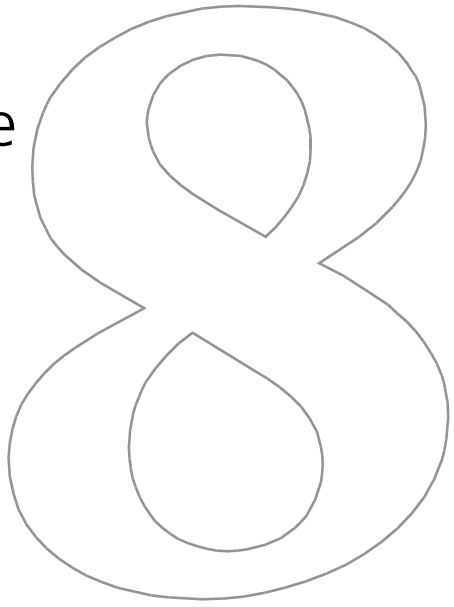
TIMSS 2003

SCIENCE ITEMS

Released Set
Eighth Grade



TIMSS & PIRLS INTERNATIONAL STUDY CENTER
LYNCH SCHOOL OF EDUCATION, BOSTON COLLEGE

International Association for the
Evaluation of Educational Achievement

TIMSS & PIRLS
International Study Center
Lynch School of Education, Boston College

Unique ID	MS Block	MS Block Seq	Item Type	Key	Trend	Content Domain	Main Topic	Cognitive Domain
S012025	S01	01	MC	B	Yes	Chemistry	Particulate structure of matter	Factual Knowledge
S012026	S01	02	MC	C	Yes	Life Science	Reproduction and heredity	Conceptual Understanding
S012027	S01	03	MC	D	Yes	Earth Science	Earth processes, cycles and history	Reasoning and Analysis
S012028	S01	04	MC	A	Yes	Life Science	Types, characteristics and classification of living things	Conceptual Understanding
S012029	S01	05	MC	D	Yes	Physics	Light	Reasoning and Analysis
S012030	S01	06	MC	B	Yes	Earth Science	Earth's structure and physical features	Factual Knowledge
S022035	S01	07	CR	X	Yes	Physics	Electricity and magnetism	Conceptual Understanding
S022225	S01	08	MC	D	Yes	Physics	Heat and temperature	Reasoning and Analysis
S022117	S01	09	MC	B	Yes	Life Science	Reproduction and heredity	Conceptual Understanding
S022235	S01	10	MC	E	Yes	Life Science	Development and life cycle of organisms	Reasoning and Analysis
S022188	S01	11	MC	C	Yes	Chemistry	Chemical change	Conceptual Understanding
S022074	S01	12	MC	B	Yes	Earth Science	Earth processes, cycles and history	Factual Knowledge
S022240	S01	13	MC	C	Yes	Environmental Science	Changes in environment	Factual Knowledge
S022206	S01	14	MC	B	Yes	Chemistry	Classification and composition of matter	Factual Knowledge
S022160	S01	15	CR	X	Yes	Life Science	Structure, function and life processes in organisms	Conceptual Understanding
S022058	S01	16	MC	B	Yes	Physics	Light	Conceptual Understanding
S012013	S02	01	MC	B	Yes	Earth Science	Earth processes, cycles and history	Conceptual Understanding
S012014	S02	02	MC	D	Yes	Life Science	Structure, function and life processes in organisms	Factual Knowledge
S012015	S02	03	MC	B	Yes	Physics	Light	Reasoning and Analysis
S012016	S02	04	MC	C	Yes	Chemistry	Classification and composition of matter	Factual Knowledge
S012017	S02	05	MC	A	Yes	Environmental Science	Changes in environment	Factual Knowledge
S012018	S02	06	MC	C	Yes	Earth Science	Earth processes, cycles and history	Factual Knowledge
S012001	S02	07	MC	E	Yes	Life Science	Structure, function and life processes in organisms	Factual Knowledge
S012002	S02	08	MC	B	Yes	Physics	Energy types, sources and conversions	Conceptual Understanding
S012003	S02	09	MC	B	Yes	Chemistry	Chemical change	Conceptual Understanding
S012004	S02	10	MC	A	Yes	Physics	Light	Conceptual Understanding
S012005	S02	11	MC	C	Yes	Environmental Science	Use and conservation of natural resources	Factual Knowledge
S012006	S02	12	MC	C	Yes	Earth Science	Earth's structure and physical features	Reasoning and Analysis
S032131	S02	13	CR	X	No	Physics	Energy types, sources and conversions	Conceptual Understanding
S032202	S02	14	CR	X	No	Life Science	Ecosystems	Reasoning and Analysis
S012037	S03	01	MC	A	Yes	Physics	Electricity and magnetism	Factual Knowledge
S012038	S03	02	MC	B	Yes	Life Science	Cells and their functions	Factual Knowledge
S012039	S03	03	MC	C	Yes	Life Science	Reproduction and heredity	Conceptual Understanding
S012040	S03	04	MC	C	Yes	Chemistry	Particulate structure of matter	Conceptual Understanding
S012041	S03	05	MC	C	Yes	Earth Science	Earth processes, cycles and history	Factual Knowledge
S012042	S03	06	MC	D	Yes	Environmental Science	Use and conservation of natural resources	Conceptual Understanding
S022086	S03	07	CR	X	Yes	Environmental Science	Changes in environment	Factual Knowledge
S022198	S03	08	MC	C	Yes	Chemistry	Chemical change	Conceptual Understanding
S022275	S03	09	MC	A	Yes	Earth Science	Earth's structure and physical features	Factual Knowledge
S022041	S03	10	MC	D	Yes	Physics	Forces and motion	Reasoning and Analysis
S022283	S03	11	CR	X	Yes	Earth Science	Earth in the solar system and universe	Conceptual Understanding
S022202	S03	12	MC	B	Yes	Chemistry	Particulate structure of matter	Factual Knowledge
S022152	S03	13	CR	X	Yes	Life Science	Structure, function and life processes in organisms	Conceptual Understanding
S022154	S03	14	CR	X	Yes	Life Science	Human health	Reasoning and Analysis
S022187	S04	01	MC	B	Yes	Chemistry	Classification and composition of matter	Conceptual Understanding
S022161	S04	02	CR	X	Yes	Life Science	Structure, function and life processes in organisms	Reasoning and Analysis
S022222	S04	03	MC	E	Yes	Physics	Forces and motion	Reasoning and Analysis
S022191	S04	04	CR	X	Yes	Chemistry	Chemical change	Reasoning and Analysis
S022279	S04	05	CR	X	Yes	Physics	Light	Reasoning and Analysis

Unique ID	MS Block	MS Block Seq	Item Type	Key	Trend	Content Domain	Main Topic	Cognitive Domain
S022040	S04	06	MC	A	Yes	Physics	Forces and motion	Conceptual Understanding
S022088A	S04	07	CR	X	Yes	Environmental Science	Use and conservation of natural resources	Reasoning and Analysis
S022088B	S04	07	CR	X	Yes	Environmental Science	Use and conservation of natural resources	Reasoning and Analysis
S022249	S04	08	CR	X	Yes	Environmental Science	Use and conservation of natural resources	Reasoning and Analysis
S022286	S04	09	CR	X	Yes	Physics	Forces and motion	Reasoning and Analysis
S032595	S04	10	MC	B	No	Life Science	Types, characteristics and classification of living things	Conceptual Understanding
S032656	S04	11	MC	A	No	Earth Science	Earth processes, cycles and history	Conceptual Understanding
S032625A	S04	12	CR	X	No	Physics	Electricity and magnetism	Reasoning and Analysis
S032625B	S04	12	CR	X	No	Physics	Electricity and magnetism	Reasoning and Analysis
S032607	S09	01	MC	C	No	Life Science	Structure, function and life processes in organisms	Factual Knowledge
S032063	S09	02	CR	X	No	Environmental Science	Use and conservation of natural resources	Reasoning and Analysis
S032206	S09	03	CR	X	No	Life Science	Cells and their functions	Reasoning and Analysis
S032008	S09	04	MC	B	No	Life Science	Reproduction and heredity	Factual Knowledge
S032083	S09	05	MC	A	No	Life Science	Diversity, adaptation, and natural selection	Conceptual Understanding
S032564	S09	06	MC	B	No	Chemistry	Classification and composition of matter	Conceptual Understanding
S032057	S09	07	CR	X	No	Chemistry	Acids and bases	Conceptual Understanding
S032055	S09	08	MC	D	No	Physics	Physical states and changes in matter	Factual Knowledge
S032626	S09	09	CR	X	No	Physics	Light	Conceptual Understanding
S032281	S09	10	MC	A	No	Physics	Forces and motion	Conceptual Understanding
S032150	S09	11	MC	D	No	Earth Science	Earth in the solar system and universe	Factual Knowledge
S032301	S09	12	MC	B	No	Earth Science	Earth in the solar system and universe	Reasoning and Analysis
S032446	S09	13	MC	C	No	Environmental Science	Changes in environment	Factual Knowledge
S032637	S10	01	MC	C	No	Life Science	Human health	Factual Knowledge
S032386	S10	02	MC	D	No	Life Science	Structure, function and life processes in organisms	Factual Knowledge
S032682	S10	03	MC	C	No	Life Science	Ecosystems	Factual Knowledge
S032652	S10	04	MC	A	No	Earth Science	Earth processes, cycles and history	Reasoning and Analysis
S032437	S10	05	MC	C	No	Earth Science	Earth in the solar system and universe	Conceptual Understanding
S032242	S10	06	CR	X	No	Environmental Science	Use and conservation of natural resources	Conceptual Understanding
S032709	S10	07	CR	X	No	Chemistry	Classification and composition of matter	Conceptual Understanding
S032711	S10	08	CR	X	No	Physics	Forces and motion	Reasoning and Analysis
S032712A	S10	09	CR	X	No	Physics	Forces and motion	Conceptual Understanding
S032712B	S10	09	CR	X	No	Physics	Forces and motion	Conceptual Understanding
S032713A	S10	10	CR	X	No	Chemistry	Classification and composition of matter	Reasoning and Analysis
S032713B	S10	10	CR	X	No	Chemistry	Classification and composition of matter	Reasoning and Analysis
S032574	S13	01	MC	B	No	Chemistry	Classification and composition of matter	Conceptual Understanding
S032532	S13	02	CR	X	No	Earth Science	Earth in the solar system and universe	Conceptual Understanding
S032562	S13	03	CR	X	No	Chemistry	Classification and composition of matter	Reasoning and Analysis
S032422	S13	04	MC	C	No	Environmental Science	Use and conservation of natural resources	Conceptual Understanding
S032375	S13	05	CR	X	No	Physics	Light	Conceptual Understanding
S032714	S13	06	MC	D	No	Earth Science	Earth in the solar system and universe	Conceptual Understanding
S032704	S13	07	CR	X	No	Life Science	Ecosystems	Conceptual Understanding
S032705A	S13	08	CR	X	No	Life Science	Ecosystems	Conceptual Understanding
S032705B	S13	08	CR	X	No	Life Science	Ecosystems	Conceptual Understanding
S032706A	S13	09	CR	X	No	Life Science	Diversity, adaptation, and natural selection	Reasoning and Analysis
S032706B	S13	09	CR	X	No	Life Science	Structure, function and life processes in organisms	Conceptual Understanding
S032707	S13	10	CR	X	No	Life Science	Diversity, adaptation, and natural selection	Reasoning and Analysis

TIMSS 2003

S012025

The nucleus of MOST atoms consists of

Ⓐ neutrons only
Ⓑ protons and neutrons
Ⓒ protons and electrons
Ⓓ neutrons and electrons

Content Domain
Chemistry

Main Topic
Particulate structure of matter

Cognitive Domain
Factual Knowledge

Key
B

TIMSS 2003

S012026

A son can inherit traits

Ⓐ only from his father
Ⓑ only from his mother
Ⓒ from both his father and his mother
Ⓓ from either his father or his mother, but not from both

Content Domain
Life Science

Main Topic
Reproduction and heredity

Cognitive Domain
Conceptual Understanding

Key
C

TIMSS 2003

Content Domain
Earth Science

Main Topic
Earth processes, cycles and history

Cognitive Domain
Reasoning and Analysis

Key
D

The table gives the temperature at a certain place at different times of the day for three days.

	6 a.m.	9 a.m.	12 noon	3 p.m.	6 p.m.
Monday	15°C	17°C	20°C	21°C	19°C
Tuesday	15°C	15°C	15°C	5°C	4°C
Wednesday	8°C	10°C	14°C	14°C	13°C

When did the wind become much colder?

(A) Monday morning
(B) Monday afternoon
(C) Tuesday morning
(D) Tuesday afternoon
(E) Wednesday afternoon

S012027

TIMSS 2003

S012028

A person sorted some animals into the two groups listed on the table. Which characteristic of animals was used for the sorting?

Ⓐ Legs
Ⓑ Eyes
Ⓒ Nervous system
Ⓓ Skin

Group 1	Group 2
Humans	Snakes
Dogs	Worms
Flies	Fish

Content Domain
Life Science

Main Topic
Types, characteristics and classification of living things

Cognitive Domain
Conceptual Understanding

Key
A

TIMSS 2003

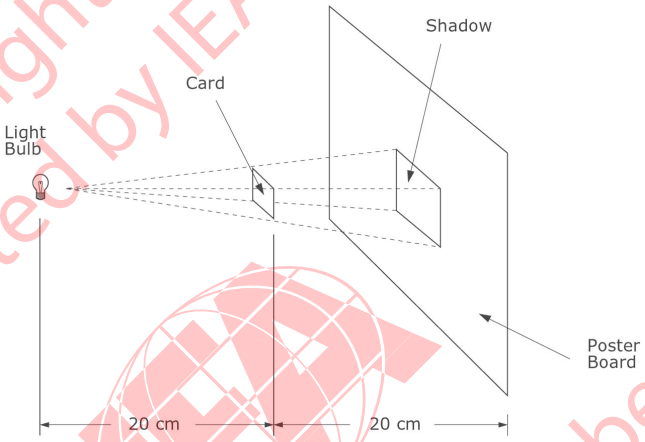
Content Domain
Physics

Main Topic
Light

Cognitive Domain
Reasoning and Analysis

Key
D

A tiny light bulb is held 20 centimeters to the left of a square card, which is in turn held 20 centimeters to the left of a poster board, as shown. The shadow of the card on the poster board has a side of 10 centimeters.



If the poster board is moved 40 cm further to the right so that it is 80 cm from the light, what will be the new side of the card's shadow on the poster board?

Ⓐ 5 cm
Ⓑ 10 cm
Ⓒ 15 cm
Ⓓ 20 cm

S012029

TIMSS 2003

S012030

Most underground caves are formed by the action of water on

Ⓐ granite
Ⓑ limestone
Ⓒ sandstone
Ⓓ shale

Content Domain
Earth Science

Main Topic
Earth's structure and physical features

Cognitive Domain
Factual Knowledge

Key
B

TIMSS 2003

Content Domain
Physics

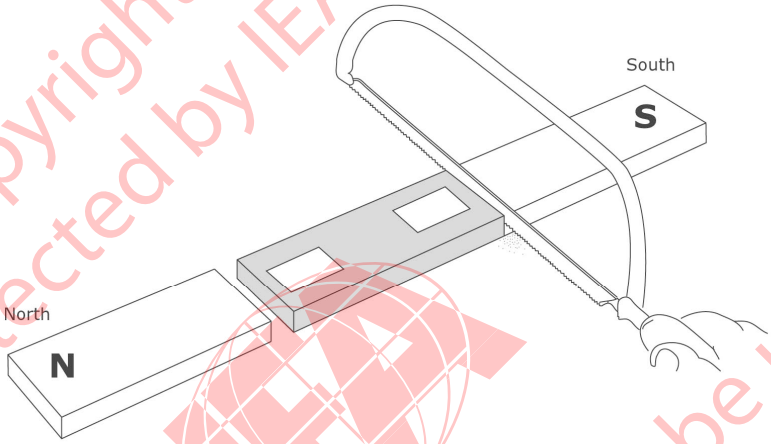
Main Topic
Electricity and magnetism

Cognitive Domain
Conceptual Understanding

Key
See scoring guide

S022035

The diagram shows a bar magnet which is cut into three pieces with a hacksaw.



Write an "N" or an "S" in each box on the diagram to show the polarity of each end of the center piece.

Note: To receive credit, the polarity of BOTH ends of the center piece must be indicated. Code as correct if polarity is indicated correctly (**N-S**), but letters are shown above, below, or outside the boxes, as long as the polarity of both ends of the center piece is clear. [Substitute appropriate country-specific labels in place of **N-S** if required.]

Code	Response	Item: S022035
	Correct Response	
10	N-S	
	Incorrect Response	
70	S-N	
71	Pole of cut ends of outer pieces are indicated (S - N) instead of poles on center piece.	
79	Other incorrect (including crossed out/erased, stray marks, illegible, or off task)	
	Nonresponse	
99	Blank	

TIMSS 2003

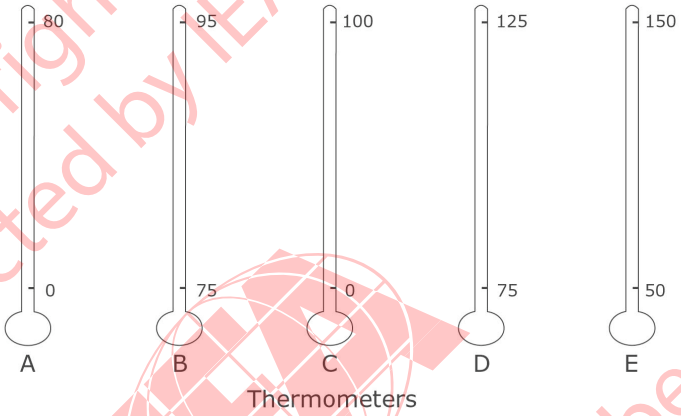
Content Domain
Physics

Main Topic
Heat and temperature

Cognitive Domain
Reasoning and Analysis

Key
D

At different altitudes, the boiling point of water ranges from about 80° C to 100° C. Which of the Celsius thermometers shown below would give the most accurate measurement of the boiling point of water at different altitudes?



Ⓐ Thermometer A
Ⓑ Thermometer B
Ⓒ Thermometer C
Ⓓ Thermometer D
Ⓔ Thermometer E

S022225

TIMSS 2003

Why would male insects be treated to prevent sperm production?

Ⓐ To increase the number of female insects
Ⓑ To reduce the total population of insects
Ⓒ To produce new species of insects
Ⓓ To prevent insects from mating

S022117

Content Domain
Life Science

Main Topic
Reproduction and heredity

Cognitive Domain
Conceptual Understanding

Key
B

TIMSS 2003

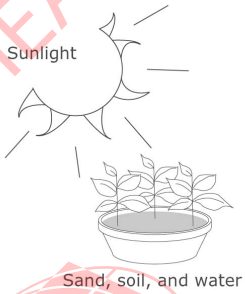
Content Domain
Life Science

Main Topic
Development and life cycle of organisms

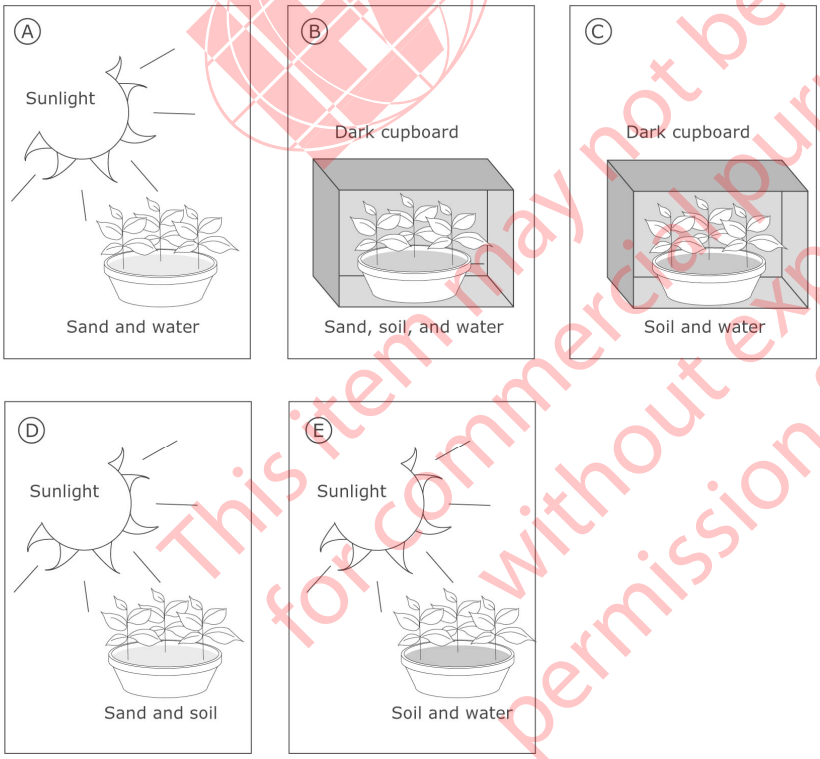
Cognitive Domain
Reasoning and Analysis

Key
E

A girl has an idea that green plants need sand in the soil for healthy growth. In order to test her idea she uses two pots of plants. She sets up one pot of plants as shown below.



Which ONE of the following should she use for the second pot of plants?



S022235

TIMSS 2003

S022188

Some chemical reactions absorb energy, while others release energy. Of the chemical reactions in burning coal and exploding fireworks, which will release energy?

Ⓐ Burning coal only

Ⓑ Exploding fireworks only

Ⓒ Both burning coal and exploding fireworks

Ⓓ Neither burning coal nor exploding fireworks

Content Domain
Chemistry

Main Topic
Chemical change

Cognitive Domain
Conceptual Understanding

Key
C

TIMSS 2003

S022074

Fossil fuels were formed from

Ⓐ volcanoes
Ⓑ the remains of living things
Ⓒ gases in the atmosphere
Ⓓ water trapped inside rocks

Content Domain
Earth Science

Main Topic
Earth processes, cycles and history

Cognitive Domain
Factual Knowledge

Key
B

S022240

One of the main causes of acid rain is

Ⓐ Waste from nuclear power plants
Ⓑ Spills from chemical manufacturing plants
Ⓒ Gases from burning fossil fuels
Ⓓ Gases from aerosol spray cans

TIMSS 2003

Content Domain
Environmental Science

Main Topic
Changes in environment

Cognitive Domain
Factual Knowledge

Key
C

TIMSS 2003

When chlorine gas reacts with sodium metal, what type of substance is formed?

Ⓐ A mixture
Ⓑ A compound
Ⓒ An element
Ⓓ An alloy
Ⓔ A solution

S022206

Content Domain
Chemistry

Main Topic
Classification and composition of matter

Cognitive Domain
Factual Knowledge

Key
B

TIMSS 2003

What is the advantage of having two ears to hear with rather than one ear?

S022160

Content Domain
Life Science

Main Topic
Structure, function and life processes in organisms

Cognitive Domain
Conceptual Understanding

Key
See scoring guide

Note: Credit is given for both higher-level responses referencing locating the source of sound (Code 10) as well as less sophisticated responses referencing hearing sounds from both sides and retaining hearing if one ear does not function (Codes 11,12). Priority is given to Code 10. If locating source of sound is mentioned, use Code 10 even if other correct codes also apply.

Code	Response	Item: S022160
	Correct Response	
10	Mentions being able to locate the position, direction and/or distance of the source of sound. *Examples:* *By having two ears, you can actually tell where a sound came from.* *With two ears you could hear which direction a noise is coming from.* *With two ears you can judge the distance the sound is away from you.* *With two ears you can tell if the sound is near or far.*	
11	Mentions hearing sounds from both sides (direction) with no mention of locating the source. *Examples:* *You can hear on both sides of you.* *You can hear sounds from all around, not just one side.* *With two ears you can hear from more than one way.*	
12	Mentions that if hearing is lost in one ear, the other may still function. *Examples:* *In the result of being deaf in one ear, you have another one that is used.* *If you lost the hearing in one ear, the other one might still work.*	
19	Other correct	
	Incorrect Response	
70	Gives only a general or vague response relating to how well one can hear. *Examples:* *You hear better.* *You can hear half as much with one ear.* *Two ears lets you hear a lot more.* *The volume is greater.*	
71	Mentions only that hearing is uneven/unbalanced with one ear. *Examples:* *If you had one ear, the sound would be uneven.* *Your hearing would be out of balance.* *You hearing gets balanced better with two ears.*	
79	Other incorrect (including crossed out/erased, stray marks, illegible, or off task)	
	Nonresponse	
99	Blank	

TIMSS 2003

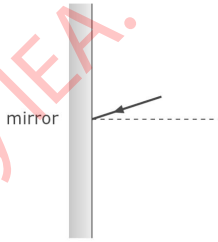
Content Domain
Physics

Main Topic
Light

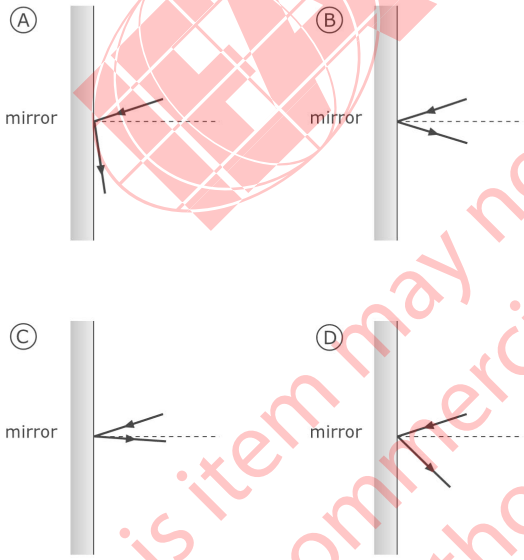
Cognitive Domain
Conceptual Understanding

Key
B

A ray of light strikes a mirror as shown.



Which picture best shows the direction of the reflected light?



S022058

TIMSS 2003

Content Domain
Earth Science

Main Topic
Earth processes, cycles and history

Cognitive Domain
Conceptual Understanding

Key
B

The pictures show two different mountains. The mountains in Picture A are rough and jagged. The mountains in Picture B are smooth and rounded.

Picture A Picture B

Which statement about these mountains is probably true?

(A) The mountains in Picture A are older.
(B) The mountains in Picture B are older.
(C) The mountains are about the same age but were formed in different ways.
(D) The mountains are about the same age but are in different hemispheres.

S012013

TIMSS 2003

S012014

When a person sees something, what carries the message from the eyes to the brain?

Ⓐ arteries
Ⓑ glands
Ⓒ muscles
Ⓓ nerves
Ⓔ veins

Content Domain
Life Science

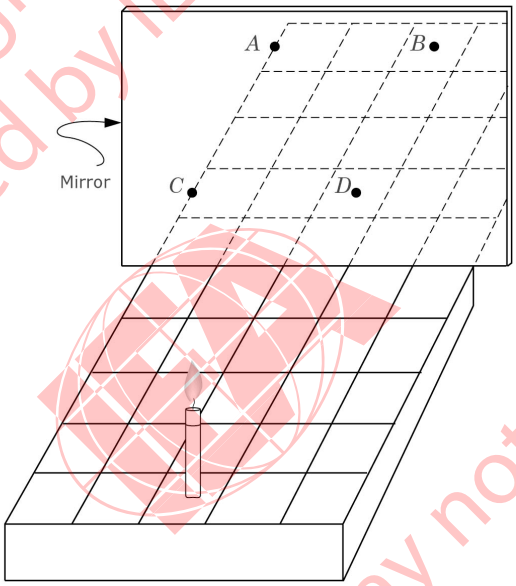
Main Topic
Structure, function and life processes in organisms

Cognitive Domain
Factual Knowledge

Key
D

TIMSS 2003

A candle is placed on a ruled grid in front of a mirror, as shown. At what point will the reflection of the candle appear to be?



Ⓐ Point A
Ⓑ Point B
Ⓒ Point C
Ⓓ Point D

S012015

Content Domain
Physics

Main Topic
Light

Cognitive Domain
Reasoning and Analysis

Key
B

TIMSS 2003

S012016

A powder made up of both white specks and black specks is likely to be

Ⓐ a solution
Ⓑ a pure compound
Ⓒ a mixture
Ⓓ an element

Content Domain
Chemistry

Main Topic
Classification and composition of matter

Cognitive Domain
Factual Knowledge

Key
C

TIMSS 2003

S012017

The burning of fossil fuels has increased the carbon dioxide content of the atmosphere. What is a possible effect that the increased amount of carbon dioxide is likely to have on our planet?

Ⓐ A warmer climate
Ⓑ A cooler climate
Ⓒ Lower relative humidity
Ⓓ More ozone in the atmosphere

Content Domain
Environmental Science

Main Topic
Changes in environment

Cognitive Domain
Factual Knowledge

Key
A

TIMSS 2003

S012018

Which is NOT a fossil fuel?

Ⓐ Coal
Ⓑ Oil
Ⓒ Wood
Ⓓ Natural gas

Content Domain
Earth Science

Main Topic
Earth processes, cycles and history

Cognitive Domain
Factual Knowledge

Key
C

TIMSS 2003

S012001

Which of the following organs is NOT situated in the abdomen?

Ⓐ liver
Ⓑ kidney
Ⓒ stomach
Ⓓ bladder
Ⓔ heart

Content Domain
Life Science

Main Topic
Structure, function and life processes in organisms

Cognitive Domain
Factual Knowledge

Key
E

TIMSS 2003

Content Domain
Physics

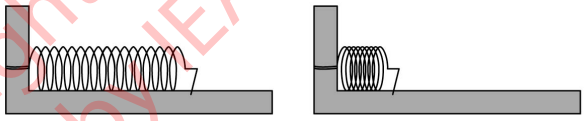
Main Topic
Energy types, sources and conversions

Cognitive Domain
Conceptual Understanding

Key
B

S012002

Spring 1 and Spring 2 were the same. Then, Spring 1 was pushed together a little and clamped in place. Spring 2 was pushed together a lot and clamped.



1 2

Which spring has more stored energy?

(A) Spring 1
(B) Spring 2
(C) Both springs have the same energy.
(D) You cannot tell unless you know what the springs are made of.

TIMSS 2003

S012003

Fanning can make a wood fire burn hotter because the fanning

Ⓐ makes the wood hot enough to burn
Ⓑ adds more oxygen needed for burning
Ⓒ increases the amount of wood there is to burn
Ⓓ provides the energy needed to keep the fire going

Content Domain
Chemistry

Main Topic
Chemical change

Cognitive Domain
Conceptual Understanding

Key
B

TIMSS 2003

S012004

A person in a dark room looking through a window can clearly see a person outside in the daylight. But a person outside cannot see the person inside. Why does this happen?

Ⓐ There is not enough light being reflected off the person in the room.

Ⓑ Light rays cannot pass through a window twice.

Ⓒ Outside light does not pass through windows.

Ⓓ Sunlight is not as intense as other sources of light.

Content Domain
Physics

Main Topic
Light

Cognitive Domain
Conceptual Understanding

Key
A

TIMSS 2003

S012005

Overgrazing of land by livestock contributes to a major problem. That problem is

Ⓐ depletion of ground water
Ⓑ increased pollution
Ⓒ erosion of soil
Ⓓ acid rain

Content Domain
Environmental Science

Main Topic
Use and conservation of natural resources

Cognitive Domain
Factual Knowledge

Key
C

TIMSS 2003

S012006

A small, fast-moving river is in a V-shaped valley on the slope of a mountain. If you follow the river to where it passes through a plain, what will the river most likely look like compared with how it looked on the mountain?

Ⓐ Much the same
Ⓑ Deeper and faster
Ⓒ Slower and wider
Ⓓ Straighter

Content Domain
Earth Science

Main Topic
Earth's structure and physical features

Cognitive Domain
Reasoning and Analysis

Key
C

TIMSS 2003

When a nail is pulled out of a wooden board, the nail becomes warm. Explain why.

S032131

Content Domain
Physics

Main Topic
Energy types, sources and conversions

Cognitive Domain
Conceptual Understanding

Key
See scoring guide

Note: Priority is given to code 10. If friction (or similar) is mentioned, then code 10 should be given even if other correct codes apply.

Code	Response	Item: S032131
	Correct Response	
10	Explanation refers to friction (implicitly or explicitly). *Examples:* *Because it is rubbed against the wood.* *Nail resists when you pull it out.* *Because of the force on the nail to pull it out.* *Because of friction.* *There is friction between the nail and the wooden board.*	
11	Explanation refers to energy change. *Examples:* *There is more energy in the nail after the transition.* *Because energy is used to get it out.* *Kinetic energy changes to heat energy when you pull it out.*	
19	Other correct	
	Incorrect Response	
70	Explanation refers only to the nail or the action taken with inadequate connection to friction or energy. *Examples:* *It is hard to get it out.* *You must pull hard.* *Because it was in the wood for too long.*	
79	Other incorrect (including crossed out/erased, stray marks, illegible, or off task)	
	Nonresponse	
99	Blank	

TIMSS 2003

Content Domain
Life Science

Main Topic
Ecosystems

Cognitive Domain
Reasoning and Analysis

Key
See scoring guide

The diagram above shows a community consisting of mice, snakes and wheat plants.

What would happen to this community if people killed the snakes?

S032202

Note: For full credit, responses must include an explicit statement of the effect on BOTH the mice population and the wheat plants. Partial credit is given for responses that refer to one but not both of these.

Code	Response	Item: S032202
	Correct Response	
20	States that mice (population) will increase AND wheat plants will decrease. *Examples:* *The population of mice would increase because there are no snakes. The increase in mice would then cause the amount of wheat plants to decrease.* *Then we would get more mice and less wheat plants.*	
21	States that the mice would eat more (all) of the wheat plants AND that the mice (population) will decrease as the wheat decreases. [May also refer to the initial increase in population of mice.] *Examples:* *Mice would eat all the plants, then the plants would die out, then the mice would not have anything to eat so then they would die.* *Mice would become overpopulated and eat all the wheat. Then all the mice would starve because there is no food left.*	
29	Other fully correct	
	Partial Response	
10	States **only** that the mice will increase. [No explicit mention of the effect on wheat.] *Examples:* *The number of mice would increase because there are no snakes to eat them.* *There would be lots of mice.*	
11	States **only** that the mice will eat more (all) of the wheat plants (or similar). [No explicit mention of the effect on mice.] *Examples:* *If people killed the snakes the mice would destroy all the wheat plants.*	
19	Other partially correct	
	Incorrect Response	
70	Refers to an effect on the whole community (ecosystem) but too vague to interpret. *Examples:* *The whole community will be affected.* *The ecosystem would be unbalanced.* *Everything dies.*	
79	Other incorrect (including crossed out/erased, stray marks, illegible or off task)	
	Nonresponse	
99	Blank	

TIMSS 2003

Content Domain
Physics

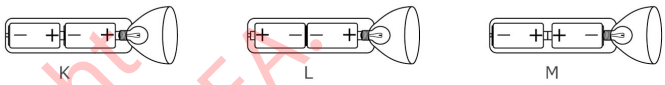
Main Topic
Electricity and magnetism

Cognitive Domain
Factual Knowledge

Key
A

S012037

The diagrams show a flashlight and three ways to put batteries in it.



In order to make the flashlight work, which way must the batteries be placed?

(A) Only as in K
(B) Only as in L
(C) Only as in M
(D) None of these ways would work.

TIMSS 2003

What is the main function of red blood cells?

Ⓐ To fight disease in the body

Ⓑ To carry oxygen to all parts of the body

Ⓒ To remove carbon monoxide from all parts of the body

Ⓓ To produce materials which cause the blood to clot

S012038

Content Domain
Life Science

Main Topic
Cells and their functions

Cognitive Domain
Factual Knowledge

Key
B

TIMSS 2003

Traits are transferred from generation to generation through the

(A) sperm only
(B) egg only
(C) sperm and the egg
(D) testes

S012039

Content Domain
Life Science

Main Topic
Reproduction and heredity

Cognitive Domain
Conceptual Understanding

Key
C

TIMSS 2003

If you took all of the atoms out of a chair, what would be left?

Ⓐ The chair would still be there, but it would weigh less.

Ⓑ The chair would be exactly the same as it was before.

Ⓒ There would be nothing left of the chair.

Ⓓ Only a pool of liquid would be left on the floor.

S012040

Content Domain
Chemistry

Main Topic
Particulate structure of matter

Cognitive Domain
Conceptual Understanding

Key
C

TIMSS 2003

S012041

Rock that is made of material that has settled to the bottom of lakes and oceans and been compressed and hardened is

Ⓐ conglomerate rock
Ⓑ volcanic rock
Ⓒ sedimentary rock
Ⓓ metamorphic rock

Content Domain
Earth Science

Main Topic
Earth processes, cycles and history

Cognitive Domain
Factual Knowledge

Key
C

TIMSS 2003

S012042

Oil is an example of a natural resource that is not renewable. Which is another example of a nonrenewable resource?

Ⓐ Wood
Ⓑ Seawater
Ⓒ Sunlight
Ⓓ Coal

Content Domain
Environmental Science

Main Topic
Use and conservation of natural resources

Cognitive Domain
Conceptual Understanding

Key
D

TIMSS 2003

Write down one reason why a "hole" in Earth's ozone layer may be harmful to people.

S022086

Content Domain
Environmental Science

Main Topic
Changes in environment

Cognitive Domain
Factual Knowledge

Key
See scoring guide

Note: To receive credit, responses must refer to filtration of the sun's radiation (ultraviolet or UV) and/or to a harmful effect caused by too much radiation (sunburn, skin cancer, eye damage, etc.). A general reference to 'burning' is not considered equivalent to sunburn unless it is used in the context of radiation or Sun's rays. Priority is given to Codes 10 and 11. If responses mention radiation from the Sun getting through, use Code 10 or 11 even if other correct codes also apply. If more than one reason is given, use the code corresponding to the first correct response, giving priority to Codes 10 and 11.

Code	Response	Item: S022086
	Correct Response	
10	Refers **BOTH** to radiation from the sun or similar (ultraviolet or UV) **AND** a specific harmful effect (e.g. sunburn, skin cancer, skin damage, eye damage, burning). *Examples:* *Too much ultraviolet rays could damage people's eyes.* *Ultraviolet rays are not blocked so people get skin cancer.* *People get cancer because more of the Sun's rays come through.*	
11	Refers to radiation **only** with no harmful effect given. *Examples:* *Because it is letting ultraviolet rays in.* *The deadly rays from the sun get through.* *The rays from the sun get through.*	
12	Refers **only** to humans getting sunburned/skin cancer with no explicit mention of radiation. *Examples:* *Increase in skin cancer.* *It gives people sunburn.*	
19	Other correct	
	Incorrect Response	
70	Associates the ozone layer with the greenhouse effect or protection against heat. *Examples:* *The hole will let in too much heat which will melt the ice caps.* *A hole in the Earth's ozone could harm people because it is very hot.* *They could get burned.* *Because it might get hot and some people will die from the hole.*	
71	Refers to ozone layer as a barrier for the atmosphere; holding the atmosphere in OR protecting the earth from materials in space getting through (other than UV radiation). *Examples:* *Rocks might hit the Earth.* *People would be sucked out the hole.* *If there was a hole the atmosphere might escape.* *It keeps the oxygen from escaping.*	
79	Other incorrect (including crossed out/erased, stray marks, illegible, or off task)	
	Nonresponse	
99	Blank	

**The scoring guide for this trend item has been simplified from the version used in 1999. Original Codes 10 and 12 were combined into Code 10; original Codes 11 and 13 were combined into Code 11; original Code 14 became Code 12.*

TIMSS 2003

S022198

Which is a chemical change?

Ⓐ Element 1 is polished to form a smooth surface.

Ⓑ Element 2 is heated and evaporates.

Ⓒ Element 3 develops a white, powdery surface after standing in air.

Ⓓ Element 4 is separated from a mixture by filtration.

Content Domain
Chemistry

Main Topic
Chemical change

Cognitive Domain
Conceptual Understanding

Key
C

TIMSS 2003

S022275

Three gases found in Earth's atmosphere are carbon dioxide, nitrogen, and oxygen. What is their order of abundance from greatest to least?

(A) nitrogen, oxygen, carbon dioxide
(B) nitrogen, carbon dioxide, oxygen
(C) oxygen, nitrogen, carbon dioxide
(D) carbon dioxide, oxygen, nitrogen

Content Domain
Earth Science

Main Topic
Earth's structure and physical features

Cognitive Domain
Factual Knowledge

Key
A

TIMSS 2003

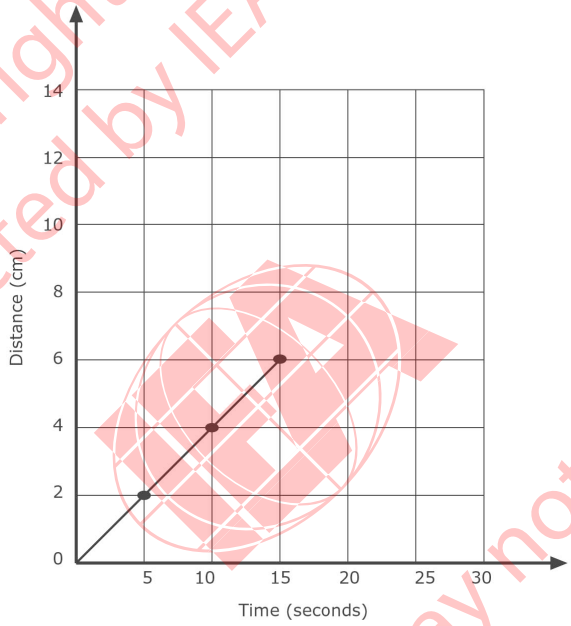
Content Domain
Physics

Main Topic
Forces and motion

Cognitive Domain
Reasoning and Analysis

Key
D

The graph shows the progress made by a beetle moving along a straight line.



If the beetle keeps moving at the same speed, how long will it take to travel 10 cm?

Ⓐ 4 seconds
Ⓑ 6 seconds
Ⓒ 20 seconds
Ⓓ 25 seconds

S022041

TIMSS 2003

S022283

The planet Jupiter is bigger than Earth's moon but it appears to be smaller when viewed from Earth. Why is this?

Content Domain
Earth Science

Main Topic
Earth in the solar system and universe

Cognitive Domain
Conceptual Understanding

Key
See scoring guide

Note: A correct response is based on the relative distances of Jupiter and the Moon from Earth. An implicit comparison is accepted for Code 10 as long as it is clear from the student response that a greater distance from Jupiter is implied. Actual distances may be used to convey the relative difference. The distances do not have to be completely accurate as long as the relative distances are correct. Responses that mention ONLY the great distance of Jupiter OR the close distance of the Moon without comparative language are also scored as correct.

Code	Response	Item: S022283
	Correct Response	
10	Refers to the greater distance of Jupiter and/or the shorter distance of the Moon (from Earth), implicitly or explicitly. *Examples:* *Jupiter is farther away from Earth than the Moon.* *The Moon is much closer than Jupiter.* *Jupiter is farther.* *It (Jupiter) is a long distance from Earth.* *Because Jupiter is so far away.* *The Moon is so close to the Earth that it looks bigger.*	
19	Other correct	
	Incorrect Response	
70	Refers to distance but explanation does not clearly communicate the effect of Jupiter's or the Moon's distance on the appearance of size. *Examples:* *Because of distance.* *Jupiter's moons are closer.*	
71	Refers to the Moon being further, or Jupiter being closer to Earth.	
79	Other incorrect (including crossed out/erased, stray marks, illegible, or off task).	
	Nonresponse	
99	Blank	

**The scoring guide for this trend item has been simplified from the version used in 1999. Original Codes 10 and 11 were combined into Code 10.*

TIMSS 2003

S022202

What is formed when a neutral atom gains an electron?

Ⓐ A mixture
Ⓑ An ion
Ⓒ A molecule
Ⓓ A metal

Content Domain
Chemistry

Main Topic
Particulate structure of matter

Cognitive Domain
Factual Knowledge

Key
B

TIMSS 2003

What processes take place in the human body that prevent it from overheating during exercise?

S022152

Content Domain
Life Science

Main Topic
Structure, function and life processes in organisms

Cognitive Domain
Conceptual Understanding

Key
See scoring guide

Note: Priority is given to Codes 10 and 11. If perspiration or sweating is mentioned, use Code 10 or 11, even if other correct responses such as increased blood flow to the skin are also included.

Code	Response	Item: S022152
	Correct Response	
10	Refers to perspiration (sweating) AND the cooling effect of evaporation. *Examples:* *When people sweat, it evaporates to cool them down.* *Sweating. When the sweat evaporates, it cools the skin.* *Perspiration cools you down when it evaporates.*	
11	Refers to perspiration (sweating), without explicitly mentioning the cooling effect of evaporation. *Examples:* *The body sweats.* *Perspiration keeps you from overheating.* *The perspiration cools you off and you don't stay hot.*	
12	Refers to increased blood flow to the skin. *Examples:* *The blood rushes to your face and cools you down.*	
19	Other correct	
	Incorrect Response	
70	Refers only to drinking water to cool down.	
71	Refers to an effect of exercise but does not specifically address overheating and/or cooling. *Examples:* *The blood pumps faster.* *Breathing increases.* *Your body is working hard and using up more food energy.*	
79	Other incorrect (including crossed out/erased, stray marks, illegible, or off task)	
	Nonresponse	
99	Blank	

TIMSS 2003

Content Domain
Life Science

Main Topic
Human health

Cognitive Domain
Reasoning and Analysis

Key
See scoring guide

S022154

Salil went to school with a cold. Several days later, half of his classmates also had colds. What is one likely reason some classmates had colds but others did not?

Note: To receive credit, responses must include some reference to transmission of 'germs' (viruses, bacteria, etc.), either explicitly or through a description of a method of transmission (sneezing/coughing, direct physical contact, etc.), or to defense mechanisms (immunity, resistance, etc.). A response that includes only a general reference to proximity without any description of a method of transmission will be scored as incorrect. Priority is given to Code 10. If a response includes transmission of 'germs' (viruses, bacteria, etc.), use Code 10 even if other correct codes also apply. Otherwise, if more than one reason is given, assign the code corresponding to the first correct reason, giving priority to diagnostic codes (Code 11, then 12) over the 'other' code (Code 19).

Code	Response	Item: S022154
	Correct Response	
10	Refers explicitly to transmission of 'germs' (viruses, bacteria, etc.) from Salil to some classmates (or not to others). *Examples:* *Some students were hanging around Salil with him sneezing his germs onto them.* *The ones exposed to the virus caught it.*	
11	Refers to some students having better defense mechanisms (immunity, resistance). *Examples:* *Some of the students have just got over a cold.* *Some students' immunity was low because they went outside in the cold.*	
12	Refers to a specific method of transmission involving physical contact or exposure without mentioning germs explicitly (e.g. sneezing/coughing, shaking hands, drinking from same glass, breathing same air). *Examples:* *He sneezed on the ones that got it.* *They touched something Salil touched.*	
19	Other correct	
	Incorrect Response	
70	Includes ONLY a general or vague response relating to proximity or "catching the cold" from Salil. [No explicit description of a method of transmission is given.] *Examples:* *Some of his classmates did not like him so probably were not near him a lot.* *The ones who were his friends got it.* *The kids who sat by him caught the cold.* *Some caught it from Salil.* *Salil gave it to some of the class.*	
79	Other incorrect (including crossed out/erased, stray marks, illegible, or off task)	
	Nonresponse	
99	Blank	

[*] *The scoring guide for this trend item has been simplified from the version used in 1999. Original Codes 70 and 71 were combined into Code 70.*

TIMSS 2003

Which of the following is NOT a mixture?

Ⓐ Smoke
Ⓑ Sugar
Ⓒ Milk
Ⓓ Paint

S022187

Content Domain
Chemistry

Main Topic
Classification and composition of matter

Cognitive Domain
Conceptual Understanding

Key
B

TIMSS 2003

Briefly explain how eyeglasses and contact lenses help some people to see more clearly.

S022161

Content Domain
Life Science

Main Topic
Structure, function and life processes in organisms

Cognitive Domain
Reasoning and Analysis

Key
See scoring guide

Note: Credit is given for higher-level responses that demonstrate knowledge of vision by describing how lenses modify the way light enters the eye and hits the **retina** or back of the eye (Code 10) as well as less sophisticated responses based on helping eyes to focus, to see objects at different distances or to magnification. Use the highest level code applicable (Code 10, 11, 12, then 13). Responses referring only to "near-sighted" or "far-sighted" people without further explanation of correcting vision of objects at different distances receive Code 70. Explanations based on corrections for other eye disorders such as astigmatism, lazy eye, etc., are given Code 19.

Code	Response	Item: S022161
	Correct Response	
10	Mentions that glasses/contact lenses bend (refract) or focus light rays onto the **retina** (or back of the eye). [May use a diagram to show this]. *Examples:* *The glasses focus the light onto the retina.*	
11	Mentions the curvature (shape) of lenses (concave/convex) and/or bending of light by lenses. [Based primarily on the properties of lenses with no explicit mention of the focusing of light on the retina or back of eye.] *Examples:* *You can focus better because glasses bend the light into your eye.*	
12	Mentions that glasses/contact lenses help the eyes focus and/or allow (near-sighted/far-sighted) people to see images at a distance or close up. *Examples:* *Some people can see close up but need glasses in order to see things far away.* *Far-sighted people can only read with glasses that correct their close-up vision.* *Eyeglasses can help your eyes to focus more clearly on things.*	
13	Mentions that glasses/contact lenses magnify or enlarge (images). *Examples:* *They magnify.* *The magnification in the glasses make things more clear and bigger.* *The lenses make things look bigger.*	
19	Other correct	
	Incorrect Response	
70	Gives only a vague reference to glasses/contact lenses helping people see more clearly or containing prescriptions (chemicals, special type/shape/thickness of glass, etc.) without further explanation of vision or how lenses work. *Examples:* *They make you see more clearly.* *If you are near sighted, you need glasses to help you see.* *Contacts help vision because of the prescription injected into them.* *Lenses are prescribed to fix eye problems.* *The lenses in glasses are made thick so you can see better.*	
79	Other incorrect (including crossed out/erased, stray marks, illegible, or off task)	
	Nonresponse	
99	Blank	

[*] *The scoring guide for this trend item has been simplified from the version used in 1999. Original Codes 70 and 71 were combined into Code 70.*

TIMSS 2003

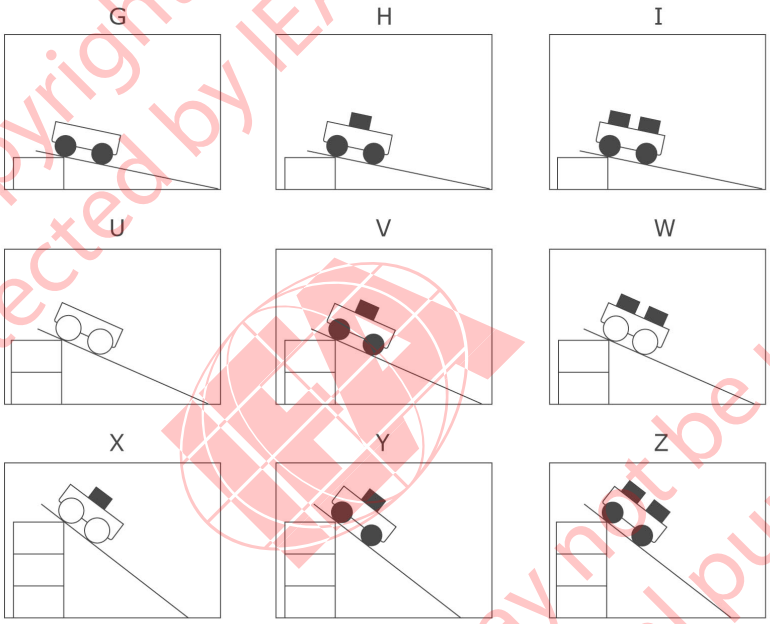
Content Domain
Physics

Main Topic
Forces and motion

Cognitive Domain
Reasoning and Analysis

Key
E

The diagrams show nine different trials Usman carried out using carts with wheels of two different sizes and different numbers of blocks of equal mass. He used the same ramp for all trials, starting the carts from different heights.



He wants to test this idea: The higher the ramp is placed, the faster the cart will travel at the bottom of the ramp. Which three trials should he compare?

Ⓐ G, H and I
Ⓑ I, W and Z
Ⓒ I, V and X
Ⓓ U, W and X
Ⓔ H, V and Y

S022222

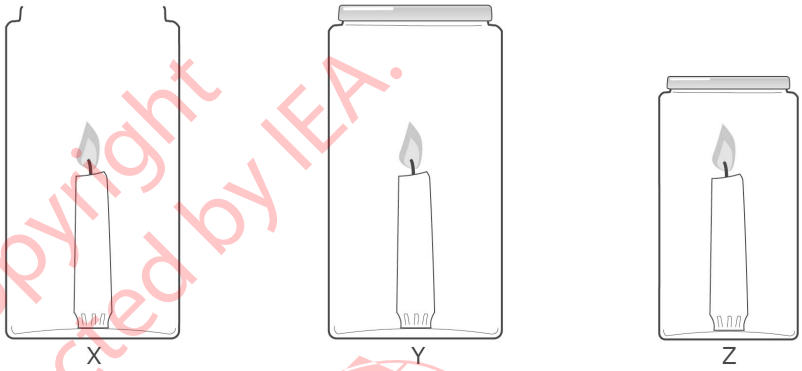
TIMSS 2003

Content Domain
Chemistry

Main Topic
Chemical change

Cognitive Domain
Reasoning and Analysis

Key
See scoring guide



Three identical candles are placed in the three jars shown above and lit at the same time. Jars Y and Z are then sealed with lids, and Jar X is left open.

Which candle flame will go out first (X, Y, or Z)? _____

Explain your answer.

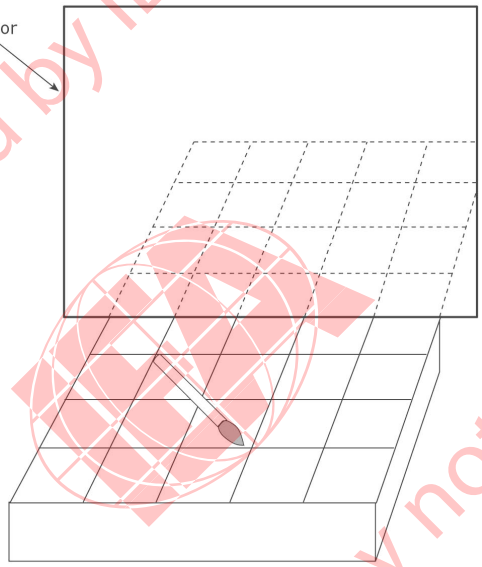
S022191

Note: For full credit, responses must identify **Z** and include an explanation that explicitly mentions the need for **oxygen** (for combustion or burning). Responses may also mention that the supply runs out faster in the smaller sealed jar, but it is not required for full credit. Responses referring to the need for air (explicitly or using non-scientific language) are given partial credit. Responses mentioning **only** smoke (fumes, carbon dioxide, etc.) build-up or **heat** should be coded as incorrect.

Code	Response	Item: S022191
	Correct Response	
20	**Z**. Explanation refers to the need for oxygen (for burning). *Examples:* *Z. The flame in the smaller jar will go out first since it has the least oxygen in it.* *Z. Oxygen is needed for the candle to burn.* *Z. It has less oxygen.*	
29	Other fully correct	
	Partial Response	
10	**Z**. Explanation refers to lack of air (gas) explicitly or using non-scientific language (e.g. suffocation, smothering, choking, etc.). (No explicit mention of oxygen). *Examples:* *Z. The flame in the smallest jar will be suffocated first.* *Z. It does not have enough air to breath.* *Since Z is the smallest jar, it will have less air in order to burn.* *Z. It gets smothered as the carbon dioxide increases.*	
11	Indicates both **Y AND Z** (Y, Z; Y or Z; Y/Z etc.). Explanation based on the need for oxygen or air. *Examples:* *Y and Z. The flame needs oxygen for it to burn, and both of these jars will run out of it.* *Y, Z. The closed jars do not get any air.* *Y or Z. They do not get any oxygen.*	
19	Other partially correct	
	Incorrect Response	
70	**Z** with no explanation or an incorrect explanation. *Examples:* *Z. This jar will have the smallest flame since it is in the smallest jar.* *Z. The smoke cannot escape, so the flame dies.* *Z. The carbon dioxide level builds up too much.* *Z. The candle wants to let off heat, so it bursts.*	
71	**X**. Explanation based on the candle being blown out (or similar). *Examples:* *X. A person walking past the candle might cause it to blow out.* *X. If the jar is not closed, it goes out from the wind.*	
72	**X OR Y** with no explanation or any other incorrect explanation.	
79	Other incorrect (including crossed out/erased, stray marks, illegible, or off task)	
	Nonresponse	
99	Blank	

TIMSS 2003

The picture shows a paint brush that is lying on a shelf in front of a mirror. Draw a picture of the paint brush as you would see it in the mirror. Use the patterns of lines on the shelf to help you.



S022279

Content Domain
Physics

Main Topic
Light

Cognitive Domain
Reasoning and Analysis

Key
See scoring guide

Note: Codes refer to the diagrams below showing examples of each type of response. A brush on the borderline of the correct squares should be accepted as correct. Credit is given for a brush in the correct squares even if the hairs are not clearly shown. Only if the hairs are clearly shown in the wrong direction is the incorrect code 70 given.

Code	Response	Item: S022279
	Correct Response	
10	Correct placement: angle, grid position, and direction (hairs to the **right**). (See Figure 1.)	
	Incorrect Response	
70	Correct angle and placement, but image flipped with hairs clearly turned to the **left**. (See Figure 2.)	
71	Image parallel to original (hairs to the right or left). (See Figure 3; other rows/columns are possible).	
72	Correct angle but image translated (hairs to the right or left). (See Figure 4; other rows/columns are possible).	
79	Other incorrect (including crossed out/erased, stray marks, illegible, or off task)	
	Nonresponse	
99	Blank	

**The scoring guide for this trend item has been simplified from the version used in 1999. Original Codes 71 and 72 were combined into Code 71; original Codes 73 and 74 were combined into Code 72.*

Figure 1 (Code 10)

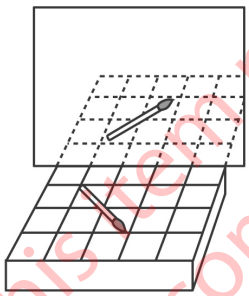


Figure 2 (Code 70)

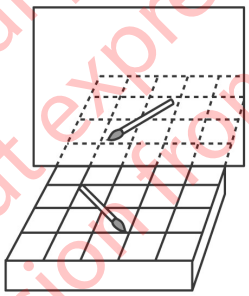


Figure 3 (Code 71)

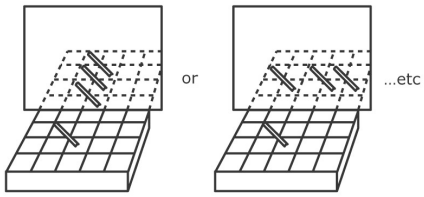
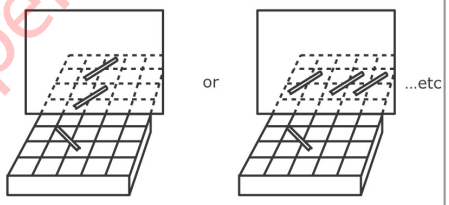


Figure 4 (Code 72)



TIMSS 2003

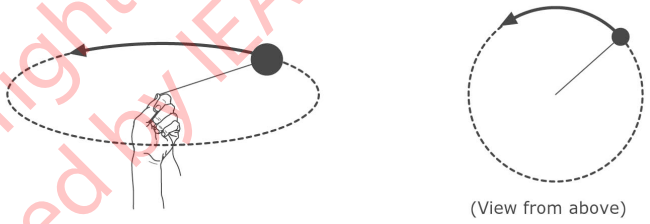
Content Domain
Physics

Main Topic
Forces and motion

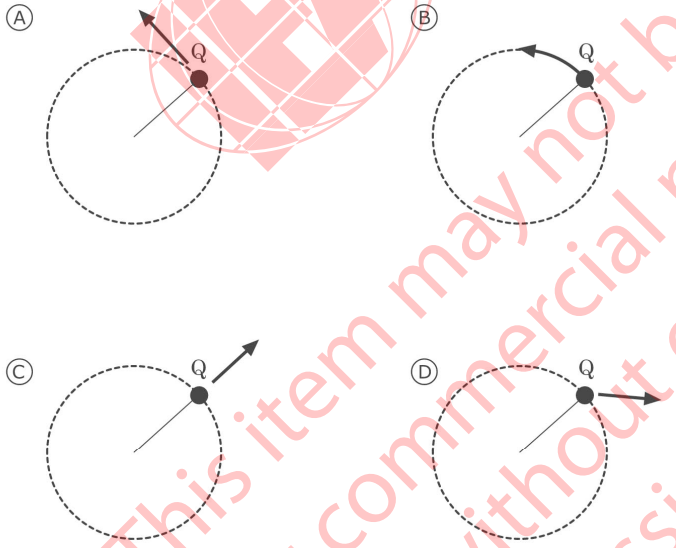
Cognitive Domain
Conceptual Understanding

Key
A

The diagram on the left shows a ball on the end of a string being whirled in a circle. The diagram on the right shows the whirling ball as viewed from above.



After several whirls, the string is released when the ball is at Q. Which of these diagrams shows the direction in which the ball will fly the instant the string is released?



S022040

TIMSS 2003

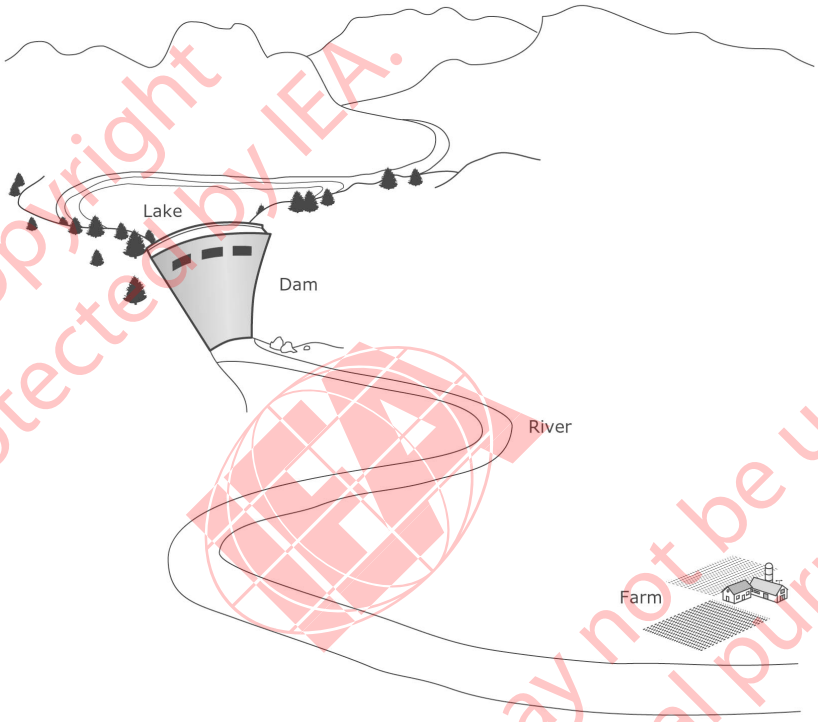
Content Domain
Environmental Science

Main Topic
Use and conservation of natural resources

Cognitive Domain
Reasoning and Analysis

Key
See scoring guide

The diagram shows a farm in a valley where a dam has just been built.



The presence of the dam can have both positive and negative effects on farming in the valley.

A. Describe one positive effect of the dam on farming.

B. Describe one negative effect of the dam on farming.

S022088

A: Codes for Positive Effects

Note: For credit, responses must clearly indicate a positive effect of the dam related to farming in the valley. If more than one effect is given, assign the code corresponding to the first correct effect.

Code	Response	Item: S022088A
	Correct Response	
10	Mentions that the dam prevents flooding. *Examples: Without the dam, a big storm could cause a flood.* *There is no chance of flooding.* *It slows down the river so it does not overflow and ruin the crops.*	
11	Mentions that the dam controls the water supply. *Examples: It stores water for the summer.* *The dam releases just the right amount of water.* *It brings more water closer to the farm.* *It would be easier to irrigate.*	
12	Mentions a soil-related benefit of the dam. *Examples: More top soil.* *Controls erosion.* *The ground will be more fertile because of the large supply of water.*	
13	Mentions the dam as a source of power. *Examples: The farmer will have a good power supply.* *The farm can use the hydroelectric power for energy.*	
19	Other correct	
	Incorrect Response	
70	Mentions a positive effect but does not clearly address the issue of farming or the effect of the dam. *Examples: It provides better drinking water.* *Water is good for the crops.* *It makes the river small for swimming and fishing.*	
71	Gives a negative effect. *Examples: It might prevent the farm from getting enough water.* *The water could become too high and overflow.*	
79	Other incorrect (including crossed out/erased, stray marks, illegible, or off task)	
	Nonresponse	
99	Blank	

TIMSS 2003

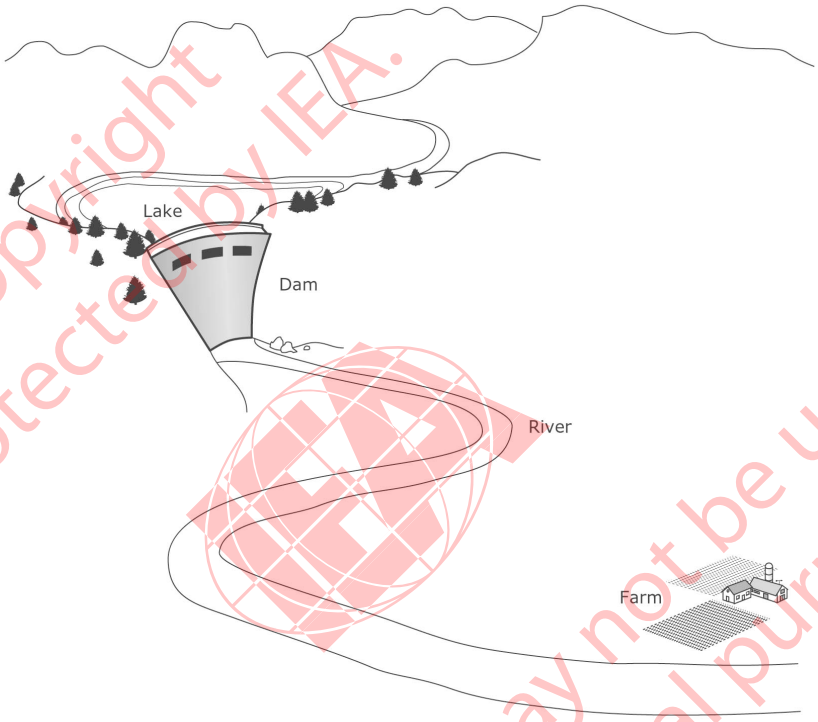
Content Domain
Environmental Science

Main Topic
Use and conservation of natural resources

Cognitive Domain
Reasoning and Analysis

Key
See scoring guide

The diagram shows a farm in a valley where a dam has just been built.



The presence of the dam can have both positive and negative effects on farming in the valley.

A. Describe one positive effect of the dam on farming.

B. Describe one negative effect of the dam on farming.

S022088

B: Codes for Negative Effects

Note: For credit, responses must clearly indicate a negative effect of the dam related to farming in the valley. If more than one effect is given, assign the code corresponding to the first correct effect.

Code	Response	Item: S022088B
	Correct Response	
10	Mentions the dam breaking (resulting in flooding). *Examples:* *If the dam breaks it could flood the valley and the crops.* *If there is a leak, the whole dam could flood and destroy everything.*	
11	Mentions the river drying up or decreasing water supply. *Examples:* *No or less irrigation because the dam does not let the water flow through.* *The fields could dry out from too little water.* *It slows the river too much and the farm will not have enough water.*	
12	Mentions a soil-related problem of the dam. *Examples:* *Nutrients not replenished by flooding.* *The rich nutrients from the water are not coming over the fields.*	
13	Mentions upsetting the ecological balance. *Examples:* *The dam could alter the ecology of the farm.* *The dam might interfere with the farm's ecosystem.*	
19	Other correct	
	Incorrect Response	
70	Mentions a negative effect but it does not clearly address the issue of farming or the effect of the dam. *Examples:* *It bursts.* *It is now going to be a tourist attraction.* *Flooding. [Does not mention how the dam causes this.]* *A lot of fish will die because their habitat has been changed.* *The fish cannot swim upstream.*	
71	Response indicates a misconception of how dams function (controlled release of water). *Examples:* *The lake could overflow the top of the dam.*	
79	Other incorrect (including crossed out/erased, stray marks, illegible, or off task)	
	Nonresponse	
99	Blank	

TIMSS 2003

The surface of Earth has more water than land. Write down TWO reasons why some people still do not have enough water to drink.

1.

2.

S022249

Content Domain
Environmental Science

Main Topic
Use and conservation of natural resources

Cognitive Domain
Reasoning and Analysis

Key
See scoring guide

A, B: Codes for each reason

Note: Each of the two responses is coded separately. The same code may be used twice if they are based on general categories. However, if the two responses are essentially the same, the second response should be coded as 79. For example, if a response mentions both water frozen in glaciers and the North Pole, the first is given Code 15, and the second is given Code 79. If only one response is given, the second should be coded as 99.

Code	Response	Item: S022249A, B
	Correct Response	
10	Mentions unsuitability of salt water for human consumption. *Examples: Because most of the world's water is salty.* *People cannot drink sea water.*	
11	Mentions climate or uneven distribution of rain/water. *Examples: Because in areas like the desert, water is not plentiful.* *No lakes or rivers run through some places.* *In really hot areas, the water evaporates too fast.*	
12	Mentions pollution as a cause. *Examples: Much of the water is contaminated.* *Because humans are polluting the fresh water with waste and chemicals.*	
13	Mentions reasons related to population, water consumption, or waste of water. *Examples: People use up the water for other reasons than drinking.* *If there are too many people, they use it all up.*	
14	Mentions economic/technical factors (cost of transportation, water treatment). *Examples: Most people cannot filter water.* *People might live where water cannot be brought.*	
15	Mentions that much of the Earth's water is frozen in icebergs, glaciers, etc. *Examples: There is a lot of water frozen at the North Pole.* *Some water is in glaciers, so it is not available to drink.*	
19	Other correct	
	Incorrect Response	
70	Mentions only water in clouds. *Examples: Most of the water is held up in the clouds.*	
71	Response too vague. *Examples: Poor countries.* *Some areas just do not get water.*	
79	Other incorrect (including crossed out/erased, stray marks, illegible, or off task)	
	Nonresponse	
99	Blank	

[*] *As in 1999, the derived variable based on this trend item will be worth only one point overall. During data analysis, responses that give two correct reasons will be scored as correct, while responses that give only one or no correct reasons will be scored as incorrect.*

TIMSS 2003

Content Domain
Physics

Main Topic
Forces and motion

Cognitive Domain
Reasoning and Analysis

Key
See scoring guide

The table below shows the results of an experiment to investigate how the length of a spring changes as different masses are hung from it.

Mass (grams)	Length of Spring (cm)
0	5
10	7
20	9
30	11
40	12
50	13
60	13

Describe how the length of the spring changed as different masses were hung from it.

S022286

Note: To receive credit, responses must address two basic regions in the table to describe the trend in spring length as a function of the mass added:

(i) initially, the spring increases in length (at a constant rate) as more mass is added.

(ii) after a point (40 grams), the spring length starts to level off and then remains constant as more mass is added.

Responses may be quantitative or qualitative in nature. [No credit is lost for using wrong or no units in describing length or mass.]

Code	Response	Item: S022286
	Correct Response	
10	Response includes both regions (i) and (ii). *Examples:* *At low mass, it grew 2 for every 10 grams. Then it changed by 1 at 40g. Then at 50g, it did not grow any more.* *It increases by 2's until 30, increases by 1's until 50, and increases by 0 at 60.* *The length increased steadily up to 40g, and then it increased just a little bit more until it was 13cm at 50 and 60 grams.* *At first it got longer every time you added a mass, but then after a while, it did not get any longer.*	
19	Other correct	
	Incorrect Response	
70	Includes only region (i). Response references only an increase in length as more mass is added but discussion of leveling off is inadequate or missing. *Examples:* *The length increased as more mass was added.* *The spring length got 2cm longer with each mass.* *It increased by 2cm each time until 40 grams.*	
71	Refers only to leveling off of spring length or decreasing increments at higher masses. [Description of change in region (i) is inadequate or missing.] *Examples:* *It stretches but only up to 13 cm.* *After 50 grams it did not change.* *It stretches less at higher masses.*	
79	Other incorrect (including crossed out/erased, stray marks, illegible, or off task)	
	Nonresponse	
99	Blank	

TIMSS 2003

S032595

Cats are most closely related to which of the following animals?

Ⓐ crocodiles
Ⓑ whales
Ⓒ frogs
Ⓓ penguins

Content Domain
Life Science

Main Topic
Types, characteristics and classification of living things

Cognitive Domain
Conceptual Understanding

Key
B

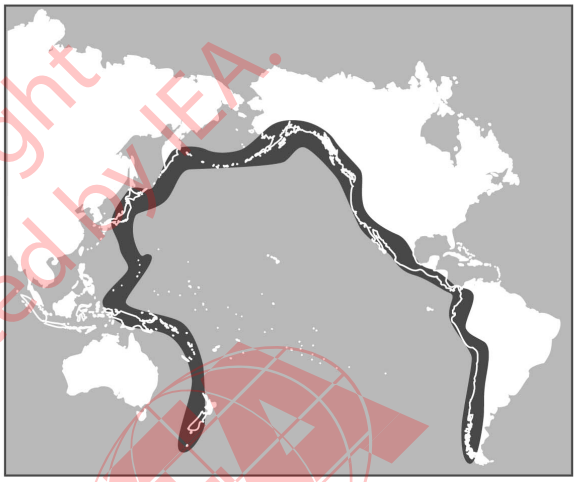
TIMSS 2003

Content Domain
Earth Science

Main Topic
Earth processes, cycles and history

Cognitive Domain
Conceptual Understanding

Key
A



The diagram above shows the Pacific Ring of Fire. Earthquakes and volcanic activity occur along the Ring of Fire. Which of the following best explains why?

Ⓐ It is located at the boundaries of tectonic plates.
Ⓑ It is located at the boundary of deep and shallow water.
Ⓒ It is located where the major ocean currents meet.
Ⓓ It is located where ocean temperature is the highest.

S032656

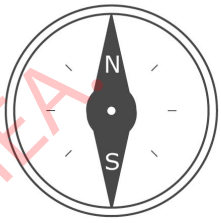
TIMSS 2003

Content Domain
Physics

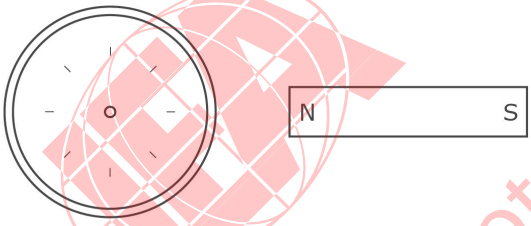
Main Topic
Electricity and magnetism

Cognitive Domain
Reasoning and Analysis

Key
See scoring guide



The diagram above shows a compass needle with its North and South poles labeled (N and S). It is placed next to a strong magnet as shown in the diagram below.



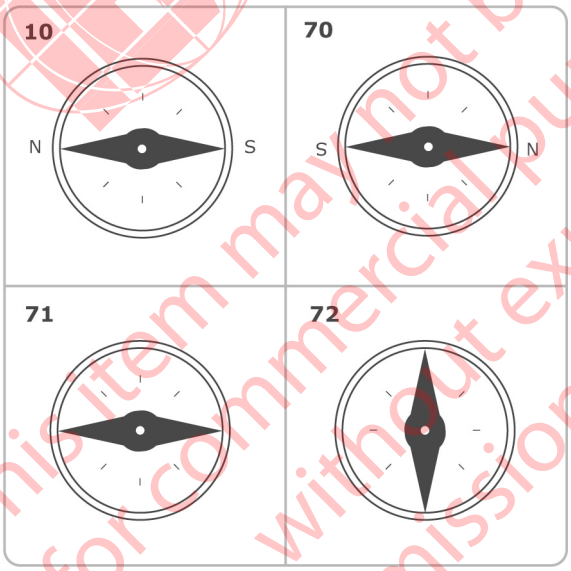
A. Draw the compass needle in the circle on the diagram above. Label the North (N) and South (S) poles of the needle.

B. Explain your answer using your knowledge of magnets.

S032625

A: Codes for Drawing

Code	Response	Item: S032625A
	Correct Response	
10	Draws a "horizontal" needle with N to the left and S to the right. [See diagram below.] **Note:** Credit should be given even if one label is missing (N to the left OR S to the right shown).	
	Incorrect Response	
70	Draws a "horizontal" needle with poles reversed (N to the right and/or S to the left). [See diagram below.]	
71	Draws a "horizontal" needle with no poles indicated. [See diagram below.]	
72	Draws a "vertical" needle with or without poles indicated. [See diagram below.]	
79	Other incorrect (including crossed out/erased, stray marks, illegible, or off task)	
	Nonresponse	
99	Blank	



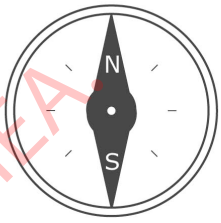
TIMSS 2003

Content Domain
Physics

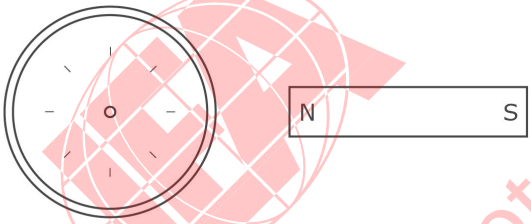
Main Topic
Electricity and magnetism

Cognitive Domain
Reasoning and Analysis

Key
See scoring guide



The diagram above shows a compass needle with its North and South poles labeled (N and S). It is placed next to a strong magnet as shown in the diagram below.



A. Draw the compass needle in the circle on the diagram above. Label the North (N) and South (S) poles of the needle.

B. Explain your answer using your knowledge of magnets.

S032625

B: Codes for Explanation

Code	Response	Item: S032625B
	Correct Response	
10	Explains that opposite poles attract (N toward S, etc.) or like poles repel (or similar). *Examples:* *The south point of the compass is attracted to the north pole of the magnet.* *North and south attract together.* *The magnets which have different poles attract one another.* *The N pole on the magnet will attract the S pole on the compass.* *Opposites attract and likes repel.* *The magnet pushes the N pole of the compass away.*	
19	Other correct	
	Incorrect Response	
70	Refers to magnetic attraction/repulsion but with an incorrect application. *Examples:* *Because the same pole will be attracted.* *The magnet is closer to the compass and will have a stronger attraction to the N end.* *The needle of the compass is metal, so it is attracted to the magnet and turns.* *It attracts the needle to North and South poles.*	
71	Explains that the compass needle always points North, or similar. *Examples:* *The needle of North always goes to the magnetic North.* *North always goes toward North.*	
79	Other incorrect (including crossed out/erased, stray marks, illegible, or off task)	
	Nonresponse	
99	Blank	

TIMSS 2003

S032607

Which of the following organs in fish has the same function as the human lung?

Ⓐ kidney
Ⓑ heart
Ⓒ gill
Ⓓ skin

Content Domain
Life Science

Main Topic
Structure, function and life processes in organisms

Cognitive Domain
Factual Knowledge

Key
C

TIMSS 2003

Content Domain
Environmental Science

Main Topic
Use and conservation of natural resources

Cognitive Domain
Reasoning and Analysis

Key
See scoring guide

S032063

Sea water contains dissolved salts and is not suitable for drinking. Describe a procedure that can be used to obtain a cup of drinking water from a bucket of sea water.

Note: For full credit, responses must give a procedure that clearly indicates the method used to separate water from salt and collect the pure water. The most common procedure is the distillation method (Code 20), but other correct procedures such as the freezing method or reverse osmosis method are possible. Partial credit should be given for responses that address at least the separation portion of the procedure. Responses that are based on boiling or filtering without indicating how separation of water and salt occurs are scored as incorrect (Code 70 or 71).

Code	Response	Item: S032063
	Correct Response	
20	Describes a correct procedure that includes the following basic steps (may use diagrams): i) Boiling/evaporation to separate water from salt ii) Collecting the distilled water (condensation) *Examples:* *Heat the salt water, catch the steam on a tray, drip it into a cup and the salt will be left in the bucket and drinking water in the cup.* *Boil the sea water taking the steam up to a tube and letting steam turn back into water.*	
29	Other fully correct	
	Partial Response	
10	Describes boiling/evaporation step to separate water from salt; condensation step is omitted. *Examples:* *Maybe if you boiled the salt water the salt would separate from the water.* *Take the salt water and boil it and the steam will create great drinking water.*	
11	States 'distillation' or similar but no description of the process is given. *Examples:* *The best way is to use a distillation apparatus.* *Distill it.*	
19	Other partially correct	
	Incorrect Response	
70	Mentions boiling but with no or incorrect indication of separation included. [May also mention filtering or other processes.] *Examples:* *You can boil it.*	
71	Mentions filtering to separate salt. [Response not based on boiling.] *Examples:* *Make it go through a filter.*	
79	Other incorrect (including crossed out/erased, stray marks, illegible or off task)	
	Nonresponse	
99	Blank	

TIMSS 2003

Content Domain
Life Science

Main Topic
Cells and their functions

Cognitive Domain
Reasoning and Analysis

Key
See scoring guide

The picture shows how a student set up some apparatus in a laboratory for an investigation. The inverted test tube was completely filled with water at the beginning of the investigation as shown in Figure 1. After several hours, the level of water in the test tube had gone down as shown in Figure 2.

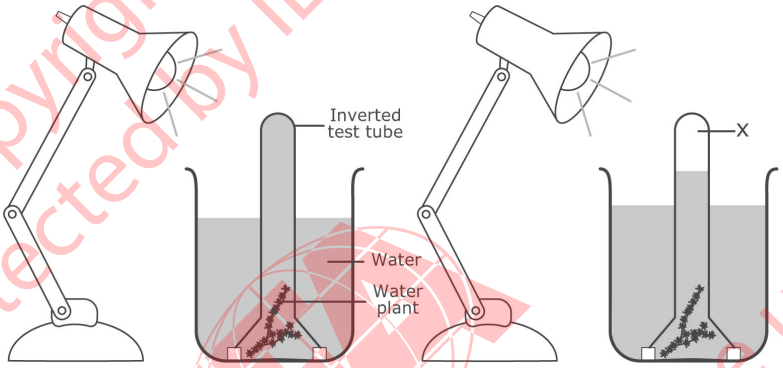


Figure 1

Figure 2

What is contained in the top part of the test tube labeled X in Figure 2?

(Check one box.)

- ☐ air
- ☐ oxygen
- ☐ carbon dioxide
- ☐ vacuum

Explain your answer.

S032206

Code	Response	Item: S032206
	Correct Response	
10	**OXYGEN** with an explanation that explicitly refers to **photosynthesis** (or equivalent). *Examples: Photosynthesis takes place. Plants use carbon dioxide from the water and give off oxygen.* *During photosynthesis, plants produce oxygen and glucose.*	
11	Gives an explanation that explicitly refers to **photosynthesis**, but checks CARBON DIOXIDE or AIR. *Examples: CARBON DIOXIDE. The plant undergoes photosynthesis.* *AIR. When the plant photosynthesizes it takes in carbon dioxide and gives off air.*	
12	**OXYGEN** with a minimal explanation based on carbon dioxide/oxygen exchange involving plants. [No explicit mention of photosynthesis.] *Examples: Plants take in carbon dioxide and give off oxygen.* *Plants give off oxygen.*	
19	Other correct	
	Incorrect Response	
70	**OXYGEN** with no explanation or an incorrect explanation not related to plant processes. *Examples: Because the heat has evaporated the water and the oxygen pressure is too great.* *Because water is made up of 2 parts hydrogen and 1 part oxygen. Some hydrogen has detatched from the oxygen, leaving the oxygen in the top of the tube.*	
71	**CARBON DIOXIDE** with no explanation or an incorrect explanation (not based on photosynthesis). *Examples: There is carbon dioxide in the water and it bubbles up when it is heated by the light.*	
72	**AIR** with no explanation or an incorrect explanation (not based on photosynthesis). *Examples: The plant has dissolved half the water and there is nothing in the tube left but air.* *When the water gets warm enough it will start to evaporate into air.*	
73	**VACUUM** with no explanation or an incorrect explanation. *Examples: The plant has taken in the oxygen from the water and left a vacuum at the top.*	
79	Other incorrect (including crossed out/erased, stray marks, illegible or off task)	
	Nonresponse	
99	Blank	

* : Revised following data collection.

TIMSS 2003

S032008

Which of the following takes place during fertilization in animals?

Ⓐ production of sperm and egg
Ⓑ joining of sperm and egg
Ⓒ division of egg
Ⓓ development of embryo

Content Domain
Life Science

Main Topic
Reproduction and heredity

Cognitive Domain
Factual Knowledge

Key
B

TIMSS 2003

S032083

The fossils that are found in the oldest layers of sedimentary rock were formed from which types of organisms?

Ⓐ only organisms that lived in the sea
Ⓑ only organisms that lived on land
Ⓒ only organisms that lived in the air
Ⓓ organisms that lived on the land, in the sea and in the air

Content Domain
Life Science

Main Topic
Diversity, adaptation, and natural selection

Cognitive Domain
Conceptual Understanding

Key
A

TIMSS 2003

S032564

David makes a solution by dissolving 10 grams of salt in 100 ml of water. He wants a solution that is half as concentrated. What should he add to the original solution to obtain a solution that is about half as concentrated?

Ⓐ 50 ml of water
Ⓑ 100 ml of water
Ⓒ 5 grams of salt
Ⓓ 10 grams of salt

Content Domain
Chemistry

Main Topic
Classification and composition of matter

Cognitive Domain
Conceptual Understanding

Key
B

TIMSS 2003

S032057

A solution of hydrochloric acid (HCl) in water will turn blue litmus paper red. A solution of the base sodium hydroxide (NaOH) in water will turn red litmus paper blue. If the acid and base solutions above are mixed in the right proportion, the resulting solution will cause neither red nor blue litmus paper to change color.

Explain why the litmus paper does not change color in the mixed solution.

Content Domain
Chemistry

Main Topic
Acids and bases

Cognitive Domain
Conceptual Understanding

Key
See scoring guide

Note: To receive credit, responses must refer to neutralization or a chemical reaction that results in products that do not react with litmus paper. Priority is given to Code 10 then 11. If the neutralization reaction is mentioned, then Code 10 or 11 should be given even if other correct codes apply. In responses where chemical reaction is not mentioned, the use of the term neutralization (or a technical equivalent) is required. Responses that refer ONLY to the acid/base being opposites or canceling each other when mixed, etc., are scored as incorrect (Code 70).

Code	Response	Item: S032057
	Correct Response	
10	Explanation refers explicitly to the formation of **water** (and salt) from the neutralization reaction. *Examples:* *Hydrochloric acid and sodium hydroxide will mix together to form water and salt, which is neutral.* *The hydrogen ions combine with the hydroxide ions to form water, so the litmus paper does not change colour.* **Note:** Responses may use words or a chemical equation. The equation does not need to be completely correct for credit as long as neutralization is clear.	
11	Explanation refers explicitly to **neutralization** (or equivalent), but the specific reaction is not mentioned. *Examples:* *When you mix acid and alkali, the mixture becomes neutral and has a pH of 7.* *The HCl neutralizes the NaOH, and the NaOH neutralizes the HCl.* *The mixed solution is neutral, so litmus paper does not react.* *Acid + base = neutral solution* *There is a neutralization reaction.*	
12	Explanation refers to a chemical reaction taking place (implicitly or explicitly) to form products that do not react with litmus paper (or similar). [Neutralization is not explicitly mentioned.] *Examples:* *The acid and base react, and the new chemicals do not react with litmus paper.* *The chemicals that change the litmus paper must have a chemical reaction to each other. Therefore they will not change the color of the paper anymore.* *They form a new solution that has different properties and doesn't react with litmus.*	
19	Other correct	
	Incorrect Response	
70	Mentions **only** that acid and base are "balanced", "opposites", "cancel each other", or similar. *Examples:* *The acid and base are opposites and counteract so they cancel each other out.* *The acid tries to turn it red and the base just turns it blue again at the same time.* *Because they're balanced out and equal.*	
79	Other incorrect (including crossed out/erased, stray marks, illegible, or off task)	
	Nonresponse	
99	Blank	

TIMSS 2003

S032055

A wet towel will dry when it is left in the Sun. Which process occurs to make this happen?

Ⓐ melting
Ⓑ boiling
Ⓒ condensation
Ⓓ evaporation

Content Domain
Physics

Main Topic
Physical states and changes in matter

Cognitive Domain
Factual Knowledge

Key
D

TIMSS 2003

S032626

Mary was looking out her window on a stormy night. She saw lightning and then heard thunder a few seconds later.

Explain why she saw lightning before she heard thunder.

Content Domain
Physics

Main Topic
Light

Cognitive Domain
Conceptual Understanding

Key
See scoring guide

Code	Response	Item: S032626
	Correct Response	
10	Refers to light traveling faster than sound (or similar). *Examples:* *Speed of light is faster than speed of sound.* *Light travels quicker than sound.* *It takes more time for sound to reach her than light.*	
19	Other correct	
	Incorrect Response	
70	Refers only to lightning being closer or thunder being further away (explicitly or implicitly). *Examples:* *Thunder has a longer way to go.* *Thunder is striking from kilometers away.*	
71	Refers to lightning occurring first, causing thunder, or similar. [No explicit mention of the relative speed of light/sound to travel.] *Examples:* *Lightning is so quick, thunder only happens afterward.* *The noise occurs later.* *Thunder occurs from lightning.* *Thunder is the echo of lightning.*	
79	Other incorrect (including crossed out/erased, stray marks, illegible, or off task)	
	Nonresponse	
99	Blank	

TIMSS 2003

S032281

A balloon filled with helium gas is set free and starts to move upward. Which of the following best explains why the helium balloon moves upward?

Ⓐ The density of helium is less than the density of air.

Ⓑ The air resistance lifts the balloon up.

Ⓒ There is no gravity acting on helium balloons.

Ⓓ The wind blows the balloon upward.

Content Domain
Physics

Main Topic
Forces and motion

Cognitive Domain
Conceptual Understanding

Key
A

TIMSS 2003

S032150

The Sun is an example of which of the following?

Ⓐ comet
Ⓑ planet
Ⓒ galaxy
Ⓓ star

Content Domain
Earth Science

Main Topic
Earth in the solar system and universe

Cognitive Domain
Factual Knowledge

Key
D

TIMSS 2003

Content Domain
Earth Science

Main Topic
Earth in the solar system and universe

Cognitive Domain
Reasoning and Analysis

Key
B

The table shows some information about the planets Venus and Mercury.

	Average Surface Temperature (°C)	Atmospheric Composition	Mean Distance from the Sun (millions of km)	Time to Revolve Around the Sun (Number of Days)
Venus	470	Mostly Carbon Dioxide	108	225
Mercury	300	Trace amounts of gases	58	88

Which of the following best explains why the surface temperature of Venus is higher than that of Mercury?

Ⓐ There is less absorption of sunlight on Mercury because of the lack of atmospheric gases.

Ⓑ The high percentage of carbon dioxide in the atmosphere of Venus causes a greenhouse effect.

Ⓒ The longer time for Venus to revolve around the Sun allows it to absorb more heat from the Sun.

Ⓓ The Sun's rays are less direct on Mercury because it is closer to the Sun.

S032301

TIMSS 2003

Content Domain
Environmental Science

Main Topic
Changes in environment

Cognitive Domain
Factual Knowledge

Key
C

S032446

Which of these daily activities can most directly help reduce air pollution in a city?

Ⓐ turning down the volume on the television
Ⓑ using biodegradable materials
Ⓒ using public transportation instead of driving
Ⓓ recycling paper

TIMSS 2003

S032637

Eating leafy vegetables is important for human health. This is because leafy vegetables are a good source of which of the following?

Ⓐ protein
Ⓑ carbohydrates
Ⓒ minerals
Ⓓ fat

Content Domain
Life Science

Main Topic
Human health

Cognitive Domain
Factual Knowledge

Key
C

TIMSS 2003

S032386

In humans, where does the absorption of food into the blood stream mainly take place?

Ⓐ stomach
Ⓑ mouth
Ⓒ large intestines
Ⓓ small intestines

Content Domain
Life Science

Main Topic
Structure, function and life processes in organisms

Cognitive Domain
Factual Knowledge

Key
D

TIMSS 2003

S032682

Animals and plants are made up of a number of different chemical elements. What happens to all of these elements when animals and plants die?

Ⓐ They die with the animal or plant.

Ⓑ They evaporate into the atmosphere.

Ⓒ They are recycled back into the environment.

Ⓓ They change into different elements.

Content Domain
Life Science

Main Topic
Ecosystems

Cognitive Domain
Factual Knowledge

Key
C

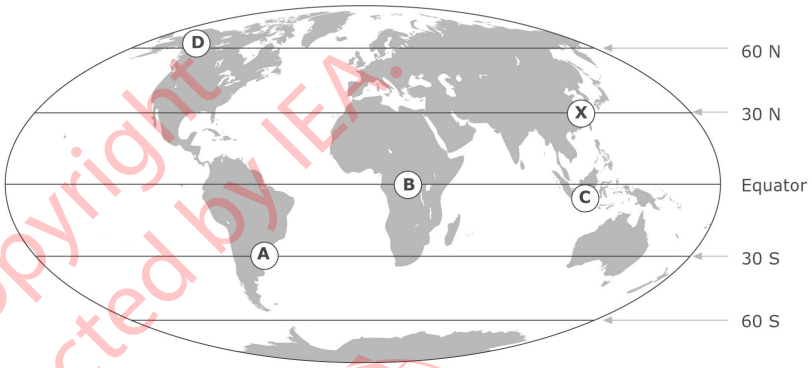
TIMSS 2003

Content Domain
Earth Science

Main Topic
Earth processes, cycles and history

Cognitive Domain
Reasoning and Analysis

Key
A



The diagram above shows a map of the world with the lines of latitude marked. Which of the following places marked on the map is most likely to have an average yearly temperature similar to location **X**?

Ⓐ location A
Ⓑ location B
Ⓒ location C
Ⓓ location D

S032652

TIMSS 2003

S032437

The shape of the moon appears to change regularly during each month. Which of the following best explains why the shape of the moon appears to change?

Ⓐ The Earth turns on its axis.

Ⓑ The Moon turns on its axis.

Ⓒ The Moon orbits around the Earth.

Ⓓ Clouds cover the Moon.

Content Domain
Earth Science

Main Topic
Earth in the solar system and universe

Cognitive Domain
Conceptual Understanding

Key
C

TIMSS 2003

Content Domain
Environmental Science

Main Topic
Use and conservation of natural resources

Cognitive Domain
Conceptual Understanding

Key
See scoring guide

S032242

Write down one renewable energy source and describe one way that people make use of it.

Energy Source: _____

Use:

Note: For credit, responses must name a renewable energy source or device and a use that indicates how the energy from the source/device is applied. Credit is NOT given for responses that name a renewable source/device with no or inadequate description of its use.

Code	Response	Item: S032242
	Correct Response	
10	**Sun or sunlight** (solar energy) with a correct description of its use. *Examples: Sun. It is used to heat water by solar panels.* *Sunlight. It keeps us warm.* **Note**: Must name "sun", "sunlight" or "solar energy" for full credit. If just "light" is named, then use Code 11.	
11	**Wind** (windmills) with a correct description of its use. *Examples: Windmills. Are for grinding corns or for pumping water.* *Wind turbines to generate electricity.*	
12	**Water** (waves, tides, water wheels, etc.) with a correct description of its use. *Examples: Tidal barrage. To generate electricity.* *Water. To generate electricity.*	
19	Other correct *Examples: Food. To give the body energy.* *Wood. It is used in wood stoves for cooking.*	
	Incorrect Response	
70	Names any fossil fuel (e.g., coal, oil, gasoline). *Examples: Gas. You can use it for heating.*	
71	Names a renewable energy source/device with no or inadequate description of use. *Examples: Water. You can heat, freeze and melt it.* *Sunlight.* *Windmill.*	
72	Names "light" (without connection to the Sun) with or without a correct description of use. *Examples: Light energy. It help us to see.* *Light.*	
79	Other incorrect (including crossed out/erased, stray marks, illegible or off task) *Examples: Electricity. Used for cooking.* *Batteries. To power a torch.*	
	Nonresponse	
99	Blank	

* : Revised following data collection.

Metal Crown

Instructions: The next four questions are about an investigation of the properties of a metal crown. To answer these questions, you may use any information shown on the pages in the Metal Crown section.

SP32709

A king gave a jeweler a block of pure metal. He asked the jeweler to make him a crown out of the metal.

metal crown

metal block

After the jeweler delivered the crown, the king observed it carefully. He thought that the jeweler might have substituted another pure metal or a mixture of metals to make the crown. He weighed the crown, and it had the same mass as the original block, 2400 grams. Still not satisfied, the king asked some scientists to help him find out what the crown was made of.

Questions for Metal Crown begin on the next page.

TIMSS 2003

Content Domain
Chemistry

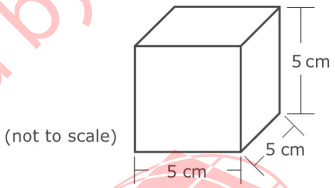
Main Topic
Classification and composition of matter

Cognitive Domain
Conceptual Understanding

Key
See scoring guide

The scientists decided to compare the densities of the crown and a block of metal just like the original block. The density of a substance is the mass of a sample of the substance divided by its volume (density = mass/volume).

The scientists found the volume of the block and computed its density based on its known mass (2400g). The diagram below shows the dimensions of the block of metal that the scientists measured.



What is the density of the block of metal?

Answer: _____ g/cm^3

S032709

Questions for Metal Crown continue.

Code	Response	Item: S032709
	Correct Response	
10	19.2 g/cm^3 **Note:** Extra trailing zeroes may also be added (e.g., 19.20, 19.200)	
11	19 g/cm^3 [Rounds to nearest whole unit.]	
	Incorrect Response	
70	Shows the set-up for density (mass/volume) but does not compute density or makes a computational error.	
71	125 [Computes volume but not density.]	
72	19.3 [No work shown ; indicates density copied from table.]	
79	Other incorrect (including crossed out/erased, stray marks, illegible or off task)	
	Nonresponse	
99	Blank	

TIMSS 2003

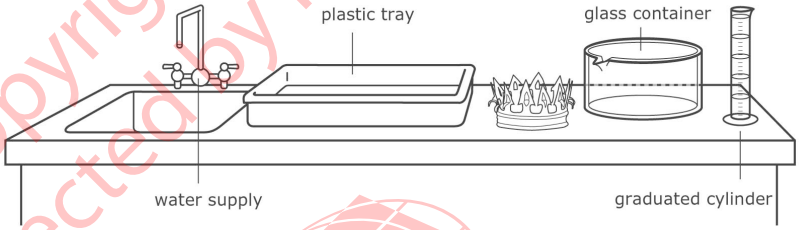
Content Domain
Physics

Main Topic
Forces and motion

Cognitive Domain
Reasoning and Analysis

Key
See scoring guide

The scientists then needed to find the volume of the crown in order to determine its density. The following equipment and materials were available for them to use.



Describe a procedure that the scientists could use to find the volume of the crown using some or all of the equipment and materials shown above. You may use diagrams to help explain your procedure.

S032711

Questions for Metal Crown continue.

Note: For full credit, responses must describe or diagram a procedure based on displacement and clearly identify how the volume of the crown is determined. Partial credit is given for procedures or diagrams that demonstrate knowledge of displacement without a complete description of the steps/measurements to be made. Responses may also implicitly refer to other materials not indicated in the diagram (e.g., ruler, marker, etc.). Because it is not totally clear from the diagram what the relative size of the crown, beaker, and tray are, credit is given for procedures that use any of these materials for displacement even if the actual procedure might not be completely successful.

Code	Response	Item: S032711
	Correct Response	
20	Describes or diagrams a procedure based on displacement of water using measured water level differences: i) Adding water to the beaker (sink or tray) and marking the water level. ii) Placing the crown in the beaker (sink or tray) and marking the new water level. iii) Measuring the volume difference before/after adding the crown using the graduated cylinder	
21	Describes or diagrams a procedure based on displacement of water using measured overflow: i) Filling the beaker (or tray) with water. ii) Placing the crown in the beaker (or tray) and collecting the overflow. iii) Measuring the volume of the overflow using the graduated cylinder	
29	Other fully correct	
	Partial Response	
10	Describes or diagrams a partial procedure that includes displacement of water but with inadequate or no description of the steps/measurements to determine the volume. *Examples:* *Put some water in the beaker and add the crown. Measure how much the level of water went up.* *Add the crown to the beaker filled with water. See how much overflowed.*	
19	Other partially correct	
	Incorrect Response	
70	Mentions putting the crown in the beaker (sink or tray) of water with no explicit mention that the water level will rise/overflow and no or incorrect procedure given for measuring the volume. *Examples:* *Fill the beaker to the top with water and add the crown. You can get the volume that way.*	
79	Other incorrect (including crossed out/erased, stray marks, illegible or off task)	
	Nonresponse	
99	Blank	

TIMSS 2003

Content Domain
Physics

Main Topic
Forces and motion

Cognitive Domain
Conceptual Understanding

Key
See scoring guide

The scientists measured the volume of the crown five times. They computed the density for each volume measurement. Their results are shown in the table below.

Trial	Volume of Crown (cm^3)	Density of Crown (g/cm^3)
1	202	11.88
2	200	12.00
3	201	11.94
4	198	12.12
5	199	12.06

A. Why did the scientists measure the volume five times?

B. The scientists reported to the king that the density of the crown was 12.0 g/cm^3. Show how the scientists used their results to obtain this value for the density.

S032712

Questions for Metal Crown continue.

A: Codes for Why Scientists Repeat Measurements

Note: Priority is given to Code 10. If accuracy, precision, experimental uncertainty, measurement error, etc., is mentioned, then Code 10 should be given even if other correct codes apply.

Code	Response	Item: S032712A
	Correct Response	
10	Refers to accuracy, precision, reliability, experimental uncertainty, estimation of measurement error (or similar). *Examples:* *Because there is experimental error. So measuring it 5 times you can calculate the average to know how much error there is.* *Each time they measure the volume it is close but not exactly the same. So, it's better to measure it a few times to be sure.* *They want a more exact answer.* *To get an accurate measure of the volume.* *It's more reliable.*	
11	Refers only to computing an average or mean value (or median or range). *Examples:* *To find the average volume.* *To work out the mean.*	
19	Other correct	
	Incorrect Response	
70	Refers only to 'mistakes' or changes in the measurements (or similar); no explicit mention of accuracy, precision, experimental uncertainty, etc. *Examples:* *In case mistakes happen.* *To make sure it wasn't changing.* *To make sure the answer was right and he did not make a mistake.* *To make sure they did it right.* *To check if it was correct.*	
71	Refers only to a 'fair test' or similar; no explicit mention of computation of average, accuracy, precision, experimental uncertainty, etc. *Examples:* *To make sure it was a fair test.* *To ensure a fair test.*	
79	Other incorrect (including crossed out/erased, stray marks, illegible or off task)	
	Nonresponse	
99	Blank	

TIMSS 2003

Content Domain
Physics

Main Topic
Forces and motion

Cognitive Domain
Conceptual Understanding

Key
See scoring guide

The scientists measured the volume of the crown five times. They computed the density for each volume measurement. Their results are shown in the table below.

Trial	Volume of Crown (cm^3)	Density of Crown (g/cm^3)
1	202	11.88
2	200	12.00
3	201	11.94
4	198	12.12
5	199	12.06

A. Why did the scientists measure the volume five times?

B. The scientists reported to the king that the density of the crown was 12.0 g/cm^3. Show how the scientists used their results to obtain this value for the density.

S032712

Questions for Metal Crown continue.

B: Codes for Obtaining Average (Median) Value

Code	Response	Item: S032712B
	Correct Response	
10	Shows (or describes) a correct method for computing the average (mean) value. *Examples: (11.88+12.00+11.94+12.12+12.06) = 60. 60/5=12.0* *(202+200+201+198+199)/5 = 200. 2400/200=12.0* *They added together all of the densities and then divided by 5 to get the average.*	
11	Shows (or describes) a correct method for determining the median value. *Examples: 202, 201, 200, 198, 199. 200 is the median volume, so 2400/200 is the median density (12).* *12 is the middle value when placed in order (12.12, 12.06, 12.00, 11.94, 11.88).*	
19	Other correct	
	Incorrect Response	
70	States that it is the average, mean or median value with no or incorrect work shown.	
71	Shows a computation of density (mass/volume). [No determination of average or median included.] *Examples: They did mass divided by volume.* *2400g/200cc = 12 g/cc*	
79	Other incorrect (including crossed out/erased, stray marks, illegible, or off task)	
	Nonresponse	
99	Blank	

TIMSS 2003

Content Domain
Chemistry

Main Topic
Classification and composition of matter

Cognitive Domain
Reasoning and Analysis

Key
See scoring guide

The table below lists the density for different metals.

Metal	Density (g/cm^3)
Platinum	21.4
Gold	19.3
Silver	10.5
Copper	8.9
Zinc	7.1
Aluminum	2.7

A. Look at the density you computed for the block of metal. What was the block of metal most likely made of?

Answer: _____

Explain your answer.

B. The density of the crown was found to be 12.0 g/cm^3. What would you report to the king about what metal or mixture of metals the jeweler used to make the crown?

End of Metal Crown section.

S032713

A: Codes for Identifying Metal in Block

Note: To receive credit, responses must identify gold AND give an explanation based on density. Responses that identify gold with no or incorrect explanation are given Code 70. It is possible that a different metal or metal(s) may be identified based on an incorrect density computation in the previous question. These types of responses may be given Code 19, provided the explanation is reasonable based on the computed density.

Code	Response	Item: S032713A
	Correct Response	
10	GOLD with an explanation based on correct density computed in previous question (19.2 g/cm^3). *Examples: Gold. Because it had the closest density.* *Gold. The density is the same.*	
19	Other correct	
	Incorrect Response	
70	GOLD with no explanation or incorrect explanation that is NOT based on density. *Examples: Gold. Because that is what crowns are always made of.*	
71	SILVER (alone or mixed). [Confuses density of crown with density of the metal block.] *Examples: It is mostly silver because the density is 12 and that's the closest one.*	
79	Other incorrect (including crossed out/erased, stray marks, illegible, or off task)	
	Nonresponse	
99	Blank	

TIMSS 2003

Content Domain
Chemistry

Main Topic
Classification and composition of matter

Cognitive Domain
Reasoning and Analysis

Key
See scoring guide

The table below lists the density for different metals.

Metal	Density (g/cm^3)
Platinum	21.4
Gold	19.3
Silver	10.5
Copper	8.9
Zinc	7.1
Aluminum	2.7

A. Look at the density you computed for the block of metal. What was the block of metal most likely made of?

Answer: _____

Explain your answer.

B. The density of the crown was found to be 12.0 g/cm^3. What would you report to the king about what metal or mixture of metals the jeweler used to make the crown?

End of Metal Crown section.

S032713

B: Codes for Reporting Composition of Crown

Note: To receive credit, responses must indicate that the crown is composed of a mixture of metals (alloy) AND identify the metals that might be included based on the density (crown density between the densities of the pure metals). Responses that indicate that the crown is made of a mixture (alloy) or is not pure gold with no further information about what other metals are included are scored as incorrect (Code 70). If responses indicate that the crown is made of Palladium (not in the table but with a density of 12 g/cm^3), they should be given a Code 19.

Code	Response	Item: S032713B
	Correct Response	
10	Reports that the crown is made of a mixture (alloy) AND names specific metal(s) that might be included (reasonable composition based on density). *Examples:* *The jeweler used some silver as well as gold.* *It might have had some copper mixed in because that would lower the density and the cost.* *The jeweler most likely used all silver except for a thin coat of gold to make it look pure gold even though it wasn't.*	
19	Other correct	
	Incorrect Response	
70	Reports only that the crown is made of a mixture or is NOT pure gold (or similar); NO specific metals are named. *Examples:* *The jeweler didn't use the block of metal that the king gave him.* *The jeweler used four more metals to make the crown.*	
71	Reports SILVER (density closest to 12 g/cm^3). *Examples:* *The metal used is silver.*	
72	Reports an incorrect mixture of metals based on additive densities. *Examples:* *It's silver and aluminum (10.5 + 2.7)* *Mixture of silver and aluminum as their density adds up to 12.0 approximately.* *Copper and aluminum.*	
79	Other incorrect (including crossed out/erased, stray marks, illegible or off task)	
	Nonresponse	
99	Blank	

TIMSS 2003

Oxygen, hydrogen, and water are substances.
Which of these substances are elements?

Ⓐ oxygen, hydrogen and water
Ⓑ oxygen and hydrogen only
Ⓒ oxygen only
Ⓓ water only

S032574

Content Domain
Chemistry

Main Topic
Classification and composition of matter

Cognitive Domain
Conceptual Understanding

Key
B

TIMSS 2003

Content Domain
Earth Science

Main Topic
Earth in the solar system and universe

Cognitive Domain
Conceptual Understanding

Key
See scoring guide

S032532

Draw the position of the Moon on the diagram below to show what is meant by an eclipse of the Sun.

Note: To receive credit, the Moon should be located between the Earth and the Sun within the shaded region shown in the diagram below. Responses may also show the shadow cast by the Moon on Earth. Credit should be given for responses based on the correct position of the Moon even if incorrect shadows are shown. Because it is not explicitly required in the item, errors in the relative size or distance of the moon will not be considered.

Code	Response	Item: S032532
	Correct Response	
10	Moon is located between the Sun and Earth within the shaded region. **Note:** For credit the moon must be located completely within the shaded region.	
	Incorrect Response	
70	Moon is drawn on the other side of Earth (lunar eclipse).	
71	Moon is drawn overlapping the Sun (concentric or partially "eclipsed" circles).	
79	Other incorrect (including crossed out/erased, stray marks, illegible, or off task)	
	Nonresponse	
99	Blank	

TIMSS 2003

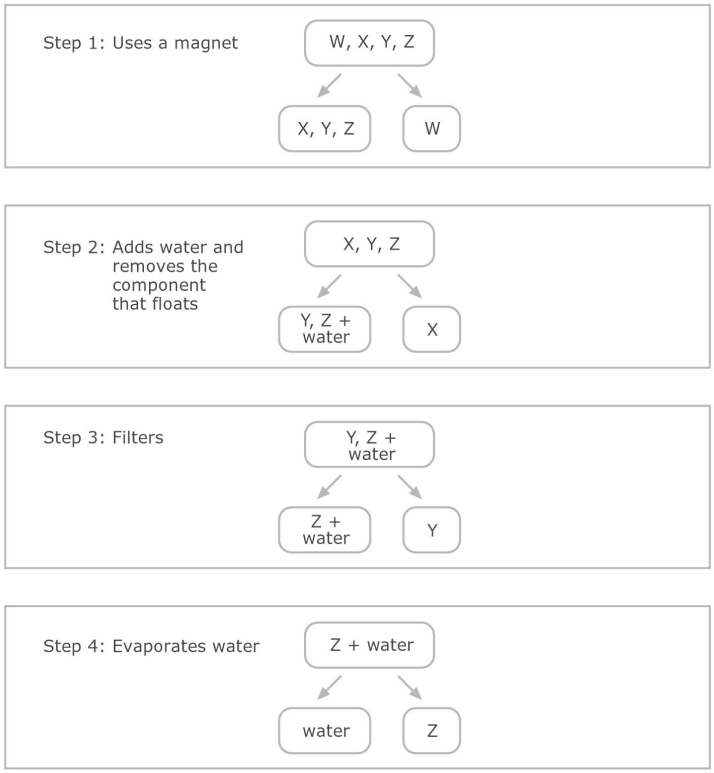
Content Domain
Chemistry

Main Topic
Classification and composition of matter

Cognitive Domain
Reasoning and Analysis

Key
See scoring guide

Teresa is given a mixture of salt, sand, iron filings, and small pieces of cork. She separates the mixture using a 4-step procedure as shown in the diagram. The letters W, X, Y, and Z are used to stand for the four components but do not indicate which letter stands for which component.



Identify what each component is by writing *salt, sand, iron, or cork* in the correct spaces below.

Component W is: _____

Component X is: _____

Component Y is: _____

Component Z is: _____

S032562

Note: To receive full credit, responses must correctly identify all four components. Partial credit is given for responses that list at least two components correctly. If a component is listed more than once, none of the entries for that component will be considered as correct. For example, a response that lists Iron, Salt, Salt, Salt will receive Code 70.

Code	Response	Item: S032562
	Correct Response	
20	Identifies all four components correctly: W = iron; X = cork; Y = sand; Z = salt.	
	Partial Response	
10	Identifies **iron** and **cork** correctly (W and X); sand and/or salt are missing or incorrect. *Examples: Iron, Cork, Salt, Sand* *Iron, Cork, Sand, Blank*	
11	Identifies **iron** and **salt** correctly (W and Z); cork and/or sand are missing or incorrect. *Examples: Iron, Sand, Cork, Salt* *Iron, Blank, Blank, Salt*	
12	Identifies **sand** and **salt** correctly (Y and Z); iron and/or cork are missing or incorrect. *Examples: Cork, Iron, Sand, Salt* *Blank, Blank, Sand, Salt* *Water, Cork, Sand, Salt*	
19	Other partially correct (that identifies at least two components correctly)	
	Incorrect Response	
70	Identifies only **iron** correctly (W), all other components are missing or incorrect.	
79	Other incorrect (including crossed out/erased, stray marks, illegible or off task)	
	Nonresponse	
99	Blank	

TIMSS 2003

Content Domain
Environmental Science

Main Topic
Use and conservation of natural resources

Cognitive Domain
Conceptual Understanding

Key
C

S032422

Which group of energy sources are ALL renewable?

Ⓐ coal, oil, and natural gas
Ⓑ solar, oil, and geothermal
Ⓒ wind, solar, and tidal
Ⓓ natural gas, solar, and tidal

TIMSS 2003

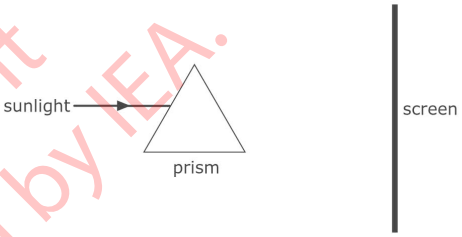
Content Domain
Physics

Main Topic
Light

Cognitive Domain
Conceptual Understanding

Key
See scoring guide

The diagram shows a ray of sunlight entering a glass prism.



Describe what will be seen on the screen.
(You may draw on the diagram to help explain your answer.)

S032375

Note: For full credit, responses must explicitly indicate that different colors are seen on the screen, either by textual description or by drawing on the diagram. A completely correct or complete sequence of colors is not required for full credit. Partial credit will be given for responses that show or describe refraction even if the appearance of the light beams on the screen is not fully described.

Code	Response	Item: S032375
	Correct Response	
20	Describes or draws the visible color spectrum. *Examples: A spectrum of seven colors which is red, orange, yellow, green, blue, indigo, violet.* **Note**: A completely correct sequence of colors is not required for full credit.	
21	Refers to a spectrum, rainbow, colors, etc. (no color spectrum shown) *Examples: I will see many colors on it like the rainbow.* *All the colors of the color spectrum.* *There will be seven colours.*	
29	Other fully correct	
	Partial Response	
10	Describes or draws multiple refracted rays but with no explicit connection to color. *Examples: There will be a lot of rays coming out the other side of the prism.* *The light will spread out across that side of the prism and be seen on most of the screen.*	
11	Describes or draws only the refraction (bending) of light beam (no mention of color dispersion). *Examples: The light inside the prism will bend.* *The sunlight would go through at an angle.*	
19	Other partially correct	
	Incorrect Response	
70	Describes or draws a shadow or image of the prism (or similar). *Examples: The prism will make a shadow on the screen.*	
71	Refers only to seeing sunlight or light on the screen. [No mention of color dispersion or refraction.] *Examples: Sunlight hitting the screen.* *The screen will be bright because there is light falling on it.*	
79	Other incorrect (including crossed out/erased, stray marks, illegible or off task)	
	Nonresponse	
99	Blank	

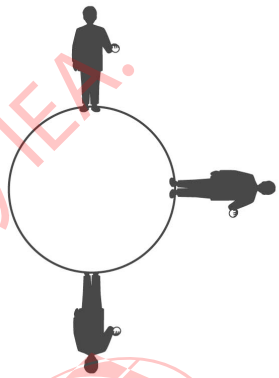
TIMSS 2003

Content Domain
Earth Science

Main Topic
Earth in the solar system and universe

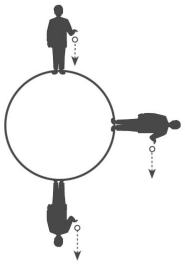
Cognitive Domain
Conceptual Understanding

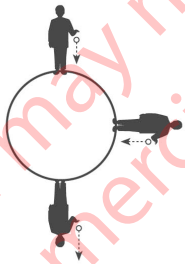
Key
D

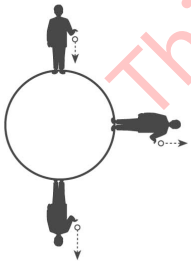


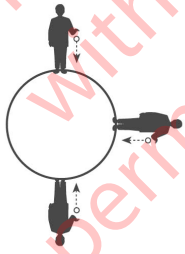
The diagram above shows a person holding a ball standing at three different places on Earth. If the person drops the ball, gravity will make it fall.

Which of the following diagrams best shows the direction the dropped ball will fall at the three different positions?

Ⓐ 

Ⓑ 

Ⓒ 

Ⓓ 

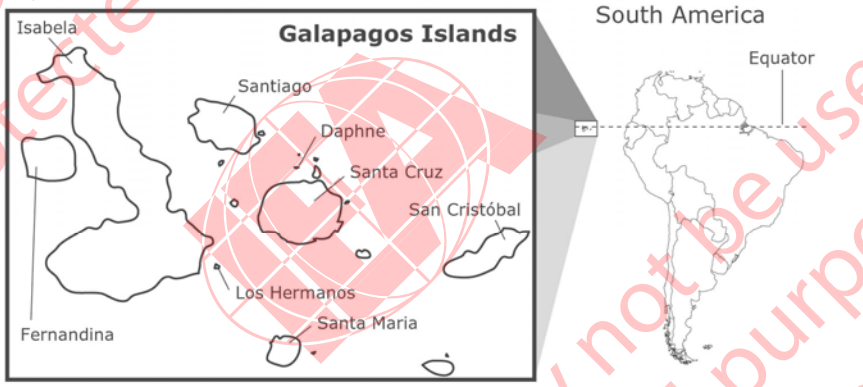
S032714

TIMSS 2003

Galapagos Islands

Instructions: The next four questions are about the Galapagos Islands. To answer these questions, you may use any information shown on the pages in the Galapagos Islands section.

The diagram shows the Galapagos Islands, a group of volcanic islands in the Pacific Ocean about 1000 kilometers from South America. When these islands first formed they consisted of lava only. Eventually, living organisms (plants and animals) inhabited the islands. These organisms arrived long before people settled on the islands.



SP32704

Questions for Galapagos Islands begin on the next page.

TIMSS 2003

Content Domain
Life Science

Main Topic
Ecosystems

Cognitive Domain
Conceptual Understanding

Key
See scoring guide

Which organisms that live on land most likely inhabited the Galapagos Islands first?

(Check one box.)

☐ Land plants
☐ Land animals

Explain your answer.

S032704

Questions for Galapagos Islands continue.

Note: Credit is given for responses that check PLANTS and give an explanation that refers explicitly to **photosynthesis** or plants making their own food (Code 10) as well those that refer only to the survival or mode of transportation of plants/animals (Code 11). Priority should be given to Code 10. If photosynthesis (or similar) is mentioned, use Code 10 even if other correct codes also apply. Responses that check ANIMALS may also receive credit with a reasonable explanation based on transportation and the availability of alternative food sources, e.g., fish (Code 12).

Code	Response	Item: S032704
	Correct Response	
10	**PLANTS** with an explanation based plants being able to make their own food (**photosynthesis**). *Examples:* *Plants can photosynthesize.* *Because plant make their own food using light, water and chlorophyll.*	
11	**PLANTS** with an explanation based only on survival OR mode of transportation of plants/animals. [Photosynthesis or making food not explicitly mentioned.] *Examples:* *They could survive there first because plants only need water and air.* *Without plants there would not be animals.* *First the plants arrived. Then the animals can come and survive by eating the plants.* *Seeds could just be carried by the wind. Animals would have to swim a long distance.* *Seeds from South America blew to the islands.*	
12	**ANIMALS** with a reasonable explanation based on transportation **AND** availability of alternative food sources (may be implicit based on the specific type of animal named). *Examples:* *Birds could fly over to the island to nest and survive by eating fish from the sea.* *Seals can swim there and live on the rocky shore. [Assumes seals eat fish.]*	
19	Other correct	
	Incorrect Response	
70	**PLANTS** with no explanation or an incorrect explanation. [May include a correct statement that does not apply to the situation.] *Examples:* *They just grew from the ground.* *Because plants grow faster and live longer.* *They are living organisms.* *Plants were on Earth before animals.*	
71	**ANIMALS** with no explanation or an incorrect explanation. *Examples:* *Birds could just eat the seeds in the ground.* *They are everywhere.* *There will be a surplus of food.* *Animals can move but plants cannot.* *Animals migrate.*	
79	Other incorrect (including crossed out/erased, stray marks, illegible or off task)	
	Nonresponse	
99	Blank	

TIMSS 2003

Content Domain
Life Science

Main Topic
Ecosystems

Cognitive Domain
Conceptual Understanding

Key
See scoring guide

When settlers came to live on the Galapagos Islands, they brought with them a number of new animals such as cats and goats. Write down one effect the introduction of cats and goats could have on the animals and plants already living on the islands.

A. One effect of **cats**:

B. One effect of **goats**:

S032705

Questions for Galapagos Islands continue.

A: Codes for Effect of Cats

Code	Response	Item: S032705A
	Correct Response	
10	Refers to cats preying upon other organisms, or similar (resulting in a reduction in population). *Examples: They will eat the birds and other animals.* *The cats help them by eating the rats and mice.* *Their prey could become extinct.*	
19	Other correct *Examples: They might pass on diseases to other animals.*	
	Incorrect Response	
70	Refers **only** to an effect on the cat with no explicit effect on other organisms. *Examples: They cannot survive on the island.* *Cats might reproduce and get out of control.*	
79	Other incorrect (including crossed out/erased, stray marks, illegible, or off task) *Examples: The cats might eat all the plants.*	
	Nonresponse	
99	Blank	

TIMSS 2003

Content Domain
Life Science

Main Topic
Ecosystems

Cognitive Domain
Conceptual Understanding

Key
See scoring guide

When settlers came to live on the Galapagos Islands, they brought with them a number of new animals such as cats and goats. Write down one effect the introduction of cats and goats could have on the animals and plants already living on the islands.

A. One effect of **cats**:

B. One effect of **goats**:

S032705

Questions for Galapagos Islands continue.

B: Codes for Effect of Goats

Code	Response	Item: S032705B
	Correct Response	
10	Refers **only** to the goats eating plants (resulting in a reduction of the amount of plant life on the island). *Examples:* *The goats will eat all the grass on the island.* *It could lead to erosion if the goats clear the land by eating all the plants.* *Large pieces of grass will disappear as the goats eat it.*	
11	Refers to an effect of the goat on other animals (e.g., competition for food/habitat, as a food source for predators, etc.). [Note: may also refer to the goats eating plants.] *Examples:* *The animals that eat goats would have more food.* *They might become a source of food.* *The goats will eat up the plants and the populations that depend on plants will decrease.*	
19	Other correct	
	Incorrect Response	
70	Refers **only** to an effect on the goat with no explicit effect on other organisms. *Examples:* *Goats would have more babies.* *They would die because they don't have any food.*	
79	Other incorrect (including crossed out/erased, stray marks, illegible, or off task) *Examples:* *Goats might eat the cats.*	
	Nonresponse	
99	Blank	

TIMSS 2003

Content Domain
Life Science

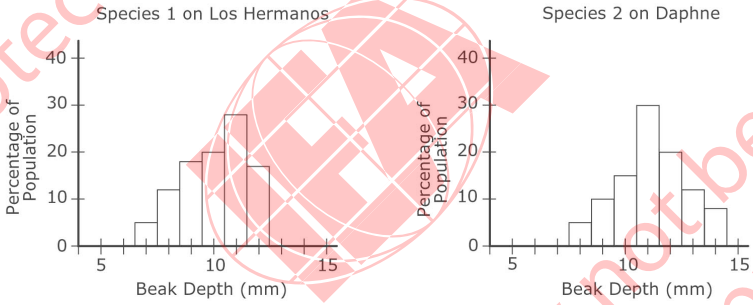
Main Topic
Diversity, adaptation, and natural selection

Cognitive Domain
Reasoning and Analysis

Key
See scoring guide

The Galapagos Islands contain a number of different species of finches (birds) that are thought to have developed from one species. Some species of finches eat certain types of seeds depending on their beak depth. The diagram below shows the head of one species of finch and its beak depth.

Some of the islands have only one species living on them, while other islands have more than one species. Species 1 lives on Los Hermanos Island. Species 2 lives on Daphne Island. The two graphs below show the percentage of the population with different beak depths for each of the two species.



A. How do the beak depths of Species 1 and Species 2 compare?

S032706_1

This Galapagos Islands question continues on the next page.

A: Codes for Description of Beak Sizes

Note: Correct codes will be given for responses that are consistent with the information in the graphs. This includes responses that are based on similarities (Code 10), differences (Code 11), or both (Code 12). Responses that indicate that the two species are 'similar' must refer to specific information from the graphs, such as the range, average, most frequent beak size (mode), etc., in order to receive credit. Responses that state only that the two species are the 'same' or 'similar' with no supporting information are scored as incorrect (Code 70).

Code	Response	Item: S032706A
	Correct Response	
10	Gives a description based on **similarities** that is supported with information in the graphs. *Examples: Both are similar in average beak size.* *They are similar because they both have most finches in the 11mm beak range.*	
11	Gives description based on **differences** that is supported with information in the graphs. *Examples: Species 1 is a little bit shorter than Species 2.* *Species 2 has more that are big.* *Species 2 has a wider range of depth than of Species 1.*	
12	Give a description that includes **both** similarities and differences. *Examples: Both species have the greatest amount of birds with 11mm beak depths, but Species 1 does not have birds with beak depths bigger than 13mm.*	
19	Other correct	
	Incorrect Response	
70	States **only** that the two species are the 'same' or 'similar' without supporting information from the graphs. *Examples: They are nearly the same.*	
71	States that one species is larger or smaller than the other, but does not identify which. *Examples: One of them is a bit different on beak depth.*	
79	Other incorrect (including crossed out/erased, stray marks, illegible, or off task)	
	Nonresponse	
99	Blank	

S032706_2

B. A wide variety of seeds exist on the islands, and both Species 1 and Species 2 eat seeds. Based on the beak depths of the two finch species, what would you conclude about the size of seeds that each species eats?

Questions for Galapagos Islands continue.

TIMSS 2003

Content Domain
Life Science

Main Topic
Structure, function and life processes in organisms

Cognitive Domain
Conceptual Understanding

Key
See scoring guide

B: Codes for Types of Seeds Eaten

Note: The response to Part B must be consistent with the comparison of beak sizes given in Part A in order to receive credit. Correct responses can refer explicitly to comparisons of the two "species" (Codes 10 or 11) or more generally to a comparison of "birds" of different sizes within or across species (Code 12). It is possible that a correct conclusion may be drawn based on an incorrect response to Part A.

Code	Response	Item: S032706B
	Correct Response	
10	States that the two species eat the same (similar) types of seeds. [Response to A indicates that the two species have the same or similar size beaks.]	
11	States that Species 2 eats larger seeds than Species 1. [Response to A indicates that Species 2 is larger.]	
12	States only that birds (finches) with larger beaks eat larger seeds (or similar). [No explicit comparison of the two species.]	
19	Other correct	
	Incorrect Response	
70	States that the two species eat the same (similar) types of seeds, but this conclusion is inconsistent with the response given in Part A.	
71	States that one species eats larger seeds than the other, but this conclusion is inconsistent with the response given in Part A.	
79	Other incorrect (including crossed out/erased, stray marks, illegible, or off task)	
	Nonresponse	
99	Blank	

TIMSS 2003

Content Domain
Life Science

Main Topic
Diversity, adaptation, and natural selection

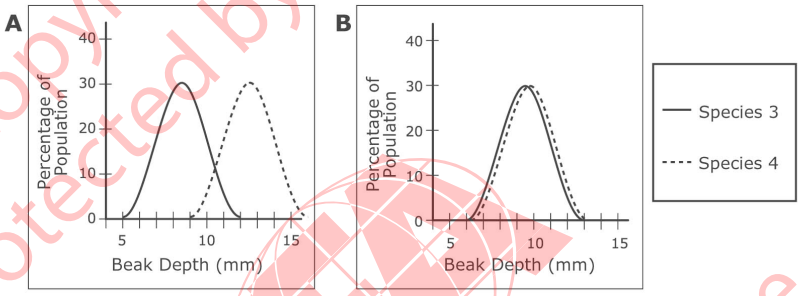
Cognitive Domain
Reasoning and Analysis

Key
See scoring guide

Two other species (Species 3 and Species 4) live on Santa Maria Island, which also has a range of seed types.

Which of the following graphs shows a range of beak depths for Species 3 and Species 4 that would best insure the survival of both species on Santa Maria Island?

(Circle the letter by the correct graph.)



Explain why this range of beak depths would be best.

S032707

End of Galapagos Islands section.

Note: For credit, responses must identify A with an explanation based on reduced competition for food as a result of beak size differences. Credit is NOT given for responses that identify A with a minimal explanation that indicates a correct interpretation of the graph but refers only to differences in beak size.

Code	Response	Item: S032707
	Correct Response	
10	**A** with an explanation that relates the difference in beak size to reduced competition (or similar). *Examples:* *With the different sized beaks they would not have to share food.* *One species will eat the small seeds and one will eat the large seeds.* *There would be no competition between the two species if they ate different seeds.* *They each have their own food source.*	
19	Other correct	
	Incorrect Response	
70	**A** with a minimal explanation that refers **only** to the difference in beak size. [Does not explicitly mention competition for seeds or similar.] *Examples:* *Because they are different sizes.* *Because Species 3 has a smaller beak size.*	
71	**A** with no explanation or an incorrect explanation. *Examples:* *Because their beaks look sharper.* *Because both species have a large beak to the percentage of population.* *It's like the other graphs.*	
72	**B** with no explanation or an incorrect explanation. *Examples:* *Bigger beak depths so they could eat more seeds.* *Both are nearly equal and are a more normal size.* *It's better if they are the same size because they eat the same seeds.*	
79	Other incorrect (including crossed out/erased, stray marks, illegible or off task)	
	Nonresponse	
99	Blank	

* : Revised following data collection.