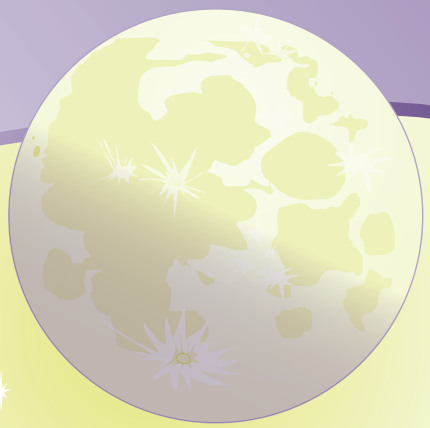
QCATs
Queensland Comparable Assessment Tasks

2009

6

SCIENCE

SAMPLE RESPONSES



Moon phases

This booklet is designed to help teachers make overall, on-balance judgments by providing examples of student responses. The responses are not an exhaustive set.

C samples

Queensland Government

Queensland Studies Authority
Partnership and innovation

Contact information:

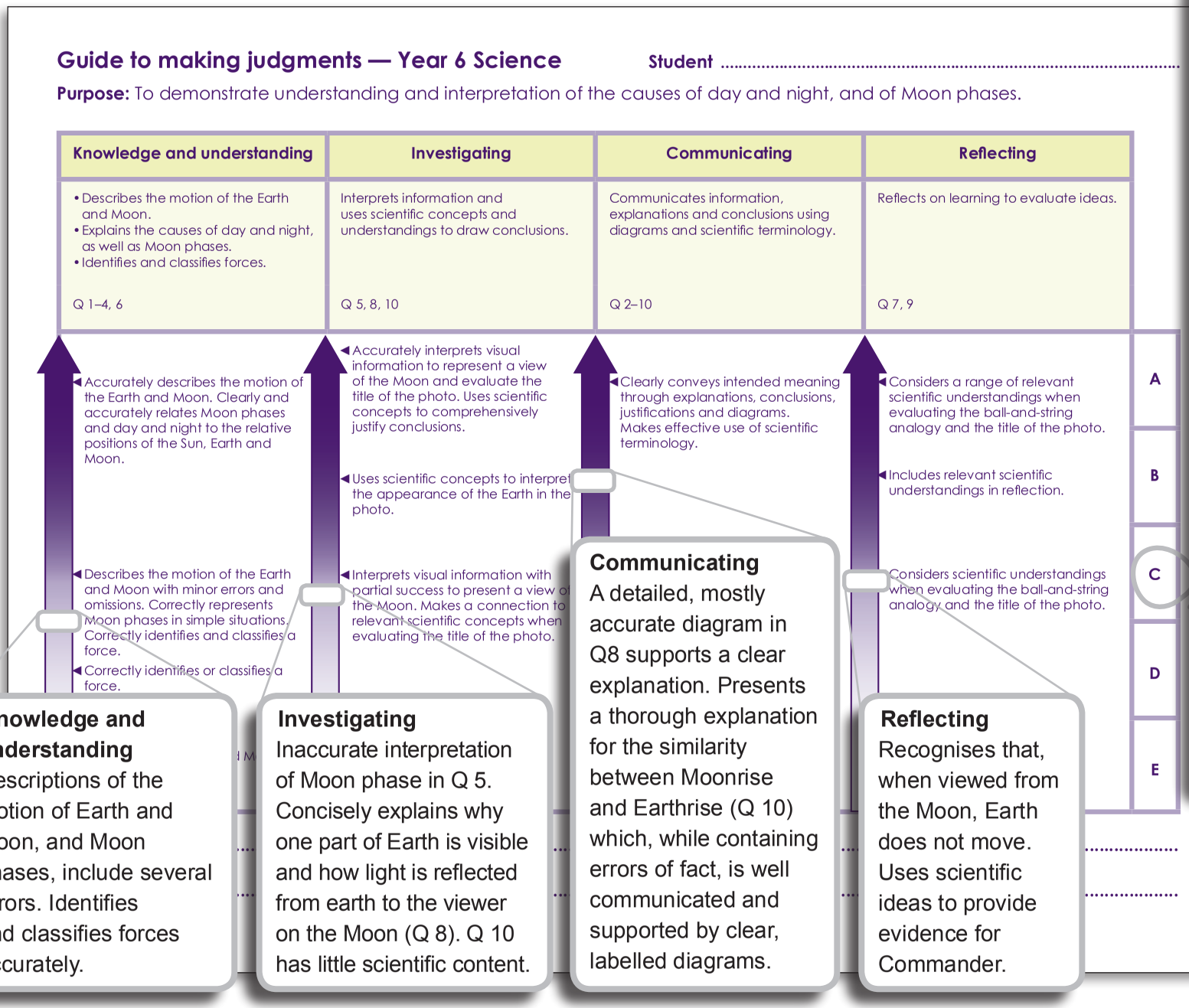
Information about QCATs is available on the QSA website <www.qsa.qld.edu.au>.

Direct questions concerning implementation or receipt of materials to:

Project Officer (Operations)
Phone: 07 3864 0299
Email: QCARadmin@qsa.qld.edu.au

Queensland Studies Authority Ground floor, 295 Ann Street Brisbane. PO Box 307 Spring Hill Qld 4004.
Phone: (07) 3864 0299 Fax: (07) 3221 2553 Email: office@qsa.qld.edu.au Website: www.qsa.qld.edu.au

C Sample: Response 1



Guide to making judgments — Year 6 Science

Student .....

Purpose: To demonstrate understanding and interpretation of the causes of day and night, and of Moon phases.

Knowledge and understanding	Investigating	Communicating	Reflecting
• Describes the motion of the Earth and Moon. • Explains the causes of day and night, as well as Moon phases. • Identifies and classifies forces. Q 1–4, 6	Interprets information and uses scientific concepts and understandings to draw conclusions. Q 5, 8, 10	Communicates information, explanations and conclusions using diagrams and scientific terminology. Q 2–10	Reflects on learning to evaluate ideas. Q 7, 9

	Knowledge and understanding	Investigating	Communicating	Reflecting
A	Accurately describes the motion of the Earth and Moon. Clearly and accurately relates Moon phases and day and night to the relative positions of the Sun, Earth and Moon.	Accurately interprets visual information to represent a view of the Moon and evaluate the title of the photo. Uses scientific concepts to comprehensively justify conclusions.	Clearly conveys intended meaning through explanations, conclusions, justifications and diagrams. Makes effective use of scientific terminology.	Considers a range of relevant scientific understandings when evaluating the ball-and-string analogy and the title of the photo.
B		Uses scientific concepts to interpret the appearance of the Earth in the photo.		Includes relevant scientific understandings in reflection.
C	Describes the motion of the Earth and Moon with minor errors and omissions. Correctly represents Moon phases in simple situations. Correctly identifies and classifies a force.	Interprets visual information with partial success to present a view of the Moon. Makes a connection to relevant scientific concepts when evaluating the title of the photo.		Considers scientific understandings when evaluating the ball-and-string analogy and the title of the photo.
D	Correctly identifies or classifies a force.			
E				

Knowledge and understanding
Descriptions of the motion of Earth and Moon, and Moon phases, include several errors. Identifies and classifies forces accurately.

Investigating
Inaccurate interpretation of Moon phase in Q 5. Concisely explains why one part of Earth is visible and how light is reflected from earth to the viewer on the Moon (Q 8). Q 10 has little scientific content.

Communicating
A detailed, mostly accurate diagram in Q8 supports a clear explanation. Presents a thorough explanation for the similarity between Moonrise and Earthrise (Q 10) which, while containing errors of fact, is well communicated and supported by clear, labelled diagrams.

Reflecting
Recognises that, when viewed from the Moon, Earth does not move. Uses scientific ideas to provide evidence for Commander.

Overall grade
The purpose of this QCAT is for students to demonstrate understanding and interpretation of the causes of day and night, and of moon phases. This response provides evidence of sound knowledge and understanding of the causes of day and night, Moon phases and a thorough understanding of forces involved. The communication is effective, but there are flaws in the scientific content. The investigating is competent and reflecting is relevant. On balance this is an overall C.

C Sample: Response 1

1. Choose words from the word list to complete the paragraphs below.

Word list					
Sun	~~Earth~~	Moon	~~orbit~~	~~in shadow~~	~~phases~~
~~sunrise~~	reflecting	~~28 days~~	~~24 hours~~	~~day~~	night

- Use Diagram 1 to help you.
- Not all of the words are used.

Earth rotates once every ...28 days..... On the side facing the Sun, it is ...day..... and on the other side it is ...night..... because it is ...reflecting.. .

Moonrise, ...Sunrise..... and the appearance of the Sun and Moon moving across the sky are actually caused by the rotation of the Earth.

The Moon is in ...phases..... around the Earth, taking about ...24 hours... for one revolution.

As it moves around the Earth, the Moon appears to go through changes in shape, called ...orbits....., as we see more or less of the side that is ...in shadow... light from the Sun.

While orbiting the Earth, the Moon also rotates slowly, almost exactly one turn during each orbit, so the same side is always facing the ...Earth..... .

5

C Sample: Response 1

Diagram 2: Phases of the Moon

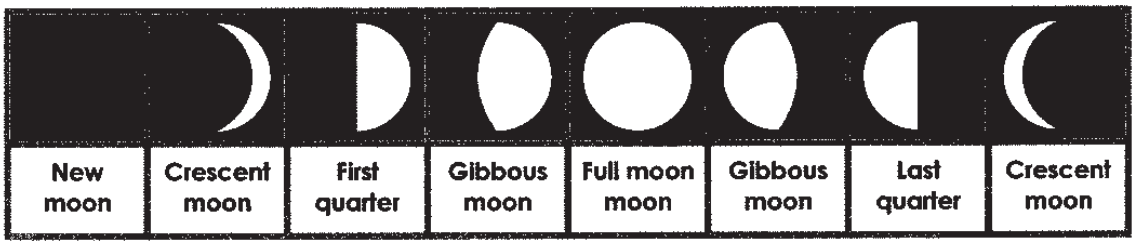


Diagram 3: Earth with the Moon in two different positions

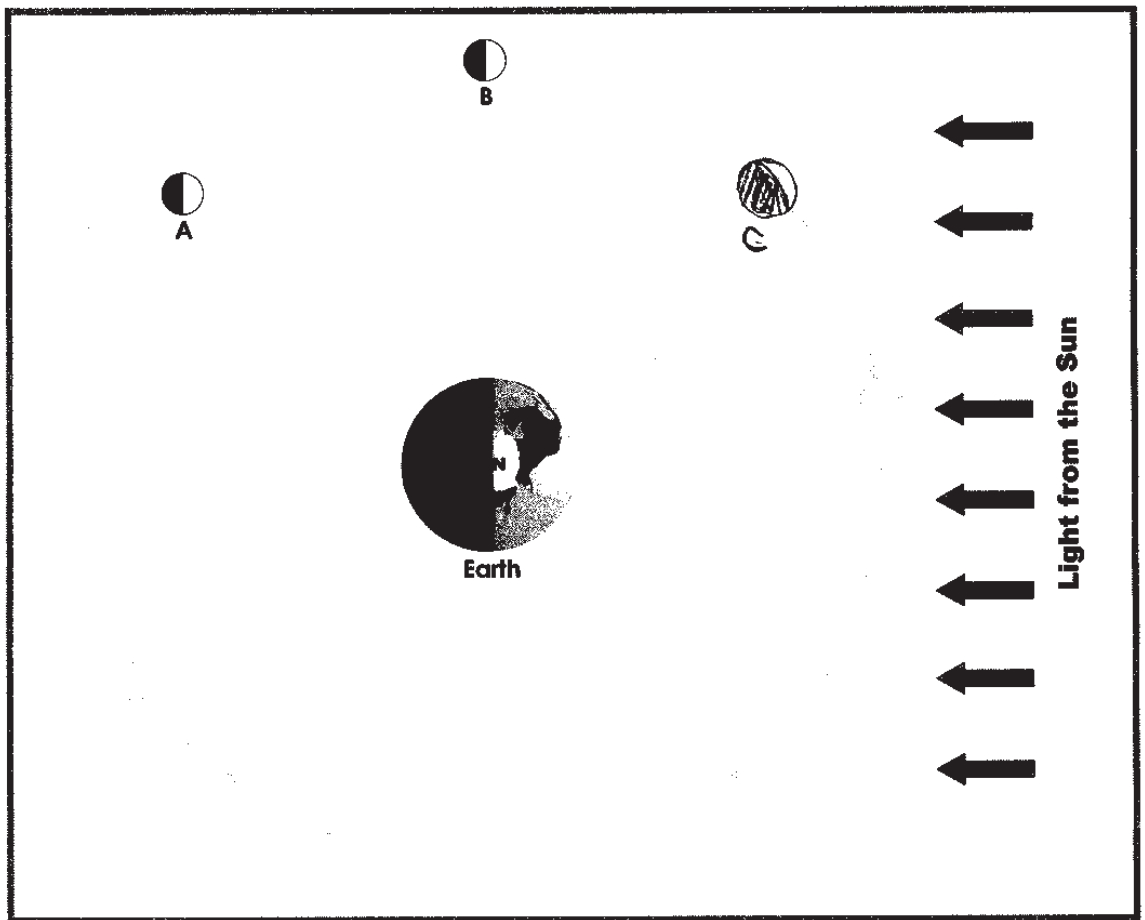


Diagram is not to scale.

6

C Sample: Response 1

Use Diagrams 2 and 3 to help you complete the following questions.

2. Shade in the shape and name the phase of the Moon when it is in position A.

View from Earth	Name of phase
	First Quarter

3. Shade in the shape and name the phase of the Moon when it is in position B.

View from Earth	Name of phase
	First quarter

4. Draw another moon in Diagram 3, according to the following instructions:

- **draw the Moon in a position to show the phase below**
- **label it C**
- **shade the dark side.**

View from Earth	Name of phase
	Crescent moon

7

C Sample: Response 1

5. In the box below:

a) draw the phase of the Moon you would see from the position shown in Diagram 4

b) colour the sky to show whether it is day (blue) or night (black)

c) name the phase of the Moon: last quarter

9

C Sample: Response 1

6. Compare the ball and string with the actual Earth and Moon, by completing this table.

	The boy with the ball and string	The Earth and Moon
What are the forces stopping the Moon and ball from moving away? Choose from this list: • magnetism • gravity • reflection • string pulling in • string pulling out	String pulling in	Gravity
Is the force a contact force or a force acting at a distance? Circle one in each case.	(a contact force) or a force acting at a distance	a contact force or (a force acting at a distance)
Does the same side of the Moon (or ball) always face Earth (or boy)? Circle one in each case.	(Yes) or No	(Yes) or No

7. Think about using the ball and string to explain the motion of the Moon.

What is useful about the ball and string?	What is **not** useful about the ball and string?
• It tellls you a little about the moon	• It is a contact force and not a force acting at a distance
•	• It doesn't really tell you something specific about the moon

STOP HERE: WAIT FOR YOUR TEACHER'S DIRECTIONS

11

C Sample: Response 1

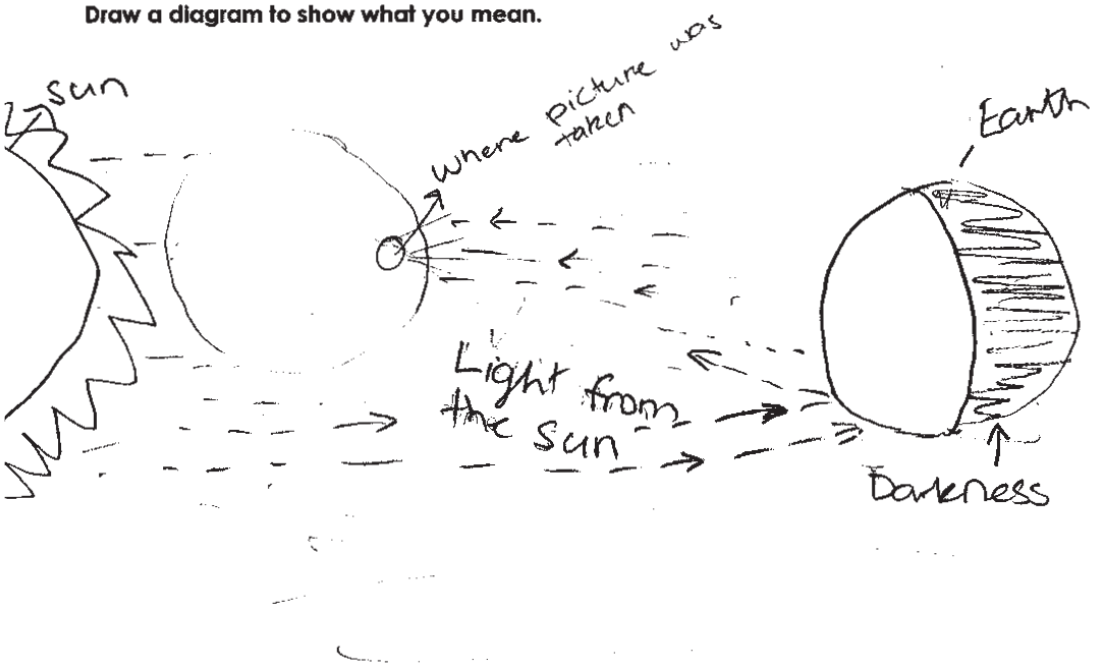
Look at the photo of the Earth.

8. Explain why the Earth has that shape in the photo.

Think about what causes Moon phases.

- Because this face of the moon is facing one part of the Earth
- The sun is shining on this part

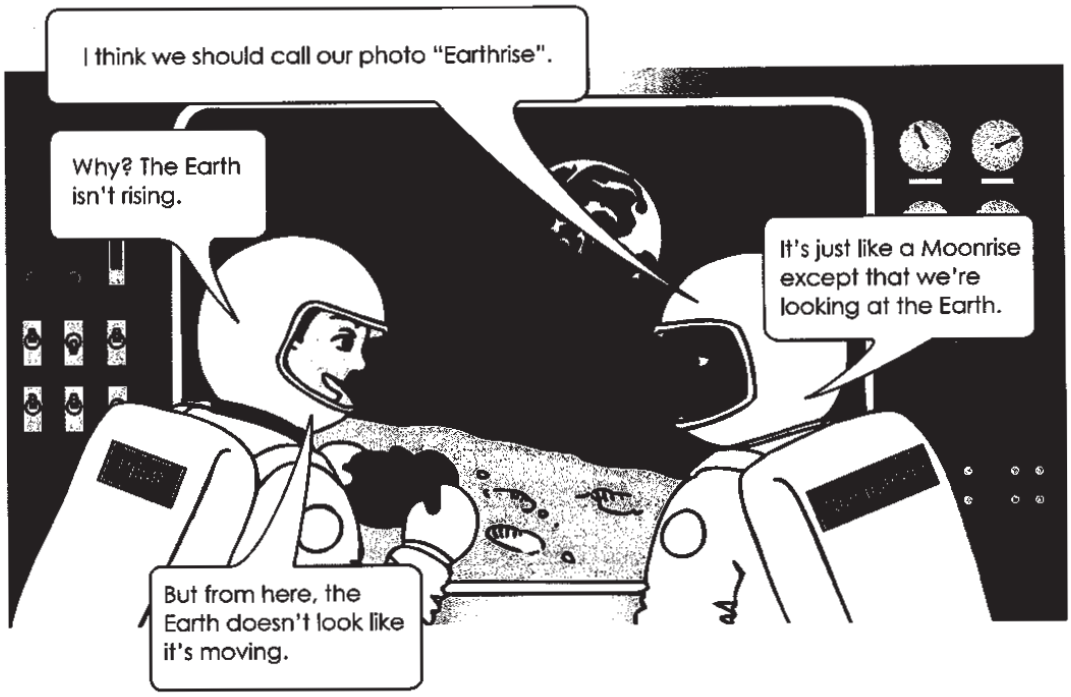
Draw a diagram to show what you mean.



13

C Sample: Response 1

Here are two astronauts who have taken a similar photo.
The astronauts discussed what they should call it.



The Pilot and Commander disagree about whether "Earthrise" is a correct title.

9. List some science ideas they could use to support their opinions about "Earthrise".

- List all the evidence you can find to support one or both astronauts
- Look back over pages 4–11 for ideas.

Pilot: "The Earth isn't rising"	**Commander:** "Earthrise"
• It doesn't look like it's rising • It's not moving, so it can't be called Earthrise	• Only half the moon can be seen from here, like when the moon rises you see half of it at first

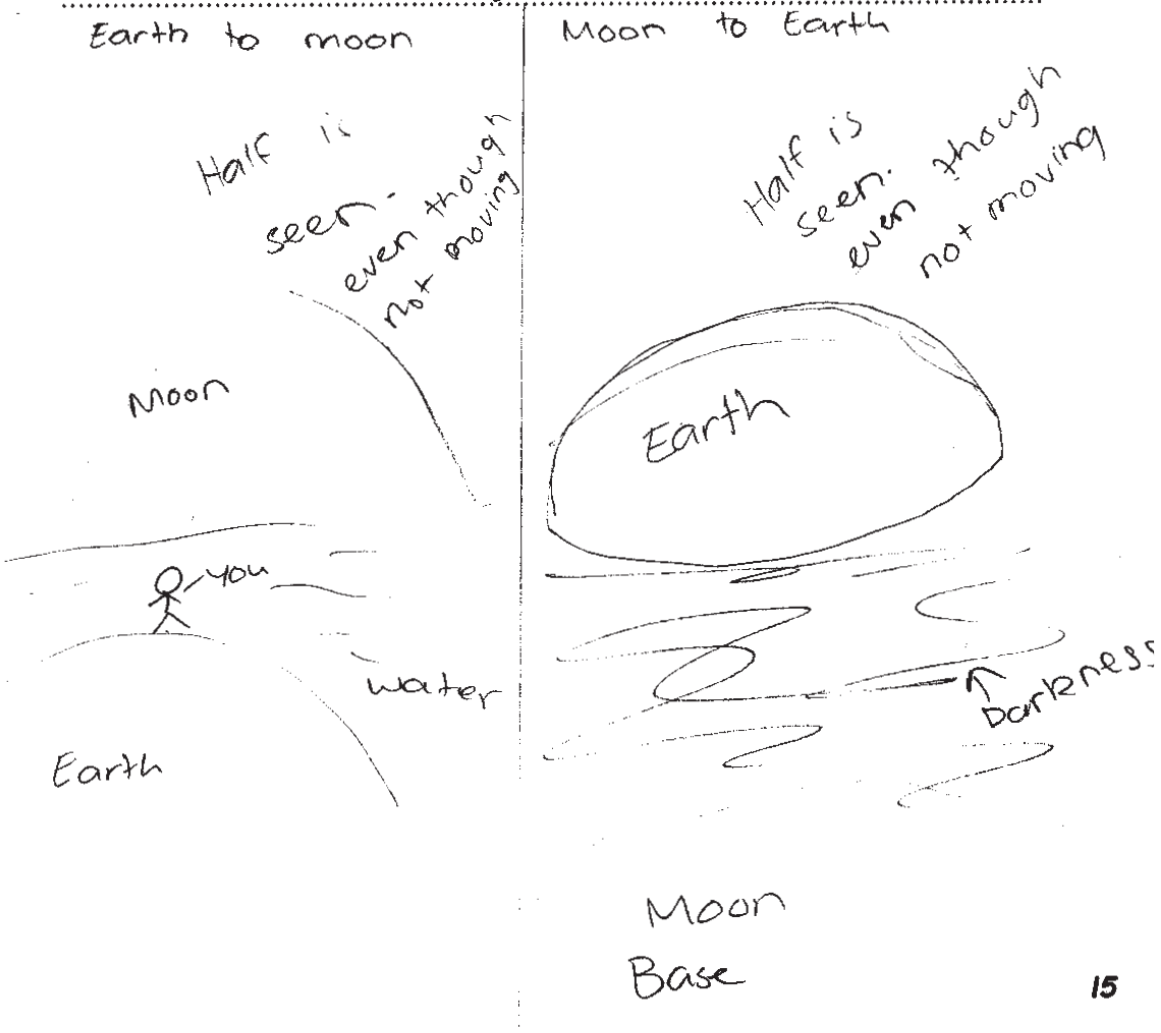
14.

C Sample: Response 1

0. Decide which astronaut you agree with.

Give scientific reasons to explain your opinion. You may use a diagram.

I agree with the Commander because it sort of does look like the Earth is rising, because it's true that when the moon rises it's half that can be seen and that even though the Pilot says that it looks like the Earth isn't moving, the moon doesn't look like it's moving when it first rises.



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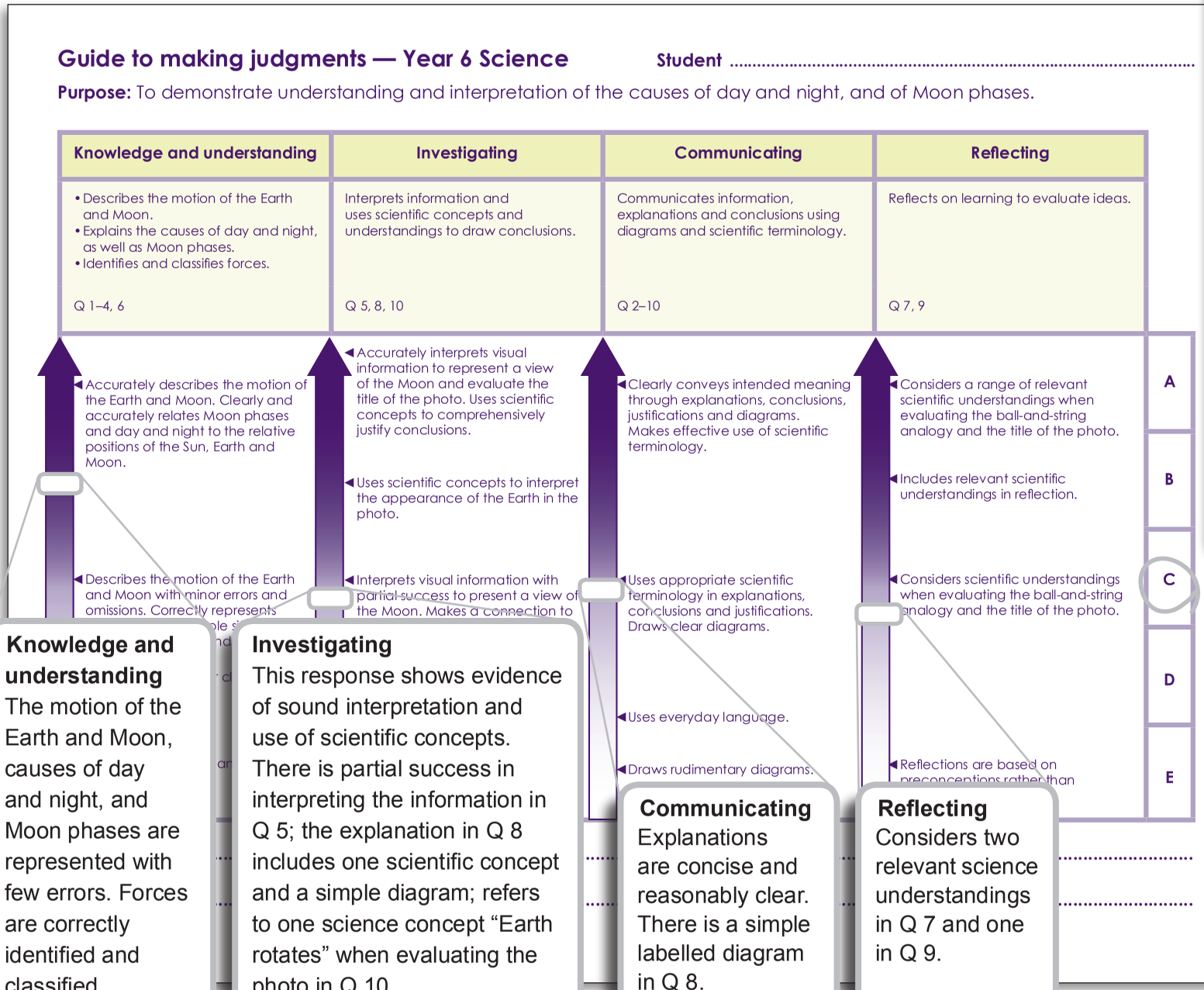
C Sample: Response 2



Overall grade
This response demonstrates a high level of knowledge and understanding of the causes of day and night, of Moon phases and of forces. The processes of investigating and communicating are applied soundly and there are some relevant understandings in the reflections. On balance this is an overall C.

Knowledge and understanding
The motion of the Earth and Moon, causes of day and night, and Moon phases are represented with few errors. Forces are correctly identified and classified.

Investigating
This response shows evidence of sound interpretation and use of scientific concepts. There is partial success in interpreting the information in Q 5; the explanation in Q 8 includes one scientific concept and a simple diagram; refers to one science concept "Earth rotates" when evaluating the photo in Q 10.

Communicating
Explanations are concise and reasonably clear. There is a simple labelled diagram in Q 8.

Reflecting
Considers two relevant science understandings in Q 7 and one in Q 9.

C Sample: Response 2

1. Choose words from the word list to complete the paragraphs below.

Word list					
Sun	Earth	Moon	~~orbit~~	~~in shadow~~	~~phases~~
~~sunrise~~	~~reflecting~~	~~28 days~~	~~24 hours~~	~~day~~	~~night~~

- Use Diagram 1 to help you.
- Not all of the words are used.

Earth rotates once every 24 hours. On the side facing the Sun, it is day and on the other side it is night because it is reflecting.

Moonrise, Sunrise and the appearance of the Sun and Moon moving across the sky are actually caused by the rotation of the Earth.

The Moon is in orbit around the Earth, taking about 28 days for one revolution.

As it moves around the Earth, the Moon appears to go through changes in shape, called Phases, as we see more or less of the side that is in shaddow light from the Sun.

While orbiting the Earth, the Moon also rotates slowly, almost exactly one turn during each orbit, so the same side is always facing the Earth.

5

C Sample: Response 2

Diagram 2: Phases of the Moon

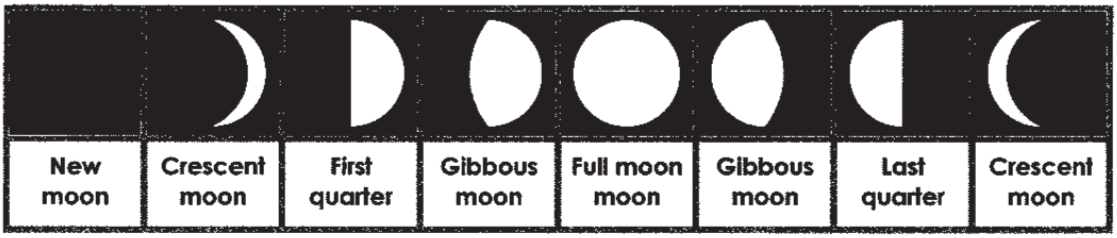


Diagram 3: Earth with the Moon in two different positions

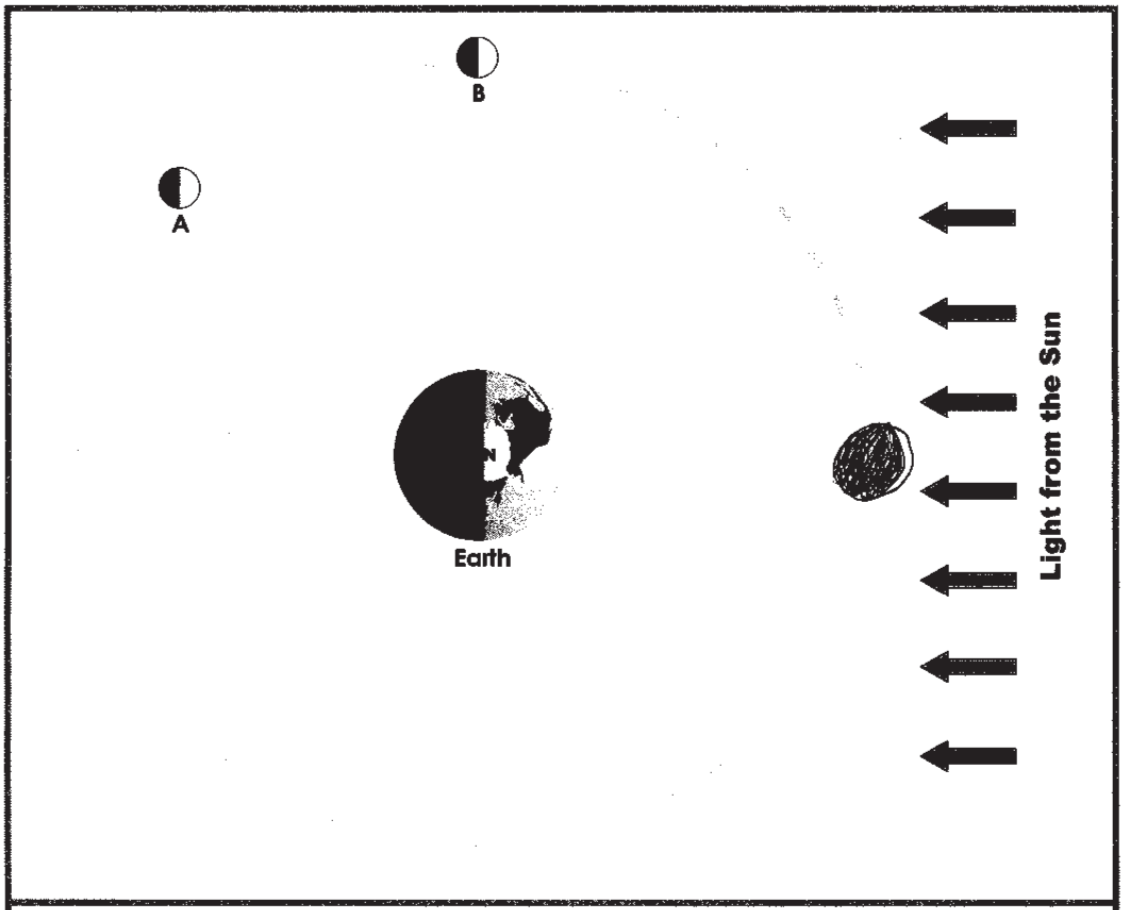


Diagram is not to scale.

6

C Sample: Response 2

Use Diagrams 2 and 3 to help you complete the following questions.

2. Shade in the shape and name the phase of the Moon when it is in position A.

View from Earth	Name of phase
	Gibbous moon

3. Shade in the shape and name the phase of the Moon when it is in position B.

View from Earth	Name of phase
	First quarter

4. Draw another moon in Diagram 3, according to the following instructions:

- **draw the Moon in a position to show the phase below**
- **label it C**
- **shade the dark side.**

View from Earth	Name of phase
	Crescent moon

7

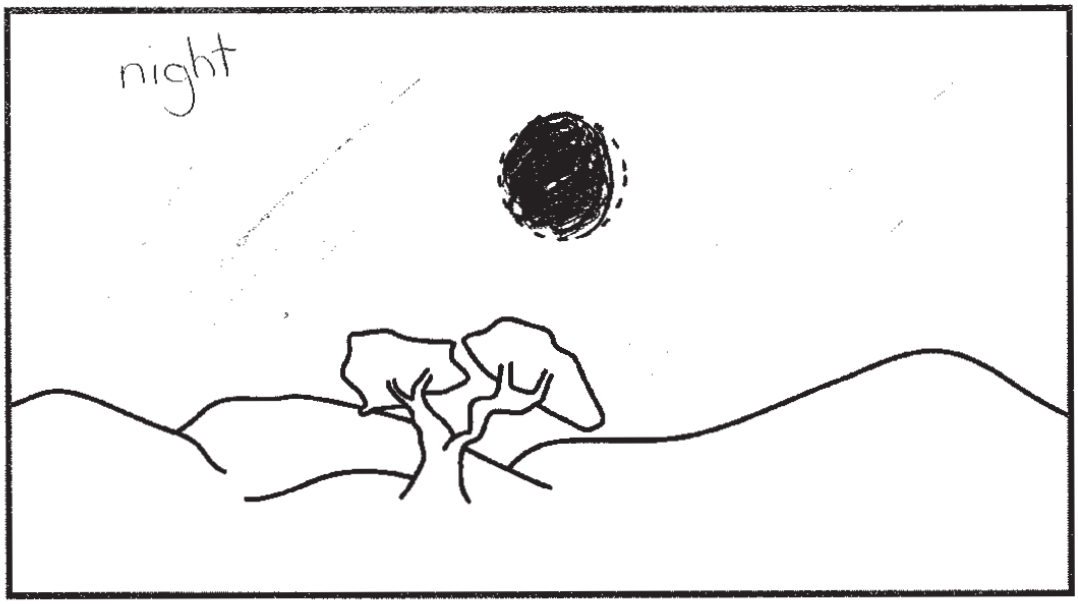
C Sample: Response 2

5. **In the box below:**

a) draw the phase of the Moon you would see from the position shown in Diagram 4

b) colour the sky to show whether it is day (blue) or night (black)

c) name the phase of the Moon: ..... cresent .....



9

C Sample: Response 2

6. Compare the ball and string with the actual Earth and Moon, by completing this table.

	The boy with the ball and string	The Earth and Moon
What are the forces stopping the Moon and ball from moving away? Choose from this list: • magnetism • gravity • reflection • string pulling in • string pulling out	String Pulling in	gravity
Is the force a contact force or a force acting at a distance? Circle one in each case.	(a contact force) or a force acting at a distance	a contact force or (a force acting at a distance)
Does the same side of the Moon (or ball) always face Earth (or boy)? Circle one in each case.	(Yes) or No	(Yes) or No

7. Think about using the ball and string to explain the motion of the Moon.

What is useful about the ball and string?	What is **not** useful about the ball and string?
• the ball orbits the boy's hand like the moon and earth	• it is not the same distence

STOP HERE: WAIT FOR YOUR TEACHER'S DIRECTIONS

11

C Sample: Response 2

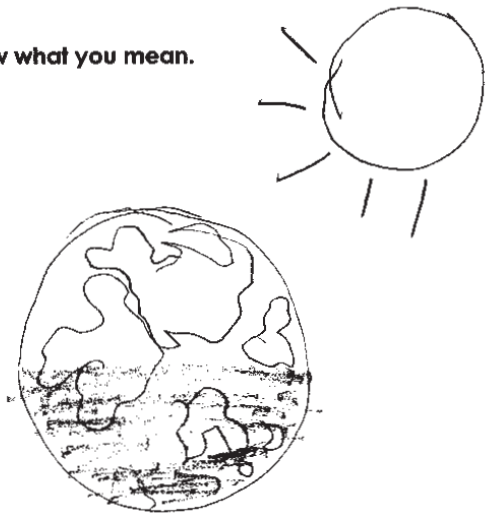
Look at the photo of the Earth.

8. Explain why the Earth has that shape in the photo.

Think about what causes Moon phases.

Because the Sun is not shinning on all the Earth only half.

Draw a diagram to show what you mean.



13

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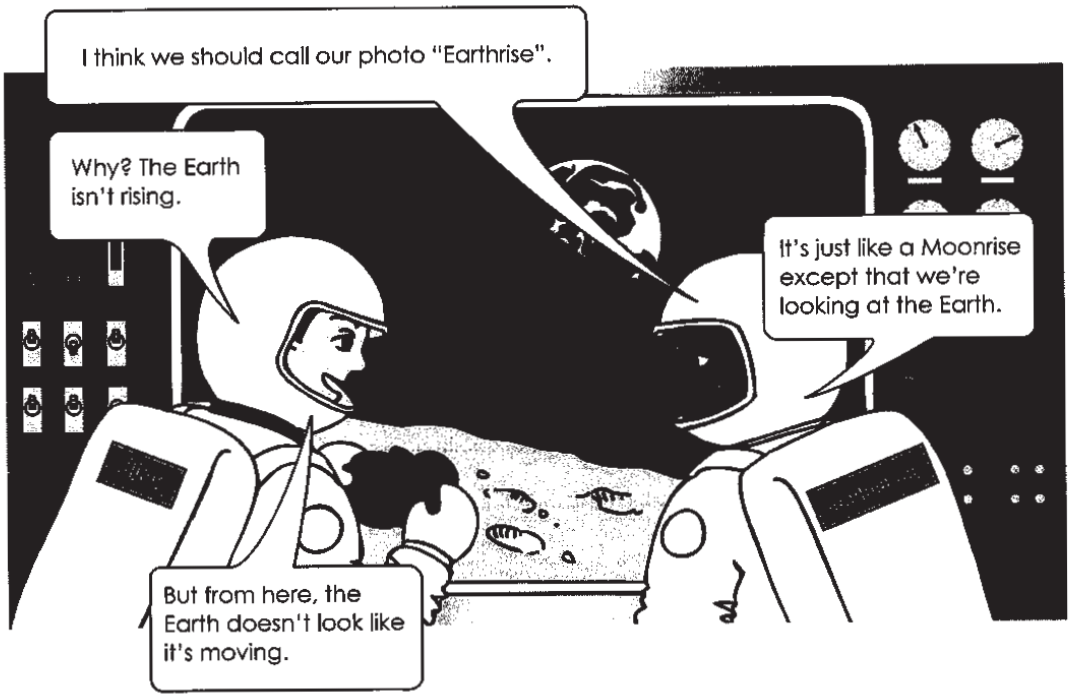

The Pilot and Commander disagree about whether "Earthrise" is a correct title.

9. List some science ideas they could use to support their opinions about "Earthrise".

- List all the evidence you can find to support one or both astronauts
- Look back over pages 4–11 for ideas.

Pilot: "The Earth isn't rising"	**Commander:** "Earthrise"
• The earth dosent rise the earth rotates and the angel of the Sun looks different	

14

C Sample: Response 2

10. Decide which astronaut you agree with.

Give scientific reasons to explain your opinion. You may use a diagram.

I agree with the Pilot because the Earth isn't rising

and the Earth dosent rise the Earth rotates and the angel of the sun looks different

15