

Mica is a compound mineral (silicate) that cleaves in one plane.

Graphite cleaves in one plane but it is a native element.

**28** **Answer (D)**

Metallic luster, cubic cleavage and heavy specific gravity: galena.

**29** **Answer (C)**

The hardness of calcite is 3 and of amethyst 7, so the hardness of (X) is between them: 5

**30** **Answer (D)**

Quartz ($SiO_2$) has no weakly bonded planes, so it does not cleave and gives conchoidal fracture.

It is a silicate, its colour is variable and its luster is non-metallic.

**31** **Answer (A)**

Vitreous luster and cleavage in three non-perpendicular directions (rhombic): calcite.

**32** **Answer (B)**

Flint and quartz are silicates ($SiO_2$), have conchoidal fracture and do not cleave.

But flint is found in sedimentary rocks, not igneous rocks.

**33** **Model answer**

(1) Quartz.

(2) Silicates.

(3) Conchoidal.

(4) White.